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The investigation of using wiki technology to support self-regulated learning in the academic context at Princess Nora bint Abdul Rahman University, Saudi Arabia

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Abstract

Technology has become a major focal point in the modern learning environment. Web 2.0 is being increasingly widely employed in university education and has the potential to improve the quality of education. For optimum benefit to students' learning practices, web 2.0 technology needs to actively foster regulation skills among students. Self-regulated learning skills (SRL skills) potentially offer a shift from traditional teacher-centred to learner-centred approaches. Wiki technology, as a form of web 2.0 technology, has the potential in education to foster such an approach to learning. The thesis investigates how a wiki can be utilised to enhance self-regulated learning among a cohort of female students attending higher education in Saudi Arabia.

The study was primarily motivated by the lack of studies investigating SRL skill enhancement in wiki–assisted learning in higher education, in Saudi Arabia, where the education system largely relies upon teacher-centred learning. This study, therefore, was an effort to potentially improve SRL skills among students attending Princess Nora University (PNU) in Saudi Arabia, with a view to the results being applicable to teaching and learning in similar contexts. The first two objectives of this study were to explore the potential of a wiki as an enhancer of executive function and evaluation skills and to explore students' attitude towards using wiki as a learning environment. The third objective was to explore students' perceptions of wiki learning and its contribution to the enhancement of SRL skills. A single case study was administered before and after use of a purpose-designed wiki for an Education Technology module taken by a cohort of female students at PNU. Quantitative data was collected by a questionnaire triangulated with qualitative data gathered in interviews. The findings revealed that after using wiki, students felt that six of the eight SRL sub-skills listed under executive function and evaluation skills had, on the whole, improved significantly.

Students generally reported extremely positive attitudes towards learning with wiki technology. They perceived that the reflective nature and the design of the wiki tasks, together with the pages and guidance given by the tutor, may have supported the development of SRL skills, increased their overall motivation to learn and improved their independent learning processes. Overall, this study sought to discover information on a relatively new area to Saudi higher education and acts as a stepping stone to further research into students' perceptions of wiki technology and its effect on SRL skill enhancement. There is, of course, an opportunity in the future to measure actual SRL skill levels to corroborate the promising results which may, given the reader's discretion, be viewed as transferable to similar cultural and study contexts.

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Some of the content of this thesis has been published in the following conference papers.

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Dedication

I would like to dedicate this work to my family.

my father, Saleh and my mother, Nora.

my husband and my lovely children, Mashal, Halla and Hamody,

for their unfailing love.

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Abbreviations and Definitions:

Effective learning: *effective* learning or learning *effectively*, in the case of this thesis, is assumed to be a consequence of the perceived improvement in SRL skills, as a result of a focus on wiki design and the teacher's role in students' learning.

ICT: Information Communication Technology

NCEL: National Centre for Electronic Learning

PNU: Princess Nora University

SRL: Self-Regulated Learning

Web 2.0: a second version of the World Wide Web

Wiki: an exemplar web 2.0 platform, used throughout this study to investigate the potential enhancement of SRL skills among students, through the use of its appropriate functions and design possibilities. The term "wiki" will refer to the specific wiki site designed and used in this study.

Wiki learning / wiki-assisted learning: Learning fostered by a wiki that provides opportunities to practise SRL skills, a key focus point in this study.

SA: Saudi Arabia

Chapter 1 : Introduction

1.1 Introduction

The aim of this chapter is to present the research topics explored within this thesis and the questions that this research seeks to answer, which will provide the rationale for conducting this study. The chapter also explains the researcher's background in this topic area of Education Technology at higher education level. The following sections present the researcher's experience in this subject area, the background of the research in terms of web 2.0 technology and more specifically, the research supporting the potential benefits of wiki technology. This leads to identification of the research problem and offers an insight into the potential role of site design, the tutor and tasks in helping to develop SRL skills among students, with a view to further justifying the undertaking of this study. The chapter ends with details of the structure of the rest of the research.

1.2 Background and positionality in relation to the research:

The researcher's first degree was a Bachelor Degree in Computer Science and, after she graduated, she worked as a Programmer at the Ministry of Education in Saudi Arabia (SA) before she completed a Master's Degree in Education Technology and became a lecturer at Princess Nora University (PNU). This allowed her, and still permits her, to impart her in-depth knowledge of this modern-day subject to her students.

Once integrated into the department, what she had already suspected became even clearer to her: The Saudi Ministry of Education was making active steps to implement some projects with the aim of fostering technological prowess and technology-based learning. Unfortunately, more often than not, these projects seemed to not be as effective as they could have been and they were often abandoned, by students and teachers alike (Alebaikan 2010; Alshahrani, 2015). Post project analysis did not seem to be a common procedure and recurring mistakes appeared, resulting in little progress in terms of learning via technology. During her first years in the post, feedback from students was rarely acted upon and regular assessment of new projects' effectiveness was not carried out. Occasionally, the Western origins of the projects chosen for implementation at higher education level did not seem to suit the level of technological prowess or the culture of

the Saudi female students they were being aimed at (Oyaid, 2009; Alebaikan 2010). Over time, this provided the researcher with the motivation to think about how technology could be utilised for learning in an effective way in order to combat the many difficulties students face in terms of using technology and their actual learning processes. The traditional classroom is often reported to have a tendency to encourage a lecturer to treat a cohort of individual students as a group (Smith & Abouammoh, 2013; Alshahrni, 2015), bypassing the fact that each student has a very personal, different level of knowledge and experience of dealing with technology. As a lecturer, it became a challenge to offer appropriate amounts of support to students who needed it, due to time constraints and differing levels of responsibility that students demonstrated in terms of their own learning. This lack of responsibility for one's own learning certainly seemed prevalent in the Saudi classroom and was something the researcher had also experienced throughout her own education, being brought up, academically speaking, on rote memorisation and passive learning practices. While the teacher will always be a source of knowledge (Khan, 2011;Alim, 2017), students tended to rely far too heavily on the efforts and experience of the teacher in order to learn, demonstrating very few independent learning skills. Not only this, but she also found that some lecturers at Princess Nora University appeared to be unaware of the potential usefulness of different teaching methods using technology. For example, material was often–presented in PowerPoint slides and some teachers still preferred to create incredibly lengthy paper trails including students' homework. In the researcher's view, this is far less easy to organise and to keep safe. It may have been that some teachers were aware of how to utilise technology for learning, but they did not seem able to implement it; perhaps due to a potential lack of time, lack of knowledge, lack of facilities, or perhaps even, lack of confidence in themselves as e-tutors or in their students in terms of their acceptance of technology as a learning medium.

The researcher in this study has always been interested in the area of Education Technology and in the betterment of female education within the context of Saudi Arabia. As a former lecturer at the university, she was not only very well informed on the use or lack of use of technology in learning but had also been able to observe students of the same culture and gender as herself, providing vital background experience for this study. Despite these characteristics in common with the researched cohort, the researcher also recognised that education, by nature, is ever-evolving and that her experiences lower down the system may have been even more traditional than that of the cohort of students participating in the study and that she would need to approach the study with the

knowledge that today's students are more capable of using technology than she may have been in the past. Despite students being more computer literate, the researcher realised the necessity of a more effective implementation of technology to promote more effective learning (Smith & Abouammoh, 2013; Alshahrni, 2015). The researcher also realised that, while technology use in learning seemed to have potential, any benefits were likely to depend on the context and manner in which they were used (Alzahrani, 2013; O'Neil & Perez, 2013; Bedrule-Grigoruţă & Rusu, 2014; Alblehai, 2016). Hence, she decided to choose this topic on the little-researched yet potentially important role of web 2.0 technologies in Saudi-specific learning, specifically focusing on wikis as a learning platform, so that the technology behind them may be better understood and therefore better utilised to enhance SRL skills among female students at PNU.

1.3 Background to the research

Technology has become increasingly prevalent in many aspects of life in the 21st century, and possibly most of all in the education sector, where it is used to seek to enhance education (Kirkwood & Price, 2011; O'Neil & Perez, 2013; Bedrule-Grigoruţă & Rusu, 2014;Chu et al., 2017). It is increasingly common for web 2.0 technologies to be employed in higher education (Casey & Evans, 2011; Usman & Oyefolahan, 2014; Alim, 2017; Cilliers,2017) as a way of trying to facilitate interaction, improve communication and secure information sharing (Alias et al., 2013; Echeng & Usoro, 2016). Wikis, in which content is created collaboratively by their users, are being increasingly employed as an online learning tool in higher education thanks to their ability to facilitate a number of educational processes. For example, they can be used for presenting learning material to students, storing work carried out on a project, storing and logging learning content, collaborating with peers, and keeping track of changes made to documents and projects (Majhi & Maharana 2010; Lin & Yang, 2011; Li, 2012; Hadjerrouit, 2014; Biasutti, 2017). There are many examples in the literature of wikis being used in education in some case studies (that are both relevant and highly supported by referenced evidence), including such prominent and recent studies as those performed by Hadjerrouit (2014); Page and Reynolds (2015); Zheng et al. (2015) and Chu et al. (2017). Zheng et al., for example, despite basing a discussion solely on perception-based data, applied several sources of data from students' and teachers' perspectives in order to show support for knowledge construction via wikis through collaborative learning and writing skills.

Technology is now widely regarded as a fundamental part of higher education; it can provide both teachers and students with new opportunities and ways to effectively engage in education (Lin & Yang, 2011; O'Bannon & Britt, 2012; Smith & Abouammoh, 2013). Web 2.0 technology via wikis can be used to support the development of students' skills in learning, accessing resources, and communication. Some authors of previous studies believe that, as SRL skills have an important impact on learning outcomes, developing these skills in students should be recognised as being a necessary part of the curriculum, particularly for higher education (Barnard-Brak et al., 2010b; Cassidy, 2011; Cho & Cho, 2013; Yen et al., 2013). Self-regulated learning can be defined as a process through which students organise and manage their own learning with the aim of achieving set learning objectives (Pintrich, 2004; Zimmerman & Schunk, 2011). Based on measurements of students' achievements and perceptions, it is claimed that SRL helps students to be more responsible for their own learning as well as to become more effective in how they tackle the learning process (Zimmerman, 2011; Samruayruen et al., 2013). Hence, it is valuable to explore the advantages of the use of web 2.0 tools via wikis to determine to what extent it can enhance SRL skills among students.

From the review of the previous studies in the literature, it is important to note that, in order to use technology in an effective way, it is not enough to simply 'add' it on to traditional teaching methods (An & Williams, 2010; Gray et al., 2012). Consideration must therefore be given to how it will be incorporated, the instructions, the design of interventions and appropriate activities to promote learners' self-regulation (Rahimi et al., 2015 b; Hemmati & Mortazri, 2016).

Lawanto et al. (2014a, b) claim that positive acquisition of knowledge, comprehension and SRL skills occurs when students are exposed to more *special* education experiences in formal curricula. An example of this would be when individuals acquire academic information and familiarise themselves with skills through *special* instruction, using specifically-designed wiki pages and tasks that foster SRL skill enhancement. Furthermore, research suggests that SRL skills, for example self-evaluation, self-monitoring and goal setting, can be improved through the use of web tools that enable resources and experiences to be shared, while learners can be encouraged to seek help when needed with communication tools (Dabbagh & Kitsantas, 2012; Kitsantas, 2013).

In order to reap these benefits, however, it may be suggested that students need self-regulated learning skills (see section 3.7). Self-regulated learning involves the skills of

knowing what and how to learn, setting goals and measuring progress in order to be active learners (Zimmerman, 2011; Reis & Greene, 2014). Such skills include executive function and evaluation skills. Executive functions, such as the ability to set goals for completion within appropriate time frames, as well as keeping one's work documented within an organised learning environment, are especially important if learners are expected to produce quality work, assignments, and projects that require them to organise and plan many academic tasks (Meltzer & Krishnan, 2007; Meltzer, 2011;Walker, 2012) (see section 3.7.3). Evaluation is highly necessary since it allows learners to frame successes and failures with respect to ability based on their progress and performance on academic tasks (Lai, 2011; Haig, 2012) (see section 3.7.4). This process may occur through learning individually or as part of a community and asking for help when necessary, culminating in an overview of their level of self-efficacy as a learner.

In previous studies, such as that conducted by Bol and Garner (2011a, b), evaluation and executive function skills are combined as one group of SRL skills for use in online learning. The current research, in contrast, separated executive function and evaluation skills into two separate areas, and extended the number of skills investigated in order to answer the research questions and provide a deeper and more unique analysis of both skill groups and whether and/or how they can be developed among students via wiki technology. This would promote an in-depth analysis of each of the eight individual, yet related, sub-skills investigated in differing combinations across research papers thus far (Dabbagh & Kitsantas, 2012; O'Bannon& Britt, 2012; Hadjerrouit; 2014; Page & Reynolds, 2015; Ng, 2016).

Despite the advantages that students may potentially reap in terms of SRL skill development from the use of a web 2.0 environment, there is a shortage of empirical research in this area (Huang et al., 2012; Quince, 2013; Samruayruen et al., 2013; Pange, 2014; Broadbent & Poon, 2015). For example, Broadbent and Poon (2015) carried out a meta-analysis of papers on SRL in an online higher education learning environment for the period 2004-2015. From an initial 130 papers, they finally analysed only 12 studies that met their inclusion criteria, that is, studies that examined the SRL skills of students enrolled on an online or web environment. Wiki technology, by extension, does not feature heavily in the research body on the development of SRL skills, neither at a global level nor at a local level in the Saudi context (Jdaitawi, 2015) (see Chapter Two). This information provides the context that gave rise to the formulation of the problem to be addressed in this research, which is introduced next.

1.3.1 Identification of the Research Problem:

According to several studies in recent years, many students in Saudi Arabia fail because traditional education methods do not help them to construct knowledge and develop necessary skills (including SRL) and a lack of motivation to learn **(**Khan, 2011; Alnassar & Dow, 2013; Al-Dali, 2013; Darandari & Murphy, 2013; Almuntashir et al., 2016). Previous studies have alluded to several limitations of the education system in Saudi Arabia, creating several barriers that could potentially affect students' learning (Alnassar & Dow, 2013) (see section 2.3.1). The barriers include didactic teaching strategies (Khan, 2011), which involve traditional, lacklustre approaches with content delivered through a teacher-centred approach, students perceiving the teacher as the only source of knowledge (Khan, 2011;Alim, 2017), and students passively receiving information. Given the predominance of the teacher-centred approach, (Smith & Abouammoh, 2013), university students have little opportunity to interact with their teacher or their peers. Being placed in such a position as a student is believed to affect *how* the students learn and *how* they tackle the course (Chao & Lo, 2011; Khan, 2011; Albadri, 2012; Alshahrani, 2015). Alotaibi et al. (2017) point out that education has mainly been focused on teacher-centred lessons that incorporate rote memorisation on the part of the learners and this has caused a lack of focus on self-regulation skills in Saudi universities. Therefore, new approaches may be needed, for instance, to develop SRL and to shift from teacher-centred learning to student-centred learning. Studies by Alsahli (2012) and Alotaibi et al. (2017) indicate that SRL skills are starting to be recognised as a necessary prerequisite for effective learning and academic achievement in higher education in Saudi Arabia. For example a study by Alotaibi et al., (2017) which investigated the relationship between the level of students in SRL skills and students' average scores in some academic courses (English & maths) at King Saud University in Saudi Arabia, indicated, based on the responses of 356 community college students, that there were positive relationships between SRL components (i.e., goal setting and planning, keeping records and monitoring, rehearsal and memorisation, and seeking social assistance) and academic performance in those courses.

In addition, previous studies in the Saudi context suggest that technology is valuable for facilitating the learning process (Ahmad et al., 2013; Alzahrani, 2013; Alhojailan, 2013; Alresheed et al., 2017; Alim, 2017) (Alim's study is discussed in section 2.3.1).The aforementioned authors argue that teaching is more effective when technology is used as

a tool to foster the learning process, and that technology also allows learners to gain the necessary skills and to embrace the necessary information and knowledge in greater detail over a reduced time period (Ahmad et al., 2013; Alzahrani, 2013;Alhojailan, 2013; Alresheed et al., 2017; Alim, 2017).

These findings suggest that the use of technologies could potentially address the problem identified above; moreover it is supported by Saudi educationists and the government. The Saudi government has expressed the intention for the nation to catch up with the level of technology use of developed nations. According to the Saudi Ministry of Education, Saudi students need to be able to compete in a global arena of students, who already use technology on a daily basis, as part of effective teaching and learning methods (Ageel, 2011) (see Chapter Two).

However, despite such indications of interest and support, there are reportedly limitations to the use of technology in higher education in Saudi Arabia (Balubaid, 2013; Ahmad et al, 2013), although the new generation has grown up with a certain technological prowess in the predominantly social arena (Coates, 2007). Also, there is little extant research in the Saudi content on the extent to which technology might be used (Alblehai, 2016). Alkraiji and Eidaroos (2016) confirm this based on a meta-analysis of previous Saudi studies. Previous studies indicate that the successful employment of Web tools depends on having the necessary infrastructure in place, and students and teachers having full knowledge of how best to utilise these tools (Alhojailan, 2013; Alzahrani, 2013; Smith & Abouammoh, 2013). Confirming this point, Alharbi (2015b) suggests that broad measures need to be taken to integrate technology fully into the academic life of modern students, such as redesigning curricula, systems and textbooks.

Taking the above arguments together, therefore, the researcher was motivated in the current study to investigate how wiki technology might be used to support SRL skills among PNU students in Saudi Arabia.

This empirical study therefore investigates how a wiki site, as a part of web 2.0 learning platforms, may be used to potentially enhance SRL skills among students. It demonstrates, by extension, the possible impact of changing from a teacher-centred approach to a learner-centred one. In so doing, this study extends previous studies in the area of web 2.0 technologies as an academic online environment that encourages the enhancement of SRL skills (Cifuentes et al., 2011; Huang et al., 2012; Cho & Cho, 2013; Pang, 2014; Ng,

2016). This study seeks to fill a gap in our knowledge. It explores whether and how utilising wiki as an online environment may be able to enhance SRL skills by actively encouraging learners to interact with the learning tasks and with each other, during the teaching of an Education Technology course. Also, it explores specific SRL skills by investigating the students' perceptions of their executive function skills and evaluation skills while actively learning the course content. Furthermore, this study explores the students' attitudes towards wiki as a learning environment to see whether they readily accepted technology when they used this way of learning. This was conducted in the Saudi context, where the use of specifically interactive technology in teaching is limited due to cultural influences linked with the female gender and the historic reliance on didactic teaching (see Chapter 2). The students' perceptions help the researcher to understand whether there are any external factors that could affect the final findings of the current study and it aids the effective and in-depth interpretation of the results. In light of the problem identified above, the aim and objectives/questions to be addressed in the study are formulated as follows.

1.4 Research Aim and Objectives

Aim

To explore how wikis can be utilised to enhance self- regulated learning skills among Education Technology students attending Princess Nora University in Saudi Arabia.

Objectives

1- To examine how using wiki learning can enhance self-regulated learning among students.

This objective is divided into two sub-objectives:

- To examine how using wiki learning can enhance executive function skills among students.
- To examine how using wiki learning can enhance evaluation skills among students.

2- To gain insights into students' perspectives and experiences of the use of wiki as an appropriate environment for learning.

3- To gain insight into students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills.

1.5 Research Questions

The main question is as follows:

How can wikis be utilised to enhance self-regulated learning skills in online learning among Education Technology students attending Princess Nora University in Saudi Arabia?

Sub-Questions:

1- To what extent can using wiki learning enhance self-regulated learning among students?

Further sub-questions:

- To what extent can using wiki learning enhance executive function skills among students?
- To what extent can using wiki learning enhance evaluation skills among students?

2- What are the attitudes of students towards the use of wiki learning as an appropriate environment for learning?

3- What are the students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills?

1.6 Significance of the Research

The research makes an original contribution that help to fill a gap in the extant literature. To date, little research has been conducted on the subject of SRL skills in online learning in a web 2.0 context, especially on the use of wiki as a tool to possibly enhance SRL (Huang et al., 2012; Cho & Cho, 2013; Pange, 2014), as demonstrated in the meta-analysis for the period 2004-2014 by Broadbent and Poon (2015), referred to above (section 1.3). It is for this reason that the current research was undertaken, in order to reduce the research gap in this area.

Furthermore, the research makes a number of specific contributions to knowledge. It will enrich the literature in the area of utilising web 2.0 in teaching students in higher education in Saudi Arabia (Alhojailan, 2013; Alzahrani, 2013; Balubaid, 2013; Alblehai, 2016; Alkraiji & Eidaroos, 2016; Alim, 2017), which is important as there is a dearth of

empirical studies on this area in higher education in Saudi Arabia (Alghanmi, 2014; Alblehai, 2016). This has been confirmed by Alkraiji and Eidaroos (2016) confirm, based on a meta-analysis of previous studies. This study could be the first study to investigate the use of wiki with the aim of enhancing SRL skills for female students at PNU. There may be some benefits to the pedagogy for students learning, especially in facilitating a move away from passive learning and teacher-centred learning.

With regard to SRL in online learning, there are factors such as self-training, the teacher's role and the design of the site, which could be of vital importance, according to the analysis of relevant literature pertaining to this research area (Cho & Shen, 2013; Rahimi et al., 2015a; Zheng et al., 2015). By investigating these, the research provides more clarity and guidance, bearing in mind that previous studies (Bol & Garner, 2011a; Järvelä, 2015) claimed that SRL in an online environment faces many challenges.

In terms of potential practical value, this study explores novel learning methods, using a wiki as an online environment, which could help to enhance the quality of education through a motivational design. The study employs the learning technique of SRL in order to decrease the reliance on teacher-centred learning, which is currently used in Saudi classrooms (Khan, 2011; Allamnakhrah, 2013; Alasmari, 2015). This technique is also claimed to promote meaningful interaction among students (Alasmari, 2014; Alasmari, 2015; Alshahrani, 2015). Thus, this study may be of particular use in providing an insight into the potential role of technology in the development of SRL skills for education decision makers and instructional designers in the Saudi higher education context. It may be of particular use to those decision makers that seek to develop away from traditional teaching methods. It may assist them with employing the potential of web 2.0 applications (in this case, wikis) with the aim of possibly improving conventional education, as part of effective teaching and learning methods. For example, the study provides guidance on wiki design and draws attention to other aspects, such as infrastructure issues, and the role of the teacher, which may guide and facilitate future initiatives to incorporate wikis or other applications in learning. This, in turn, may increase students' interaction with the course content, the teacher and each other, as well as their ability to set goals, and to manage and evaluate their own learning.

1.7 Organisation of the Study

This thesis consists of seven chapters, structured as follows:

Chapter One provides the introduction and background to the study and also presents the significance and contribution of the study, with the aims and objectives of the research and the research questions.

Chapter Two presents a definition of online learning, discovers the wider context of the study and contains the background to the education system in Saudi Arabia, higher education in Saudi Arabia and the focal institution (PNU), the state of online learning in Saudi Arabia, and the use of web 2.0 technologies in higher education in Saudi Arabia.

Chapter Three is the literature review. It consists of a review of the literature available on web 2.0 technology, as well as the background to wikis, the components of wikis and wikis in education. It presents information on the concept of SRL, SRL skills and models, and how these can be employed in online learning. It also explores the teacher's role in students' learning, students' attitude towards online learning, learning theories and specifically, social constructivism theory.

Chapter Four describes the research methodology used in this research. This chapter presents information on the research paradigm, research methods and design, data collection techniques, and the procedures of course design using wiki. It also looks at how the extent to which online regulation learning takes place can be explored, the selection of the participants, the pilot study, translation issues, research reliability and validity, data analysis procedures, the researcher's position and reflexivity, and finally, ethical issues.

Chapter Five is the findings chapter. It represents the data analysis in this study which consists of three parts as follows: the quantitative data (descriptive statistics for three domains - executive function, evaluation skills and also attitude towards using wiki as a learning environment); the qualitative data which contains four themes: attitude, awareness of SRL, development and reasons, which include a range of sub-themes and codes; and finally the data triangulation.

Chapter Six discusses the study findings so that the research questions may be answered. Also, an interpretation of the themes is generated from the data collection.

Chapter Seven provides the conclusion to the research, which also summarises the research. Also, this chapter indicates the contribution of the study and limitations of this study. It ends by highlighting implications based on the study's findings and suggests areas that could be researched in the future.

The next chapter introduces the study context and provides more detailed discussion

of various concepts relevant to this research. Figure 1.1, below, shows the important concepts addressed in the following chapters, in order to give readers an overview of the thesis content and how the various elements are related.

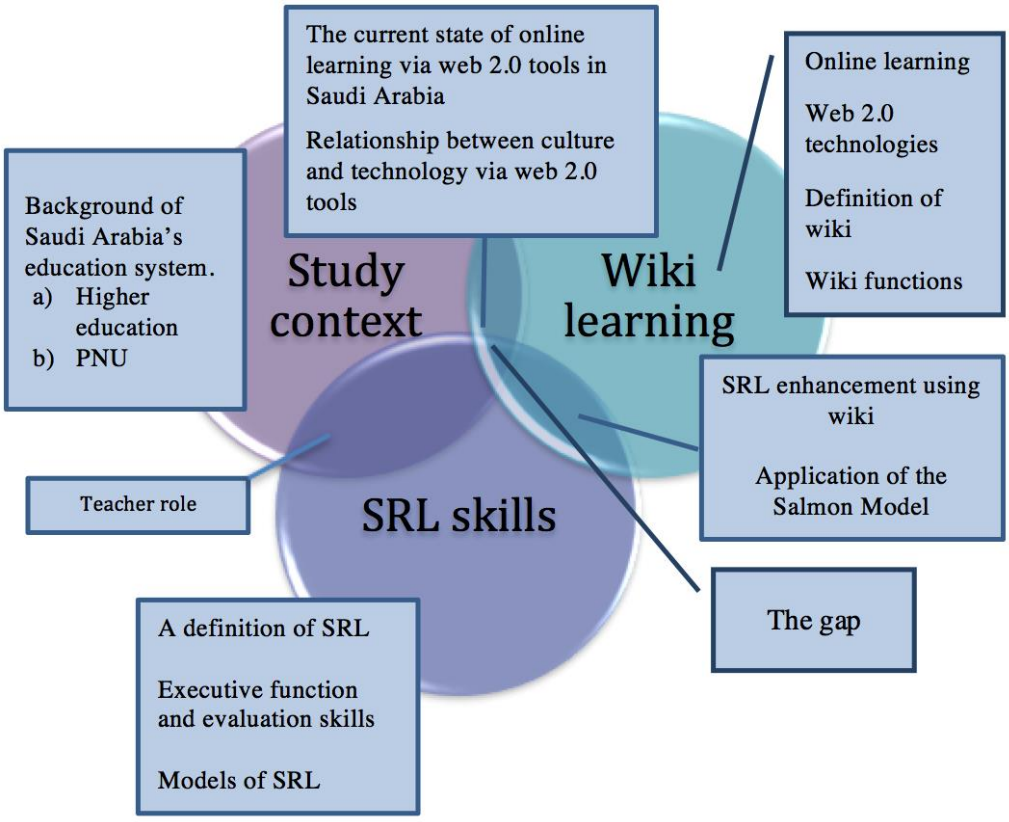


Figure 1:1 The conceptual framework in this study

2 Chapter Two: Context of the Study

2.1 Introduction

This chapter presents useful background information about the study context, i.e. the cultural basis and details of the Saudi education system. Robak (2014) indicates that culture influences learning processes. Understanding the cultural context of the current study contributes to decreasing ambiguity. The chapter's first section presents background information on Saudi Arabia. This is followed by an explanation of the Saudi education system in general, the higher education institutions, and, more specifically, PNU, where the study took place. This chapter also contains a brief overview of SRL, online learning, and wikis as a part of web 2.0 tools in the Saudi context. In addition, it explores previous research work conducted on online learning via web 2.0 in higher education in Saudi Arabia. This chapter has been written with a view to discovering factors that could affect student perspectives towards use of wiki as a learning platform.

2.2 Background of Saudi Arabia

Saudi Arabia occupies an area of 2,250,000 square kilometres, thus covering approximately 80% of the Arabian Peninsula. The Kingdom is situated on the south-west side of Asia. On its western side, Saudi Arabia is bordered by the Red Sea, having the UAE, Arabian Gulf and Qatar bordering it on the eastern side, and Iraq and Jordan on the northern side. On the southern side, Saudi Arabia is bordered by Oman and Yemen (Alrushaid, 2010) (see Figure 2.1).

Figure 2:1 Map of Saudi Arabia (Source: Alrushaid, 2010)

The official language in Saudi Arabia is Arabic. According to the General Authority for

Statistics in Saudi Arabia (2017), the country has an estimated population of 31,742,308 (General Authority for Statistics, 2017).

There are more than 5,000 villages, towns and cities in Saudi Arabia, distributed among 13 administrative provinces. The capital city is Riyadh, which is in a central location. Other important cities include Jeddah, which is an important Red Sea port, and Dammam, which is the principal Arabian Gulf port (Alrashidi & Phan, 2015). The ethnic background of the citizens is mainly Arab (90%), with the remaining 10% comprising people of Asian and African origin (Alrashidi & Phan, 2015). The Kingdom of Saudi Arabia is a vast expanse of land and includes many remote areas. While much effort is being put into modernising education across the country, as is evidenced by the Ministry's aims (Alkhalaf et al., 2011), it cannot be denied that such an undertaking would put further strain on relatively limited facilities, particularly in more remote areas. This is one of the factors encouraging interest in the use of technology, since the potential advantages of using technology such as wiki in teaching, as a type of online learning, could offer a way to combat the isolation and hindrances learners endure (discussed further in sections 2.3.1; 2.9).

The system of government in Saudi Arabia is a monarchy. The King heads the government and makes decisions with regard to the affairs of state. The law in the country is based on the Holy Book, the Quran (Koran), and Sunnah (Sayings of Prophet Muhammad) which are sources of Islamic law (Baamir, 2009). The foundation of Saudi culture is the Islamic religion. Islam and the Muslim religious identity influence all areas of life in Saudi Arabia. Saudi society is governed by Islamic moral values. These values apply to personal relations as well as to the tribe and extended family, and they derive from an intricate set of interrelated commitments that the Quran assigns to different people. The values and rules of Islam direct all of the aspects of Muslims' lives (Oyaid, 2009; Alyami, 2014) including the education system. This area will be discussed in further detail in later sections in this chapter.

2.3 Education Sector in Saudi Arabia

In Saudi Arabia, the Education Policy for higher education and state school education was initiated in 1970. Policy is based on the culture and religion of the country and understanding these areas is necessary in order to understand what the Saudi government is trying to achieve through education (Alebaikan, 2010; Alhareth, 2014). The educational

sector of higher education was created in 1975 with the establishment of the Ministry of Higher Education in Saudi Arabia. It was responsible for all of the various areas of higher education (Oyaid, 2009), including scholarships, academic collaborations overseas, and educational offices in other countries. Education is covered by central government policy; therefore, individual institutions have very little autonomy (Oyaid, 2009). This means that any changes in teaching approach would depend on the approval and facilitation of the Ministry. Hence, this section will present information about the education system of Saudi Arabia in order to provide an overview of the context and the factors that may influence the adoption of any education innovation, such as wiki-assisted learning. It will then focus on higher education in Saudi Arabia and the technology employed currently in Saudi universities. Such information will provide indications of the potential relevance of the study in Saudi Arabia and contextual factors that may facilitate or challenge any attempt to develop wiki learning, especially for female students, in Saudi Arabia (see section 2.10). Moreover, it will contribute to the rich contextual description needed, on the principle of transferability, to enable readers to make an informed judgement on the relevance of the research conclusions to other contexts (see sections 4.13.3; 7.3).

2.3.1 Education system and learning in Saudi Arabia

The Saudi educational policy aims to develop learners' capabilities so that they can benefit both themselves and the society at large. Additionally, the objective of the Saudi education policy is to ensure that education eradicates illiteracy among Saudi learners, and to make education more efficient in order to meet the social, religious and economic needs of the nation (Ministry of Higher Education, 2017).

In Saudi Arabia, there are four key aspects of education: a focus on the Islamic nature of the Saudi population; gender separation; state financial support; and centralisation of the education system (Smith & Abouammoh, 2013). The major focus has been centred on the Islamic setting of the culture of the Saudi population, which is heavily influenced by the fact that Saudi Arabia is the birthplace of Islam. Saudi culture calls for males and females to be segregated in all aspects of life, which includes education (Alebaikan, 2010). In Saudi Arabia, Islamic law emphasises that education must be gender-segregated at every stage apart from kindergarten, in relation to school structures, education and the teaching workforce (Khutani, 2013). This is because under Islamic law, men and women who are not closely related are generally not allowed to interact. However, both genders pass through the same educative process, although there are small differences in the curriculum

regarding Home Economics, which is specifically for girls, and Physical Education, which is confined to boys (Alrashidi & Phan, 2015).

The education system of Saudi Arabia offers free-of-charge education from kindergarten to university, but education is not obligatory (Alhojailan, 2013). In institutions financially supported by the government, books and a comprehensive health service are provided for free. Unfortunately, however, the availability of schools tends to be higher in wealthier areas where education is more highly prized. Therefore, in order to give support to education in all areas, the government has been increasing the number of schools for some decades now. There are five stages in the Saudi education system. These stages include kindergarten for children aged 3-5 years, primary (6-11 years), intermediate (12-14 years), secondary level (15-18 years), and university level for those over the age of 18 (Alhojailan, 2013). Almalki (2011) pointed out that the universities in Saudi Arabia offer Diplomas, Bachelor's, Master's and PhD degrees.

According to the country's education policy set out in its website, education has the purpose of fulfilling the economic and skill demands of Saudi Arabia, while adhering to its cultural and religious norms (Ministry of Education, 2017). The main points of the policy are expressed in 12 objectives, as follows:

1. Enhancing students' personalities in the sense of Islamic, national and intellectual values based on their skills, knowledge and beliefs.
2. Ensuring that all students are able to access education.
3. Developing criteria for the qualification and recruitment of teachers in addition to motivating teachers and improving their competencies.
4. Promoting high-quality education and improving the qualitative level of education.
5. Conducting, disseminating, and utilising scientific research and knowledge, and expanding higher postgraduate programmes.
6. Expanding private education in order to contribute to the achievement of the development objectives.
7. Increasing the quality of educational outputs so that students can meet the requirements of society and the country's development.
8. "Developing a regulatory environment, and activating governance".
9. Participating in the exchange of knowledge and meeting development needs by granting overseas scholarships to talented students.
10. Employing information and telecommunication to an optimum.

11. Diversifying sources of education funding and investing in education.
12. “Enhancing local and international partnerships”.

However, these objectives are all expressed as broad, aspirational statements. They lack specific detail and it is not clear how progress will be defined and measured, where responsibilities lie or within what timeframe the objectives are intended to be achieved. Analysis of some examples clearly reveals the limitations of such objectives, as a guide to teaching and educational decision making. For example, the first objective is “Enhancing students’ personalities in the sense of Islamic, national and intellectual values based on their skills, knowledge and beliefs”. However, the objective does not specify which specific skills are to be built (and certainly makes no reference to SRL skills). Moreover, the prominence given to “Islamic”, without clarification or discussion, could leave scope for emphasis on tradition and the rejection of knowledge or skills considered to be “modern” or “Western”. At the same time, studies conducted in Saudi Arabia have asserted the importance of those skills of SRL being gained by students (see section 1.3.1). Moreover, educationists and even officials in the education sector in Saudi Arabia have criticised the dominant teaching methods for being relying heavily on rote learning, without students participating actively and using direct skills (see, for example, Alsahli, 2012 and Almuntashiri et al., 2016).

Other objectives refer to means of achieving the desired improvement, one of which is " Employing information and telecommunication to an optimun", but it is not stated what resources are to be employed, or what would be their optimal use; thus there is, for example, no specified requirement for education institutions to use specific technologies or approaches. Moreover, although the government commits itself to "investing in education", it does not state where its investment priorities lie. Thus, despite the rhetoric, in practice there are shortcomings in schools’ and universities’ possession of technology, both in terms of quantity and quality (Robertson & Al-Zahrani, 2012;Al-Zahrani, 2015), which limit the scope for its use in teaching and learning.

In Saudi Arabia, there are still challenges faced by the education system. One of the challenges regards teaching methods and the learning environment, according to many studies carried out on education in Saudi Arabia (Robertson & Al-Zahrani, 2012; Hamdan, 2014; Al-Qahtani, 2015; Al-Zahrani, 2015; Alotaibi et al, 2017). More specifically, with regard to challenges in the traditional teaching and learning environment, a study by Al-

Qahtani (2015) explored students' perceptions about their learning environment and any possible relationships between their academic achievement and the learning environment. The findings of a questionnaire distributed among 156 female undergraduate students at Dammam University in Saudi Arabia, revealed significant relationships between approaches to study and learning environments, and there was also a significant relationship between academic achievement and student academic self-perception. Also, students' dissatisfaction with some aspects of the learning environment was noted. Students pointed out that they were displeased with the rigidity of the core courses, and the teacher-centred approach to teaching, passive learning, an undesirable superficial learning approach, and a learning environment that did not encourage student learning.

As a result of the adherence to this approach, the aforementioned authors claim that students lack opportunities to practise skills such as independent learning, inference, experimentation, research skills or simply finding alternative sources of information. It has been argued that students do not acquire SRL skills or other professional skills if their teachers are not willing to embrace more contemporary teaching techniques where students can gain first-hand experience (Smith & Abouammoh, 2013; Alotaibi, 2017). Therefore, the current study could help to give students opportunity to take responsibility for their learning and offer a conducive learning environment to encourage students in learning.

Concerns have been expressed that traditional teacher-centred learning, might lead to a lack of personal interaction between students and teachers. This method could also result in students being discouraged from expressing their own thoughts and opinions in the classroom and therefore from participating in any unnecessary interaction with their classmates. Several authors such as Alsaedi (2012), Altamimi, (2014), AlNajdi (2014) and Aldayel (2017) believe that Saudi students who have experienced this way of learning and have had little opportunity for interaction could lack confidence; they feel sensitive (shyness) about discussion and making errors in front of their teachers and peers and they may not want to be viewed as lacking in intelligence.

Whilst the above problems have been raised in relation to the education system as a whole, concerns have been raised especially in the higher education sector, where students are preparing for their future professional lives. In that context, a number of authors (Hamdan, 2014;Al-Zahrani, 2015; Alim, 2017) have suggested that a solution may lie in the

appropriate usage of technology to encourage students' active learning. In the next section, therefore, the challenges facing higher education, as the context of this study, and the current debate on technology in the sector, will be introduced.

2.4 Higher Education in Saudi Arabia

Saudi Arabia has experienced an increase in the number of students attending higher education institutions. Currently there are eight private universities and 25 government-run universities. The latter are directly governed by the Ministry of Higher Education but also have a degree of independence in terms of academic and administrative procedures within the parameters of government policy (Ageel, 2011; Ministry of Higher Education, 2014). Apart from three universities, universities in Saudi Arabia include both genders (in separate buildings). Among these three universities, two are for men – the Islamic University in Medina and King Fahd University for Petroleum and Minerals (Abouammoh et al., 2014). For a student to complete a Bachelor's Degree in Education, Social Sciences or Arts at the undergraduate stage, he/she must attend courses for four years, while a Bachelor's degree in disciplines such as Engineering, Computer Science or Medicine will take five or more years (Alhojailan, 2013).

This study is focused on the students of Princess Nora bint Abdurrahman University, henceforth also known as Princess Nora University or simply PNU. This research will focus on a cohort of undergraduate students in the Education Technology Department (for more information, please see section 2.5). PNU is not only a result of quantitative expansion in Saudi higher education, but is also expected to benefit from and contribute to several initiatives and projects aimed at developing the quality and efficiency of universities in Saudi Arabia. These have been funded by the Ministry of Education.

The following is a list of some of the objectives of these initiatives (Ministry of Higher Education, 2014), which also support development within the higher education sector:

1) Attaining internationally recognised excellence in research, teaching, and services for the community.
2) Promoting collaboration with industrial and research institutions, both in Saudi Arabia and abroad.
3) Achieving world-class academic standards.
4) Developing excellence in the field of research.

5) Aiming to have students who, post-graduation, can compete with candidates from other countries for employment.
6) Fostering inter-university competition within Saudi Arabia.

The Kingdom of Saudi Arabia has recently spent the equivalent of millions of dollars seeking to improve the country's educational system, with a particular focus on higher education. These improvements include changes to curricula followed, as well as the introduction of technology for educational purposes (Aljabre, 2012; Alshaghdali et al., 2014). The benefits that it seeks to reap from technology include improvements not only to the level of critical, higher-order thinking on the part of students (Alfahad, 2012; Aljabre, 2012; Smith & Abouammoh, 2013) but also to the design of the learning environment used by students, which should promote improved interaction and higher levels of motivation as well as foster improved time management (Ministry of Education, 2017). The implementation of technology is also hoped to foster teachers' use of it as an interactive teaching resource that takes the pressure off them to plan lessons in the traditional manner. This should ultimately increase cost-effectiveness, and facilitate wider access, flexibility and simplified revision (Alebaikan & Troudi, 2010; Alshaghdali et al., 2014). The National Communication and Information Technology Plan in Saudi Arabia (NCITP) in 2007 laid out the above-mentioned advantages as reasons for technology's implementation in higher education institutions (Alebaikan & Troudi, 2010; Alkraiji & Eidaroos, 2016). The Ministry of Higher Education supported the e-Learning project in Saudi universities by creating the National Centre for eLearning and Distance Learning NCEDL (for more information see section 2.9).

Suggestions have been raised that technology might offer solutions to the problems reported in Saudi education, many benefits of using technology in learning and using technology to learn collaboratively are documented by writers including Al-Ismaiel (2013), Alzharani (2013), Alim (2017) and Cilliers (2017). For example, a study by Alim (2017) examined the experience of Saudi academics of using web 2.0 technologies via Twitter in higher education teaching, based on responses to a survey of 60 academics across Saudi universities. The findings indicate that technology facilitates teaching activities such as sharing information and ideas and enabling students to ask questions, although there is some way to go in terms of the integration of Twitter into areas such as assessment.

However, another challenge reported in the Saudi education system is that technology has not yet been effectively integrated into the teaching process, particularly at higher education level, as Alharbi (2011) and Al-Zahrani (2015) found by surveying students and interviewing academics respectively. This means that the potential benefits are still not fully exploited by institutions (Alebaikan, 2010; Al-Zahrani, 2015) in order that the quality of education for the current digital generation may potentially improve (Li et al., 2015; Alahmari, 2017). It is, however, important to note that educators should also realise that the fact that more technology is made available in the classroom does not necessarily mean that learning will become more productive. The term 'techno-centric thinking' has been coined by Al-Harbi (2014) to refer to this belief that technology on its own will have an effect, and it is an attitude that may not be conducive to gaining the maximum benefit from technology. The mere presence of the technology will not improve academic outcomes – indeed, if technology is used without a clear plan and instructions, and if the teachers do not have enough experience, the use of technology will remain deficient and cannot be expected to produce dramatic changes in student performance (Lim et al., 2013). It is the *way* in which the technology is employed that makes the difference, and if it is not used effectively, it may simply represent a waste of money and resources (see 3.4.4; 3.6.5).

After having given details on the efforts made by the Saudi Education Ministry to improve and modernise education in the country via technology, and the ongoing challenges in this area in higher education, it is now necessary to examine the focal university in this research -PNU.

2.5 The Princess Nora bint Abdurrahman University

Princess Nora bint Abdulrahman University (PNU) is a university exclusively for women and one of the newer universities in Saudi Arabia. The physical facilities available on the campus are extensive, and there are 14 colleges and an Arabic Language Institute. The colleges include Social Sciences, Arts and Humanities (Art and Design, Arabic Language and Literature, English Language and Literature, Geography, History, and Islamic Studies), and Health and Medical Education (Medicine, Dentistry, Nursing, Pharmacy, and Physical Therapy). Additional colleges include "programmes in Computer and Information Sciences, Business and Administration, Community Service, Home Economics, Language and Translation, Education, Sciences and Social Services" (Almansour, 2015:34).

PNU is the largest university in the world designed specifically for women. It spans an area of 8 million square metres. More than 50,000 students are enrolled on the Bachelor programmes, 400 on Master's programmes and 350 on the doctorate programmes (Alfayez, 2014). PNU's vision "aims to achieve national and international leadership through college education and scientific research" and "to contribute to society and environmental development based on Islamic values and social and cultural awareness for sustainable development" (Princess Nora bint Abdulrahman University Information Booklet, 2013: 2).

Despite this ambitious rhetoric, it is claimed that students attending PNU, as well as other Saudi universities, frequently face barriers to their learning. These barriers, as are detailed in Chapter 1, include teaching strategies (Khan, 2011; Alshaghdali et al., 2014), traditional, uninspiring approaches through a teacher-centred approach (Al-Zahrani, 2015; Alotaibi, 2017) and also a lack of use of web 2.0 technologies (Chaurasia et al., 2011; Alshaghdali et al., 2014) to potentially enhance the level of student-centred learning. This study will explore the possibility for this university to develop its current methods of teaching by exploiting the affordances wiki technology with the aim of developing SRL skills. Specifically, this study is relevant to two of the university's eight declared aims:

1) "To provide innovative methods for education and learning that are integrated into the academic programmes, such as e-education, cooperative education, self-learning, continuous learning, and leadership programmes".
2) "To offer innovative graduate and postgraduate programmes based on modern scientific research, and the best practices concerning labour market needs, leadership, and professional ethics" (Princess Nora bint Abdulrahman University, 2017:1) (see Appendix 1).

Furthermore, this study was conducted at this university because it views itself as a pioneering, new university for female students only. It is also currently a focal institution of the Ministry of Higher Education, since equality for females in terms of education is high on the Ministry's agenda, thanks to King Abdullah's aims to improve education for females to enhance their status in their communities (Smith & Abouammoh, 2013; Alhareth, 2014).

Following this explanation of the research context, the next sections define SRL and wiki technology, as a part of online learning, as these are the local issues of this research in PNU. There will then be a discussion of the current online learning situation in Saudi Arabia.

2.6 Definition of Self-Regulated Learning (SRL)

Self-regulated learning refers to students' well thought-out efforts to organise their learning processes so that they may achieve their objectives (Pintrich, 2004; Zimmerman & Schunk, 2011). The concept of SRL centres on the learners' ability to control the learning process through a number of self-regulatory skills which are goal setting, resource-oriented learning, self-monitoring, modification of learning strategies, resource management (e.g., seeking help and time management) and reflection on their learning (Bandura, 2001; Pintrich, 2000; Pintrich, 2004; Zimmerman, 2008; Zimmerman & Schunk, 2011; Sorgenfrei et al., 2013). To be more specific, self-regulated students must master a list of key self-regulatory procedures that incorporate setting appropriate goals through the application of a range of strategies to tasks they are faced with to reach these goals. They must also self-monitor and evaluate their progress through practice opportunities offered (Zimmerman, 2011; Zimmerman & Kitsantas, 2005).

The concept of SRL also deals with different areas or three dimensions of learning, namely motivation, cognitive strategies, and metacognition (Pintrich, 2004; Schunk, 2005; Zimmerman, 2008; Zimmerman & Schunk, 2011; Barak, 2012). The cognitive part of SRL refers to using learning strategies so that information may be understood and remembered (Smith & Pellegrini, 2000; Simsek & Balaban, 2010; Zarei & Gilanian, 2015); the metacognitive constituent is related to planning for learning, setting clear goals, monitoring progress, and evaluating. Motivation incorporates self-motivation, taking on the responsibility for both successes and failures and increasing self-efficacy, which, in turn, results in improved effort and perseverance; effective learning behaviour involves actively seeking help and creating a positive learning environment for studying (Zimmerman & Schunk, 2011). Moreover, other researchers define SRL by stating that it incorporates a mixture of skills such as executive function skills, cognitive, metacognitive and evaluation skills (Alamari & Almasaed, 2012). As skills that individual learners must develop and apply, these SRL behaviours are part of each learner's wish to succeed in

their learning. These self-regulation skills can be applied in both social interactions and learning (Barnard-Brak et al., 2010a).

In this study, the researcher investigates possible SRL enhancement as a result of utilising wiki technology as an online learning environment that potentially provides skill-developing learning tasks based on course topics.

2.7 Definition of Wiki

Wiki technology could be described as an effective, interactive platform for online learning, particularly due to the fact that it is attuned to current educational theories (O'Bannon & Britt, 2012; Alzahrani, 2013; Salaber, 2014; Stafford et al., 2014), such as social constructivism (see section 3.6). Alias et al. (2013) indicate that the term "wiki" is used to describe a collective website that can be easily edited through a hypertext system to save and change information. A wiki is a dominant site incorporated under the title of web 2.0, and it consists of a set of pages that together create a system that allows more than one learner to construct and edit pages to their academic knowledge (Biasutti & El-Deghaidy, 2012; Sen, 2015). In other words, wikis are described as 'social software' and they allow users to interact easily and share knowledge inside a networked, text-based space, to add to or update the content, construct knowledge, and track the changes (Carney-Strahler, 2011; Pifarré & Staarman, 2011; Wang & Wei, 2011; Biasutti & El-Deghaidy, 2012; Sen, 2015; Li & Kim, 2016). Furthermore, Heng and Marimuthu (2012) state that wiki technology allows users to incorporate additional features such as photos, video, multimedia content, and links to other websites, in addition to several other useful website tools (Biasutti & El-Deghaidy, 2012; Katzlinger, & Herzog, 2014; Trocky & Buckley, 2016) (for more information about wiki, see 3.3.2). The next section discusses online learning, as the broader approach of which wiki potentially forms a part.

2.8 Online Learning

The focus of this study was online learning via web2.0 technology, specifically the utilisation of wiki technology to potentially lead to the enhancement of SRL skills. It is important to now explain the methods of learning associated with wiki's functions in order to provide a better understanding of how the students may enhance their SRL skills.

In this age, online learning has become one of the most advanced applications used in higher education (Kaymak & Horzum, 2013; Lim, 2015; Page & Reynolds, 2015; Reese, 2015; Biasutti, 2017). Online learning is defined as the integration of technology and information into learning and teaching in order to enable access to internet resources and to make learning resources (e.g. materials or modules) available to students (Gonzalez, 2010; Thomas & Quinney, 2011; Poulová et al., 2012; Mohammadi, 2015).

Wikis are just one of the emerging web 2.0 technologies worldwide, but they are particularly popular in current times: more than one user can view and alter content on web pages, both synchronously and asynchronously (Biuk-Aghai & Lei, 2010; Huang, 2010; den Exter et al., 2012). Hence, wikis allow the time and place of learning to be flexible, which means that students can learn in this way as part of a lecture and they can learn at home. The synchronous type of learning was employed in this study, but students can access wiki learning asynchronously at any time. Synchronous online learning helps students to feel involved in the learning process and allows for feedback straight away (Pifarré & Staarman, 2012; Zhang, 2016). It can therefore foster communication. The lack of rigidity means that everyone can participate in the discussion simultaneously. Asynchronous learning, conversely, can also facilitate discussion among students and allows for vital reflection time on information posted by others (Pifarré & Staarman, 2012; Zhang, 2016).

The flexibility of online learning has been reported, in a variety of national contexts, to help improve SRL skills, since flexible learning takes into account a student's way of learning and therefore fosters independence (Al-Ismaiel, 2013; Allen & Seaman, 2015; Biasutti, 2017). One of the largest benefits linked with online learning is that any resources a student requires are normally readily available for download, at any time, from any location (Goggins & Xing, 2016; Biasutti, 2017). A study by Al-Ismaiel (2013) showed that when students worked online, their individual skills developed through the completion of specific tasks as individuals and as a group. However, the study in Saudi Arabia by Al-Ismaiel (2013) reported that the students did not find it easy to involve themselves fully in tasks that required online collaboration. Their discussions through the online tools did not show a deep understanding of the tasks. Also, the author indicated that the students' performance was influenced by contextual factors – for example the fact that the use of online learning tools was not common in Saudi Arabia. This study, undertaken several years prior to the current study, highlights the on-going battle with integration of technology in the education sector and alerts the current researcher to the

fact that solutions will need to be found to encourage students to see the benefits in a relatively unknown learning tool, in the context of Saudi Arabia.

The latter finding is consistent with previous research, which has reported that there are often several barriers to the successful implementation of online learning in developing countries. These include issues with access to networks, resources and information, a lack of infrastructure, little support from the educational institutions, and a lack of technological expertise (Holmström & Pitkänen, 2012; Mehta et al., 2016). Dailey-Hebert and Dennis (2014) add that a further obstacle to the implementation of online learning is that universities will have to either train existing staff to use the new system, or hire staff that are familiar with it, and then, in turn, change the teaching strategies that are being employed (Holmström & Pitkänen, 2012). Hence, the current study takes into account the level of experience of the students regarding their prior use of online tools, specifically wiki (see Appendix 4) and seeks to ensure that tasks are accessible to all learners by employing wikis' functions in a beneficial fashion to each and every student. The next section will explain the current state of online learning in Saudi Arabia.

2.9 The current state of online learning via web 2.0 tools in Saudi higher education

This section will present an overview of online learning using web 2.0 tools in Saudi Arabia to allow the reader a fuller understanding of the Saudi context in terms of online learning via web2.0 tools.

According to Pavan (2013), universities in Saudi Arabia have a significant function in developing education and in upholding the significant role of technology in developing quality teaching and learning. As pointed out by Oyaid (2009), the main suppliers of school teachers are teaching colleges and universities. In higher education, the integration of technology attracts a strong interest among learners in Saudi Arabia. The utilisation of technology in higher education has been supported by the Ministry through projects designed to develop internet access and technology infrastructures, as well as course content (Ageel, 2011).

Meanwhile, the massification of the higher education sector in Saudi Arabia has brought many educational challenges, making it necessary to address the issues of how high-quality teaching and learning can best be achieved and how institutions can encourage students to develop effective learning skills (Alshahrani, 2015). It is important that

teachers provide students with opportunities to improve their confidence and that they adopt new techniques themselves for teaching. Otherwise, students will not be able to adopt SRL skills or deepen professional and cultural abilities (Alnassar & Dow, 2013).

Moreover, despite the fact that a good internet connection is paramount, online learning plays a major role in enabling the dispatch of various online courses to learners in remote regions (Macintyre & Macdonald, 2011; Alzahrani, 2013; Alkraiji & Eidaroos, 2016), where they might have difficulties attending the institution in person. Hence, online learning in Saudi Arabia is attracting increasing attention and investment from Saudi universities (Algamdi & Samarji, 2016). For example, the first Saudi university that bought into online learning was King Saud University, which intends to expand its programmes of online learning, offering distance learning to students so that they can access education. This is particularly important for those students whose region lacks a university (Alharbi, 2013; Ali et al., 2013; Yamin, 2013). In addition, students will save time as they will not have to travel back and forth to university (Alharbi, 2013; Alzahrani, 2013).

In order to develop learning, the Ministry of Education intends to enhance the quality of education by providing a range of programmes that integrate technology (Aljabre, 2012). In addition, the Ministry has initiated the National Centre for E-learning and Distance Learning (NCEL) in order to uphold the quality of education in learning and teaching. It aims to do so via the best possible utilisation of ICT and other sophisticated systems, in a manner that improves communication and engagement, in order to attain national objectives and development in the education system (National Centre for E-learning, 2013). As pointed out by the NCEL (2013), some NCEL objectives include improving the application of e-learning and distance education in conformity with quality values**,** and upholding research. Over the last few years, universities have started to value the fact that use of online technology in the field of learning can make a positive contribution towards improving systems. One vital step universities have taken recently is to invest in the development of web services using e-Learning strategies (Alebaikan & Troudi, 2010; Alhojailan, 2013).

Currently, many universities in Saudi Arabia have greatly increased their emphasis on online learning and they are integrating the existing curriculum with online learning materials. WebCT was first used by the King Fahad University of Petroleum and Minerals (KFUPM) in 2003, whereby the university incorporated access to online materials.

Through the Open Courseware Consortium, KFUPM offers around 80 courses, which include Sciences, Engineering and Industrial Management. These courses are delivered in English and Arabic. An Open Courseware Consortium was also offered by Alfaisal University in 2006. In addition, most universities have recently initiated Deanships for E-learning and Distance Learning. Examples of these universities include King Faisal University, Al-Baha University, King Khalid University, Qassim University, King Saud University, King Abdul Aziz University, and Taiba University (Al-Asmari & Rabb, 2014; Yamin, 2013).

There are general movements happening in Saudi Arabia's higher education sector, for example, a growth in the use of online learning and the improvement of the learning skills of university students. Furthermore, it is important to use new tools, such as web 2.0, to provide online learning (AlJeraisy et al., 2015 ; Alblehai, 2016). According to AlJeraisy et al. (2015) and Alblehai (2016), it is vital to comprehend how people use web 2.0 tools in everyday life. Nowadays, the younger generation use web 2.0 tools much of the time without realising it, and therefore they may expect to use them in their education – a reason to ensure that they are employed in universities (Al-Ali & Gunn, 2013; AlJeraisy et al, 2015; Alblehai, 2016). However, although Saudi universities seek to use web 2.0 tools in learning to the benefit of their students, according to a study by Ahmad et al. (2013), this is still not achieved very often, although they claimed that Saudi universities are aware of web 2.0 tools such as Facebook, Twitter, YouTube, RSS feeds, Flickr and LinkedIn. More specifically, they point out that PNU may be aware of the potential of using Facebook and Twitter. However, the author found that, although the PNU website contained links for Twitter and Facebook in practice when they attempted to click on these link to access the application, there was no response. Overall, they concluded that there is a lack of knowledge about wiki tools in Saudi universities (Ahmad et al., 2013), and we cannot assume that students and teachers in universities know how to use those tools effectively.

Despite these efforts to integrate technology into Saudi universities, lecturers who currently use these systems are relatively few, as Al-Zahrani (2015) found by interviewing lecturers. One of the many probable causes behind the small number of lecturers who have embraced such systems is that universities and other learning institutions do not have adequate online training workshops (Almalki et al., 2013; Al-Zahrani, 2015). A number of lecturers who are familiar with online learning and are proficient in particular fields share materials that are related to their courses (Alfahad, 2012; Almalki et al., 2013).

Alblehai (2016) and Alqarni (2015) claim that the introduction of online learning (i.e. web 2.0 tools) in Saudi universities is still in its early stages. Another study by Balubaid (2013), surveying students about the use of web 2.0 technologies as platforms for sharing knowledge between students and academics at King Abdulaziz University in Saudi Arabia, indicates that there is a lack of use of web 2.0 tools in Saudi higher education (Alqahtani, 2016).

For example, in Smith and Abouammoh's (2013) report, the results of a survey of 268 academics at seven universities across Saudi Arabia showed that, while there is limited use of technology in teaching (e.g. e-mail and electronic smart boards), there remain a number of barriers such as lack of training and support, infrastructural failures and software issues. This result corresponds to the findings of Alhojailan (2013). In this light, Smith and Abouammoh (2013) point out that if Saudi Arabia aspires to have a number of leading universities by world standards, it will need to invest heavily in technology, infrastructure, and skilled human resources.

Saudi Arabia's education sector is highly concerned about how best to use online learning tools in order to ensure that they are employed *effectively*. Colbran and Al-Ghreimil (2013) believe that if Saudi Arabia is to achieve its objective of owning universities that are world leaders, it will be necessary to put a lot of investment into technology, human resources and infrastructure. It will fall to senior managers to make sure that the new technologies adopted are accompanied by the active involvement of education communities.

This concern extends to the use of web 2.0 tools, and how they can be used to possibly enhance students' self- and peer learning (Alblehai, 2016). Therefore, this study considers how to utilise wiki to potentially enhance SRL skills among students. Firstly, it reviews the challenges faced by Saudi higher education institutions (as mentioned above) to give the reader a fuller understanding of the Saudi context with regard to the influences of its social and education culture. Secondly, it may fill the gap in the literature in the Saudi context. Some studies have been conducted using different tools of web 2.0 in higher education institutions in Saudi Arabia (Alhojailan, 2013; Alrashed, 2013; Balubaid, 2013; Al-Khalifa & Garcia, 2013; Ahmad et al., 2013; Alsurehi, & Al Youbi, 2014). Nevertheless, there are still comparatively few studies in this field (Alsurehi & Al Youbi, 2014), relative to the size of the country and the large budget allocated to the education sector (Alrashed, 2013; Aldiab et al., 2017). Moreover, there is a lack of attention paid to

exploring the potential for the wiki to be used to enhance students' skills in an academic context, apart from one study by Alzahrani (2013) that investigated the impact of using wiki technology on male students studying Biology at Al-Baha University. Even this study focused solely on collaborative learning. The present study is concerned with female students and explores how utilising wikis could potentially enhance SRL skills among students studying a module on Education Technology at PNU. It is worth noting that this study could be the first study to focus on the possibility of developing SRL skills in online learning via wiki in a Saudi context. It could provide information about the benefits of wiki technology in Saudi universities and PNU, and although it is conducted at a local level, the study's results may be of interest at a global level. Wiki-assisted learning could potentially develop teaching and learning for the better if it can enhance students' SRL skills (Pange, 2014) (see sections 1.3; 3.3.2; 3.4). In fact, several Saudi researchers have already highlighted how important it is that students take on the responsibility for their own learning while completing a degree (Al Sahli, 2012; Alotaibi et al., 2017).

Taking into account the important role that web 2.0 technologies play generally in education, and the leading role that universities in Saudi Arabia aspire to, the Saudi Ministry of Education has expressed interest in exploiting the many advantages that online education has to offer, particularly in higher education institutions throughout the country. Web 2.0 technologies are considered to be among the most important types of online learning across the world of modern-day research (Czerkawski, 2010; Lee & McLoughlin, 2010b; Pelet, 2013). Furthermore, Alharbi (2013) and Alzahrani (2013) state that a blueprint is needed for online learning via web2.0 tools for future strategic developments for the betterment of student learning.

There is still a great deal of research required on the implementation of web 2.0 technologies as learning platforms, as well as encouragement in the education sector for students to focus on their SRL skills. This study will help to fill this research gap. First, however, given the distinctiveness of the Saudi culture, the next section discusses cultural influences linked to the adoption of technology and especially web2.0.

2.10 Relationship between culture and technology via web 2.0 tools

In the sections above, it was indicated that the use of web 2.0 tools among students at Saudi universities was limited. However, there is little information about the situation of female students at PNU, since most studies have been performed with male students (Alhojailan, 2013; Alzahrani, 2013; Balubaid, 2013; Alghanmi, 2014; Alblehai, 2016), due to the fact that technology was first deployed in these universities. Given the traditional constraints on girls' and women's activities and interactions in the Saudi context; it is important to discuss the peculiarities linked to culture and how it may limit the use of web 2.0 technology among female students, as well as how it could affect the students' attitude towards technology.

According to Hofstede et al. (2010), culture can be defined as a group of beliefs, attitudes and norms that are shared by one group of people, and which are manifested in their behaviour. Hence, culture could affect all aspects of life, including education. As mentioned above, the culture of Saudi Arabia is based on Islamic law, which governs all aspects of life. Nevertheless, there are multiple interpretations of Islam which, over the years, have been confused with some conservative social values, and could be invoked to impose constraints on various behaviours, especially for women. For example, in Saudi Arabia, although Islam encourages education for all, females have had a struggle in terms of gaining their right to receive an education, leading to high levels of inequality in this area (Alkhalaf et al., 2011; Alhareth, 2014). Efforts are being made to improve girls' education, which had lagged behind that of boys due to the fact that gender segregation had once been used to restrict the education of women in specific, more traditionally male, career paths and subjects (Alsuwaida, 2016). An example of theses efforts is the government's introduction of a policy for equality in the right to an education in 1970. Nevertheless, conservative attitude persists particularly in the central regions in Saudi Arabia, such as Riyadh (the location of the focal university – PNU) where, as Alharbi (2014:61) points out, "full power of society resides". This could therefore represent a further level of influence on the collected data in terms of the level of acceptance of technology and motivation to use it. This is in comparison with more liberal areas of the country where technology use by females may be more greatly accepted by society.

Further to the above point, Alhareth (2014) and Alshaghdali et al. (2014) point out that there are four cultural factors that affect female students in terms of reaping the benefits of teaching by online education. These are the conservative, tribal social culture; families'

willingness to allow their female members to use technology to learn; the way families view the culture of the use of the internet in daily life; and finally, the level of encouragement given by the government to females to take up online learning (Aljaber, 2012). Samovar et al. (2009) point out that there is a strong link between culture and general learning (which should, by extension, include any online learning). This is shown in the way students prefer to learn material. Based on the above points, it is highly likely that the impact of social and religious beliefs on women's education will require investigation (Alhareth, 2014).

In some cases, conservative social values discourage use of technology, especially access to the internet, due to a fear that exposure to foreign values will encourage immoral behaviour, especially among girls, whose morality is more closely guarded (Amoudi & Sulaymani, 2014). Some also do not allow girls to use technology in learning because they worry that it will lead to them mingling with the opposite sex (Alkahtani, 2012). This cultural peculiarity has been reported by some researchers to have hindered the implementation of online learning for girls (Smith & Abouammoh, 2013; Alhareth, 2014).

In contrast to such concerns, there are arguments that use of technology in education can help alleviate the impact of culture constraints. For example, in Saudi Arabia, segregation means that female students are normally only taught by female teachers. In higher education, if no female lecturers in a particular discipline are available, then they are taught by a male lecturer via closed-circuit TV to avoid direct interaction (Alsuwaida, 2016). In the online environment, where students and teachers are not in the same physical space, there are fewer restrictions; thus online learning via wikis could perhaps expand the educational options and resources available to female students, allowing for more equal opportunities in learning by allowing mixed-gender collaboration.

Moreover, the official government attitude towards technology in learning is supportive. The government wishes to use education to produce a workforce that has the skills the nation needs to develop, and has accordingly promoted the education of females. Moreover, it has declared a commitment to the use of technology in learning. This stance has been predicated on the rationale that Saudi Arabia faces competitive pressures in a globalised world and its students must acquire the same skills as their international counterparts (Hamdan, 2014; Pavan, 2016). However, it may not have taken full account of the impact that culture has on education (Amoudi & Sulaymani, 2014), including online education, or it could be that the government faces some challenges in achieving the balance between traditions and globalisation (Pavan, 2016). Pavan (2016) (citing

Alhareth 2015:121) maintains: “Saudi Arabia is a socially and religiously conservative country. It has a high cultural homogeneity based on tribal and Islamic affiliations and therefore has a unique and complex culture. The government faces great challenges if it is to achieve its goal of development, and fundamental changes in the way society is conducted are needed”. Its mistake may lie in trying to implement technology into the learning process, without first educating the population about its relevance and importance to future development (Alebaikan, 2010; Alshahrani, 2015). If this were done, Saudis may not have such a rigid mental image of technology and its negative effects (Amoudi & Sulaymani, 2014). It is fair to state that the population really needs to be educated carefully about the use of technology so that they feel more comfortable embracing it. This may be achieved through local sessions in the community, for example.

A study by Almunajjed (2009) states that the advancement of education has been hindered in Saudi Arabia by a great resistance to change, which originates from the dominant intellectual and conservative religious trends that are prevalent among its population. According to a study by Algamdi and Samarj (2016), there are several challenges related to technology facing higher education institutions, for both staff and students. This is particularly so when either the institution or the individuals concerned are new to the field of e-learning. The study findings reveal two principal reasons why people are reluctant to participate in e-teaching: resistance to change and technophobia **(**Alasmari, .(2014

Despite challenges, there are indications that social culture is gradually changing to become more accepting of technology. Alasmari (2014) suggested that the implementation of technology in learning may bring a reduction in workload for teachers, despite concerns laid out in his literature review that online learning may increase workload. It should, however, be considered that for this to be achieved in Saudi Arabia, the government would have to implement an entirely new strategy, and not necessarily copy one already successfully implemented in the West (Almalki & Williams, 2012). Alasmari’s Saudi case study also used mixed-methods to discover that students, as well as their teachers, hold positive perceptions about using online technology to learn. The large sample size (228) adds weight to Alasmari’s positive findings. Alasmari nevertheless highlights that, despite advancements in technology, there is still a long way to go in Saudi Arabia. Alasmari argues that more effort must be made by higher education institutions and their staff to incorporate technology into each student’s personal way of learning. The author also mentions a number of technological issues that would challenge higher education systems in Saudi Arabia, such as a lack of technology infrastructure, and

general internet connection issues. Thus, in this study, the researcher was aware that such problems could be faced in the learning environment when applying the main study and thought about the best solutions to prevent such problems (see section 4.11.1).

All of the above-mentioned points could help to explain why there is a limited use of web 2.0 tools among students at PNU, although this study does not intend to and will not cover the factors related to the slow response to technology in learning. Rather, this study explores the students' attitudes towards wiki technology and whether such attitudes are related to culture. Nevertheless, this section has provided the reader with background information about culture with regard to using technology in learning. This will help the reader to better understand the context of the study, in order to interpret the results in a later chapter.

2.11 Summary

This chapter has presented the relevant background information on the education system in Saudi Arabia, describing the objectives of higher education in Saudi Arabia. The education sector is highly influenced by Islamic values, and males and females are not allowed to interact face-to-face during their education. This is an important advantage of online learning, as it allows mixed-gender collaboration, which may increase students' exposure to different ways of thinking. Online learning also potentially has an important role to play in Saudi Arabia in filling in the gap between the students wishing to attend university and the places available, as well as the gaps between males and females in terms of their technological prowess and confidence. This chapter has explored the education policy in Saudi Arabia and the challenges that the education sector, and especially higher education, faces in trying to achieve the objectives set. It has also provided background information on the focal university, PNU, and discussed the current situation in the country regarding online learning and web 2.0 technology. Evidence and arguments have been presented in favour of the possibility that teaching through web 2.0 technologies via wiki and applying SRL skills could address the many shortcomings that have been identified in traditional education approaches in the Saudi culture. Research in this domain could create a stepping stone towards a better understanding of the reasons behind both positive and negative attitudes towards the use of technology for learning in a Saudi context, specifically from the perspectives of female students.

The next chapter is the literature review and it will break down the different concepts relevant to web 2.0 tools, wikis and SRL skills, in light of the most recent research in the field. Based on the analysis of core literature, the chapter will enable decisions to be made by the researcher on how a wiki can best be used in her study to enhance SRL skills among students.

3 Chapter Three: Literature Review

3.1 Introduction

The previous chapter outlined the higher education system in Saudi Arabia as the context of this study. The previous chapter also investigated the current state of online learning in Saudi universities, and PNU particularly (as the sample source in this study). This chapter focuses on a review of the literature available on web 2.0 technologies, specifically wiki, and on SRL skill enhancement via online learning platforms. This will inform the researcher on how wiki technology may possibly be utilised to enhance SRL skill development among students studying at PNU, Saudi Arabia, in the most effective manner.

As mentioned in the previous two chapters, there is, globally, a striking lack of research in the area of wiki being used as a medium to develop SRL skills, and this extends to studies in a Saudi Arabian context (see sections 1.3; 2.9). A systematic and structured approach was applied to search for previous studies in the areas of wiki as a part of web 2.0 platforms and of SRL skill enhancement (see Appendix 2). The researcher chose the previous studies based on the following criteria.

1) Studies were restricted to theses, academic papers and books published in English between 2010 and 2017. It was important to have up-to-date studies, since technology changes quickly, as does its use in education institutions. English language sources were selected because most of the research in the area has been done in Western settings and published in English, as well as to make the materials accessible to readers, given that the study was conducted at a British university.
2) The quality was controlled for by using the advanced features of the electronic research database "Summon" to include only PhD theses, conference papers, books and journal articles. The latter were preferred since they had been peer reviewed.
3) The researcher identified key words for searching based on the topic of the research (See Appendix 2).
4) The search was refined to the areas of education, learning and educational technology because these areas were linked to the aim of this study.
5) Finally, a filtering stage was undertaken during which the researcher read every single title of each article to confirm if relevant. If so, the abstract was read to check if the paper was linked to the aims of the current study.

The above process led to the identification of a number (170) of relevant studies, all of which combined a wiki platform or technology in general with the aim to enhance SRL skills or one of these skills. The Critical Analysis Skills Programme systematic review checklist (CASP, 2018) was used to confirm the quality of the studies included.

Based on the above-mentioned search, the researcher took the decision to separate wiki, as part of web 2.0 technology, from SRL in the first instance, allowing the reader a more in-depth insight into the two core areas of this study. The studies produced by the search above will, throughout this chapter, provide clarification on how these two core areas match up, through careful, analytical reviews. Whilst the systematic review was conducted to identify previous studies directly connected to the core theme of the research, a discursive review was conducted on other areas relevant to the research, in order to allow a broader discussion of background issues.

The first section represents the studies that used web 2.0 platforms via wiki to enhance the learning of students in educational institutions. The second section represents the theory behind SRL skill development and how, according to published studies, SRL skills may be enhanced through the use of web 2.0 platforms such as wiki. Great care was taken to represent studies in the global arena but to focus especially on studies that may be perceived applicable to the Saudi higher education context, in order that data interpretation may be carried out most effectively in the later stages of this study.

This chapter draws on the advantages as well as the potential drawbacks that web 2.0 learning platforms may bring with them and offers a review of wiki in previous research. The attitudes that students hold with regard to the use of wiki are also highlighted by analysing previous, mainly qualitative, studies in order to inform practices in the current study.

The focal point in part two is the way in which the SRL sub-skills listed under executive function and evaluation skills have been enhanced in previous studies, highlighting specifically the use of task and site design. A brief resume of the literature available on Zimmerman's Cyclical Phase Model, and the popular Salmon Model and its application in other studies is provided to justify its use in this study. The role of the teacher during intended SRL skill development among learners is also investigated in order to identify key literature that offers clarification on the balance of teacher support

and intervention. Key research on the social constructivist learning theory as a backdrop for SRL development is also investigated. This ensures that the research questions detailed in Chapter 1 (see sections 1.5; 3.6.3) and their responses are supported and informed by solid studies and research. The ultimate intention of the review is to ensure that the utilisation of wiki in potential SRL skills development for all students in higher education in Saudi Arabia, particularly at PNU, may be even more strongly justified than in Chapter 2.

3.2 Web 2.0 technologies

Web 2.0 stands for the expansion and development of World Wide Web application usage (Paily, 2013; den Exter et al., 2012; Bennett et al., 2012; Echeng & Usoro, 2016). O'Reilly (2005) first used the term in order to refer to the modern interactive generation of internet application services that crucially allow users or learners to *create* their own content (Al-Hojailan, 2013; Balubaid, 2013, Brown, 2012; Rahimi et al., 2015b). Web 2.0 tools facilitate communication and interaction that is unique to technology-based learning (for example, distributed participation through the use of a discussion board, see section 6.2.3.4) and not simply a copy of the interaction that would be found in a traditional classroom (Bennett et al., 2012; den Exter, 2012; Brown, 2012; Al Jeraisy et al., 2015; Echeng & Usoro, 2016; Palaigeorgiou & Grammatikopoulou, 2016).

Most web 2.0 applications go a long way to enhancing this technology-specific type of learning interaction. They attempt to draw learners in with their copious features and functions. In this respect, web 2.0 differs from its earlier counterpart, web 1.0, which simply *describes* information for research purposes and is a form of one-way communication that offers a read-only approach (Cifuentes et al., 2011; Madar & Abdikadir, 2015). Web 2.0 offers two-way communication and allows not only reading but also writing and therefore editing. Guzzetti and Lesley (2015) further clarify that web 2.0 sites, in contrast to web 1.0, often attempt to create *portalization,* which is an effort to incorporate every possible feature into the site to avoid a visitor leaving it. Personal Learning Environments (PLEs), such as wikis, could be viewed as *portalized* sites since they offer bundles of content and a range of tools such as links to appropriate blogs, YouTube, Flickr, etc. all in one place, coordinated by the tutor, leading to a centralised and standardised learning experience (Guo et al., 2010; Dabbagh & Kitsantas, 2012), while still offering the autonomy required to students via, for example, the discussion

board, so that they may develop into more independent learners. In this regard, McLoughlin and Lee (2010a) believe that, when applied appropriately, web 2.0 tools can pass control over to the student by fostering a sense of *learner agency* and *autonomy* that combine several real and virtual learning spaces free from physical, locational and organisational limitations.

From the comments and definitions above, the researcher is reminded that, just as inspiration draws in students in a teacher-led classroom (perhaps created by a witty orator or simply by an intriguing topic), the positively viewed asynchronous as well as synchronous functions of the wiki site used in this study (which will be detailed in a later section 3.3.2), would need to be employed at every given and relevant opportunity to ensure maximum engagement and a lack of distraction among students. Billings (2012) also states that there is a need to adopt the use of web 2.0 technologies that offer *ease of use* in terms of features and tools. Although attracting students to learning through the use of such a platform may aid their progress and skill development, it is the planning of how to use web 2.0 tools which may increase the effectiveness of that process. If the role of both the teacher and the learners during learning tasks are clarified, and teachers and learners are trained to use web 2.0 platforms effectively, students may reap more rewards in terms of their skill development as the process may be deemed more valuable (see section 3.4.2, the effective learning process).

Several research studies confirm that web 2.0 technologies allow users to communicate *effectively* with each other, simultaneously accessing information by using the Internet, as well as creating their own content (Billings et al., 2012; Bembenutty, 2011; Dabbagh & Kitsantas, 2012; Echeng & Usoro, 2016). Web 2.0 platforms are applied for this purpose in higher education institutions worldwide since they offer the possibility of engaging students in their learning, while increasing social interaction with other students who are grappling with the same academic content (den Exter et al.,2012; Bennett et al., 2012; Al-Hojailan, 2013; Usman & Oyefolahan, 2014; Aljeraisy et al., 2015).

The potential of web 2.0 is therefore particularly significant in contexts, such as Saudi Arabia, where learning has traditionally been undertaken in traditional, hierarchical lecture-based formats. In such environments, web 2.0 approaches offer a particularly stark contrast, and potentially significant improvements. This highlights the need for and value of this study in a Saudi university (see sections 2.3.1; 2.4).

Criticising *traditional* approaches to teaching and learning, Alnassar and Dow (2013) and Alshahrani (2015) recognise that the relatively weak performance of students in Saudi Arabia has often been blamed on a teacher-centred pedagogy, expressing the dominance of the teacher and therefore a lack of focus on students' independent development of learning skills. They also highlighted that research is required into alternative learning methods that can be employed in the Saudi education system, especially those that develop self-regulation among all students and that allow students to learn in a manner that is more personal to them. Some authors suggest that teachers would also benefit from handing over the responsibility for learning to their students, due to the time constraints that are typically associated with the teaching profession (Alnassar & Dow, 2013; Melero et al., 2015; Ololube et al., 2015).

It can be determined from several previous studies that web 2.0's purpose is to promote interaction with each other and knowledge sharing among its users (Kulakli & Mahony, 2014; Madar & Abdikadir, 2015; Echeng & Usoro, 2016). A specific point of interest regarding this form of interaction, in the Saudi context is that it may abate social anxiety and the *cultural shyness* of female students studying in Saudi Arabia's higher education system. Tubaishat (2008) observed this phenomena in Zayed university, an all-female university in the UAE, which is similar to Saudi Arabia in culture, society and religion. Tubaishat highlights that social expectations for male and female students are different and, most interestingly, that in this all female setting, 74.2% of the students reported that they were more comfortable posting their views on discussion boards in comparison to having to speak in a *traditional* classroom setting. Students also reported increased levels of confidence in expressing their own ideas, with 85.6% of students stating that they were more satisfied with their education when working online. Furthermore, Tubaishat (2008) also reported that female students actually interacted less in a *traditional* classroom compared to when they used a discussion board. For further information on cultural and social characteristics that may affect the sample cohort in this study, see sections 2.3.1 & 2.10.

Although the social nature of the online learning environment is clearly reported to be a positive experience in the above-mentioned studies, the potential negative impact of the *social nature* of web 2.0 tools is often still overlooked (An & Williams, 2010). The above studies tend to focus rather biasedly on the positive aspects of *social learning* and ignore

the potential distraction from learning that it could introduce to students. In the current study, measures needed to be taken to ensure that discussions are monitored regularly by the tutor. A balance between the strict guidelines of "netiquette" and the licence of creativity afforded to the students in terms of content needed to be struck.

In addition to the above, a review of the literature available (specifically detailing negative impacts on students using web 2.0 tools as a learning platform - which will be further detailed in a later section), highlights an array of issues that needed to be thought through, prior to beginning the study at hand: Of specific interest to the researcher is the study performed by den Exter et al. (2012) which sought to explore the use of web 2.0 technologies for peer learning in a higher education context. The review of the literature performed in den Exter et al.'s study included an in-depth, and widely accepted, analysis of strengths and weaknesses that web 2.0 technologies can present to teachers and students, highlighting the areas that would need to be fully incorporated in this study, in order that web 2.0 tools could be used effectively by the cohort of selected learners. These key issues include: content, process, guidance and teacher presence and design; all of which were also laid out as focal points by a previous study by He (2011). These form the premise of the literature review on learning hindrances using web 2.0, especially wiki, in a later section of this chapter (3.4) and informed the researcher of possible mitigating actions that would need to be taken in the current study. First, however, the functions and reported benefits of wikis as a leading web 2.0 application for learning are discussed below.

3.3 Wikis:

This section is broken down into sub-sections detailing wikis' position amongst other web 2.0 applications, their functions and potential capability to develop SRL skills among students. It offers an in-depth analysis of research focusing on typically-used wiki functions, which opens up questions regarding the implementation of such functions in the current study.

3.3.1 Wiki as a front-runner in web 2.0 applications

Many previous studies have reported the benefits of using wikis in higher education (Alzahrani, 2013; Alias et al., 2013; Katzlinger & Herzog, 2014; Camacho et al., 2016; Ng, 2016). Indeed, the use of wikis has become increasingly prevalent in higher education among both teachers and researchers (Carney-Strahler, 2011; O'Bannon & Britt, 2012; Roussinos & Jimoyiannis, 2013). Moreover, in higher education globally there is an increasing use of wikis for academic purposes, to exploit the potential educational value of wiki technology for supporting learning, both inside and outside the classroom. This is thanks to its ability to allow students to build content and interact with each other and their teacher throughout the learning process (Judd et al., 2010; Roussinos & Jimoyiannis, 2011; Salaber, 2014).

Other web 2.0 applications do share similarities with wiki: for example, blogs, wikis and discussion boards share several similarities such as the ability to publish to the web, encouragement to collaborate, allowing users to post opinions and ideas as well as comment on other's work (West & West, 2009). Nevertheless, subtle differences ensure that each of the three is applied for very different learning processes. Studies by Dabbagh and Kitsantas (2012) and den Exter et al. (2012) set out a clear explanation of the differences between a blog and a wiki: blogs are applied, in the first instance, as a *private* journal, replacing the typical paper trail, to set objectives. This is followed by active encouragement from a tutor to *allow* comments to be made on the journal, entirely at the student's discretion, the individual student being very much in charge of his or her work's fate.

On the contrary, wikis should be viewed by the student as a *way* to file their work in the first instance. According to Bembenutty (2011) Kitsantas and Dabbagh (2011); and Kitsantas (2013), wikis are used in higher education across the world since they offer many opportunities to share and elaborate on note-taking, which is important in the enhancement of the self-record skill, an aspect of the self-regulated learning skills investigated in this study. Following being used as a way to file work, a wiki task or full page created by the administrator may then potentially be utilised to increase communication (Lee, 2010a), peer learning (Alzahrani, 2013; Lai & Ng, 2016; Biasutti, 2017) and feedback, as well as tutor-student feedback. At the same time, the students are aware that they can navigate back in time to track and revise changes made to their "file of knowledge". This positive view of wikis is shared by Aydın and Yıldız (2014), who

claim that, despite the fact that other online learning platforms, such as blogs and journals, allow for discussions, teachers may often find that wikis offer the best of all educational technology available. This may be due to the fact they afford students the opportunity to *own* their learning via individual and collaborative tasks, therefore also increasing the level of student autonomy in the learning process. It must, however, be noted that the studies detailing these benefits of wikis are all case studies and there is no guarantee that the same benefits will be identified in the context of this study.

In an attempt to increase the effectiveness of wiki use, some studies (Dabbagh & Kitsantas, 2012; Kitsantas, 2013) have suggested a framework on how to use wiki including design and learning guidance ideas that would potentially support the enhancement of a number of SRL skills. The need for a clear, purposeful design is also highlighted by Barbera et al. (2013), who suggest that wikis can help to remove time management issues through the enhancement of distributed learning through clear layouts. Wikis can also help teachers to analyse student progress better and ensure that students continue to write, think and question independently through the correct application of functions that may enhance SRL skills (see section 6.2.3). Such attributes may have led a number of authors to believe in wikis superiority in the field over other web 2.0 learning platforms (Avci & Askar, 2012; Aydın & Yıldız, 2014). The next section focuses in more detail on the specific capabilities of wikis, pertinent to this study.

3.3.2 Wiki's functions – a summary of potential SRL-fostering capabilities

In terms of wikis' potential facilitation of SRL skill enhancement, it is widely reported that they offer three specific features: editing, discussion facilitation and history tracking (Gokcearslan & Ozcan, 2011; Hadjerrouit, 2011; O'Bannon & Britt 2012; Li& Kim 2016), as has been partially covered under a previous section (3.3.1).

Firstly, the editing function allows users to change the page's content, therefore seemingly affording all students the opportunity to control and contribute to their understanding of curriculum knowledge (Hadjerrouit, 2014; Peled et al., 2014; Cilliers, 2017), and thereby potentially practising the sought-after SRL skills focused on in this study, such as *building content*. Although conducted in a different culture, Lin and Yang's (2011) mixed-method study, using a smaller sample of 32 higher education students, was able to identify some of the most valued and least valued functions offered by wiki. They

found that a wiki learning community provides flexibility and authenticity in editing content thanks to the fact that workers can login simultaneously, allowing real time contributions from all learners involved in the process. Secondly, Hadjerrouit's study (2014), conducted with a smaller cohort of older students, also confirms through empirical analysis of students' activity on a wiki, and through peer feedback on contributions, that wiki is able to foster *asynchronous and synchronous written interaction* between learners by affording students possible clarifications and by posting comments on the course content on the discussion board. It is very interesting, however, that Hadjerrouit's cohort perceived there to have been less interaction than had been expected by the researcher. This may be due to the smaller sample size of 16 which can, of course, make results appear more severely positive or negative. Nonetheless, Hadjerrouit's study still indicates that the tools provided by wiki may give learners an effective opportunity to give and receive feedback to and from peers.

Adding content to a wiki page is a task that requires a certain level of social interaction. Indeed, one of the most prevalent features of wikis is their social nature, fostering *distributed participation* as well as group collaboration. Hence, this is a feature that is portrayed as having the potential to help to provide skills of peer learning and peer evaluation as a part of SRL (see Section 3.7.4) (Lin & Yang, 2011). It is therefore unsurprising that discussion boards are some of the most frequently used online tools in higher education, Aljeraisy et al. (2015). Pifarré and Li (2012) as well as Xia et al (2013) Akinul et al. (2017) also feel that discussion boards promote the enhancement of classroom dynamics through the possibility they afford to students to discuss course topics. This allows for a deeper level of reflection, since students are given time to research their answers, unlike in a traditional classroom where a certain immediacy is required of answers. Aljeraisy et al. (2015) do, however, indicate that, despite the many advantages that discussion boards can offer students, they can only be of full use to the student with some form of expert or teacher intervention, where subtle guidance towards learning goals encourages the learners to be independent in their own skill development but also ensures they go down the correct path. Furthermore, communication and interaction fostered by the use of discussion boards on wiki specifically are hailed as being important developments in internet technology by Alharbi (2015a) and Khalid (2016). They conducted a study into teacher presence and its impact on students' course satisfaction in Malaysia in an effort to enhance online learning in higher education institutions employing a Learning Management System. Although the study at hand

actually focuses on attitude instead of satisfaction, Khalid's study still highlights an important finding in terms of positive attitudes from students; the results indicated that students who saw a higher level of teacher presence in online discussion forums were more likely to indicate a much higher level of satisfaction or a higher positive attitude when using the online environment to discuss. Rather unusually, this study used a quantitative approach, which Liu et al (2010) and Wang and Vásquez (2012) claim is rare in this field nowadays. The lack of in-depth student interviews post wiki learning meant that attitude could not be gauged in significant detail, as is the intention of the present study.

Thirdly, the ability to track history is also described by Lin and Yang (2011) as highly useful; through this function, users can view both the original and edited content, making it easier to compare old and new information. According to Avci and Askar (2012) because of content editing, wikis are more flexible than blogs. With wikis, each individual has an equal right to change the content and monitor others' changes, while with a blog, those who own the entry retain the right to edit and monitor content changes and followers can only add comments as a separate element to the text. Furthermore, the fact that wikis can be retained after a project has been completed by a group of students means that a record of work can be kept (Gokcearslan & Ozcan, 2011; Page & Reynolds, 2015; Zheng et al., 2015) and deletions can be recovered easily (Hadjerrouit, 2014; Nami & Marandi, 2014; Cilliers, 2017), therefore showing that an enhancement of the SRL skills of self-record as well as self-evaluation may in fact, be possible. In the current study, the researcher sought to develop self-record and self-evaluation skills to avoid the traditional, physical, paper trail that students often experience in the *world of learning* (Fry et al., 2014; Zheng et al., 2015) (See Chapter five).

The intention of the current study was to investigate whether or not it is possible to benefit from wiki use in such a manner that it would promote the enhancement of SRL-skills among students. This would offer a guide for how to use them to their advantage and how to create tasks that wholly seek to promote this way of learning. In this study, it is therefore hoped that extrapolating the benefits of web 2.0 tools, specifically wiki, could potentially enhance SRL skills in online learning among students. The study seeks to explore whether this is the case and if so, to what extent over a period of time, with a cohort of female students studying a module as part of an Education Technology course. The potential advantages of wiki for higher education, that other researchers have sought to exploit, are summarised in the table below.

Table 3:1Examples of wiki's positive functions that may benefit the education of learners, based on the reviewed literature above

N#	Function	Description
1	Understanding of curriculum knowledge	The editing function specifically allows users to change the page's content and allows students the opportunity to control content.
2	Flexibility and authenticity	Wiki allows workers to log in simultaneously, allowing real time contributions from all learners involved in the process.
3	Asynchronous and synchronous possibilities	The discussion board allows for *interaction* between learners on a real time basis or with a delay, over a longer period of time, if this is required.
4	Classroom dynamics	The discussion board affords to students the possibility to discuss course topics 24-7 from all locations, if they so wish.

3.4 Learning hindrances in the use of wiki, and their implications

This section reviews discussion of potentially problematic areas in the implementation of web2.0 technologies and specifically wiki, which needed to be taken into account in the design of the intervention in the study.

3.4.1 Building content

Wikis allow students to generate their own knowledge by active engagement in building content. As Begoña and Carmen (2011), O'Bannon and Britt (2012), Zheng et al (2015) and Cilliers (2017) state, students have to develop skills in dealing with information that they seek out and build content with, potentially editing it afterwards. A study by O'Bannon and Britt (2012) examined the effectiveness of creating and using a wiki to increase knowledge of web 2.0 tools for 103 pre-service teachers. This study used a mixed-method approach (survey/interview). The authors inferred, based on the participants' views, that the wiki they created may have increased the trainee teachers' knowledge of the core curriculum. The data showed a significant difference in the impact of the hands-on activities and different assignments facilitated through wiki were reported to help to reduce anxiety and make students feel more comfortable when being assessed. The authors did note, however, that the design of the project hindered the students' ability to edit pages that did not belong to them. They suggested, therefore, that educators should explain how edits are made effectively, praise student contributions and carefully observe participation to keep students on target. A caveat is needed, however; the participants in

this study by O' Bannon and Britt (2012) were students who had already elected to study a technology course and the authors selected a sample that was predisposed to be receptive to the use of such technology. Thus, the participant feedback during wiki tasks may very well not reflect views of the participant cohort more generally.

Building content is a significant advantage linked to wiki and possibly allows the development of SRL skills since, by using this function, users are no longer passive but instead active, independent members of a learning community who can contribute to the building and editing of content (Camacho et al., 2016). With the ability to track and make changes to content, editing should be an easier process than in the traditional classroom (Deters et al, 2010). Building content is an active process, that may contribute to the construction of knowledge (Begoña & Carmen, 2011). According to Alzahrani (2013), however, the process is a complex one that can be split into individual and group processes, which may be cognitive, physical or both.

Students in Prokofieva's study (2013) reportedly felt uncertain about editing others' content and working with others due to a belief that group work added to workload, as it would require more organisation than had they simply worked alone. The mixed-method study highlights through analysis of interview statements that students who earned a higher final grade for the subject did not want to extend their work through collaboration with other students in their group. Students felt it was more difficult to edit others' work without reading about the topic they had to write about using wiki and also explicitly reported that the lack of knowledge of how a wiki actually works was an issue, from which the researcher inferred that more training would be necessary in the study at hand. Communication increased over time thanks to the students becoming more familiar with the wiki, but the issue with the planning and design of wiki group tasks is not expanded upon in the article and very little is provided by way of potential solutions. The authors do, however, suggest that the tutor's role in the process may have helped the students to become more quickly accustomed to working with others collaboratively.

Students across all of the above-mentioned studies also reported that they were not confident enough in their own knowledge to *correct* someone else's point of view that they had posted, for example, on the discussion board. Some studies suggest that the process can be problematic because of the way students perceive the social dimension, specifically the meaning and implications of comments on others' work. It appears that

the students in these studies often falsely felt that they were *correcting* others, as opposed to *adding to another student's point of view.* It was therefore vital in this study that the researcher fostered a supportive environment for learning in which students would feel *equal* from the very beginning of the course. This was achieved through the provision of a clear guide and constant reminders of *netiquette* to ensure a comfortable environment. Although the many positive features of wiki reported by other researchers will be discussed in a later segment (see section 3.3.2 – wiki's functions), it is worth noting here that wikis do offer a *history and changes tracker* by which students can research the sources of any edits made, where necessary. It is also vital to note that the above-mentioned research was heavily reliant on qualitative data analysis techniques and was built equally around student and teacher attitudes. This could result in more detailed answers but also lead to misinterpretations where students and/or teachers may not have effectively expressed in words what they interpreted to be their feelings regarding their learning experiences with wiki. This could be due to a lack of communication skills or due to several possible external factors, including the country-wide lack of encouragement for Saudi students, especially girls, to express their opinions (Alanazy, 2013; AlNajdi, 2014), which could lead to girls lacking confidence in their own ideas and knowledge (see sections 2.3.1; 2.10).

In this study, students were not only expected to add material to existing content but also to add new ideas elicited by the researcher based on the main and sub topics of the lecture before documents were uploaded to wiki. Students were expected to take responsibility for searching for information to add to the content that had already been built. The process of building content on the wiki site was therefore intended to contribute to the internal process of constructing knowledge (more information about the procedure of this stage can be found in sections 4.9; 4.10). Building content is an integral part of the whole learning process that students must go through while learning using wiki. The learning process will be discussed in detail below, in the light of recent literature.

3.4.2 The *effective* learning process

Given the nature of content building with wiki, questions arise about how to encourage and evaluate individuals' contributions.

According to Lai and Ng (2011), Witney and Smallbone (2011) Lin and Reigeluth, (2016) and Stetson-Tiligadas (2016), the wiki platform could be more useful, and students might

expend more effort on wiki tasks, when clear explanations are given as to how to use the platform and when teachers are constantly available to guide their learning. This raises the question of whether learning is in fact independent, however. The answer lies the specific role of the teacher (discussed in section 3.4.3). Independent learning is still possible if the teacher is less the director of the learning and more a resource from whom students can seek help as needed (see section 3.7). The results of the above-mentioned studies also show that students appreciated the self- and peer-evaluation tasks built into the wikis, since they helped the students to understand the learning process better and how the site would facilitate it. This, in turn, meant that the effectiveness of wiki tasks may have resulted from an emphasis on the design of the wiki and the role played by the tutors.

The use of a wiki in academic courses therefore requires careful planning and monitoring of students' completed work, including clear feedback after having completed any tasks (Papadima-Sophocleous & Yerou, 2013). Across a range of literature, the potential advantages of wikis for student collaboration and group work are well evidenced but the disadvantages seem to result more from inadequate instruction (Stafford et al., 2014). From these statements, it could be deduced that certain students may shy away from responsibility if they do not possess clarity prior to a group activity commencing and therefore it is vital that, in the current study, each page offers clear explanations of the tasks with options to set individual and group objectives (Lin & Reigeluth, 2016). According to Nami and Marandi (2014), citing from Li and Zhu (2011), it is necessary to organise a structured training session in order that students may benefit fully from the wiki experience and the processes it requires. Cilliers (2107) also states that it is necessary to inform all students *how* the technology works, *how* to access it, *when* to submit tasks when completed and any additional expectations in order to avoid passivity on a learning platform such as a wiki.

The importance of this stems from the fact that students may be unfamiliar with the learning approach that underpins wiki-aided learning. Due to the fact that wikis may allow users to co-construct knowledge in the process of building content, a constructivist approach is often used in the design of wiki academic tasks, as it was in Zheng et al.'s study in 2015. These researchers used mixed-methods to investigate collaborative work between university students on wiki. A smaller cohort was used to fill in the questionnaire in comparison to that used in the current study and even fewer students consented to be interviewed at the end of their wiki course. Despite this, and the fact that the study was

set in an entirely different context, Zheng et al.'s results clearly demonstrated that the wiki discussion board did allow students actively to construct knowledge via peer and teacher interaction when building site content. Although there are limitations linked to sample size, therefore, the study seems to indicate the need for the teacher to provide pedagogical support in order that the design for collaborative learning may work, which also speaks in favour of social constructivism (see section 3.6.3).

It should not be assumed, therefore, that, because the students are of a digital generation, they will automatically know how to apply their knowledge of technology to their learning. Every effort should be made by the researcher to set out clear expectations, avoiding a situation where the teacher felt the need to intervene rather than simply guide, ultimately depriving the students of their independent skill development (see section 3.6.5).

3.4.3 Guidance and teacher presence in an online learning platform

Learning environments in this day and age have come to expect a *participatory* element from the learner, where the focus shifts from the instructor as the *font of all knowledge*, to the student being *guided* by the knowledge provider and not simply *lectured to* (Heng & Marimuthu, 2012; Goulão & Menedez, 2015; Rahimi et al., 2015a). The use of web 2.0 technologies, such as wiki, is one way in which such a shift may be reflected. In such a context, however, it is difficult to strike an appropriate balance in terms of a teacher's participation in a student's learning process: the teacher should be involved enough that the student is motivated by receiving praise and communicating with his or her instructor; meanwhile, a teacher should be careful not to remove key processes that students should go through themselves in order to learn by being overly helpful (Lin et al., 2016). Despite this, Demiray et al. (2012) suggest that the teacher should still manage students' learning from afar without being overtly involved, to ensure maximum possible progression in SRL skill development and academic progress. In the current study, this was achieved by setting out clear deadlines with reminders, a help page with clear communication systems available to all students and making the objectives of the tasks clear.

Huang and Nakazawa (2010), O'Bannon and Britt (2012) and Yusop and Basar (2017) confirm Demiray's thoughts, stating that, although students may be used to this technology in their personal lives, such attempts to apply this technology to their learning processes are not always successful. Initial guidance from the teacher and a clear site

structure is therefore required. From these studies, it could be interpreted that a clear plan for the tutor should be devised regarding when and how often positive reinforcement should be given, as well as simple guidance at task intervals (see section 3.6.5). The design of tasks themselves is integral to this guidance process and will be discussed below.

3.4.4 Design of online tasks and learning platforms

Educators must be careful not to view web 2.0 tools, specifically wiki in this case, as *instantaneously* useful in learning. According to Cifuentes et al. (2011) and Altanopoulou et al. (2015), it is the design features of learning environments that specifically need to be investigated more thoroughly in order that students' learning experiences benefit from a design that promotes maximal enhancement of self-regulation among students (Sulisworo, 2012; Alexiaou and Paraskera, 2013; Salter, 2014).

Wikis, specifically, as a learning platform, stand out from the rest of the learning platforms afforded to learners by web 2.0 developments in this area, since they are often seen as particularly efficient facilitators of communication thanks to their design (Bennett et al., 2012; den Exter et al., 2012; Hadjerrouit, 2014; Zheng et al., 2015). More specifically, one may take the study by Zheng et al., (2015) as an example. These researchers argue that wikis promote collaborative learning thanks to the design of wiki activities, particularly when the tutor has thought carefully about how to facilitate maximal interaction among the students (He, 2011; Ambreen et al., 2016). Ambreen et al.'s study demonstrated that how the site was designed to increase interactivity with course material and technology-based assessment tasks was perceived as highly influential in SRL skill development among higher education students. Students in their study perceived their levels of self-regulation to be high prior to starting this study therefore it would have been expected that it would be hard to convince students that online learning tools (Web 2.0) had aided the development of their skills. In practice, however, it was found that students considered the presentation of information and reflective tasks to be very effective in the development of self-regulation. The fact that in this case the perceptions of students were corroborated by teachers' perceptions adds to the reliability of the results, although the data collection method only spanned qualitative methods in the form of focus group discussion and individual interviews.

Several authors, such as O'Bannon and Britt (2012) and Hadjerrouit (2014), report that the *history* function of the wiki enables both the tutor and the students to research and

analyse contributions. In fact, Kear et al., (2010) refer to the equal importance of the learning design and the social elements of learning. Alyousef and Picard (2011), Suilsworo (2012) and Yusop and Basar (2017) further clarify that the design of wiki can support the cooperation among a group, rather than force the creation of a competitive environment (see section 4.9.1), as well as enhance positive peer interaction through the sharing of course information. The *design* or *appearance* of the chosen web 2.0 tool was therefore crucial in this study, since the design is the medium through which students can access and enhance course information and SRL skills respectively. It was therefore also necessary to consider ways in which students could contribute to the actual *design* and *layout* of pages and tasks themselves, as long as clear guidance was given, and whether this could lead to a further enhancement of independent learning skills. The functions contributing to the educative design process will be further clarified below, including literature detailing advantages, disadvantages and the future actions of the researcher based on these available functions (see chapter six for further clarification in this area).

In an attempt to clarify what constitutes effective wiki task design, Chu et al (2017) and Yusop and Basar (2017) draw on the point made by O'Sullivan (2013) by stating that students, in terms of design, require tasks that foster engagement in their own learning processes, demonstrate their confidence in their use of technology and offer social interaction in the process. They clarify this summary of students' design needs by stating that a wiki task should promote understanding of content as well as the development of their independent learning skills, and offer an array of tried and tested activity types that promote the above-mentioned skills. They add that it should be part of a flexible environment, controlled by the students as far as possible to avoid annoyances regarding unclear task designs that result in lower motivation to learn (Hartnett et al., 2011). A recent study by Chu et al (2017) corroborates the above: the study investigated the effectiveness of wikis for project-based learning in higher education based on the survey responses of 71 undergraduate students at a public university in Hong Kong, and interviews with three teachers. The findings illustrated that the effectiveness of project-based learning was enhanced by the use of wiki, and improved students' collaboration skills. Most crucially, it was discovered that some factors, such as students' previous learning experiences, their motivation regarding using wiki, their technical backgrounds and the appropriate instructional design of wiki tasks, deserved more attention from teachers if they were considering the adoption of wikis in their courses, since they appear to affect students' perceptions of wikis and of their own learning. This, Chu et al (2017)

suggest, may have been caused because some students, due to the factors mentioned above, may not have been sufficiently motivated to use wiki, and students may have also viewed this new learning opportunity as an increase in their workload. It is important to exercise caution when drawing conclusions from Chu's study given its small size and the culture differences of the sample compared to Saudi Arabia. Nevertheless, the outcome suggested that the researcher in this study needed to consider the design of the wiki tasks and the instructions that would accompany them carefully, especially since the cohort chosen for this study had little or no prior experience of wiki.

In addition, Cifuentes et al. (2011) further clarify that the design of a course should include objectives, guided tasks, rubrics, the possibility for peers to assess and learn from each other and edit content, interaction with the teacher and peers as well as technical guidance. This should, according to these researchers, lead to an enhancement of SRL skills without overloading students cognitively, thanks to a range of *novel* tasks that engage learners.

The research into design, thus far, has therefore revealed the need to be increase the comfort of students in editing and contributing to others' work by fostering a supportive atmosphere. To be effective, the design should be clear, with an easily accessible layout that offers guidance where needed, and with constant reminders of protocol.

Thus far, the design of wikis has often been described as a flexible resource that could be manipulated by teachers for their students' gain. The next section investigates the students' attitude towards using wiki in learning, to have a better understanding about students' views in regard to wiki learning, especially in a Saudi context, as its unique culture may affect learning with technology (see Chapter Two).

3.5 Attitude towards using wiki technology as an online environment for learning

Farzaneh and Nejadansari (2014) define an attitude as a positive or negative evaluation towards learning, and understanding students' attitudes may offer new insights into the obstacles or drivers of learning. In many cases, the effectiveness of technology implementation during the learning process depends greatly on how positively a student perceives technology (Page & Reynolds, 2015; Chen et al., 2015; Cai et al., 2017). The 'perception' or 'feelings' towards certain objects and beliefs therefore influences the ways in which an individual acts toward them (Ardies et al., 2012; Altanopoulou &

Tselios, 2017). According to Altanopoulou and Tselios (2017), attitudes toward wikis can be viewed as both the determiners and consequences of learning experiences, which they suggest may be affected by factors such as social norms, perceived degree of usefulness and ease of use of the technology, the teacher or the environment students are in, which may, in turn, impact on attitude.

For this reason, Cai et al. (2017) note that researchers investigate students' attitudes towards technology from various perspectives, some including feelings and emotions (e.g. comfort, anxiety, personal taste), some including personal beliefs about technology's social impact, level of usefulness as well as levels of self-confidence about one's own ability when using technology to learn. Twu (2010) confirms the above by stating that a student's attitude towards using wiki may involve beliefs, feeling, values and characteristics of social learning.

A number of studies have previously investigated the attitude of students towards learning when using wiki technology with all reporting an increase in students' positive attitudes (Twu, 2010; Li et al., 2011; Wichadee, 2013; Chen et al., 2015; Page & Reynolds, 2015). Chen et al. (2015) analysed attitudes based on three aspects: motivation, perceived usefulness and perceived ease of use. With a high mean score for all three areas, their multiple regression analysis demonstrates that motivation is the most vital in terms of encouraging students to perform peer-learning tasks. The aforementioned studies focused predominantly on collaborative writing and general learning as a way to encourage students to form opinions via social interaction, and therefore attitudes, towards wiki as a learning platform. Chen et al. (2015) also investigated perceived usefulness and perceived ease of use via their work on attitudes and they stated that students, on the whole, found wikis to be *exciting* as a learning platform, as did Page and Reynolds (2015). In their eight-week-long study, student excitement and motivation to collaborate was specifically attributed to the design of the wiki by the postgraduate students that took part. Similar to the current study, multiple data tools were used pre, during and post wiki, including self-reports, class quizzes and performance data in order to reach the general conclusion that attitudes were positive towards the design of wiki. Due to the methods used, this study appears to be reliable although it must be noted that the main focus was on how *designing* a learning experience and its adjoining tasks using a wiki could affect exam performance. This was based on the students' involvement with the wiki and not specifically on students' attitude towards wikis, although attitude was obviously an integral part of the process.

Papadima-Sophocleous and Yerou (2013) also explored students' perceptions towards using wikis for academic purposes. Similar to this study, the mixed method approach and a sample size of 33 allowed the researchers to conclude with some confidence that motivation among 27 students increased following use of the wiki, although the sample in the current study was bigger and stronger, at three times that size. Papadima-Sophocleous and Yerou's results demonstrate that students perceive that they are motivated, on the whole, when they have a reinforced feeling of success academically, and when they feel they are progressing with content or skills they are in turn increasingly more motivated.

In Saudi Arabia, a tribal culture prevails, which may mean that a family's willingness to allow its female members to use technology may differ and therefore females' attitudes towards technology could be profoundly different, depending on their family background (see section 2,10). Hence, based on the above points, it was of interest to explore students' attitude, in order to better understand how learners felt after a decrease or increase in their level of SRL skills after using wiki as an online environment, specifically in this context. This knowledge could guide educators and students in PNU in their understanding of how to apply wiki from a self-regulation perspective.

Previous research reports a positive relationship between students' attitude towards using wikis and the development of learning skills for example, communication skills, content assimilation and collaborative writing skills (Twu, 2010; Alzahrani, 2013; Wichadee, 2013). Twu's results indicate that students' positive attitude towards using wiki could help in predicting how much they choose to interact with others during the learning process. Twu's study collected data from the students' own perceptions via a survey. One cannot assume that all students have the same level of engagement with wiki learning, when they may have different views based on different experiences: as explained in great detail in Chapter 2 (section 2.10) the culture of a student may affect their attitude towards using wikis to learn, since their experience in a traditional classroom may have increased or decreased their confidence levels (Khan, 2011). This may have been due to the passive nature of tasks, for example. The lack of participation in the traditional learning scenario, i.e. rote memorization and the extremely formal open setting in front of many other students may lead to a reduction in self-belief among students which, in turn, could reduce motivation to learn and potentially induce a feeling of boredom among students (Albadri, 2012).

Albadri further clarifies the feeling of boredom as including tiredness during long lesson explanations. Even if this is not the case, external factors, outside of the education system, may also affect how a student feels about using technology to learn. For example, in this study, the level of freedom of speech that is deemed by an individual as acceptable in Saudi society was one external factor to be reckoned with. This point also re-emphasises the issue with students in this study potentially not feeling free enough to say how they really felt about their experiences, as well as the issue of shyness prevalent in Saudi females (Alanazy, 2013; Alsaedi, 2012; Dulaimi, 2011; Aldayel, 2017). The fact that the education system in SA is teacher-centred may also mean that students in the tested cohort may already possess biased opinions – albeit possibly of satisfaction with 'run-of-the-mill' lectures or, as mentioned above, by Albadri, boredom in such traditional classrooms**.** This is in line with Altanopoulou and Tselios (2017), who confirm the possibility of differences in attitude towards technology among students due to different social environments and the different ways in which they are guided through the learning process.

In this respect it is of interest to note that for one of these factors, national background, there is some evidence of positive attitudes in a Saudi context, from Alzahrani's (2013) study involving learners on a Biology course. The findings showed that learners possessed positive attitudes towards wikis in general, although these attitudes differed between students due to their different prior experiences of using wikis. Alzahrani also demonstrated that the content available to students on wiki pages, that they are able to read and edit, significantly influences their own advances in content knowledge. Alzahrani concluded that wikis enabled increased knowledge gain thanks to clear display of content as well as possibilities to edit, and this contributed to students' positive attitudes towards this way of learning.

It should be noted, however, that the sample size in this male only study incorporated only 31 students within the district of Abha city, which is not in central Saudi Arabia like the location of the current study's university, PNU(Riyadh). As mentioned in Chapter Two (see section 2.10) Saudi Arabia is a vast country and areas may differ in the prevalence of liberal acceptance of technology usage, especially by woman. When one compares the current study with that of Alzahrani, therefore, both the focus on a different gender and a different region could greatly affect the data. This highlights the context specific nature of the findings.

Further to the above studies, Chen et al., (2015) conducted a study to examine the attitudinal factors that impact on course knowledge and students' group work while using wikis for a writing task that was split into three stages: pre-writing, individual-construction as well as joint-constructions. The results were evaluated on three attitudinal areas: motivation, usefulness (as perceived by the student) and ease of use. Students reported mostly positive attitudes regarding how easy it was to use tools. Students also reported that they found a value in the group tasks provided by the wiki, which the researchers report may be attributed to the fact that students had previous exposure to wikis, in some cases, and therefore already felt confident using them. This may mean that, in a Saudi context, where students are unlikely to have prior experience of wikis, attitudinal data may appear to change in a more extreme manner, in a positive direction, if students are guided well through the process by the tutor, e.g. with an instruction guide tailored to their needs. Despite these positive attitudes attributed to wiki's skill-developing functions, many Saudi institutions still wonder how to adopt these tools (Aifan, 2015) (see section 2.9). Analysing students' attitudes and expectations in terms of how to utilise web 2.0 technologies effectively could therefore support learning and may aid instructors in gaining a better view of how the *digital generation* are applying online tools for learning purposes.

While the above studies indicated that the students had positive attitudes toward using wikis during the learning process, some other studies have produced contrary findings. Karasavvidis (2010) for example, claimed that, based on students' thoughts, using wikis in an academic context to promote constructivist learning actually meant that students experienced more problems with the tasks involved. The main reason given for why the learners did not possess sufficient skills to assimilate the knowledge content effectively was that they did not sufficiently enter into the process of communication and collaboration required to deal with the wiki assignment effectively. This may have been due to the fact that they were more accustomed to practices in the traditional classroom, and this interpretation appears to be confirmed in the results of a study by Deters et al. (2010), during which students offered perceptions on using wikis. Despite irritating technical problems that some experienced, students also felt the teaching should be delivered in an old-fashioned method.

This highlights again, for the current researcher, the necessity to think carefully about the wiki design, activities and teacher's role (Altanopoulou &Tselios, 2017), to avoid a negative impact on students' attitudes (see section 3.4.4), although according to Judd et

al. (2010), design is not the only element that contributes to students' positive attitudes towards wiki. The aim of the study was to assess collaborative behaviour based on the contributions trainee student teachers made to a group task in terms of the text produced and the time they used to create it. According to the researchers, the level of collaboration could have been higher, even though the cohort found the general experience rather positive. It was suggested that the thought-through design of collaborative tasks did not ensure that students would work together cohesively, especially since the researchers felt that the guidance given by the tutors in the project did not go far enough. This is unlikely, however, to have been the only reason for the failure of the design in the above study in terms of its encouragement to collaborate. The fact that students did not share the work equally contributed, rather predictably, to the students' choice to work or not work together on the wiki. Furthermore, returning to an earlier section, entitled "content" under *Hindrances and Implications,* Twu (2010) also found that, due to a lack of motivation and confidence, students were sometimes not willing to edit the writing of other learners. Wheeler (2010), rather interestingly, points out that students find it difficult to maintain their levels of motivation to study. Initially, they post, read and comment but due to a lack of time or simply feeling that posting new information is not worthwhile for their individual learning experience, students lose their motivation easily. Doolan (2011) also discovered that students were reluctant to edit wiki content. These negative attitudes of a few students towards implementing the tools that wikis offer, as part of their learning process, were attributed by the researcher to students' feeling that there was a lack of true responses and truthful communication. Such negative attitudes, regardless of their original cause, may impact negatively on the student's motivation to learn and apply new SRL skills using wiki. Wheeler's study did, however, also conclude that, where students' posts were commented on by others, motivation remained high and students felt encouraged to post more, resulting in a much more positive attitude towards using wiki.

It is also important to note that Zheng et al., (2015) quite astutely pointed out in their study that a wiki is neither solely responsible for better academic results nor is it solely responsible for a student's attitude towards using technology. The above highlights the need for a teacher to intervene and guide students' contributions, thereby creating a positive environment and experience that would maintain a positive attitude. The role of the tutor in providing guidance is vital in the support of students' learning processes, with a view to removing the superficiality of students' work, making work delegation fairer (see sections 6.2.3.1; 6.2.3.5) and maintaining motivation levels.

Insight into factors that can contribute to students' failure to engage with the material provided on a wiki page was also provided by Cole (2009) in a study involving a third-year undergraduate course module. It was discovered, based on solely qualitative data, that students could not easily separate their personal use of such sites as wiki from their academic use. It is worth noting that the studies above were performed in a 'Western' context and it is anticipated that the Saudi focus of the current research, based on a range of variables discussed in chapter 2, (see section 2.10), might reveal entirely different student attitudes, as mentioned above.

In summary, based on the literature reviewed thus far, the researcher recognised the need to explore students' attitudes in depth after careful consideration of the context of the study, e.g. the cultural constraints and peculiarities (see section 2.10), task and page design and guidance given by the tutor. This should result in a better understanding of the extent to which SRL skills can be developed via wiki. Thus, drawing on the insights from previous literature, the current research focuses more deeply on the issues raised in other studies performed in the realm of wiki as a learning platform and seeks to confirm the role played by the design of wiki pages and tasks, all the while, investigating, from students' personal attitudes, the extent to which SRL skills in students can be developed through the use of wiki to learn content for a higher education technology module in a Saudi context (see sections 4.9.1; 4.10).

Summary

In summary, environments for learning have benefitted greatly from advances in the world of technology. Delen and Liew (2016) state that online learning provides great opportunities for learner autonomy. Wikis in particular, according to extensive research, offer opportunities for learners to become more self-regulated while learning, if tasks and pages are designed in an appropriate manner. Ultimately, the aim is to foster engagement and motivation for learning, without the constraints of a typical classroom with a teacher as the *font of all knowledge*. The body of literature reviewed above also points to potential difficulties. This suggests that, in order to foster a healthy, self-regulated learning environment, the design of the tasks and pages applied on wiki pages need to be based on learning theories and research conducted in this very specific field of online self-regulation skills. The design must inspire students to be engaged in their own learning processes.

Having built up an analysis of a body of literature for the current study regarding the potential value of wikis as a higher education learning platform, it is now necessary to investigate and critique literature on SRL. In the following sections, self-regulation skills specifically appropriate to online learning will be clarified through a review of the literature pertaining to modern learning theories and models. This will be specifically in the area of skill enhancement via wiki in order to ensure that SRL skills and wiki are viewed in this study as a unified concept rather than isolated foci. Background theories such as constructivism will form the backdrop for this critique, but it is the online application of this in other studies that will be reviewed, specifically in terms of how it can work with wiki, any pitfalls that may be encountered and the implications derived for this study.

3.6 Theoretical perspectives of wiki technology and SRL

3.6.1 Introduction to the theoretical background of self-regulation using wiki

The first part of this chapter described the advantages and potential drawbacks of web 2.0, specifically wiki, in a higher education context. It also investigated wiki as a potential front runner for education, based on empirical research that was accumulated from relevant studies across the world. In the next section, the researcher provides an overview of key theories that may be applied to online learning and SRL development, describing the path to social constructivism, the use of Zimmerman's cyclical model and the Salmon model used in this study. In addition to the above, this section will address the main implications derived from the relevant, aforementioned theories, for the potential enhancement of SRL skills among students in higher education utilising wiki as an online platform for learning.

3.6.2 Selection of a theory – the path to social constructivism

Ling Lo (2012) defined a theory as a *way* of thinking and a model of the way in which things work, how principles are interconnected, and what causes things to work together (Isak &Posch, 2013). In the field of online learning, there are three major types of learning theories: behaviourism, cognitivism and constructivism (Beutelspacher & Stock, 2011). This section will introduce each theory and present the justification behind choosing the most suitable theory as the backdrop for this study.

The behaviourist theory, created by Skinner (1979), views learning as manifested, observable changes in a learner's behaviour, induced by interaction with the conditions of the environment (Weegar & Pacis, 2012). It argues that, since cognitive and internal processes are invisible and cannot be scientifically studied, the indication of individual learning is outward behaviour (Barak, 2010). The major focus for instruction should be on setting clear objectives, providing positive reinforcement, and activities providing further practice in the recall and use of information, which may be supported by online learning platforms such as wiki. Behaviourist theory, according to a study conducted by Ertmer and Newby (2013), depends on repeated efforts to attain the anticipated behaviour as well as on the provision of feedback provision. Regulation, according to behaviourist theory, is conducted via external reinforcement (Bird, 2009). In addition, learners' thoughts are not as important as their actions: the teacher should have *full* responsibility for the pedagogical tools and information, constructing content and managing the activities to ensure that learners progress using the expected behaviour. The behaviour that learners exhibit could be taken by those learners and adapted to other cycles of behaviour to form appropriate responses in other scenarios (Bruner, 1996). In summary, the function of the teacher is to provide the conditions necessary to adapt or change a learner's behaviour, reactions and actions (Ching, 2014; Zhou & Brown, 2014). Alzaghoul (2012) further points out the implications of this theory for teachers and learners; clear goals should not be set by the learner, but by the teacher, in order that the learner can effectively decide whether or not they have achieved what they were expected to (Mödritscher, 2006). A test against this learning objective would also need to be carried out, after the teacher has *shared* his or her knowledge with the class through the use of repetition.

The focus of the present study is on the learner's own potential development of SRL skills and the intention was to allow the teacher to guide instead of lecture. This theory could therefore not be consistently applied to the current research study, because the aim of this study is to explore the potentially advantageous learning functions of wiki and how they could be utilised to enhance SRL skills based on students' perceptions and attitudes towards using technology to learn. This required a structured approach but with a large element of freedom of choice for learners. This study is also not focused on changes in student behaviour and instead seeks to allow students the independence to make their own decisions about their own learning processes. Behaviourism also presents a challenge in

that it would lack focus on the social element of the study, and thus would not explain the inner workings of student interaction.

In contrast, cognitive theory has been described by Piaget (1952) to be based on the happenings inside an individual learner's mind. Cognitivists consider learning as an internal process and assume that the mastery of content learned depends on the learner's proficiency in processing the required information, together with the amount of effort exerted in the learning process, the depth of processing and the learner's prior knowledge of the information at hand (Alzaghoul, 2012). Furthermore, unlike behaviourism, cognitivism scrutinises internal mental structures and their transformation, rather than the learning that could take place in the learning environment involving interaction with content, peers and the teacher (Brockbank & Magill, 2007). The study by Afifi and Alamri (2014) stresses the importance of making connections between previous and new learning, and the recommended education strategy is to start with teaching simple ideas, then to revisit them gradually to help to create the connection between current and previous learning. Cognitive theory assumes that learners create an understanding of their surroundings, then notice differences between what they already know and what they find to be new. The learners are isolated, although also independent, work in "intensive" environments and may disregard instruction given by their lecturer, learning on "their own two feet".

In some ways cognivitism has potential for use with wikis. It emphasises the learner as an active participant in the learning process, and indeed one of the key educational influences of cognitivism has been an increased focus on active and collaborative learning (Ertmer & Newby, 2013). Cognivitism is also open to at least some SRL skills, in that it encourages self-planning and monitoring (Ertmer & Newby, 2013). It has been criticised, however, for a lack of attention to the social and cultural influences on learning, and thus too rigid a position in respect to the stages of learning (Barrouillet, 2015).

Some authors add a further theory to describe the new technology tools in learning, which is connectivism. In "Connectivism: A Learning Theory for the Digital Age", Siemens (2005:1) characterises connectivism as the "amplification of learning, knowledge and understanding through the extension of a personal network". Cheng (2013) acknowledges that the principles of connectivism are supported by web 2.0 technologies as they enable individuals to carry out learning by collaborating with other learners and sharing knowledge, rather than learning on their own by their own internal actions. Connectivism

is becoming increasingly important in the field of education as web 2.0 technologies allow control to be transferred away from the teacher to the learners, who are becoming more and more autonomous (Shriram & Warner, 2010).

This theory might not be a feasible basis for this study, however, because at a practical level, there were individual tasks for learners to complete on their own. Furthermore, several scholars, including Verhagen (2006) have criticised connectivism as they consider it to be more of a pedagogy than a theory of learning. Lange (2012) and Clara and Barbera (2014) support this view, claiming that it simply combines already existing learning theories rather than providing a new theory. Moreover, Clara and Barbera (2014) assert that connectivism does not address several important elements of learning and is therefore not applicable to web 2.0 learning. More specifically, there is no explanation of how knowledge can be accessed by learners. A further criticism of connectivism is that, as Goldie (2016) states, the evolution of interaction is oversimplified and the role of other people in the network has been under- conceptualised. Connectivism also does not provide a clear definition of the concept of development. Bell (2011) asserts that it is important to realise that, while networks play a significant role in learning, supporting teachers through collaborative technologies such as wikis, blogs and social media, they cannot be used as replacements for traditional theories.

Further to the possible background theories for this research above, the constructivist learning theory addresses both external and internal knowledge (Bell, 2011). The concept of social constructivism, proposed by Vygotsky (1978b), is inquiry-based learning, whereby learners develop their own constructions of knowledge in the light of their experiences and application of knowledge to relevant contexts (Comas-Quinne et al., 2009). The social constructivist theory is of particular interest in this study thanks to the emphasis it puts on teacher-student, peer interaction, and personal guidance based on individual student needs (Sun, 2010). This could certainly aid the successful employment of advantageous wiki functions in the development, analysis and explanation of the potential enhancement of SRL skills among students. Vygotsky's (1978b) social constructivist theory suggests that two developmental levels should be considered. The first level is referred to as the "actual" level of development. This refers to the developmental level exhibited, i.e. what a student is capable of doing or the knowledge demonstrated by him/her without another person's help. The Zone of Proximal Development (ZPD) is the second level of development (Rezaee & Azizi, 2012). This particular level of development cannot be achieved by a learner unaided but can be

attained with a more knowledgeable individual's support (Vygotsky, 1978a,b; Taber, 2011). In terms of online learning with wiki, this theory implies that the researcher should make every effort to ensure a high level of peer interaction. The design used in the study should be grounded on the concept of *guided discovery,* giving students responsibility for their own learning decisions and skill development but enabling them to receive help when necessary through the use of tutor or peer support and through illustrative examples, model answers or case studies to follow (see section 3.6.3).

From the literature review thus far, it appears that the behaviourist, cognitivist, constructivist and, more recently, connectivist theories are those most commonly applied to an online learning context (Weegar & Pacis, 2012). The behaviourist vein of thought is that the effect of a stimulus can be measured quantitatively but the theory disregards the effect of thought processes. Although earlier online learning platforms may have been based on this theory, cognitivism goes one step further than this and maintains that the inner-workings of the brain also need to be understood if we are to enhance students' learning experiences effectively. Cognitivism does make efforts to point out that memory, cognition, motivation and crucially to this study, reflection or evaluation, play an important part in learning, viewing a learner as an "information processor", as is pointed out by Alzaghoul (2012), who also said that this approach to online learning favours experiments that are qualitative in nature which may be useful in terms of solely attitudinal studies. Further to this, connectivism is interested in reflecting new, technology–enhanced pedagogies, but has shown itself to be limited in its conceptual foundation and explanation of various aspects of learning.

Overall, however, a good balance for the present study was provided by constructivism, for a number of reasons. At a practical level, constructivism supports the design of activities /tasks through which individuals and/or groups (see section 4.9) can build knowledge. It suggests that learning tasks facilitate student learning and knowledge transfer. This is applicable in the present study, which used the wiki environment as a platform enabling students to exchange ideas during work on activities as individuals, and in a group, and in make meaning through the contributions to the content\ideas\views in the wiki from different students. Also, this study was focused on self-regulated learning. Constructivism, which focuses on the situated aspect of learning, is consistent with the expectation that the teacher would support students' learning during their work on wiki activities through guiding them in tasks, setting goals and facilitating access to information resources via the wiki tool (see sections 4.9; 4.10).

Furthermore, it also supports the collection of both qualitative and quantitative data, to improve reliability. With the emphasis on the construction of new knowledge drawing on a learner's prior experiences, the research cited above suggests that this theory partners extremely well with online learning platforms such as wiki, since it demonstrates the importance of the combination of self-evaluation and knowledge construction through peer learning. Yusop and Basar (2017) highlight the link between constructivism and the use of wikis for learning by stating that students construct their knowledge by being part of their own learning pathway and via communication with peers and their tutor.

In view of all that has been mentioned so far, in this study a form of constructivist theory is applied - *social* constructivist theory. According to Schunk (2012), there are three perspectives of social constructivism: exogenous, meaning knowledge that is built up from the learner's experiences; endogenous, meaning knowledge that is connected to the working of the mind; and dialectical, which is knowledge that is built up by an individual's interactions with the environment.

The following section explains social constructivist theory and how it contributes more specifically to the present study. (Further notes on the value of this approach, as manifested in the research outcomes, can be found in section 7.3.2).

3.6.3 Social constructivist theory:

The above section has explained the value of constructivism for this study and declared the decision to take a specific form, social constructivism, as the most appropriate guiding theory in this study. This sub-section is an effort to explain in detail exactly why, according to the principles of Vygotsky's theory, education is most effective when it focuses on thinking and understanding rather than on memorization, and when it concentrates on learning *how* to process information and recall it when necessary (Aqda et al., 2011; Mrayyan, 2014). The constructivist theory was created mainly by Vygotsky, but many other researchers have contributed to the theory and the shift from teacher-centred learning to student-centred learning that it represents; Vygotsky viewed the social environment as *critical* for learning and felt that social communications changed learning experiences for the better (Schunk, 2008). Constructivist learning theory is concerned with active construction of new knowledge based on a learner's former experiences. Research shows that constructivist learning theory fits well with e-learning because it supports learning among learners (Alzaghoul, 2012). In addition to this, online learning

creates a social constructivist learning community where the role of interaction, dialogue and feedback take precedence (Bryant & Bates, 2015).

Constructivism favours putting learners in charge of their own learning and not the teacher, with the latter tasked with providing tools in order to help learners construct knowledge and form their own new ideas and concepts of learning (Barhoumi & Kabli, 2013). A teacher should not simply observe and assess students but should also discuss progress with students while activities are being completed (Alzaghoul, 2012). Peer interaction through web 2.0 can be seen as creating what Lave and Wenger (1991), cited by Lin and Yang (2011), refer to as the engagement in that community, encouraging learners to make a transition from being quite peripheral in tasks to becoming more involved in group activities.

It comes as no surprise, therefore, that many researchers design their online learning platforms based around the social constructivist approach (Inagaki et al., 2012). Further to this, Abdoli-Sejzi et al., (2015) stated that effective web 2.0 tools link well with the constructivist approach since it helps learners take responsibility for their own learning processes and knowledge construction, since web 2.0 tools offer different ways for students to deal with information, away from the formal setting of a classroom, and thus allowing students to group together as a society of learners with shared learning goals that might lead to an enhancement in SRL skills.

Vygotsky's theory of social learning fits neatly with another social learning theory, that of Bandura (1977b), who argues that acquiring or building knowledge content is intensive, and that the social aspect of learning, such as might now be provided by the interactive-rich functions of wikis, may reduce the amount of work required by students to achieve their learning goals. As Aifan (2015) astutely points out, the work of Vygotsky and Bandura offers theoretical support for online learning, since social media-rich learning platforms allow students to interact with their peers, which may help them to build knowledge more easily than in a traditional classroom.

Further to the above, it is pertinent to mention the socio-cultural and activity theory (Lin & Yang, 2011) that is based on Vygotsky's theory. This is of particular relevance to this study because it not only highlights the key principle that learning takes place with others or in a practising and learning community (Rogoff, 2008; Vygotsky, 1978b); it also highlights the fact that participation in such a practising community is also dependent on

the use of resources provided to learners by their *cultural community* (Rogoff, 2008). This is of particular interest to the current researcher, due to the very specific cultural context provided by this study and the need to research the advantages of peer assistance in Saudi Arabia (see sections 2.10; 2.3.1). Furthermore, this study sought to elicit students' perspectives, and it might be suggested that the Saudi culture would possibly play a role in students' views in regard to acceptance of technology and attitudes toward wiki (see section 6.2.2).

In the current study, the students need to be responsible for their own learning through the completion of tasks that require them to manage their own learning independently as well as in groups, constructing their own knowledge content. The use of wiki, specifically, as an active environment for learning, fits well with the social constructivist approach since it whole-heartedly promotes social and communication skills by creating opportunities for interaction with other students through the use of a discussion board and many other elements that encourage the exchange of ideas linked to course content (Opportunities that wiki offers will be further discussed in Sections 6.2.3.4; 5.3.2.1.7). Furthermore, it is worth noting that this theory is pertinent to the current study since it can help to explain the role of the teacher in students' learning (see section 3.6.5).

More specifically, the fact that the theory facilitates an enhanced explanation of the process learners face when using technology, particularly wiki technology as an online learning environment, is the key reason why the present research study into SRL skills was informed by social constructivist theory (Pifarré & Staarman, 2011; Alzahrani, 2013; Wang, 2014; Kai Ming, 2015; Rahimi et al., 2015a). It is important to note at this stage that Howe and Berv (2000) describe self-regulated learning as a learning design that permits learners to *interact* with the material through their own knowledge so as to construct their own understanding. From the perspective of constructivism, Piaget (1971) focuses on the knowledge of an individual and how learners construct knowledge. Knowledge is constructed by learners based on individual experience (Powell & Kalina, 2009; Kocadere & Ozgen, 2012). Following this, Kaya & Dönmez (2010) and Alsaggaf (2013) indicate that learning is therefore an active process involving learners constructing new knowledge based on current experience and knowledge. Individuals learn to self-regulate through control of their own engagement (Vygotsky, 1978a,b). Given appropriate instructional conditions based on the perspective of constructivism, self-regulation is primarily affected by the ZPD. The constructivist idea advocates guidance of a student's knowledge-building in order that new information be constructed to

enhance the process of knowledge construction (Sen, 2015). Also, Lin et al. (2016) point out that social constructivist views of self-regulation support the notion of external guidance as a main contributor to the self- regulation process. A social environment can also allow for guidance that is required to be provided for SRL development (Lin et al., 2016). According to Çelik (2012) and and Paily (2013), the social constructivist learning theory is essentially a collaborative learning theory in which learning is seen as a process of learner-to-learner interaction that is refereed and structured by the teacher.

This point confirms the role of guidance (and thus the teacher) in social constructivist theory and the current study confirms the importance of the role of the teacher in guiding the learners to practise SRL in online learning via wiki. This web 2.0 environment provides the social element of learning, as explained in section 3.2. Furthermore, several research studies, including Enonbun (2010), Napierala (2011), Heng and Marimuthu (2012) and Alzahrani (2013), give a description of learning through the use of web 2.0 technologies from the perspective of social constructivist theory. Sen (2015) points out that constructivist learning has been applied in a range of ways in different studies that have used wiki as a learning platform, including in ways that focused on reflective activity and communal or social constructivism.

Bryer and Chen (2012) highlight that peer-to-peer interaction while learning (as a key part of the constructivist theory) fits with the advantages offered by web 2.0 technologies thanks to the high level of focus on collaborative opportunities. A learning environment closely linked with the constructivist strategy is provided by wiki technology (Alzahrani, 2013; Su & Beaumont, 2010; Stafford et al., 2014) which was a reason for the application of this theory to this study. Vygotsky's perception of constructivism (1978 a,b) is mainly directed towards human development and learning, where various tools mediate purposeful action. Both McLoughlin and Lee (2010b) and Niiya and Warschauer (2015) state that technology enables learners to learn through dialogue, through remote interaction with each other and this potentially plays a key role in the enhancement of course content knowledge as well as SRL skills (Rowe& Rafferty, 2013). This point can be applied to wikis, as they provide a platform for such interaction. Interaction will be further discussed below, since it is a primary design feature of the online learning exhibited on wiki sites (Hampel & Pleines, 2013; Page & Reynolds, 2013; Hadjerrouit, 2014).

3.6.3.1 Interaction:

As mentioned above, a key principle of constructivism is interaction, in so far as this helps learner to create their own meaning. The wiki environment may facilitate this process by enabling easy interaction among students. “The web 2.0 phenomenon supports user development and discovery of content via highly interactive means, and the pace of the interaction is primary determined by learners” (Enonbun, 2010:17). More specifically**,** as a communicative environment, the Web is able to support many educational interaction formats (e.g. synchronously, asynchronously). Additionally, there has been a development in communication to the extent that high quality student-teacher interactions can be supported either in delayed time or in real time, individually or among groups (Garrison & Anderson, 2003).

Figure 3.1 demonstrates the types of interaction referred to in the studies by Garrison and Anderson (2003: 43).

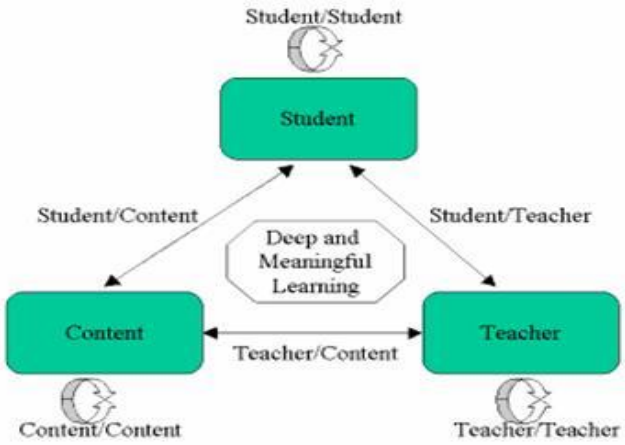


Figure 3:1The types of interaction (Garrison & Anderson, 2003:43)

As seen in figure 3.1, and according to Garrison and Anderson (2003) and Cho and Kim (2013), there are three aspects of interaction: interaction between the instructor and student, interaction between students, and interaction between the learning content and the student. These three aspects are essential to a successful online learning experience.

When using wiki technology as an environment for learning to practise SRL skills, students interact with the content and share different resources related to the content through developmental self-regulated learning tasks. Students can also demonstrate this

point by using the *taking notes* function to write important ideas related to the course content included in activities (Kitsantas, 2013). Regarding the interaction between a teacher and a student, it is necessary to say that along with regular peer feedback via discussion boards and one-to-one tutor-student feedback, wikis may also help to facilitate communication, enhance understanding of the module and boost the students' confidence levels in approaching the tutor remotely for assistance (Hadjerrouit, 2014). Moreover, the interaction among students is social communication in learning which enables students to create richer knowledge compared to when they must work on their own, as they would in a traditional lecture (Garrison & Anderson, 2003). The previous statements can be supported by the evidence of Prokofieva (2013), who investigated interactions occurring in a wiki-based collaborative learning project among 39 students at a metropolitan Australian university. The results showed that students' interactions online were of two types, student-content and student-student. Although, student-content interaction was dominant, the author reports that student-student interaction occurred as learners shared knowledge with their peers and received feedback. The study also suggests guidelines on how student-student interaction can be encouraged, for example through wiki-design.

Based on the above argument and evidence, this theory may be suitable in the interpretation of how online learners could build or gain knowledge through their own experience and interaction with content of an Education Technology module via wiki by completing tasks as individuals with peers as well as with their tutor's guidance. Whilst social constructivism provides a theoretical foundation for the potential benefits of online learning and supports students' active role and responsibility in learning, it does not in itself, focus on SRL. Various researchers, however, have developed models purporting to explain such skills and how they can be developed through online learning. These are discussed below.

3.6.4 Models for online self-regulated learning:

As stated by Anane (2014), self-regulation is viewed as a combination of many areas; hence, in this study, theoretical self-regulated learning models will be explored for more clarity on how learners become more self-regulative. The self-regulation model of learning includes a key group of abilities that students must acquire to improve their academic skills, such as goal setting, choosing, planning and applying strategies, and self-monitoring one's effectiveness in learning (Zimmerman, 2008, 2011), so that their learning is formed by a framework of motivation and strategy use in an academic context.

Research into SRL has led to a number of theoretical models being proposed in an attempt to discover the various variables that compose SRL. Such models include those devised by Puustinen and Pulkkinen (2001); Winne et al.(2001); Pintrich (2004) and Zimmerman (2008, 2011).

In this study, Zimmerman's three phase model (2011) is the focus in part because it is the most up-to-date model available for use with web technologies (Rebenich, 2012). Moreover, this model is the most popularly used in recent studies that have examined the combination of web 2.0 technologies and SRL skills (Huang et al., 2012; Rebenich, 2012; Alexiou & Paraskeva, 2013; Pange, 2014) and this will support the comparison of the results of the present study with those of previous studies. For example, Pange (2014) used Zimmerman's three phase model in order to support self-regulation in an online learning environment. He applied this model with self-selected groups of undergraduate students using ICT (e.g. Facebook) and also to give information about the procedure and the learning outcomes. The results showed that this learning model can help groups of students to develop self-monitoring benchmarks/regulations, structured self-monitoring, learning motivation, goal setting, action control and learning strategies. Thus, the researcher used this model in this study to provide a framework for understanding how self-regulated learners follow three phases to complete a *cycle* to help/guide them in how to apply SRL skills in wiki. These phases are expanded in Zimmerman's Cyclical Model of Self-Regulated Learning, explained below.

3.6.4.1 Zimmerman's Cyclic Phase Model:

Zimmerman's model was developed from the social cognitive theory proposed by Bandura (1991); it focuses on the extent to which learners are capable of becoming metacognitive, motivational and behaviourally active participants in their own learning and sets out to explain human actions and learning through the interactions between behaviour and the environment (Zimmerman, 1989; Zimmerman, 2011). The cyclic phase model involves three phases, according to Zimmerman (2008, 2011) which are forethought, performance and self-reflection, as illustrated in figure 3.2 (Zimmerman, 2008, 2011). These processes are said to aid students in self-motivation and guidance in terms of their own learning.

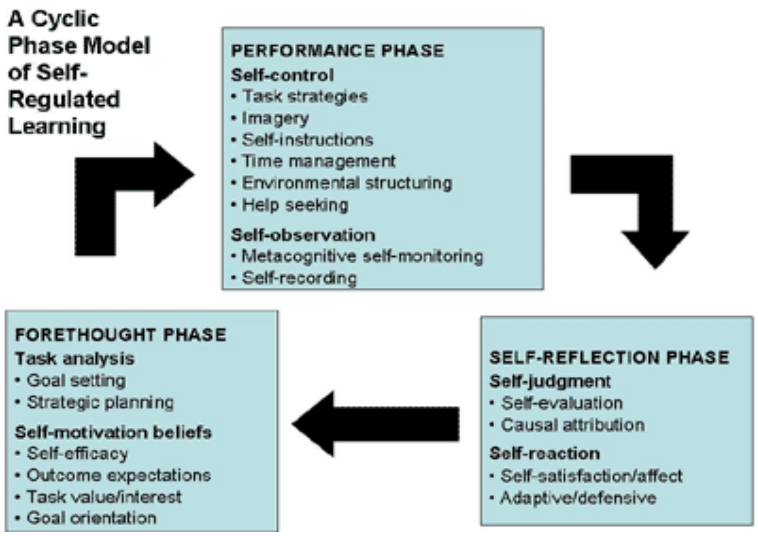


Figure 3:2 Model of Self-regulated learning (source: Zimmerman 2008, 2011).

The first phase, the forethought phase, incorporates two main sources of self-regulation: analysis of given tasks and self-motivational beliefs, which both aid students in preparation for their learning. After having analysed their prior knowledge, students create their own learning goals and decide which strategy to use. For example, goal setting and planning skills are included in this phase. Self-efficacy also plays a role, not only in the forethought phase but also in other phases, which will be discussed later. The second phase (the performance phase) incorporates two major areas: self-control and self-observation and this involves the application of learning skills as well as the monitoring of their own accuracy in learning e.g. environmental structuring. The third phase, the self-reflection phase, incorporates two types of self-reflection, which include self-judgement and self-reaction, both of which consist of processes that happen post learning. This is the point at which students decide what they have already learnt and how they are to proceed. Due to the evolving nature of personal, behavioural and environmental factors, students require feedback that they can then act on based on prior learning experiences so that they are able to focus their efforts even more successfully. This is one of the main reasons that SRL is described as a *cyclical* process (Zimmerman, 2008): The self-reflection phase is followed by the forethought phase of the next learning process (Zimmerman, 2011).

Zimmerman's model encompasses a number of SRL skills, posing the question of the choice of an appropriate range of sub-skills to analyse via a wiki course in this study, especially as hardly any studies measure *all* of the self-regulation processes described by Zimmerman in an online learning environment (Derby, 2013). In this study, possible SRL enhancement via wiki is investigated through the careful selection of eight sub-skills,

most of which can be found in one or other of the phases detailed above, therefore enabling Zimmerman's model to be sufficiently tested in the online learning arena. These skills are goal setting, time management, self-record, organisation of the learning environment, self-evaluation, seeking help, self-efficacy and, finally, peer learning - which could be deemed to be part of the metacognitive aspect in the Zimmerman model (Cassidy, 2011). As mentioned in Chapter One, the research question focuses on executive function skills and evaluation skills, necessitating investigation of skills under those aspects in order to distinguish them from one another. Another concern was to expand the range of investigated SRL sub-skills beyond those that have already been part of other studies in this area (see sections 1.3; 1.3.1).

Whilst Zimmerman's model has value in the above areas, a possible weakness is a focus on student-content interaction rather than on peer interaction, that is to say, student-student or student-teacher interaction and how the student uses SRL skills to cope with these types of interactions (Bol & Garner, 2011a). Indeed, the skills listed in Zimmerman's model may appear inward-looking since they only refer to self-contained activities (it is noticeable that the prefix *–self* occurs ten times). The model makes no explicit reference to peers. For this reason, Zimmerman's model might have a limitation in terms of the interaction aspect of students' work with each other in wiki-based group activities in this study. Hence, it was decided to complement this model with another model of online learning, so as to give information and procedures to guide the teacher in a wiki environment as well as to help learners to be active in wiki activities/ tasks. The next section discusses the choice of an appropriate complementary model.

3.6.4.2 Models of Online learning:

Following the decision to complement Zimmerman with a model of online learning, the potential effectiveness of various well-known models, for example *the DialogPlus project* (Conole et al, 2004); the e-learning ladder (Moule, 2007) and the community of inquiry model for learning and teaching online (Akyol et al., 2009) were analysed in order to create a well-informed comparison that would lead to the discovery of the optimum model for this research (see Appendix 18). The model would need to help in clarifying the role of the teacher and the students in the online learning process within a wiki. This could, in turn, ensure the steady progression of SRL skills. After extensive research into various models, the Salmon (2014) model (originally created in the year 2000) was found

to be the most coherent and logically staged process. This model was the most appropriate fit for this study because Salmon's (2014) model, provides a focus on interaction aspects (e.g peer learning). Another reason why the Salmon model was selected over other available models is that**,** even if learners are able to plan a learning activity themselves and monitor and evaluate it, this does not necessarily mean that a learner can steer and direct his or her own learning; they *need* the aid of a teacher in the first instance (Cho & Shen, 2013; Rahimi et al., 2015). This gives importance to the teacher's role, and teachers accordingly need an understanding of the importance of self-regulated learning for their students. They also need models and guides so that they can become self-regulated learners themselves, imparting this knowledge to their students (Cho & Shen, 2013;Mikroyannidis et al., 2014). The Salmon model meets this need.

Support for choice of the Salmon model is provided by its widespread acceptance and application in higher education institutions in courses delivered via wikis (Tshuma, 2012; Alzahrani, 2013; Goh et al., 2014; Khawaji, 2016). There have been several studies that have applied the Salmon model in wiki technology as a way to enhance students' skills in learning (Su & Beaumont, 2010; Morley, 2012; Alzahrani, 2013). Hence, it is possible to compare the findings in these studies with the findings in this current study, due to their similarities in model choice and learning platform. Another main reason why this model was chosen is the fact that it reportedly aids learners to overcome barriers to online learning and to reach their objectives in online learning (Bromage, 2010 & Abdullah et al., 2013).

The next sub-section discusses the Salmon model, and the reasons for its application in this study.

a) The Salmon model (2014) as a guide for using wiki in support of Self-Regulated Learning:

The five Stage model (Salmon, 2006) is a tactical approach to structuring academic content and peer and student-teacher interaction, on the basis of a natural progression by stages that the e-learner should go through while learning online. Stage 1: access and motivation, Stage 2: online socialisation, Stage 3: information exchange, Stage 4: knowledge construction, and Stage 5: development.

The Salmon model was designed to put the tutor in the role of learners, with a view to helping them to appreciate the role and potential of online learning (Tshuma, 2012).

The model allows the course designer access to a form of guide in order to help organise course information and its structure, with the involvement of specific stage-appropriate online tasks (Salmon, 2006, 2014). The stages of the model will be addressed in detail in the methodology chapter and in the findings chapter as part of the extensive data analysis performed there (see sections 4.10; 5.5). In this particular model, it is proposed that seeing and commenting on the contributions and ideas of other students encourages mediated learning and responsive feedback. This, in turn, increases the students' confidence in the use of peer assessment and formative self-assessment, leading to effective learning. To further explain this, one student would be the focus of attention from their tutor, while others profit from receiving an overview of the interaction.

The Salmon Model is based on the social constructivist theory. Schalkwyk and D'Amato (2015) point out that Salmon acknowledged the influence of social constructivism (Vygotsky, 1978a) in her work. The model emphasises access and motivation for students to use online socialisation, information exchange, knowledge and knowledge construction. According to Abdullah et al. (2013), the Salmon model is useful in collaboration with major learning theories such as Vygotsky's theory of Zone of Proximal Development (ZPD). This theory works on the premise that academic guidance should be a central theme of learning. Indeed, this is in line with the study by Feng et al. (2017) which indicates that the Salmon model provides guidance to facilitate and support learning. The guidance helps in facilitating individualised instruction, as well as in encouraging students to participate, organise activities and provide feedback and assessment (Azevedo, 2011; Feng et al. 2017), a vital component on which this study on self-regulated learning is based.

Prior research demonstrates the usefulness of the Salmon model. For example, Morley (2011) constructed a study on enhancing learning skills among first year students at Bournemouth University (UK), using the Salmon model as a backdrop. Morley claims that Salmon's model speaks for constructivism, ensuring that challenge increases over a period of time studying course content and that thus guidance from the tutor is reduced. Based on the evaluation of 69 students' online contributions to wikis, as well as questionnaires completed by samples of students and academic staff, Morley states that the independence in terms of skills that students acquire through course designed on the

principles of this model is vital for peer learning and effective use of group wikis. Interestingly, Morley also indicates that the model demonstrates how the role of the tutor and technical support are equally important in order for students' SRL skills to be effectively enhanced (see section 4.10, for a graphic overview of the model applied in this study).

Further to the review of the literature available on the application of the Salmon model to wiki learning, Conrad and Donaldson (2011) as well as Salmon (2013), state that instructional design and guidance contribute to a great extent to effective online learning environments since these can develop communication skills among students. According to Khawaji (2016), the Salmon model also demonstrates how peer learning can be guided and staged effectively, this being just one of the reasons that the model has been applied in many studies incorporating the design of online learning activities (Su & Beaumont, 2010; Alzahrani, 2013; Goh et al., 2014; Khawaji, 2016). Based on the above, it appears that Salmon's model provides the fundamental steps and values that are reported to be required to promote the effective use of online learning environments and therefore the development of SRL skills.

As noted by Lytras et al. (2010), the Salmon model is regularly updated in terms of its design and can easily be applied with web 2.0 tools such as wikis. According to Lytras et al. (2010), the design emphasises the importance of creating interaction between participants using online learning as a tool to facilitate the development of SRL skills. This is just one of the reasons why teachers have readily taken to web 2.0 technologies as part of the learning experience, recognising that it is students who must construct the means of using technology effectively. Researchers at Copenhagen University (Kaas, 2013:1) reported that the Salmon model is a "model of structured online learning activities that is aimed at creating greater *interaction and participation* between participants in e-learning". This confirms the appropriateness of this model in promoting online learning, which is in line with the objective of the present study, in which the researcher seeks to explore the extent to which the enhancement of SRL skills (such as peer learning), is possible via the use of wiki as an online learning environment, e.g. through the use of a discussion board provided by the lecturer/researcher. Since the focus of this study is self-regulated learning, the Salmon model is relevant, as it advocates a true learner-centred approach which encourages interaction among the students themselves as well as between the student and the teacher, all the while treating each student as an individual with different learning methods via wiki.

The Salmon model (2014) was therefore adapted in this study to suit the Saudi context of this research (see section 4.10).

3.6.5 Teacher role – the balance of teacher intervention and potential SRL skill development via wiki:

Further to Section 3.4.3 in part one of the literature review, Stafford et al. (2014) points out that the effective use of wiki technology in learning and SRL skill development requires careful guidance from the tutor. Stafford's work here is theoretical, but the researcher does raise an interesting point to consider regarding the implementation of teacher guidance and how it could be facilitated specifically using wikis. Mikroyannidis et al. (2014) indicated that Technology-Enhanced Learning (TEL) environments allow students the opportunity to improve their SRL skills, while also allowing learners who need further help during the learning process to receive guidance.

Furthermore, teachers have an important role to play in aiding students to learn self-regulatory skills (Sardegna & McGregor 2012; Van Ewijk & Van der Werf, 2012; Boruchovitch & Ganda, 2013; Cho & Shen, 2013; Spruce & Bol, 2015). Rahimi et al. (2015 a) confirm that teachers as well as the actual learning environment play vital roles in a student's enhancement of self-regulated learning skills. Mikroyannidis et al. (2014) indicate, meanwhile, that a technological learning environment offers a clear enhancement of SRL skills but also, and rather crucially, that learners require additional help and guidance from their teachers because academic goals are often less clear to learners working alone, and they might not select the most appropriate learning path to reach their objective. The results from this study are sound and can be generalised to a certain extent, thanks to its mixed-method approach and the fact that the survey was applied inside *and* outside of Europe. The authors' astute comment that SRL skill development may still not be high enough on most education system agendas, however, is a crucial reminder that difficulties may face teachers who seek this independence among their students.

Like Mikroyannidis et al. (2014), Cho and Kim (2013) also pointed out that a teacher's effort to enhance SRL in an online learning environment provides the necessary interaction with students that would lead to the mastery of any academic goal or demographic information. Moreover, this interaction enhances students' motivation and engagement in a course. Furthermore, Cho and Cho (2013) indicate that teachers' efforts

to monitor their students using web 2.0 tools such as Twitter can promote students' self-regulation. In self-regulated learning, teachers should provide immediate educative feedback, clearly planned and logical lessons, unambiguous learning objectives for progression, the use of practice and repetition in tasks (thus increasing learner motivation) and they must also ensure learners are aware of the significance of the subject matter (Anane, 2014). Teachers must be in a position of knowing how to promote SRL effectively and how to alter instructional strategies to reflect changing student demands, since a lack of knowledge of SRL skill development on the part of the teacher might lead to a heightened risk of academic failure for the students concerned (Van Ewijk & Van der Werf, 2012; Peeters et al., 2016).

Rahimi et al. (2015b) concur with the above researchers by inferring that a student needs to plan their learning with web 2.0 and this can be fostered by the teacher through the supply of pedagogical, technological and social options to the student. Drawing on transactional control, Rahimi et al. conclude that it is providing feedback on learning and general guidance that are vital in the process of students achieving control of their learning, in that they may eventually become more independent and self-regulated learners. Feedback allows the student to view his or her own progress and alerts the teacher to the progress made at the same time. Rahimi et al.'s results certainly suggest, despite the different context, that having a purpose-built model to follow can aid the encouragement of students to construct their own learning environments via interaction with and guidance from the teacher. Rahimi et al.'s study did have a mixed gender focus and a much smaller sample size of 29 that informed the results of their solely descriptive study, however.

In addition to the above, the individuality of students' cognitive characteristics, such as prior experience of the web 2.0 learning platform in question, levels of motivation (self-efficacy), and developmental constraints also influence their learning (Hampel & Pleines, 2013; Kitsantas, 2013). Apart from these personal variables, the context in which learning takes place has a major role in terms of how students attempt to enter the learning process and develop their SRL skills. For example, teachers also exhibit a variety of personal characteristics. A particular subjective belief of a teacher in a classroom setting might impact on the feedback given to students and also affect his/her teaching. For example, if a teacher believes that the taught subject content is too difficult for the students in the classroom, the teacher might rely more heavily on direct instruction, resulting in a much less encouragement of SRL skills among students (Moos & Ringdal, 2012; Spruce & Bol,

2015). Although the subjectivity of a teacher's opinions and resulting teaching method, as well as personal variables (which affect both teachers and learners alike) play a large part in how students learn and develop their SRL skills (Gray et al., 2012; Cho & Shen, 2013; Spruce & Bol, 2015), an online learning environment, such as a wiki, may go some way towards eliminating such a direct, potentially negative impact of teaching choice on the learners. This is because it seems to encourage students to take notice of both their teacher's feedback and their peers' points of view in combination, allowing them to make more informed learning decisions that are correct for them (Gray et al., 2012; Cho & Shen, 2013).

Heng and Marimuthu (2012) and Goulão and Menedez (2015) intimate that the fine-tuned balance of tutor guidance and intervention is an area of difficulty that will need to be considered in any research project that highlights the teacher's role in a web learning environment. Although a teacher would be highly knowledgeable on how to evaluate a learner's content knowledge, it is of particular difficulty to interpret and analyse qualities of their skills and strategies, as is also pointed out by Roll et al (2011), hence the importance of finding appropriate tools, theories and methods for teachers to apply in order to analyse their students' potential progress in SRL development. Thus, as well as carefully considering a data analysis method for students' skill progression, the researcher, based on the above reviewed literature, needs to take control of the learning process initially by giving clear guidance at the beginning of the course regarding *how* to use the technology effectively (see sections 4.9; 4.10), slowly allowing more autonomy, all the while incorporating functional feedback that allows each student to personally progress with their skills.

Further to the literature reviewed above, Kitsantas (2013) completed a study discussing how technologies can aid and foster students' self-regulation in online learning environments, incorporating a focus on the role of the teacher in providing guidance that leads to the potentially effective enhancement of SRL skills. This study provides proactive guidance for researchers and teachers wanting to support their students effectively in the development of a more independent approach to learning. For example, a teacher publishing deadlines can trigger goal setting in students and prompt students to monitor their work through the use of critical forms and rubrics. Teachers can prompt informal yet thought-provoking discussions among peers on topics the students are interested in or need to focus on. A teacher's guidance can also encourage students to become part of a learning community, highlighting the advantages of peer learning in

terms of lifelong learning benefits. Kitsantas proudly claims that there is no doubt that learning technology can foster the development of SRL skills in students and points out the importance of the design and that educators receive training on how to reap maximal benefit from learning platforms such as wiki. Quite rightly, Kitsantas highlights, as have many researchers, how important it is to do further research into how learning technologies can promote SRL skill development.

Given the above-mentioned points to consider, a combination of the Cyclical Phase model (Zimmerman, 2011) and the Salmon model (2014), underpinned by a social constructivist perspective, provides the researcher with the opportunity to understand SRL processes and crucially to this section, fully explain the role of the teacher in online activities so that students may possibly develop their SRL skills effectively using wiki as a learning environment (see section 4.10). Moreover, as noted earlier, the Zimmerman (2011) model provides a basis for the selection of specific SRL skills to explore in this study, thereby building on and extending previous research in this area. The next section provides a more detailed introduction to the skills in focus in this study and previous research related to these skills as a basis for the discussion, in Chapter 4, of suitable approaches for the investigation of these skills in the present study.

3.7 Self-Regulated Learning:

3.7.1 Developments in research into SRL enhancement using online learning platforms

It has already been established that the potential use of wiki to develop SRL skills among higher education students is not a particularly well-researched area within the context of Saudi Arabia. Nevertheless, leading up to this study, there have been a number of sizeable efforts to quantify the effect web 2.0 learning platforms may or may not have on students' self-regulated learning skills (Lai & Gu, 2011; Huang et al., 2012; Alexiou & Paraskeva, 2013; Cho & Cho, 2013; Samruayruen et al., 2013; Wang et al., 2013; Lawanto et al., 2014 a,b; Broadbent & Poon, 2015; Rahimi et al., 2015 a,b; Ambreen et al., 2016). Cho and Cho (2013) investigated the impact of web 2.0 tools on SRL skills when used as a learning device; a control group was used where students did not receive any SRL training and were asked to use Twitter for learning tasks, whereas the experimental group did receive SRL instruction, resulting in a significant difference in the obvious use of SRL skills in group work online. However, that the sample size (29) is perhaps not sufficient

in terms of reliable content analysis, although the researchers did apply content analysis of what the students produced, as well as analysis of answers given in survey format. The current study, for this same reason, uses two classes of similar sizes and on a similar course to ensure consistency in results as far as possible, in this experimental study.

The limitations detailed here for Cho and Cho's study, by their own admission, are not uncommon in research investigating the relevance of web 2.0 platforms in SRL enhancement, but from their study, it does become particularly evident that the social aspect of SRL skills needs to be considered when collecting data and conducting studies (Hadwin et al., 2011). In addition to the above, Delen and Liew (2016) point out that while there are several studies on online learning environments, there is still a lack of research into learning environments' impact on self-regulation in general. Nevertheless, it cannot be denied that, in recent years, there has been a growing amount of evidence that the learning environment that students are exposed to may have an effect on the development of SRL skills and by extension, the design of online sites such as wikis (Cheng & Chau, 2013). In fact, according to Nussbaumer et al. (2015), *mash-up* designs such as those developed using wikis have been employed more frequently recently to create web 2.0 Personal Learning Environments for higher education students that seek to develop SRL skills. The following section deals with all of the investigated executive function and evaluation skills as separate entities in order to better clarify points of interest for this study.

3.7.2 The decision to investigate executive function skills and evaluation skills

An in-depth systematic, search through the available literature on *both* executive function skills and evaluation skills, as part of the overall theme of SRL skills, particularly in the area of web 2.0 learning platforms, reveals that there is a complete lack of empirical research that covers both areas simultaneously as a way to investigate and ultimately enhance SRL skills (see sections 1.3; 1.3.1). In a study by Wang et al. (2013), it is pointed out that students set goals for their learning and use many regulation skills to monitor, control, regulate and adjust their learning to reach these goals. The authors, however, confirm there is a limit to the range of SRL skills that are sought to be enhanced in web environments. Barnard et al. (2009) and Barnard-Brak et al. (2010a) suggest that the specific skills involved in SRL can be explored in online learning, and that, conversely students would need to have a good level of SRL skills in order to achieve in this

environment. A meta-analysis study by Broadbent and Poon (2015) points out there is a need to understand how students can best utilise SRL skills to achieve academic success within online environments. Hence, this study extends the range of skills explored in previous studies, by focusing on further skills of SRL in a wiki environment, to fill the gap in this area.

Executive function skills incorporate intrapersonal and interpersonal forms of interaction (Waite, 2013), both of which can be supported by using wikis as a learning platform (O'Bannon &Britt, 2012; Hadjerrouit, 2014; Page & Reynolds, 2015). In addition to this, increasing numbers of teachers are now actively encouraging students to self-evaluate on a regular basis. Evaluation shows an acknowledgement that a student is committed to lifelong learning, as Chapman and Sammons (2013) state. They continue by affirming that a learning journey cannot be fully complete without the process of evaluation of learning. Panadero et al. (2017) corroborate this by stating that students cannot learn effectively without understanding the importance of monitoring and self-adjusting their work.

Alamari and Almaseed (2012) did attempt to investigate the development of SRL skills required for enhanced academic achievement by researching the development of executive function and evaluation skills. Their study included 400 students (at Taibah university in SA), but the study did not delve deeply enough into students' perceptions, due to it being solely based on a quantitative approach. Despite its limitations, however, the study highlighted the necessity for further research into executive function skills and evaluation skills, since when a learner is given an opportunity to develop executive function skills, they may experience lifelong learning benefits from the development of their working memory, mental flexibility and self-control (Clements & Sarama, 2015).

Not all learners are born with the same level of executive function skills as others (Sha et al., 2012), and everyone has different experiences that have led to different executive skill levels. All learners therefore require, and can benefit from, the chance to develop executive function skills. The same is true for evaluation skills: viewed as an adjoining skill set to executive function skills in this study; evaluation skills allow students to assess the decisions they have made in the learning process thus far, allowing students to stay involved in the process and remain motivated, crucially taking on the responsibility for their own learning (Alzamil, 2014).

Overall, this is likely to be a vital area for development in Saudi Arabia, since students are not usually exposed to these skills in the current education system when completing learning tasks (Khan, 2011), especially not in the online arena, using platforms such as wiki. The following sections will separate the two skill areas again, in a view to analyse the literature available on each appropriate sub-skill.

3.7.3 The importance of executive function skills as part of SRL

As society becomes more reliant on technology, academic performance depends more and more on the mastery of executive function processes such as goal setting, planning, organising, prioritising, memorising and the act of self-monitoring (Bol & Garner, 2011a, 2011b; Meltzer, 2011; Haig, 2012; Alamari & Almasaed 2012; Walker, 2012). Executive function skills are also relevant in learning contexts since they underpin the extent to which an individual is successful in their learning, the actions students choose to take in order to improve outcomes (Haig, 2012) and the extent of flexibility in adapting the tasks required, within the time and resources required in accordance with the order and the needs of the individual (Alamari & Almasaed, 2012). It can therefore be assumed that the assimilation of online academic content relies heavily on the level of executive function skills that a student possesses. Despite the value of the enhancement of students' skills in this area, educational establishments do not necessarily teach them as part of the curriculum alongside appropriate content. This requires learners to take a much greater responsibility for their independent learning skills and to organise a constantly evolving source of information that is available online, on learning platforms such as wiki. In fact, students in this digital age are exposed to multiple media sources and are expected to multitask online, which was not a requirement for older generations. Meltzer (2007) proposed that this digital experience could affect the quality of neural connectivity; stating that online information may foster the development of more efficient executive systems, or it may result in less well-regulated executive systems, as less mature learners are not exposed to structured environments that are crucial in the shaping of these skills.

In terms of the potential use of wikis as a part of web 2.0 tools to enhance executive function skills, it is important to note that according to Bower (2015), the offer of web 2.0 technologies has improved the speed at which learners access, structure and share information, planning, note taking and their ability to handle multiple tasks at the same time. These are all requirements for students in order that they may gain knowledge

(Hadjerrouit, 2014). In order to answer the research question, '*To what extent can* wiki *learning enhance self-regulated learning skills?'* it is necessary to investigate literature available on the enhancement of the *individual* executive function skills appropriate to online learning (as mentioned above), as subtopics of SRL that are all, ultimately, interlinked as part of self-regulation skills.

3.7.3.1 Goal setting:

Goal setting as part of a task, especially online, ensures that there is a structured approach to that task throughout its completion, enabling the student to maximise learning potential (Zimmerman, 2008; Bloom, 2013). Goal setting is actually referred to as an important part of the planning process and is deemed to be the first step into the realm of self-regulation enhancement possibilities (Zimmerman, 2002, 2011; Pintrich, 2000, 2004). A review of literature linked to goal setting for online platforms is needed here because it can affect the motivation and therefore attitude to the whole learning process (Sun, 2009). It can be of particular importance in the process of enhancement of SRL subskills as a whole in the case of students who demonstrate a negative attitude towards learning, more specifically in terms of a lack of motivation to complete tasks. The most significant enhancement takes place when students set goals themselves, since they are able to control their learning process more effectively. Further to the above-mentioned literature, Moeller et al. (2012) conducted a five year-long experimental study into the role of goal setting in learning across 23 different schools with a total of 1,273 students in Spain. The researchers identified that there was a significant correlation between goal setting and level of persistence or motivation to complete a task well, although it must also be noted that, by the researchers' own admission, the statistical analysis (correlational and descriptive) in this study did not allow for a full conclusion of a causal relationship between goal setting and achievement. Also, a study by Zou and Zhang (2013) investigated the effect of different score reports of web-based formative tests on students' self-regulated learning by means of a survey and interviews. The outcomes indicated that the students who had clearer learning goals were also more motivated, more confident and, therefore, put in more effort.

In view of these insights, in the current study, the researcher used the Salmon model, which complements Zimmerman's model (see section 3.6.4) to guide both teacher and students by providing clear instructions and helping them to understand their roles during learning with a wiki and how to apply SRL processes. This could lead to participants

having clear goals when working on wiki tasks, and which in turn may enhance student's motivations toward learning through wiki tasks.

As researchers state, with the rise of applications that allow for self-set goals such as *Goalbot* and *Goalmingo* and full platforms such as wikis that incorporate many other tools that potentially develop a wider range of SRL skills, it is possible for students to develop a positive attitude towards their application of goal setting, including interest, pride and happiness (Kreibig et al., 2010). This, in turn, encourages students to be more active and responsible for their own learning improving not only motivation but also self-efficacy (see section 3.7.4.3). If goals are set at the correct level of challenge, and broken down into sub-goals over a semester, for example, as is reported by Turkay (2014), students are more likely to sustain their motivation and therefore positive attitude to learning online. Further to the necessity for sub-goals that are set at the correct level of challenge, students also require appropriate goal setting to be accompanied by effective tutor feedback online that is geared around the strategies students should employ to meet these goals, as well as advice on time constraints and crucially any module progress information that would ultimately also increase the level of self-efficacy in students (see section 3.7.4.3).

From the relevant literature above, goal setting seems to deserve a lot more attention as a manner in which motivation to perform and develop lifelong learning skills may be enhanced. In this study, the researcher identifies learners' ability to apply goal setting skills effectively during learning tasks via wikis, since this could drive them to manage their efforts to achieve and reach those goals and complete learning tasks; and their goal setting skills could also influence other sub-skill areas listed under both executive function and evaluation skills. Goal setting, as a skill, could apply to long term as well as short term goals, therefore the effective use of time management is also a vital part of SRL skill enhancement in this case study and is discussed below.

3.7.3.2 Time management:

Time management refers to the ability to plan time dedicated to activities (Carson, 2011; ChanLin, 2012; Effeney et al. 2013). For example, an online learner may organise a timetable in order that they may read the recommended readings on time. ChanLin (2012), based on surveying students in higher education, explored the role of time

management/study management in online academic success and they found a significant positive relationship.

According to Dabbagh and Kitsantas (2005), Zimmerman (2011) and Effeney et al (2013), time management is a crucial component in self-regulation; it involves the selection of appropriate strategies to facilitate goal accomplishment and therefore goes hand in hand with the ability to set goals as a part of effective self-regulation among students; Kwan (2014) investigated the time management skills applied by students in a university. This took place with a group of students who were members of a self-help group for time management and were all determined to be at different efficacy stages in this skill area. The study offered an insight into the process that students go through in order to be able to manage time effectively and therefore complete tasks and develop other SRL skills. Although the results from this study were purely qualitative, the interviews conducted with the students did identify a theme of four stages in time management development: the *pre-developmental* stage, as a starting point for many, defines the scenario learners find themselves in when they do not possess time management skills and have not set appropriate goals. Preparation for tasks and forethought is generally not a theme of this stage and many rush through activities. The *adopting* stage sees students setting some short-and long-term goals, but due to a lack of experience, these are not entirely effective. Once students reach the *personalising* stage, they change their schedule to suit their own personal learning needs, focusing on fixed slots of time, such as those found on a wiki calendar. This culminates in the *advancing* stage where students focus on the enhancement of effective strategies that could help them complete tasks as well as, most crucially, develop other areas of self-regulation.

Kwan suggests that for this process to happen, students need to be encouraged to revisit goals regularly and they should be developed over time, motivation, again, being of high importance in this process.

As mentioned in the paragraph above, a wiki offers an online calendar in order that students may know the due dates and time restrictions of lessons, exams, recommended reading and assignments in a timely fashion. Sigal (2013) also reports that the round-the-clock nature of this calendar is an advantage to students. It should be noted, however, that guidance from the tutor is crucial here since the mere presence of a calendar does not guarantee perfect time management skills. Furthermore, a study by Allwardt (2011) indicated that there were criticisms raised by students, such as time-management issues,

through using wiki as an environment for learning. For example, some students were irritated that online groups were inactive (students left discussions until the last minute before submission) and group members did not reply to their posts on time (Allwardt, 2011).

In the current study, the researcher explores time management skills and how they may be developed by preparing specific tasks intended to promote independent time management among all students. This ensures that the trials of time management in previously-mentioned research are taken on board and that all students understand the value of time management in learning through the use of a calendar and a clear guide given out at the beginning of the course (see section 4.9).

Thus far, the processes of goal setting and time management have been reviewed and these, in turn, enable other skills potentially to be enhanced, such as the ability to self-record, as discussed in the section below.

3.7.3.3 Self-record:

Record keeping has a strong effect on students' use of time and effort (Zimmerman, 2011). One self-regulated learning process is *self-record* or *keeping record*, which consists of several skills (note-taking, listing mistakes made, recording grades, keeping all original copies and drafts of tasks, maintaining a portfolio or folder) (Cleary & Platten, 2013; Effeney et al, 2013; Reis & Greene, 2014). These tasks come hand in hand with the structure of the learning environment. Self-record skills enable students to track their progress in learning tasks and technology offers a way to facilitate those skills (Blaschke, 2014). According to Stafford et al. (2014), the use of a wiki to collate information on the course topics and as an area for students to practise expressing those ideas, could enhance students' understanding of a topic.

Effeney's study in 2013 identified the importance of organisation among students as part of executive function skills. The structured and semi-structured interviews in this study revealed that students' prior experience of organising and filing their classwork at home greatly affected their SRL skills, highlighting the fact that the starting point with respect to this skill can vary greatly between students. In addition to this, teachers were reported to be the most common fosterers of SRL strategies, highlighting the need for clear guidance from the tutor in how to perform in this skill area. It was also identified that students who were deemed to be more able, preferred to be more organised in terms of

self-record. The current researcher therefore needed to consider ways in which students who are deemed to be less able in the tested cohort could be encouraged to increase their self-record skill, to potentially match the skill level of more able students. Although Effeney's (2013) results can be accepted by the researcher at face-value, the small sample size (N=65) is a limitation, in that the results cannot be generalised easily. Also, the sample was a male cohort, which could present entirely different results from a cohort of older female learners who constitute the current study's sample; as Samuelsson and Samuelsson (2016) indicates, males often possess lower self-regulation skills than girls, due to the fact that males are reported to get more distracted by their surroundings. Further to this, the solely qualitative method of interviewing used in Effeney's study means that students needed to have a high level of self-evaluation skills in order to provide true and detailed responses. This study does, however, highlight the need for organisational skills to be taught by the teacher. In an online environment, such as a wiki, considerations may need to be given to the suggested structure for students' class notes, balanced with the fostering of students' abilities to be intrinsically motivated to file and organise class notes without prompting from the tutor. Remaining with the theme of organisation, it is now possible to review the literature available on the organisation of the learning environment.

3.7.3.4 Organisation of the learning environment:

Providing an organised environment for studying is vital if optimal results are to be achieved. This means choosing an appropriate physical setting; eliminating or reducing distractions; and organising study periods to be spread over a period of time (Reis & Greene, 2014). Zimmerman (2011) defines environment organisation as a student making their physical surroundings more *attractive* so that they are able to complete tasks. Others define it as efforts made by a student to choose or organise the physical learning setting in order to make learning *easier*, e.g., by isolating themselves from anything that distracts them, by turning off the radio so they can concentrate on what they are doing (Effeney et al., 2013). There seems, however, to be a lack of studies focusing on this skill area as an element of SRL. An often-cited study performed by Usta (2011) sought to investigate the sub-skills mentioned in this section, and how their development affected student attitudes towards skill development online; and it was reported that the highest level of skill development was found to be under "Organising the learning environment" which incorporates the organisation of the physical setting to include no distractions and effective resources, e.g. good quality computers and a fast Internet connection. The fact

that students start at different levels for this skill in particular, may have had an impact on the positive results here, although it should also be noted that students' prior exposure to an online world may have helped them to develop this sub-skill prior to any formal efforts to enhance the skill. This may, of course, be true for students across the world, since the majority of students in higher education feel that they possess a certain technological prowess. The perceived positive affect that an online learning environment had on students' sub-skills in Usta's study was discovered from data that was solely descriptive since it sought to investigate attitude (see section 3.5) as a result of sub-skill development. The researcher also points out that it may be advisable for future research to be performed in the area of pre-information, i.e. about perception and attitudes of students before performing a course, as this should enable a better grasp of the issues that students face in skill development. The results of this study, albeit purely descriptive, are initially promising for the current research, since the use of a pre-questionnaire or survey can allow the researcher to at least determine the varying level of sub-skills such as the organisation of the learning environment. In this current study, the aim was to encourage the use of organisation skills through wiki in order to make the learning process easier and more focused. This could, thereby, potentially assist students to achieve their learning goals and perceive an enhancement in their overall SRL skills, while in a structured online learning environment provided in a university computer lab with an excellent Internet connection, ensured by the researcher's installation of a high-power modem. Having now reviewed the key literature linked to executive function skills as a part of SRL skills, it is relevant to look at the complementary set of evaluation skills and the key literature available in this area.

3.7.4 The importance of evaluation skills as part of SRL skills

Evaluation skills incorporate several areas such as self-evaluation of learning, peer-learning/feedback and help seeking. Evaluation is a key construct within a learning process (Cassidy; 2011). Self-efficacy and self-evaluation are ways of carrying out outcome assessments and positive self-evaluations boost self-efficacy (Zimmerman 2011; Ozdemir & Erdem, 2016). Evaluation skills are also of vital importance, particularly in terms of the extent to which executive function skills can be developed. For students, regardless of age, achievement and skill development depend on a combination of appropriate goal setting (executive function) and the amount of effort they put into achieving the said goal. Once a student has evaluated their achievement, they can

self-evaluate and act on their findings, leading to a higher level of self-confidence, which may result in the motivation to set further, more challenging, goals involving a heightened level of effort. This cyclical view of evaluation skill development is confirmed by Quince (2013), who states that evaluation of learning outcomes in relation to the self-regulated learning process happens several times during learning scenarios.

Alamari and Almasaed (2012) point out that the term evaluation *skills* refers to ways or tools used by individual learners in order that they may understand their own learning process. Also, it is worth noting that a student's motivation to learn (created through a higher level of self-efficacy) would also be termed as a form of *evaluation skill*. (Alamari & Almasaed, 2012). This approach to evaluation requires researchers and educators to share the responsibility of learning with the learners and aids the students in developing the required intellectual skills to make informed decisions in their academic and personal lives, currently and in the future (Thomas et al. 2011). Furthermore, this evaluation skill may be able to permeate a learning environment when it is well introduced and future benefits are emphasised (Thomas et al., 2011). In this current study, the evaluation skills among students are explored via the use of wikis as an online learning environment. The sub skills that were mentioned above will now be discussed below.

3.7.4.1 Self-evaluation versus peer-evaluation of learning:

The process of making a personal comparison between an expected and actual outcome using proof and clear criteria is called self-evaluation (Zimmerman, 2011; Spiller, 2012; Anane, 2014). It is a form of reflective learning required to improve outcomes and skill development. The skill sets for self-evaluation and peer evaluations are learned in a similar process. It may initially begin with a 'structured way of assessment' such as a 'rubric', then eventually more flexible methods are developed by the learner(s) as they become more conversant.

Peer evaluation as a type of peer learning is a process where learners are required to provide 'feedback' and/or 'grades' for their peers based on objective agreed-upon criteria (Thomas et al. 2011; Spiller, 2012; Liu et. al, 2016). Some previous studies point out that wikis particularly emphasize the collaborative learning experience through the use of discussion boards and community-based tasks (Alzahrani, 2013; Castañeda & Cho, 2013; Thornton, 2013; Hadjerrouit et al., 2014; Stafford et al., 2014) and therefore possibly the peer-evaluation of learning through the use of discussion boards and the

possibility to trace history and learn from it and evaluate it. This was also confirmed by Zou and Zhang (2013) who pointed out the potential for students to evaluate more via functions provided by an online environment than they do in a traditional classroom.

Ng's study in 2016 discussed the fostering of self-regulation among female trainee teachers through the use of self and peer assessment of wikis projects. Trainee teachers were expected to create digital learning resources for young children using wiki. Similarly to the current study, the module content being covered was in the area of Education Technology. The study focused on effective feedback using model answers, self-assessment, peer discussion and learning processes rather than content per se, although it should be noted that the role of the teacher in the online process of learning and development of SRL skills was not a focal point of this study, unlike the study at hand. Overall, the results of Ng's study demonstrated that students took responsibility for their own learning and assessment. Interestingly, students were more demanding of themselves than of their peer teachers, which is in line with the comments made under *building content* in the first part of the literature review (see section 3.4.1). It is, however, difficult to generalise the findings due to the limited sample size and small group sizes investigated, which by the time the final assessment took place, only offered a return rate of 62.5%.

In the current study, the researcher seeks to highlight the advantages of both self-evaluation and peer-evaluation, in wiki learning. Zarei and Gilanian (2015) confirm that each type of assessment has its own unique advantages; self-assessment may avoid the awkwardness of being assessed by another learner or teacher and it may foster more learner autonomous behaviour. Peer-evaluation may provide students with valued comments and avoid alienation from the cohort completing the same module. Based on the above reviewed literature, in the current study, learners should be required to work together in order to complete module tasks, firstly on an individual basis but secondly together, through the use of a discussion board that facilitates communication between peer learners, who perhaps would not usually communicate with each other in a traditional classroom. In this way, peer learning's value within the wiki environment may be determined in an academic Saudi context. The following section clarifies research on an interlinked skill to peer learning; the need and desire to seek help during the learning process.

3.7.4.2 Seeking help:

Self-regulated learners do not try and achieve every task alone but instead seek help from others in order to progress. They do this in order to then become more autonomous as individual learners (Lin et al., 2016).

This skill lies in knowing when and why to seek help, and having the ability to analyse and learn from the help received, in order to apply that knowledge to other situations. Hillgaar (2011) points out the difference between peer learning and seeking help: peer learning is using friends or study groups to aid a student's learning and seeking help is the act of eliciting help from peer learners or tutors when required and collaborating with friends. Further to this comparison, Dabbagh and Kitsantas (2005) and Zarei and Gilanian (2015) indicate that seeking help is a process in self-regulation in which the student identifies and uses other resources for help with specific learning tasks they are potentially struggling with. According to Alamari and Almasaed (2012), help seeking is an important process in self-regulated learning and learners should manage their learning using these skills and understand/know when and where they need help with tasks (Roll et al., 2011). Roll et al. point out that effective help seeking has also been identified as being associated with improved learning when using educational technologies.

In a solely quantitative fashion, Roll et al. (2011) sought to investigate whether feedback on learners' mistakes when seeking help can lead to the acquirement of improved seeking help skills. While the first study analysed the impact of a *HelpTutor* and discovered that seeking help skills did improve after using it, the second study demonstrated that the *Help Tutor*, as well as guidance on seeking help and self-assessment given by the online tutor, allowed learners to transfer their enhanced seeking help skills to learning new content, well after the seeking help support had officially finished. It was concluded that students who avoid seeking help at the domain level also do not usually notice the help on offer at a metacognitive level. This again highlights the need for intentional guidance from the tutor regarding seeking help, specifically for students who report prior to beginning wiki learning, that they possess low levels of the seeking help skill. In Roll et al.'s study, however, seeking help skills did not correlate with an improvement in domain learning, which may be due to the fact that the chosen method of providing *hints* to students who required help, was actually harder for students to act on than expected. In the current study, therefore, clarity in terms of the help given by the tutor and any peers needs to be monitored well. Interestingly, the

results of Roll et al.'s (2011) study also highlight the link between seeking help and reflection skills, or self/peer evaluation; in order to learn from help provided, reflection opportunities should be provided immediately afterwards (Lin et al., 2016). Although this study highlights the complementary link between self/peer evaluation and seeking help, the researchers state that further research needs to be completed on this link to know the true impact of evaluation on seeking help.

The current study seeks to unify these evaluation skills, by providing reflection opportunities using a critical form that is to be used once students have had the opportunity to seek and act on help given on the help page, in the help guide or given by the tutor or the learners' peers. If they so wish, learners could seek help after the critical form has been used, in order to learn from their mistakes; the key here is that students are in charge of when they receive help in the learning process. Seeking help is naturally a skill developed over time at different rates, as are all SRL skills, especially evaluation skills. Self-efficacy will be discussed below as an overarching skill that has the ability to affect the enhancement of all other skills.

3.7.4.3 Self-efficacy:

Self-efficacy is defined as an individual's belief that one can accomplish different activities. It refers to how students perceive their abilities (Wigfield et al., 2011).

As we can see above, evaluation skills incorporate several areas such as self-evaluation of learning, peer-learning/feedback and seeking help. It is also vital to note that a student's motivation to learn (created through a higher level of self-efficacy) could also be termed as a form of *evaluation skill* (Alamari & Almasaed, 2012). As mutually dependent skills, both self-efficacy and self-evaluation are ways of carrying out outcome assessments and it should be noted that positive self-evaluations boost self-efficacy (Zimmerman 2011; Ozdemir & Erdem, 2016) and that higher levels of self-efficacy can boost evaluation skills (Quinney & Parker, 2010). During the process of self-evaluation, if a person can recognise weakness in a strategy they have employed, they may still retain their self-efficacy because of the hope for future improvement (Tzeng & Nieh 2015). Kitsantas (2013) corroborates this idea by stating that self-regulated learners report higher self-efficacy beliefs than those with lower levels of SRL skills.

To be self-regulated learners, students should possess high levels of self-efficacy when completing a task, show commitment to the goals they set themselves (learning/academic)

and apply learning skills (Zimmerman, 1989; Zimmerman, 2011). It is therefore vital that the chosen platform supports the development of such skills through the use of a manageable design and easy access, as was reported by Liaw and Huang (2013) (see section 3.4.4). According to Liaw and Hunag (2013) and Wilson and Narayan (2016), a number of studies have reported that self-efficacy influences student motivation and SRL processes as well as improves learning outcomes and academic performance. Self-efficacy incorporates judgments that a student makes about his or her own abilities to perform tasks. It is a vital part of self-concept, although not precisely the same thing (Salmerón-Pérez et al., 2010). Moreover, according to Bandura (1977a), a student's self-efficacy beliefs are created prior to and after an academic task. For example, if a student already feels that he or she possesses high levels of self-efficacy, he or she is likely to achieve more than a student with a low sense of self-efficacy (Salmerón-Pérez et al., 2010; Martin & Rimm-Kaufman, 2015). In addition to this, the way students feel about their own success and failure in terms of academic performance, also has an impact on how much they achieve.

According to Wilson and Narayan (2016), the changing nature of today's environment affects the knowledge and skills that students require in order to utilise new technological tools. Wilson and Narayan (2016) sought to discover the relationship between self-efficacy, SRL strategy use and performance for individual tasks, all based in an online learning environment. A similar cohort to the study at hand, 96 undergraduates formed the test group and self-reports were used to collect data. During peer conversations, strategies used by students were counted although it should be noted, that by the researchers' own admission, this method may have excluded other strategies that were not talked about by students online. A lack of prompting to mention skills in this study also highlights the need to prompt students when being interviewed in order that sufficiently detailed responses may be acquired. Moreover, the suggestion that future studies should focus on the link between self-efficacy and learning skills in peer-learning fostering environments is an interesting one, particularly for this study, since it would need to take into consideration the personality and/or culture of students who may be introverted or shy, as is the case in the current research's context (see sections 2.3.1; 3.5). In this study, self-efficacy is highlighted as an interlinked evaluation skill in order that students may know their own level of confidence in their ability to complete a task. This may eventually improve other SRL skills through the use of a wiki page and task design

that facilitates all of the above skills. In the next section, the key studies reviewed in this chapter will be revisited, but this time, in terms of their methodology.

3.8 Literature on methodology

A theme throughout the studies mentioned under the guise of wiki or SRL enhancement alike is that many relied *either* on a quantitative approach or a qualitative approach. Wang and Vásquez (2012) confirm that quantitative research remains a key method but note a shift towards the addition of a qualitative methodology in this area in recent years, since interviews allow a much better insight into the perceptions of students towards a particular phenomenon. Also, a study by Alias et al. (2013) provides an analysis of previous studies in the area of wiki in education; they analysed 49 studies concerning wikis, for the period between 2007-2012. The authors corroborate Wang and Vásquez's (2012) point that many studies (about half those in Alias et al.'s analysis) previously relied on a quantitative method using, for example, a questionnaire. Similarly, Usta (2011) and Cilliers (2017) focused predominantly on quantitative methods through the use of questionnaires, leading potentially to less insight into the reasons for students' attitudes than a study that had used a mixed method approach. As an example of the latter approach, a study by Chu (2017) used mixed methods to investigate the effectiveness of wiki use among students in an academic context, in an effort to help learners to acquire team skills; the current study shares similarities with the aims of Chu's study since it seeks to use wiki in the hope of supporting SRL skills among students. Thus, Chu's study may provide some insight into what must be considered when using mixed methods. Also, it may be helpful to compare the findings of the current study with other studies using similar methods in different contexts/cultures.

In addition, the quantitative research that uses surveys to examine how effective wiki is as a learning tool and how it affects attitude sheds light on the use of the Likert Scale. Cifuentes et al. (2011), Twu (2011), Cho and Cho (2013) and Ng (2016) used Likert scales, but these varied in terms of the number of options given to the students to choose from; Cifuentes used a scale of six options, while Twu, Ng and Cho and Cho used five. This may have helped simplify the survey for students in terms of their choices, thus increasing the likelihood that they would tell the full truth in their responses or indeed, *encouraging* them to make a more finite decision on what their perceptions of their

progress were. As studies of perceptions, these research papers relied on self-reports, which to an extent, is unavoidable, since feelings cannot be fully measured and feelings that are collated by the researcher will always be perceived and relayed by the student, reducing the chances that the data is reliable. To investigate appropriate collaborative learning support, Zheng et al. (2015) combined surveys, interviews and observation and gleaned sound results from this approach, increasing the reliability of their results by doing this, however, triangulation processes may have increased reliability further (see section 4.5.2).

It is necessary that the method for the current study draws on the most effective areas of the studies reviewed throughout this chapter and that it finds a way to minimise the drawbacks associated with collating perceptions mentioned above. For example, the questionnaire in this study consistently uses a 4-point Likert scale, and the data is verified from two sources – the questionnaire and the interviews. Furthermore, the researcher takes measures to ensure the trustworthiness of the interviewees' responses (see section 4.13.2). The complexity of the research at hand including SRL skill enhancement and attitudes towards the use of wikis as a learning tool, may, based on the above, be best suited to a mixed-method approach since this would allow for a greater amount of information to be collated from different perspectives, providing a more holistic view of the results. The mixed-method approach selected based on the above research is further clarified in terms of advantages, drawbacks and solutions in the following chapter, focusing purely on methodology.

3.9 Summary and concluding remarks

This chapter firstly gave an overview of literature available on web 2.0 technologies in education. It then presented wiki technology's potential for skill enhancement among learners in higher education. It offered an insight into both the advantages and drawbacks that researchers and educators may face when employing web 2.0 platforms as learning environments. Literature available on wikis' key SRL-enhancing functions was also closely analysed as were attitudinal studies geared towards students' perceptions of wikis as a learning environment. Breaking down the studies that focused on individual sub-skills under the headings of executive function and evaluation skills allowed for a closer evaluation of previous studies' successes and limitations, taking in methods used by

previous studies to employ SRL-promoting designs and task types. Literature available on the role of the teacher online was also carefully reviewed and then, three learning theories, behaviourism, cognitivism and the selected theory of constructivism, specifically social constructivism, were explained and reviewed in the light of their implications for the current study. A rationale was then provided for the selection of the social constructivist theory. A review of the key literature available on Zimmerman's Cyclical Phase model and, most crucially, the Salmon model led to a clear justification of their use in this study. Finally, a connection was made between relevant learning theories and the current study. The mixed-method approach was also analysed from the reviewed studies as being the most appropriate form of methodology for this study, and this will be discussed in full detail in Chapter 4.

From the literature reviewed above, it is clear to see that SRL skill enhancement relies on a range of variables that affect the use of a wiki as a learning platform in higher education such as peer learning, communication, interaction, and self-evaluation. These learning skills have now all been reviewed in terms of appropriate literature on empirical studies, and the extent to which utilising wiki or web 2.0 platforms could be used to enhance SRL skill development has been carefully considered. The next chapter will discuss the methodology of this study, which is essential for the examination of the data tools used to gain findings from student perceptions of different issues linked to SRL skill development.

4 Chapter Four: Methodology

4.1 Introduction:

A research methodology gives structure to the research plan (Creswell & Clark, 2011). This chapter discusses ontology, epistemology and research philosophy and describes the research methods, design, instruments used, the participants and the selection process. It also includes details of how the five-stage Salmon Model is applied to the study, as a guide to understanding the role of students and teachers in the learning process and a way of measuring the extent to which the careful design of a wiki environment can enhance the development of executive function and evaluation as a part of self-regulated learning skills. The results of the pilot study are reported, and issues of validity and reliability are outlined. The analysis procedures are then explained. The researcher's standpoint is critically discussed, and the chapter ends by highlighting how research ethics were taken into consideration for this study.

4.2 Research question:

The main question is as follows:
How can wiki be utilised to enhance self-regulated learning skills in online learning among Education Technology students attending Princess Nora University in Saudi Arabia?

This was discussed in Chapter One and it will be explained in detail in Chapter Six:

Sub Questions:

1) To what extent can using wiki learning enhance self-regulated learning among students?

Further sub questions:

- To what extent can using wiki learning enhance executive function skills among students?
- To what extent can using wiki learning enhance evaluation skills among students?

2) What are the attitudes of students towards the use of wiki learning as an appropriate environment for learning?
3) What are the students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills?

4.3 Research Paradigm:

This section will explore the research paradigm, which consists of the ontology, epistemology, methodology and methods adopted, and how these are related to the current study. A research paradigm is a shared world view that represents the beliefs and values in a discipline and that guides how problems are solved (Schwandt, 2014). Paradigm is defined as "shared belief systems that influence the kinds of knowledge researchers seek and how they interpret the evidence they collect" (Creswell & Clark, 2011:46). The successful selection of an appropriate research paradigm can help a researcher to interpret the collected data successfully. According to Guba and Lincoln (1998), the research paradigm represents the beliefs of the researcher and therefore it guides the investigation of the research problem, epistemologically and ontologically, as well as in respect to the choice of methodology (Guba & Lincoln 1998). The epistemology and ontology therefore need to be addressed before a suitable research paradigm can be selected. The chosen research paradigm will then guide the researcher through the process of choosing the methods that will be most appropriate for the envisaged enquiry – i.e. how the world will be studied.

4.3.1 Ontology, Epistemology and the Researcher's Positionality

The term "positionality" refers to how a researcher's world-view, epistemological and ontological assumptions affect how he or she carries out research (Savin-Baden & Major, 2013). Hence, positionality denotes "the position that the researcher has chosen to adopt within a given study" based on their own intellectual position and world view in respect to ontology and epistemology, and how these interact with the nature and needs of the proposed study itself (Savin-Baden & Major, 2013:171).

Ontology refers to the way in which we perceive reality (Jonker & Pennink, 2010). It is defined by Crotty (2003:10) as "the study of being", and its focus is "what kind of world we are investigating, with the nature of existence, with the structure of reality as such". According to Von Glasersfeld (1995:7), meanwhile, ontology is a notion of reality, which "is made up of the network of things and relationships that we rely on in our living, and on which, we believe, others rely on, too". One aspect of ontological discussion, therefore, concerns the form and nature of social reality, i.e.: "what is the form and nature of social reality? What is there that can be known about it?" (Guba & Lincoln 1998: 201).

Turning to epistemology, Guba and Lincoln (1998:201) defined epistemology as "What is the nature of the relationship between the knower or would-be-knower and what can be known?". Creswell and Clark (2011) state that epistemology refers to the means researchers use to gain knowledge, thus building on ontology, which is about the nature of knowledge itself. The subsequent paragraphs explore how my own positionality as an individual, a Saudi Arabian female, a person committed to developing educational theory and practice in a country where higher education is a major government priority, and as a researcher, have contributed to my ontological and epistemological perspectives and thence to how this research has been constructed and conducted.

As an individual I have grown up in a society in which it is only relatively recently that education of females, particularly in higher education, has been socially acceptable, or even encouraged. My own experience of driving myself to be educated to PhD level, to become a lecturer and researcher has forced me to confront the nature of reality and knowledge perhaps more directly than many Western researchers. Much of my education has taken place in a society in which knowledge is assumed to be fundamentally objective: society and daily reality itself is structured around an absolute perception of truth, but as interpreted and handed down to us by an essentially patriarchal society, and throughout much of the education system knowledge is imparted didactically through rote learning and with the assumption that reality and knowledge are essentially fixed – things to be learnt not questioned.

As I have matured as a person and as a scholar, however, I have increasingly come to question, and reject, this absolutist, objectivist view of reality. I have come to this position by through my own observations of the weaknesses of the higher educational system in the country and by consciously tapping into and being inspired by the increasing official and scholarly recognition in Saudi Arabia that approaches to teaching need to change to produce graduates that reflect, and are able to flourish in, the dynamic, rapidly changing world economy. I have explored these issues more fully in Chapter 1 and in section 2.3.1 of Chapter 2.

Essentially, therefore, my personal history and experiences have combined (in ways that are perhaps hard to articulate and interrogate dispassionately myself) with the developing emphasis in my country, and especially my country's education system, on more interactive, more questioning and less hierarchical approaches to the acquisition of knowledge to create a worldview that is increasingly aligned with constructivism and

distanced from positivism. Indeed, the decision to focus on wiki reflects this above all else; since wiki can be seen as the epitome of an interactive non-hierarchical approach to knowledge generation. My worldview, and the very subject and my approach to my research, therefore, meld into one.

This constructivist worldview has led me to place a high value on the day-to-day reality of the inner world of the participants. I believe that in an educational context, when employing technology for teaching and learning, the students' skills cannot be easily reduced to either technique or theory – "...knowing how to do something, in other words, is not predicated on knowing principles for doing it or the possession of articulated knowledge" (Thomas, 2007: 84). I agree with Ellsworth's (2005: 27-28) view of pedagogy as "experimentation in thought, rather than representation of knowledge, as a thing already made". Furthermore, I subscribe to the idea that reality is "apprehendable in the form of multiple, intangible, mental constructions, socially and experientially based, local and specific in nature" (Guba & Lincoln 1998: 206). For example, the development of self-regulated learning skills would be a matter of perceptions and experience, shaped by students' educational history and background. Similarly, the impact of using wiki would be perceived differently according to students' experience, access to resources and encouragement to use technology. Some factors, such as internet connectivity, may be observable and measurable objectively, but their impact will be viewed differently by different people. Hence, I fundamentally view reality as socially constructed and something that people need to interpret to give meaning to their experiences. In short, the notion that students' varying perceptions of wiki learning are dependent on their individual and multifarious views of their world, and that therefore these perceptions need to be reconstructed and understood in depth and with nuance, underpinned the approach to this research in a fundamental way.

The epistemological consequence of such a stance is the belief that knowledge of the social world is built on perceptions of it as we experience it in our daily lives and interact with our surroundings. The implication is that, in order to understand the impact of wiki learning on a Saudi cohort, it would be necessary to obtain subjective accounts that explain how the individuals concerned construct and interpret their experience of it.

Rather than attempt to determine the outcomes of wiki use objectively, therefore, I have sought to understand, in a deeper and nuanced way, the students' own subjective interpretations of how using wiki in their learning benefitted them (if at all). This allows

a fuller appreciation of how wiki are actually "received" by students in Saudi Arabia, recognising that this is actually the key determinant of whether wiki can be a success in a Saudi context. This study, therefore, is an investigation that seeks to understand PNU students' perspectives in depth. For this reason, a qualitative method (interviews) formed a fundamental part of the design of this research.

Given the cultural context of Saudi Arabia, however, I anticipated challenges with getting the students to express their real views. Students may be reluctant to speak out because of several factors, such as shyness or the prevailing didactic teaching culture where the teacher has all the power in the classroom. I had, therefore, to think of a way of encouraging students to express their views. Questionnaires that the respondents complete themselves without the researcher's help can provide anonymity for the students, which may encourage them to respond accurately (Robson, 2011).

There is a difficult balance to be struck here. On the one hand, self-completed questionnaires are not satisfactory for achieving subjective opinions. On the other hand, their use did allow for some quantitative analysis of the change in these opinions over time. Interviews were therefore used in order to address the limitations of lack of depth in the questionnaire responses, even though, in the context of this research, these equally provided the potential for lack of accuracy and/or honesty in responses. Overall, however, the complementary use of both research methods was deemed to overcome the limitations of either, and to represent the most appropriate way of enabling participants to feel comfortable in expressing their own views, as well as to maximise the detail of their responses.

Another factor influencing the decision to incorporate a quantitative element was the researcher's position as a Saudi scholar, sponsored with the aim of "improving" Saudi education. As mentioned in Chapter One, the research was a response to concerns by Saudi scholars and the government that the traditional methods of learning in PNU and in the kingdom more generally are no longer effective in this new digital era. The government is investing heavily in technology with, however, little idea of how such technology could be used in the Saudi context. I was seeking to address these issues by suggesting a way to use technology to maximise the benefits of learning. I had to recognise, however that, in the Saudi research culture, some quantitative evidence would be expected and would be regarded as more credible, although this was not explicitly requested.

Recognising the limitations of both qualitative and quantitative approaches if used in isolation, I considered that both approaches could contribute usefully to the understanding of how this cohort of Saudi students responded to being introduced to wiki- assisted learning.

In other words, my essentially interpretivist and subjective positionality does not entirely reject the potential of recording students' perceptions of wiki use as systematically and, if one likes, as "objectively" as possible. Recognising that we are ultimately dealing with student "perceptions" of wiki in the development of their SRL skills, it still makes sense to attempt to pin those perceptions down systematically. I therefore took a pragmatic approach that recognised the benefit of attempting to "quantify" perceptions as "objectively" as possible – through questionnaires – while also recognising that this more distanced approach, would, in a Saudi context, make it easier to access a larger sample of students, and to reduce the influence of the researcher. This was, however, complemented by a more overtly qualitative technique (semi-structured interviews).

The quantitative data collected, are, therefore, are, with a few exceptions, the participants' subjective opinions about their approach to and engagement with wiki learning that are quantified to allow statistical analysis. This process of quantification of opinions is common in sociological and psychological research but should not be confused with robustly objective data. This has implications for the extent to which outcomes can be generalised, although, based on the reader's discretion, it may be viewed as transferable to similar cultural and study contexts (see section 7.2).

I was therefore able to obtain, on the one hand, a quantified indication of the perceived change in the level of SRL skills among the learners. This quantitative collation of attitudes towards wiki and perceptions of which skills had been improved, however, was enhanced by the qualitative exploration of how and why students felt this had happened. This provided a richer understanding of their experience. More discussion on these points will be found in Chapter Five (see section 5.1).

In short, when preparing for the fieldwork, I considered the weakness of each of the possible research approaches (quantitative, qualitative and mixed (see section 4.5.1), and considered which would form a good basis for investigating the research questions and which would be most appropriate for the purpose and context of the current study.

After discussing the ontology and epistemology, it is necessary to think about the methodology. “Methodology is the strategy or plan of action which lies behind the choice and use of particular methods” (Crotty, 1998: 9). Guba and Lincoln (1998) explain that methodology asks the question: What methods does the would-be knower (the researcher) need to use to discover whatever he or she believes can be known? (Guba & Lincoln 1998). “Methods are the specific techniques and procedures used to collect and analyse data” (Crotty, 1998: 10) (see section 4.5). The nature of the main research question has led to a research approach that is exploratory in nature, as this seems most appropriate for exploring and building detailed information about the participants’ perceptions. According to Ritchie et al. (2013), exploratory methodologies are effective for helping researchers to discover the culture, perceptions and interpretations of the participants.

Taken together, these aspects of a research paradigm determine how the researcher views the research problem, and the beliefs and assumptions that are applied in the study. They therefore also guide the methodology and how the researcher approaches answering the research questions.

4.4 Research methodology:

This part discusses the research methodology used in the current study. The techniques used, and choices made, are explained in this section; focusing on the two methods of data collection employed in this study: questionnaires and interviews. The reasons for using this combination are discussed further below (see section 3.8).

4.5 Research method:

This section describes the particular methods used in this study. The term ‘method’ is frequently employed for the procedure that is used in the collection of data (Denscombe, 2010; Bryman, 2015). This study uses a mixed-method approach by combining both qualitative and quantitative research (see section 4.5.1). The following provides a brief overview of the definition and advantages and disadvantages of both the qualitative and quantitative methods.

4.5.1 Qualitative versus quantitative research:

Qualitative research is conducted with an understanding of the social phenomenon from the participants' views (Bahari, 2010; Johnson & Christensen, 2011). According to Tichapondwa (2013), a qualitative method can be used to examine a phenomenon in depth and in detail. Qualitative research may use several methods for data collection: observation, interviews or a review of documents (Cohen et al., 2013). Although qualitative research has several advantages, the researcher spends a lot of time in the environment that is being studied and collects the majority of data through fieldwork, which is time-consuming and potentially impractical. In addition, while the knowledge that it generates can be utilised to explain phenomena from the point of view of the research participants, this has led to criticisms that these studies cannot be generalised and that they lack objectivity (Cohen et al., 2013). This contrasts with quantitative research, which studies relationships and discusses reasons for alterations in social facts that are measured (Creswell, 2008). The outcomes of quantitative research, it is often claimed, may be generalised from the study sample to the entire population (Cohen et al., 2013). In practice, however, very few studies can be truly generalised, and whilst quantitative research might aim to achieve this, it seldom, if ever, does in social science research, because generalisation requires the data to be drawn from a sample that is representative of the population. Furthermore, although qualitative research is criticised on the grounds of lack of generalisability, there is, nevertheless, a possibility of transferability, subject to the informed judgement by the reader on similarity between the research context and potential context of transfer (see section 4.15.3 for further discussion). In my view, therefore, the criticism about generalisability (or lack of it) is a red herring in the context of this research. From a practical perspective, achieving a sample for quantitative analysis that could be genuinely generalisable was effectively impossible. I am, it has to be admitted, perhaps influenced by my positionality here, which, as discussed above, conditions me to be sceptical about the benefit of quantitative research on its own.

Nonetheless, as explained in some detail in the second half of section 4.3.1 above, I do not entirely reject the merit of quantitative approaches, just the benefit of quantitative methods and, apparently objective "outcomes", on their own. There are in fact good reasons (as discussed above) for including a quantitative element in this study to generate data that allows the consideration of changes in student opinions after having been exposed to my wiki intervention.

In summary, therefore, I concluded that neither quantitative nor qualitative methods on their own are fully appropriate for this study. The following provides an explanation of the mixed-method approach and justifies it as the method chosen for this research.

4.5.2 Mixed-method approach:

According to Creswell (2014), the research questions will determine which research methods are used. In this study, some questions employ the phrase "to what extent" so that the focus becomes the depth of the students' possible enhancement of SRL skills.

This study aims to investigate whether wiki learning enhances self-regulated learning skills, namely executive function and evaluation skills. In order to analyse the development of such skills, a quantitative approach was required due to the numerical nature/type of the research questions that began with "to what extent" to explore the level of change in learners' self-perception of their skills between the pre- and post-test.
It should be emphasised, however, that the quantitative data collected through the questionnaires measure perceptions of skill development rather than actual skill development. This data was coded and analysed objectively using statistical methods. This provided a systematic assessment of changes in learners' self-perception of their skills, but it should always be remembered that the underlying data remains the students' subjective self-assessment rather than objective outcomes such as test scores.

Other questions asked of the students needed to be more exploratory and in depth since the research needed to establish their attitudes towards using wiki in learning and their perceptions regarding how wiki could enhance self-regulated learning skills, therefore requiring a qualitative approach. The requirements for this particular study suggest the suitability of a mixed-method approach which, according to Creswell and Clark (2011) includes a quantitative method (i.e. one that gathers data in a numerical form) and a qualitative method (i.e. one that gathers data in the form of words). Clark and Ivankova (2016) indicate that mixed-method is a research approach in which researchers mix quantitative and qualitative methods in order to address a research purpose. Creswell (2007) suggests that with the use of both quantitative and qualitative methods, the researcher will be able to gain a better understanding of the same phenomenon within a social world than would be obtained from one method alone. A mixed-method approach runs throughout the research process at all stages, from the identification of issues,

research questions and aims, the collection of data and analysis. Mixed methods also provide depth and breadth to the level of understanding obtained and allow the researcher to benefit from the strengths of the qualitative and quantitative research strategies. This mixed-method approach also aids the researcher in minimising weaknesses by avoiding bias (Bahari, 2010; Bracken, 2010; Creswell & Clark, 2011; Yeasmin & Rahman, 2012).

Quantitative data provided an indication of the nature and scale of changes in outcomes over time, before and after the wiki learning intervention, while qualitative data provided insights into how and why these changes may have come about and what meanings were attached to them by the students who experienced them. This was possible with data collection based on students' perceptions of their SRL skill development via wiki as well as on students' attitudes towards wiki. It enabled more information to be gleaned, whether negative, positive or ambivalent (Kolodziejczyk, 2015).

The use of a mixed-method approach to data collection in this study is particularly helpful since the research areas of SRL and wiki linked within a Saudi context are not common. It is therefore essential to learn about the variables of the study through both quantitative data collection *and* qualitative research (Saudi-specific world views and reasoning behind perceptions). It is also of particular use in terms of the ability it affords the researcher to look at the three research questions from different angles, allowing clarification of contradictions or findings that were not expected. It also allows for any potential causal relationships to be identified.

A methodological triangulation technique was able to be applied thanks to this mixed-method approach. Specifically, by collecting multiple types of data it become possible to combine them in order to gather multiple perspectives on the same issue. This, in turn, increased the researcher's understanding of the phenomenon and the validity of the conclusions (Cohen et al., 2013). Triangulation was also applied as a way to avoid bias that can occur when only one method is used to investigate a phenomenon, thereby enhancing confidence in the findings (Cohen et al., 2013). Particularly with social issues, scholars emphasise the importance of employing various methodological perspectives, as this can help to reduce the chance of ambiguity or bias, which could occur with a single source, thus enhancing the validity of the research (Silverman, 2010; Yin, 2013). Bell (1999:135) points out that with triangulation, interviews can be used to add strength to the findings from a questionnaire – as she put it, interviews can "put flesh on the bones of questionnaire responses", thus widening the breadth and scope of the research scope.

In this case study, the researcher used interviews to complement the questionnaire findings and to be able to obtain a richer interpretation of complex experiences. In addition, looking at this from the perspective of recognising my positionality, it might be argued that including a quantitative element helps to insulate my research from my own tendency to prefer and prioritise qualitative research. It forces me, if you like, to look at my data and my subject in different ways. Clark and Ivankova (2016:195) stated that triangulation is "an argument for using mixed-methods to obtain more valid conclusion about a phenomenon by directly comparing the results obtained from quantitative methods for convergence and divergence".

The researcher applied triangulation in questions one and two in order to increase the validity of data via a mixed-method approach. This involved comparing results statistically from the questionnaires that dealt with all aspects of SRL skills and attitudes towards the wiki with the thematic results from the interviews.

This study therefore began with a quantitative approach by employing a pre-test that all students had to sit to demonstrate the extent to which their SRL skills were developed. This was implemented prior to their introduction to wiki learning. Following this initial phase, both quantitative and qualitative approaches were applied after six weeks of teaching, in the form of a post-test and an interview.

The following table breaks down the analysis format of the current study.

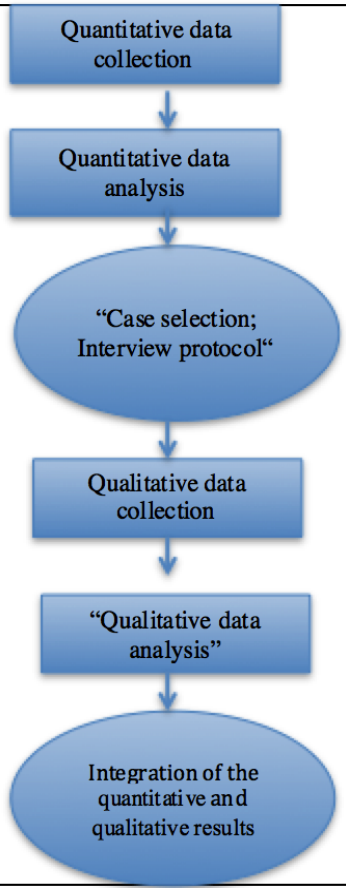
Phase	Procedure	Product
	Cross-sectional based questionnaire (N= 105) - Data screening for all scales - Frequencies SPSS Mac software v. 23 Purposefully selecting based on typical response on questionnaire (N=20) Individual in-depth face-to-face. -"Coding and thematic analysis". MAXQDA12 software	"Numeric data" - Descriptive statistics, missing data and cleaning data Case (N=20) Interview protocol "Text data (interview transcripts)". "- Codes and themes. -Similar and different themes and categories."

Table 4:1 Summary of the mixed method design (Source: Creswell & Clark, 2011: 121)

The next section will explain the research design, with the rationale for the method used in each phase.

4.6 Research Design:

Almalki (2016) describes the research design as a set of choices made prior to the research being conducted that together create a master plan, provide information and specify the means through which data will be collected, analysed and interpreted.

In order for the research to be successful, it is important to design a research strategy (Punch & Oancea, 2014). The choice of method is vital since it will help the researcher to achieve his or her goals. The researcher must consider whether it is possible or appropriate to conduct an experimental investigation on organisations or groups of individuals, with a control or intervention group, or whether a more naturalistic understanding is required (Crowe et al., 2011). In this study, the type of questions "to what extent?", "what attitude?" and "how?" required that the researcher obtain an *in-depth* understanding of a phenomenon.

Participants were selected from a small area of one department at one university, the aim of the study being to explore how wiki can be utilised to enhance self-regulated learning skills in online learning among Education Technology students attending Princess Nora University in Saudi Arabia. Thus, the research strategy chosen for this study was a single case study, which, although, usually not generalisable in terms of collated data and results (Denzin & Lincoln, 2011), could instead be viewed as transferable, at the reader's discretion, to similar cultural and study contexts. For example, it may possibly be applied to similar Saudi regions to Riyadh (see section 2.10) as well as countries with similar teacher-centred pedagogical approaches, which perhaps do not have the same culture. It may be possible to transfer the data in terms of female only education as well, but probably only within similar cultural contexts (see section 4.13.3).

The following section will discuss in detail the relevant strategies applied for this research.

4.6.1 Repeated measures design

The first phase of the research took the form of a repeated measures design, in which all members of two naturally-occurring classes in the second year of PNU were investigated on two separate occasions, before and after a period of wiki learning. Repeated measures designs are designs in which the same subject is measured more than once for each person (Stangor, 2010; Gravetter et al., 2016). A repeated measures strategy can be used when the researcher intends to attempt something new and find out what happens as a result (Oates, 2006). Although taking the form of pre-and post-test study there was no randomisation of groups and no control group; all participants were provided with the same wiki learning materials and facilities.

This more naturalistic setting was preferred to an experimental strategy (i.e. involving a control group), for a number of reasons. Firstly, in line with the researcher's interpretive stance (see section 4.3.1) the aim of this study was not to test and measure actual SRL skills or infer cause-effect relationships between variables, but to explore and understand changes in students' self- perceptions of such skills in the context of wiki learning. Since the researcher assumed the participants' perceptions of their SRL skills, and responses to wiki, would be subjectively experienced and influenced by their social context, a more naturalistic sample was appropriate. Moreover, there would be ethical issues related to an experimental design because all students were required, as part of their programme at PNU, to take the same modules, and subject to the university's standard assessments

schedule, i.e. take the same mid-year and end-of-year examinations. A control group intervention group design, with or without random assignment, would mean that some individuals might be advantaged or disadvantaged compared to their peers in the other group. For example, if (as the researcher believed), wiki learning is beneficial and potentially enhances study skills, then if would be unethical to deny some students the opportunity of experiencing it. Conversely, if studying via the wiki resulted in some students not completing the same material, or at the same pace, as their peers in the traditional classroom, they would be disadvantaged in the university examinations.

A disadvantage of the pre/post-test design is the possibility that events taking place between the two tests, and even the fact of already having taken a test, can influence the outcomes of the second test (Ohlund & Yu, 2010).

In this study, the researcher tried to solve this problem by taking into consideration external factors that could affect students' responses, such as the time of day. The researcher sought to avoid such effects; for example, the class was held early, because if it had been late, students may have been tired if they had been there since the morning. In addition, the wiki learning course was not run during university exam time so as to help students to concentrate more on the course. The least crowded computer lab was used, to try to reduce distractions. In this regard, as Normand (2016) states, a complete understanding of the relevant variables is necessary for the researcher to determine the circumstances that will produce a given effect; it was therefore helpful that the researcher had a background in teaching and had the same cultural, localised background as the students. Although this study used paired groups (which will be explained in more detail in the next section in this chapter), the researcher tried to place the learners in the same circumstances when they took the pre-test and post-test, such as place and time. Furthermore, the complementary use of different instruments in this study helped to overcome the limitations of each method individually.

This first phase consisted of five stages: (1) selecting a groups with no random change (based on availability and study requirements such as timetable, computer labs); (2) collating information/data from the pre-test before providing the learner intervention via the designed wiki site (the independent variable); (3) providing an intervention to the group via the aforementioned wiki learning with the aim of enhancing SRL skills (the dependent variable); (4) collating information/data from the post-test after having provided intervention via the wiki site; (5) comparing the outcomes of the pre- and post-

test to investigate whether the use of the wiki site was perceived as having had an impact on enhancing SRL skills or not, and why this was the case.

4.6.2 Case study:

Using a case study strategy means that the researcher can conduct a multi-dimensional, in-depth exploration of complex issues in a real-life context (Crowe et al., 2011). Case studies are employed when the researcher wishes to explore or describe phenomena in their real-life settings (Yin, 2009). Cohen et al. (2013) describe case studies as the study of a particular case in a specific context; the case is set within its context and the researcher is able to gather rich details and descriptions of the phenomena being studied. Case studies are employed to investigate phenomena through a variety of methods, thus allowing the researcher to gather in-depth understanding and knowledge of those phenomena. In addition, case studies can be used with a variety of different research techniques and can be employed with both qualitative and quantitative data.

In this study, the aim of using a single case study was to answer the three research questions through the appropriate selection of information tools to obtain in-depth knowledge about a single phenomenon based on the study aim, which was to explore the use of wikis in order to develop self-regulated learning skills.

Furthermore, one characteristic of a case study is that it is bounded by time, place, and population (Yin, 2013). This case study was time bounded to six weeks in the second semester of 2016, the place was bounded to the Princess Nora University and the sampling was bounded to a group of 105 female students in their second year of higher education.

4.6.2.1 Types of case study

Yin (2013) identified three categories of case studies: explanatory, exploratory and descriptive. These categories can be split further into single, holistic and multiple-case studies. The classification is further clarified and prescriptively summarised below:

- Descriptive: descriptive case studies describe natural phenomena in the actual context in which they occur.
- Explanatory: explanatory case studies explain phenomena, examine the causal

relationships between constructs and generate theories (Zainal, 2007).

- Exploratory: exploratory case studies investigate situations where more than one outcome can be expected.
- Multiple-case studies: multiple-case studies investigate differences between cases.

In this research, an exploratory case study was used. This was suitable because the research aimed to *explore* the phenomenon in detail (how can wiki learning be utilised to enhance self-regulated learning skills among PNU students?). Such case studies are commonly used when the context of the research has not been clearly specified, for example, when there is no preliminary research, or the research questions and hypotheses have not been closely formulated. The methodology was also limited by the research environment, because this study focused on only one university, but at the same time was an in-depth study in the Saudi context, where there is a lack of such research (see sections 1.3.1 & 7.4). An exploratory case study can be used as the first step in research in this area, as it has a wide focus (Streb, 2010).

4.7 Data Collection

Several data collection methods can be used in case study research. Yin (2013) has identified six: interviews, documentation, archival records, physical artefacts participant observation, and direct observation. It is not necessary to use all of these to conduct a successful case study, but they are complementary, and it is advisable to employ as many as possible (Yin, 2009). This study used both quantitative and qualitative data collection methods in a mixed-methods approach. The quantitative data was gathered with a closed-response questionnaire and the qualitative data was gathered through semi-structured interviews. The following sub-sections introduce the two data collection instruments in detail.

4.7.1 Questionnaire

Artino et al. (2014) state that questionnaires can be used to gather data on, inter alia, the perceptions and reported behaviour of the participants taking part in the study. A questionnaire is a very popular data collection tool and it is a widely used form of measurement for self-regulated learning skills aspects (Barnard-Brak et al., 2010a; Lai & Gu, 2011; Cleary et al., 2012; Cheng & Chau, 2013; Cho and Cho, 2013; Gregory, 2014; Lawanto et al., 2014b). Also, a questionnaire was once one of the most commonly used

instruments, despite a shift to more qualitative methods in recent years (Wang & Vásquez, 2012) and was used in some of the most prominent studies on wiki technology as a learning environment (Huang & Nakazawa, 2010; Wang & Wei, 2011; Alzaharni, 2013; DeWitt et al., 2014; Hadjerrouit, 2014; Page & Reynolds, 2014), thanks to ease of analysis, low cost, ease of administration and a format that is familiar to most respondents. The aim of using a questionnaire in the present study was to explore students' perceptions regarding the extent to which students felt they had developed executive functions and evaluation skills as a part of self-regulated learning skills. The purpose of the questionnaire was also to investigate students' attitude towards the use of wiki technology as a learning environment.

4.7.1.1 The strengths and limitations of questionnaires

Questionnaires are a popular method of data collection; one of their strengths is that their findings can often be generalised to a wider population, and they are suitable for measuring attitudes and gauging participants' perceptions (Johnson & Christensen, 2011; Cohen et al., 2013). A structured questionnaire helps the researcher to collect precise information, making analysis much easier. Although questionnaires are widely used for data collection, they also have weaknesses. They need to be kept quite short, since it is possible for participants to lose concentration and not answer certain questions or they may even provide inaccurate information. In order to be a valid data collection instrument, questionnaires must possess a high degree of reliability and validity (Cohen et al., 2013). They were therefore used alongside interviews, so that the researcher could gather evidence on the participants' attitude and perceptions of the wiki learning course, and how they believed that it had helped them to manage their learning and possibly develop their SRL skills.

4.7.1.2 Questionnaire procedure

This section discusses how the questionnaire was developed and administered. It was first constructed by dividing it into sections based on four axes. The first section of the questionnaire gathered demographic data, that is general information about participants and their access to and experience of web 2.0 tools and wikis. The second area was executive function skills, which included four domains: goal setting, time management, self-recording and organisation of the learning environment (as set out in Chapter 3,

section 3.7.3). The third section was evaluation skills, including the four domains of self-evaluation, seeking help, peer learning and self-efficacy (as set out in Chapter 3, section 3.7.4). The final segment examined the students' attitude towards the use of wiki technology in learning since attitude could be investigated in more depth after students had had time to consider questions on SRL sub-skills (see Appendix 10). The second, third and fourth segments were intended to be answered in both the pre- and post-tests. Regarding the fourth segment about attitudes towards wikis, however, students indicated that they did not have any idea about wikis at the start of the study and were unable to answer that section, which they left blank in the pre-test. Hence, the fourth segment was answered in the post-test only, after participants had experienced the wiki.

Regarding the questions investigating students' self-regulated learning skills, the researcher developed the questionnaire to suit the Saudi context, drawing on the most popular instruments used to measure self-regulated learning skills. According to the meta-analyses of previous studies in the area of SRL skills conducted by Broadbent and Poon (2015) and Panadero (2017) the most robust and widely accepted instruments to measure SRL are: the Online Self-Regulated Learning Questionnaire (OSLQ) (Barnard et al., 2009); the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991; Alamari & Almasaed, 2012); and the Metacognitive Awareness Inventory (MAI) (Schraw & Dennison, 1994). Regarding the construct of students' attitudes towards wikis, the researcher developed the items of the attitude axes to suit this study, based on previous studies of attitudes towards technology (Li et al., 2011; Alzahrani, 2013; Al Jeraisy et al., 2015). The researcher selected items from these well-established instruments to construct the questionnaire for this study using a number of different approaches to validate the questionnaire design for this specific context: 1) Choosing items that appeared to be linked and well-suited to the aim of study. 2) The feedback of supervisors in this project as well as that of six experts with experience in this area and familiarity with the study context (see section 4.13.1). 3) Testing the questionnaire through the use of a pilot study.

The second step in constructing the questionnaire was to select the key measurements of participants' responses based on a Likert scale with four points. The main reason for selecting a four-point scale was to force the respondents to make a decision on either side of the scale. In other words, when given such a scale, respondents would be encouraged to choose a particular direction, avoiding indecisiveness. Lozano et al. (2008:10) state, "the optimum number of alternatives is between four and seven. With fewer than four

alternatives the reliability and validity decrease, and from seven alternatives onwards psychometric properties of the scale scarcely increase further".

The questionnaire was applied twice – once as a pre-test (before using wiki learning) and once as a post-test (after using wiki learning). This facilitated a comparison of the differences between the learners' perceptions before and after the study, in order to give an initial impression of whether and to what extent SRL skills had developed after using wiki learning.

Finally, the participants completed the questionnaire on a personal basis with the researcher so that the instructions could be made clear, and to ensure that the learners responded in enough detail under a certain amount of "positive pressure" provided by the face-to-face nature of the application of this questionnaire. Had the questionnaire been administered online, students may not have taken their answers as seriously due to a lack of pressure to complete it to a satisfactory standard. The questionnaires were then kept in a secure box at the researcher's home.

4.7.2 Interviews

Interviews are a major tool in research and they serve in the collection of data by exploring and investigating the views, beliefs and practices of an individual or a group in relation to a certain phenomenon (Byrne et al., 2015). The purpose of conducting interviews is to acquire a deeper understanding of and insights into a lesser-known issue by asking a set of questions either face-to-face or through telephone- or computer-assisted personal interviewing (Trier-Bieniek, 2012). Interviews are commonly used to probe the ideas of the chosen sample in order to determine their response. In this study, face-to-face interviews were used because they have been shown to be effective in gathering data directly from learners, particularly with regard to attitudes (Zohrabi, 2013). They allow the comparison of information with other data and they provide information that might not be available from other sources. Also, the questions in the interview allowed the researcher to gather in-depth information and they allowed the interviewees to give reasons for their views. This enabled a better understanding of their attitudes and perceptions.

The most prominent benefit of conducting an interview is that any ambiguous information can be clarified on the spot to acquire a better understanding of the collected data (Cohen

et al., 2013). Opdenakker (2006) identified several other benefits of the interview technique. It assists by saving time, as the instant development of a relationship between the interviewer and the interviewee enhances the efficiency of the communication. Through interviews, fresh primary data can be gathered, as it is a cost-effective method where the existing reasons for feelings, issues or problems can be explored and resolved. Wide-ranging questions can be asked of the interviewee to interchange ideas and views, thereby identifying human attributes such as feelings, approach, experience and behaviour describing a specific matter. The interview is therefore an efficient way of attaining maximal responses (Opdenakker, 2006). For these reasons, the interview technique was selected as the data collection tool for exploring students' attitude and experiences in this study.

The interview technique also has limitations. If either the interviewee or the interviewer loses concentration, information can be lost, which may affect the analysis of the phenomenon under study. A lack of evidence of what has been said can lead to misunderstandings in the analysis of the data (Bryman, 2015). The interview alone cannot establish whether the interviewee is a good candidate for answering the questions, and this may lead to bias. The possibility that the interviewee has been persuaded to think in a certain way cannot be eliminated, making interpretation more difficult and possibly less accurate (Bryman, 2015). Another disadvantage is that it can take a considerable amount of time to probe the participants' responses, encouraging them to provide detail and clarification (Harris & Brown, 2010). The researcher took measures to reduce bias and increase the trustworthiness of the interview responses through several procedures (see section 4.13.2). For the purpose of this study, however, the advantages of interviews were thought to outweigh their limitations.

In addition, three different types of interviews can be conducted: structured and semi-structured and unstructured (Cohen et al., 2013). In this research, semi-structured interviews were applied because these start with a fixed set of questions used to lead and guide the interview, thereby retaining focus on the topic of interest. At the same time, they are flexible, enabling clarification, probing and the pursuit of emergent issues to capture each participant's individual experience.

The following sub-section discusses the interview procedure.

4.7.2.1 Interview procedure:

Open-ended interview questions were designed in order to give participants more freedom in terms of providing in-depth information and to understand the students' reasons for their responses (see Appendix 20). The researcher designed a *prompt list* (Appendix 21) to encourage the students to give their own, personal views. The reason for this was that, in general, Saudi girls are shy about speaking their minds, due to social and religious constraints and beliefs (Alnajdi, 2013; Aldayel, 2017). All the interviews in this research were conducted in Arabic because the participants spoke Arabic, and they took place on the university campus. There were several reasons why all the interviews were audio-recorded, including the fact that the conversations would be accurately recorded, and the researcher would be able to concentrate more on the social interaction with the participants during the interview. An unimposing digital voice recorder was utilised, and each interview took around 15 to 20 minutes to complete. The data collected from the interviews were reviewed, translated and placed in a folder called Learners' Interviews.

4.8 Sampling

The researcher must aim to choose a sample group that is an accurate reflection of the study group (McMillan, 2004). The number of participants selected is determined by the chosen approach (qualitative or quantitative), the aims of the research, the response rate that is expected, the nature of the sample population, how many variables the research encompasses, and the number of responses needed to provide full information on the phenomena under study (Cohen et al., 2013). In a case study, it is important to select cases and sources of data that will be most effective in increasing the understanding of the case (Gentles et al., 2015). Based on the purpose of this present study, the researcher selected female students who were enrolled on a technology course in their second year at PNU in Saudi Arabia. Although this sample was taken from a cohort of students who already had a passion for technology in education, the students had previously only been exposed to traditional, didactic, theoretical lessons that did not take place in a computer laboratory.

For the quantitative phase, there were 105 participants spread across two classes of a similar size and ability. Castro et al. (2010) indicate that in quantitative research it is better to have larger sample sizes (between 40 and 200) in order to conduct reliable multivariate statistical analyses. For the qualitative phase, the sample was much smaller.

Creswell (2007) states that in qualitative research that is concerned with investigating attitudes and perceptions, then 10 to 12 participants may be sufficient. On the other hand, according to Mason (2010), the acceptable sample size for interviews is 15 participants. This number was comfortably exceeded in the present study by the sample size of 20 participants.

The interview sample was chosen based on two main criteria: firstly, students were only chosen for interview if they volunteered and secondly, interviewees must have completed the pre-questionnaire. Furthermore, students were chosen based on the fact that they may have reported having a very low level of SRL skills or indeed a very high level of SRL skills.

More specifically, the researcher selected students for interview in two ways: critically and randomly:

1) *Critical* manner (purposive): Some students were selected based on their answers in the pre-questionnaires. Students who reported a low level of self-efficacy, as well as those who reported high or very low levels of skills, and students who left messages for the researcher on the forum seeking help in these areas, were highlighted in the data analysis. The progress of these students could be more obviously demonstrated. During the data analysis, it was discovered that alike students produced similar responses.

2) *Random* manner (convenience):
   Students volunteered to take part in the interview, as was the researcher's intention. Students in Saudi Arabia often exhibit shyness in one-to-one conversations and more honest, candid responses are most likely to come from those students who happily volunteer to demonstrate feelings and attitudes verbally.

4.9 Procedures of Course Design

This section presents the procedure, course design and approach to student guidance and the learning environment provided to students in this study. It details the procedure that was followed with a view to finding out whether a specific design may be used in wiki to enhance the development of SRL skills in online learning, through the demonstration

of executive function and evaluation skills among Education Technology students attending Princess Nora University.

The target groups for this study were two active second-year learner groups or classes (with the same experiences of teaching methods and level of learning based on the students' records). The reasoning for this approach has been explained fully above in section 4.6.1. The students were enrolled on the Education Technology course designed to be conducted via a specially-designed wiki course. The target group was a cross-section of these two classes, adding breadth to the study while ensuring that the reliability of the data was not compromised through the careful application of the same teaching conditions for each group by the researcher. Over a period of six weeks, which included two online lectures per week, the two classes were expected to log onto two separate yet duplicate websites to complete their tasks and enhance their SRL skills. The researcher created two websites to prevent confusion between the two groups while ensuring that both groups had the same design and same experience. This enabled the researcher to better manage the classes in terms of student numbers, to provide concise feedback appropriate to the students in each class, and therefore to focus on individuals' learning skills in a more organised fashion. Although asking the students to use the same website would have been a physical possibility, students were more familiar with other students in their own class and it was therefore better to create a duplicate website in order to encourage confidence in interaction.

The instructional approach consisted of two types of learner activity: individual tasks related to the course topics and project-based learning (group tasks). The researcher introduced the wiki in the initial exercises and course lectures and set optional ongoing tasks aimed at encouraging student engagement with the wiki learning in order to practise SRL skills online. Regarding individual learners and independent learning tasks, all of the students were responsible for creating the content for the Education Technology course via wiki through the selection of their own chosen topic or area of expertise related to the course content. During the time of completion of these independent tasks, the students had to specify, manage and monitor their learning objectives, estimate the completion times and set deadlines, as well as collect resources and evaluate their task completion using a *Criteria Evaluation Form* available on the wiki page (see Appendix 9).

The follow-up task was project-based learning. In this task, all the students were expected to select their own topics and specialisation from within the area of the Education Technology syllabus. Since the overall course content was determined by the PNU programme, this was not a completely unrestricted choice, but students had the opportunity to select, from a range of approved topics, a preferred focus for their projects. The aim of this was to give them a greater opportunity to exercise some decision–making skill and encourage them to take some responsibility for the learning. Even if a set topic had been imposed, it would have been within the same framework of the prescribed course and ultimately, all students had to complete the whole course. Moreover, the responses collected in this study were on the method of learning, rather than the specific topic. It is recognised that students being able to choose the topic for their project-based learning element of the course could have had an impact on the research. For example, one could assume that as they chose a topic which interested them, or had more knowledge about, this might increase their willingness to explore the use of wiki to support its completion. The view of the researcher, however, was that since all students had equal opportunity to select their own topic it would be unlikely that the element of choice would in itself have any major impact on the outcomes.

Furthermore, in respect to the project-based learning, although the students were expected to manage their projects independently, they could interact with the content on the wiki, and other students via online discussions, as well as with their tutor, via wiki technology. It is also worth noting that at the time of the lecture, the learners were informed that their use of wiki was being monitored by the researcher or monitored during the course. The learners could, however, use the wiki at any time, meaning that their use of the site was "natural".

The tutor/researcher played the role of a mediator and reviewer, which involved round-the-clock screening of what the students published on discussion boards, intervening where necessary and providing regular feedback, both when it was asked for and when it was necessary. Jones and Peachey (2005) describe an e-moderator as an online learning facilitator and a "guide on the side". In the view of Moule (2007), the role of the e-moderator is to encourage students where appropriate. In this very manner, the researcher monitored and reviewed the students' use of wiki learning to enhance SRL in online learning. The researcher directed students to focus on the projects when using the wiki. Moreover, the researcher played the role of facilitating students' learning when using the wiki learning to practise SRL processes by providing help when any students

faced difficulties, as well as by providing one-to-one remote tutoring to any student who appeared to be experiencing great difficulties. Also, the researcher was tasked with explaining how to engage in an online discussion appropriately as well as how to apply the evaluation rubric that had been distributed at the beginning of each task as a stage of SRL processes. Furthermore, the tutor clarified tasks and maintained clear communication with the students to ensure that they understood the expectations that accompanied each learning task. The next section will explain how the wiki pages were designed to measure SRL skills online.

4.9.1 Wiki design and measuring the extent of online Self-Regulated Learning

For the purpose of this study, the wiki sites http://wikipnucourse.wikispaces.com and http://childhoodpun.wikispaces.com were designed identically for a large group of 105 students distributed across two similar-sized classes, and each website was created to include six main pages (see Appendix 16): a home page, a record keeping page, a seeking help page, an "ice breaker" page ("motivation" page), a 'getting-to-know-you' page and a contact page. All of the students registered as members, which then gave them access to the wiki page, enabling them to enter the wiki pages in order to read events, download or upload files, and add or update the content on their wiki pages, as well as participate in discussions with other students and their tutor.

E-learners on the wiki could approach their learning in various ways and were therefore not just concerned with the course content but also with applying self-regulation study skills and technological skills as well. It was important, therefore, to provide a model of e-learning, detailing how the participants could explore the system with speed and efficiency and at the same time learn how to communicate online (Kaas, 2013). A summary of the pages and the design choices made by the researcher is provided in table 4.2 below.

Table 4:2 A simple explanation of page aims and key design decisions

Components/page titles	Aims of the page	Design decisions and advantages
Home Page	To provide a warm introduction to the course.	Simple layout for easier comprehension that would foster students' confidence levels in using wiki as a learning environment. The

		simple layout incorporated simple buttons to create pages and add attachments or add to the discussion board and these occurred on every page.
	To provide information about the main tutor of the course/other students enrolled on the course.	A "transparent" approach to sharing details about the lecturer (name and key information) and student names, creating a better bond between students and their teacher. Students were also provided with numbers via this page so that their self-confidence could be further developed through the use of anonymity.
	To explain to students the main aims of the course.	A clear Scheme of Work calendar was incorporated so that students could make their own decisions on whether or not to get ahead on topic areas.
	To provide students with the means to evaluate their performance using SRL skills.	A clear table was presented using a Word document, allowing them to self-assess their work before they submitted it.
Record-keeping Page	To foster the development of self-organisation in students.	Clear guidance was given straightaway on this page in terms of expectations for organisation. This was on the actual page and not in a downloadable document with a view to providing ease of access.

	To encourage students to take "open", sharable notes on course content that can be shared with others. To encourage students to value their work by providing the opportunity to upload and download documents in a safe way.	The upload and download function ensured that students could always access their files and notes as well as each other's. This ensured that they showed respect for other students' work and for their own.
Seeking Help	To provide students with a further opportunity to receive guidance when they feel they need it.	A PowerPoint was available for immediate download, providing a clear guide to using wiki to the students' best advantage. PowerPoint was used because it is one of the most accessible and well-known programs available and this ensured accessibility for all students. A YouTube link was also provided for guidance in Arabic to ensure understanding of wiki's protocols. The discussion board that was available on each page was particularly important here and emphasis was placed upon asking questions to other students, and the tutor, regarding how to use wiki.
Getting-to-know-you' page	To allow students the opportunity to get to know each other's points of technological prowess.	A simple editable list was provided on this page by the tutor to encourage students to add "C.V." information – they were given clear guidelines that this should be simple, and this resulted in a clear list related to the aims of the

		study that encouraged students to "use" each other's experiences in technology and course content.
Ice Breaker (motivation)	To encourage desirable actions that would lead to maximum development of skills related to SRL.	Successful students were picked out and announced by the tutor (tutor-access only) each week as a simple motivator. A short reason for their success was given, e.g. "Student 1 has successfully recorded their work this week in an organised fashion and has offered at least three pieces of advice to other students." The tutor had a focus skill each week which the students were aware of. Students were selected based on their progress in this skill and put on the Motivation page. The tutor monitored the number of times students had edited or accessed pages and discussion boards to help her in this decision.
Contact Page	To encourage students to ask "private" questions to the tutor alone and not their peers, if they feel that this was necessary.	A simple layout, with the immediate display of the researcher's email address. This page also included an encouraging statement to make sure that students felt comfortable contacting the tutor in any circumstances.

This study focused on how to use wiki technology to enhance SRL skills through the use of online learning on wiki. Thus, as mentioned above, the researcher designed these wiki pages in a way that should, according to the appropriate literature, enhance SRL skills in online learning. Ideas for the wiki page design were derived by thinking about Zimmerman's SRL model (2011) as a theoretical base and Salmon's (2014) Five Stages of Online Learning as a guide for student practice. The next section will explain the use of Salmon's Five-stage Model in the current study, as discussed in Chapter Three (see

section 3.6.4.2) when the definition of the model and the reasons why it was used were explained.

4.10 Measuring online SRL skills and the Salmon Model's Five Stages

The five stages suggested in Salmon's Model (2014) (see table 4.3) were followed in this study in two ways. The first was as a guide to designing and implementing the intervention, in order to provide an effective online learning platform and *e-activities* so that the participants could benefit from increased skills of SRL in terms of analysis and independence. This model provides clear guidelines for e-moderators who intend to support learners through their online learning experience. It is a useful model to inform and guide tutors and students about online technology practice and how it is applied, and it therefore allows everyone involved to experience the online teaching and learning interaction fully. Salmon's Model was judged to be compatible with this research study (see section 5.5). The five stages detail the support, guidance and understanding of the use of technology for tutors and students. The table shows the stages as given by Salmon's guidance, regarding the nature of the student and tutor activities shown at each stage, but the specific details of the activities shown in the table reflect the way that Salmon's guidance was interpreted by the researcher in this study. Throughout the case study, the students were expected to attend each class and interact with wiki pages, during which time the five stages listed in table 4.3 were followed while the students completed the learning tasks, followed by teacher feedback.

The second use of Salmon's model was to verify the extent of development of self-regulated learning through understanding how the learners' interacted on wiki to practise SRL skills, as well as through their reflections in the post-interviews, which could provide evidence of the extent to which the goals or purpose of each stage had been achieved.

Table 4:3 Application of Salmon's (2014) Five-stage Model (adopted from Salmon (2000))

STAGE	**STUDENT ACTIVITIES**	**TUTOR ACTIVITIES**
Stage 1 Access and Motivation	Accessing the system: - Students access the wiki page via a personal email in which they accept an invite. - Students sign up and log-in (Appendix 11).	Motivation of the students to learn online to be increased by: -explaining the aim of the study and the features of wiki. - providing students with a guide and instructions on how to access and use the wiki successfully. - providing a presentation on how to use wiki and how students can access and upload on the wiki main page. - helping and supporting each student in how to begin contributing to the wiki page community. - creating an "Ice-Breaker" page including a 'praise board, listing students' names each week so as to encourage more activity on wiki tasks for practising SRL learning skills.
Stage 2 Online Socialisation	Sending and receiving messages: - Students interact with each other and post messages via the wiki pages. - Students discuss and post on the online discussion board (Appendix 12).	Encourage students to interact with each other by: - creating a "getting-to-know-you" page on wiki in order to facilitate and encourage more frequent student interaction. - creating a help page on the wiki site to allow students to ask each other or the teacher about any difficulties faced while using the wiki, whether technical, or about managing learning during the learning tasks. - one aspect of the tasks (build content) allowed the students to choose topics related to the Education Technology module for discussion and interaction with each other. - instructing pupils on "Netiquette" and how best to behave while taking part in an online, professional forum. It should be noted that, whilst screenshots indicate that interaction did take place, the researcher did not monitor the interaction levels of individual students, as the focus of the

		study was on SRL rather than interaction specifically.
Stage 3 Learning Exchange	Students interact with the content on the wiki and interact with peers and their tutor. - students deal with course material and resources. - students share information with each other. - NB: students are expected to complete work independently in the first place before discussing the work at hand.	Facilitating structured activities, assigning roles and responsibilities and supporting the use of learning materials by: - encouraging students to keep e-files about the course and to take notes about the course via a "Recording-keeping" page such as *ePortfolio* for the wiki Education Technology course. - fostering debates between students on group topics. - inspiring students to use learning materials by creating an accessible main page on the wiki comprising all taught materials on Education Technology and also all wiki tasks. - encouraging discussions that summarise findings and/or outcomes.
Stage 4 Regulated Knowledge Construction	The students contribute to the content of the Education Technology course via the wiki page as a part of the task and try to practise SRL skills in online learning by: - starting to apply, manage and regulate independent learning by setting goals, planning, managing time and creating deadlines, taking comprehensive notes and evaluating their tasks via grade rubrics.	Facilitate *open* activities and encourage students to regulate their learning by: - promoting active and regulated learning. - encouraging students to contribute to the content of the course. - showing students how to use wiki resources effectively through the use of multimedia as well as demonstrating how to collect and collate resources. - creating a well-worded SMART objective to begin each learning task prior to students beginning their assigned tasks including goals, logical steps, allotted time for the task and an evaluative form to help students regulate learning as well as to assist with independence. - encouraging students to contribute and interact with each other on the online discussion board (appendix 13).

Stage 5 Development	Students self-reflect on their own learning and evaluate their learning experience or evaluate their performance in improvement of SRL via the use of wiki. Using wiki and recognising the benefits and drawbacks that arose, offering suggestions where necessary.	Promote and support students' independent reflection by: - encouraging students to review whether the objectives set at the beginning were met and how/why/why not for each individual task. Encourage students to evaluate their level of improvement in SRL skills by learning the Education Technology module via the use of wiki technology.

As table 4.3 shows, the researcher used and applied each stage of Salmon's five-stage model in the current study. The table shows the roles of the students and the teacher in each stage. Furthermore, the figure below represents each stage of this model for a better understanding.

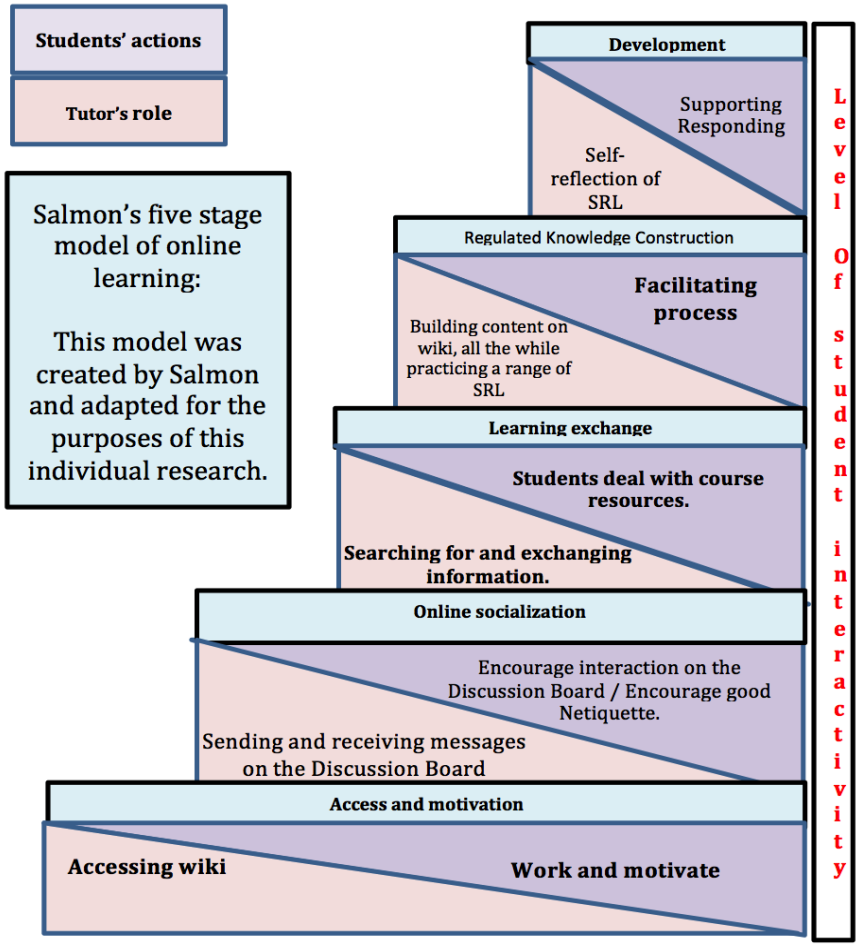


Figure 4:1 Salmon's Five Stage Model of online learning(source: Salmon, 2014:1, after update)

For further details, please see Chapter Five (see section 5.5) where an account of how each stage of Salmon's Model was achieved in the current study can be found. It should be noted that for each stage, the students are quoted individually, but every effort has been made by the researcher to ensure that the quotations are representative of the majority of students who took part in this study, and not simply individual cases or opinions. (In addition, screenshots of student contributions on the wiki site representing the achievement of each Salmon stage are included in the next chapter).

4.11 Pilot Study:

A pilot study enables the researcher to assess the effectiveness of the tools employed to gather data, and any necessary adjustments can be made before the main study commences (Ary et al., 2010). As Cohen et al. (2007) state, a pilot study is an effective means of improving and gaining further knowledge of the research process. In the present study, a pilot was used in order to reduce any likelihood of ambiguity in the items in the questionnaire or interview and also to measure the reliability of tools to ensure their validity. In this case, convenience sampling was carried out. According to Stevens (2012), convenience sampling is when the convenience of the researcher (for example accessibility or availability) determines the selection of the participants. The sample was outside the main study sample but still represented the population for the study since they were students from the same year group in the same department but from different classes to the main sample.

4.11.1 The procedure of the pilot study:

This section discusses the main process of implementation of the pilot study. A pilot study was conducted in order to identify any errors that needed rectifying, and to ensure consistency before conducting the main study.

Firstly, the researcher identified a place and time suitable for sampling on the university campus. The requirements of the pilot study were a class with access to a computer lab and an available internet connection at PNU. In general, the quality of the internet is not satisfactory because of the poor quality of the infrastructure in the computer labs in the School of Education. Thus, the researcher solved this problem by adding more than one external modem for a better connection and also arranged with the IT department to check and repair the PCs in the lab.

These problems were solved before starting the pilot study and these solutions helped the researcher to prevent any problems related to the study requirements before starting the main study.

Secondly, a meeting was held with the prospective participants (20) to explain the aim of this study and how the data would be collected. At the end of the meeting, if the attendees were happy to participate in the study, they were requested to read and sign a consent form (see Appendix 7, d).

Finally, before implementation, the researcher collected data from the sample via a pre-questionnaire. During implementation, the researcher gave each learner a manual of wiki instructions and showed them the wiki page design. The researcher also explained how this technology would be used to teach the Education Technology module online and to manage their learning, practise SRL skills in online leaning and monitor their interactions with each other. Then, the researcher collected data from the sample via the post-questionnaire and interviews with five learners who agreed to have an interview. The numeric data from the questionnaire were analysed via SPSS software, and MAXQDA12 software was employed for the analysis of the qualitative data from the interviews, as a later section will explain.

4.11.2 Lessons learnt:

The aim of the pilot study was to test the methodology and the instruments used by the research, and to evaluate their cost. By testing the techniques of the study, the research could then be improved by making necessary adjustments. It also provided the researcher with valuable experience that would avoid errors and improve the main study.

There were three main lessons learnt from the pilot study:

1) The result of the pilot questionnaire showed that all of the students had no previous knowledge of wiki technology and their levels of SRL skills were between medium and low. Thus, the researcher needed to think about the main study sample; if they had no previous experience of wikis, they would need more time to understand this technology as a type of online learning. They would also need supporting guides on wiki technology provided through a more frequently-used program or website such as YouTube, for example.

2) The number of items on the questionnaire was 52 before the pilot study but after the pilot study, the results showed there was one item (number 13) under the time management domain that was not significant statistically in terms of correlation, so it was decided to delete it before applying these tools in the main study.

As Marshall and Rossman (2011:96) said, "Pilot interviews help in understanding oneself as a researcher and also help researchers find ways to eliminate barriers". Pilot interviews help researchers detect ambiguous questions, and difficult questions that respondents cannot comprehend (Saunders et al., 2009). The researcher found that while the interview questions were clear some questions only provided short answers that did not provide enough information to analyse qualitatively. Thus, the researcher found that it was very important to prepare a prompt list including words such as "why", "explain", "tell me more", "give an example" and "how" to obtain more information and to understand students' perspectives better.

4.12 Translation Issues:

The interviews were conducted in Saudi Arabia, where Arabic is the native language, meaning that the interviews had to be translated for the purposes of this research. Marshall and Rossman (2011:165) stated, "Translation is the transfer of meaning from a source language to a target language". Thus, it was very important to make sure that the translated versions of the interviews were accurate and that none of the original meaning was lost in translation. This was vital since translation between Arabic and English poses several issues: the religious nature of the Arabic language and the lack of equivalents in English often mean that attitudes may not be successfully translated. Further to this point, Katan (2004:99) states that the same reality can be expressed in different languages in different ways, since "a language is essentially rooted in the reality of the culture and it cannot be explained without constant reference to these broader contexts of verbal utterance".

In this study, the researcher took several steps to ensure the accuracy of translation. First, all the instruments and interview transcripts were taken to a professional translation service in Saudi Arabia. The translator had a PhD qualification, and many years of experience in academic translation. During his production of a first translation into English, he maintained contact with the researcher to resolve any ambiguities. The translated versions were checked by the researcher, with the aid of an expert colleague

who has a PhD in linguistics, and some modifications were made. Second, both the Arabic and English versions were given to another academic translation service in UK, headed by an expert of Arabic origin, who had a PhD from the UK, who oversaw the checking of both versions by experts in Arabic and English. During this process, the two versions were compared thoroughly, and some retranslation was carried out. The final English version was then checked again by an expert in both English and Arabic. In this way, the accuracy of the English version as equivalent to the Arabic version was verified.

Unfortunately, and whilst, as noted, every effort was taken to ensure the accuracy of the English translations, they were not checked with the interviewees. This is potentially problematic in terms of confirming their credibility. Given, however, that the rationale for conducting the interviews in Arabic was that the participants had limited proficiency in English, it was felt that they would be unlikely to be able to make an informed judgement on the accuracy of the translation into English.

4.13 Reliability and Validity:

Investigating the validity and reliability of the instruments as part of the data collection process is very important. The strength or weakness of the results will be determined by the strength or weakness of the study's instruments (Golafshani, 2003). Reliability, when referring to research, traditionally means that the research shows consistency over time – so if the research instruments were employed by other researchers at another time in the same circumstances they would obtain the same results (Punch & Oancea, 2014). Validity, meanwhile, refers to whether or not an instrument actually measures the constructs it is intended to measure (Basit, 2010). These interpretations, however, are derived from the quantitative tradition, and a number of researchers (see for example, Punch & Oancea, 2014) suggest that they need to be re-conceptualised for qualitative research, which is not concerned with measurement and where outcomes are expected to vary with time and context, since they reflect multiple "realities" shaped by experience. Here, such a re-conceptualisation is in terms of the trustworthiness and transferability of the interview data.

The following section discusses the reliability and validity of the questionnaire and the trustworthiness of the interview and transferability, in turn:

4.13.1 Reliability and validity of the questionnaire:

For any piece of research that is conducted, it is important to establish its credibility. When discussing the scientific credibility of research, the terms most commonly employed in the assessment are validity and reliability.

a) **Reliability:**

One of the most popular reliability statistics in use today is Cronbach's alpha (Arthur, 2012). Cronbach's alpha is used to assess the internal consistency of a questionnaire that is made up of multiple Likert-type scales and items. The reliability of the questionnaire in this study was evaluated using Cronbach's alpha to test the internal consistency of the nine scales. The reliability results based on Cronbach's alpha are shown in the following table:

Table 4:4 Calculating Cronbach's Alpha coefficient

Scales (N=20)	**No. of Items**	**Cronbach's Alpha**
Goal Setting	6	0.78
Time Management	8	0.79
Self-record	7	0.78
Organisation of the Learning Environment	4	0.89
Self-Evaluation of Learning	6	0.80
Seeking Help	4	0.82
Peer Learning	4	0.87
Self-efficacy	6	0.88
Attitude towards wiki Technology	6	0.92

As can be seen Table 4.4 above, the value of Cronbach's Alpha's coefficient was deemed to be high for the dimensions of the questionnaire, ranging between 0.78 and 0.92, which indicates a good level of reliability. According to Loewenthal (2004), taking into account the number of items and construct validity, an alpha coefficient of 0.6 would be acceptable. Therefore, the reliability of the total questionnaire was rated as high (0.92).

B) Validity:

Validity can be defined as "an essential criterion for evaluating the quality and acceptability of research" (Zohrabi, 2013:3). The validity of a questionnaire is not an easy matter to deal with; therefore, it must be ensured that the questions reflect the subject under study. The questions must be clear and unambiguous. The questions that have been developed should be examined by someone who is familiar with the issues of the study and the population under examination. Pre-testing can ensure that the questions are understood correctly by the respondents. The validity of the instruments for both questionnaires was verified via feedback from six experts in research methods and the content (see Appendix 5) and feedback from students in the pilot study.

4.13.2 Interview trustworthiness:

Many researchers (for example Guba and Lincoln 1985; Merriam,1998) argue that the traditional criteria of validity and reliability are unsuitable for qualitative research, which does not seek or assume an ultimate "truth". A widely adopted alternative is trustworthiness, composed of credibility, dependability, confirmability and transferability (Guba & Lincoln 1985). Credibility concerns how well the research account reflects the experience and perceptions of the participants. One way of addressing credibility is through the use of triangulation, on the basis that claims made in research are more convincing when separately warranted by different sources (Nowell et al., 2017), in this research, the use of questionnaires and the interviews. This does not necessarily require consensus or homogeneity of views but extends the range of evidence on which the researcher bases an interpretation and the ability of the researcher to reflect the multiple perspectives of those involved.

Moreover, an important approach to establishing credibility is respondent validation in which the researcher seeks confirmation from research participants that he or she has correctly understood their social world, offering an opportunity for them to correct errors or offer additional information. Doing this helps to address the risk of researcher bias. In this study, during each interview, the researcher periodically checked her emergent understandings by using questions such as "Do you mean..?" or " Are you saying…?". Moreover, before closing each interview, the researcher offered the participant an opportunity to add any further comments or explanations, if she so wished.

It is worth noting that Hammersley (1992) questions the value of respondent validation as a sole criterion of research quality, arguing that participants may not always be fully aware of their own situation, or may have an interest in seeking to censor certain views. This does not mean, however, that participants should not have a chance to comment on the emerging interpretation or clarify their position, but that other criteria should also be considered.

In this study, therefore, the researcher also sought to establish dependability and confirmability through demonstrable integrity and transparency in carrying out the research. For example, the research process is documented and trackable, data can be traced to original sources, and the researcher has been clear about her own personal professional and philosophical position (see for example, section 4.3 on the research paradigm and researcher positionality and section 4.15 on reflexivity).

Another approach, advised by Zohrabi (2013), in order to obtain confirmation that the interpretation of the results makes sense and accurately reflects what was discussed during the interview, is peer debriefing. For this purpose, copies of the Arabic interview transcript and the English translation were sent to two Saudi peers (postgraduate students from Cardiff University in the UK and the University of Dallas in the USA). Both were fluent in English, and familiar with the Saudi educational and cultural context. The peers had copies of the digitally recorded interviews. They reviewed the interview data analysis and carried out peer debriefing by examining the transcripts of the interviews and the findings. They verified the accuracy of the transcription and the appropriateness of the researcher's interpretation even though these, for reasons already noted, were not confirmed by the interviewees.

4.13.3 Transferability

Transferability is the extent to which findings from one research study can be applied into another context or to other participants (Lincoln & Guba, 1985).

In this study, the researcher sought to increase the level of transferability by emphasising the description of social and cultural contexts that informed students' perspectives and the findings that surrounded learners' experiences.

In order to achieve this in this study, adequate detail was sought and illustrated through the use of screenshots of the students' activity on wiki, including student logins, wiki

procedures and overt examples of student interaction with wiki pages, their peers and their teachers (see section 5.5). Furthermore, with rich description of the study context as mentioned in chapter two, the context of the study was explained, including information on cultural and social issues linked with female students within the context of Princess Nora University under the umbrella of the Saudi Education Policy. Incorporating this much detailed description of student activity allows readers to decide for themselves whether or not the results are transferable to other circumstances.

4.14 Data Analysis

The data analysis phase is viewed as the most meaningful stage of research. Through the selected analytical tools, the raw data of the study is converted into meaningful information that can be employed in order to answer the research questions (Creswell, 2014). Both quantitative and qualitative data were involved in this study, and the analytical procedures that were chosen were consistent with the nature of the data.

It is important to note the aims of this research were to discover and explore a particular phenomenon rather than to find definitive solutions for a problem or to develop new theory. Hence, while the data about student perceptions of their progress captured from the questionnaire could be analysed statistically, the results do not provide objective outcomes that might form the basis for solutions or new theory; merely insights that could be explored more deeply, although still subjectively, through the thematic analysis of the qualitative data from the interviews. Some implications can be drawn from the study in order to suggest practical ways forward for the use of particular methodological approaches and for KSA policy.

Methods of analysis will be discussed in detail in the following section.

4.14.1 Data analysis – questionnaire

The researcher collected the responses of learners on questionnaires on a pre- and post-test. Only 83 out of 105 students completed both questionnaires because some learners were absent in one of the tests. Thus, in the interest of analysing the progress made, the researcher made the decision only to include results linked to students who had completed both questionnaires.

The data obtained from the questionnaires were entered into the analysis software package SPSS. To maintain the anonymity of the respondents, each questionnaire was numbered 1 to 83. For the purposes of the software, the sections and statements on the questionnaire sections were also coded. The items on the scales consisted of statements with a 4-point agreement scale coded from 1 (never), 2 (sometimes), 3 (often), to 4 (always), so higher scores represented a higher level of perceived skill or a more positive attitude. The data were then analysed for frequencies to describe the distributions of the learners' background information, the learners' experience of the executive function and evaluation skills and also the students' attitudes towards the purpose-built wiki site. In addition, a paired sample Wilcoxon test was used to compare the value of the pre- and post-tests (see section 5.2.2, (2)).

4.14.2 Data analysis – interviews

Cohen et al. (2011) claim that there is no set standard in terms of processing qualitative data and that researchers should choose the most appropriate way to analyse it to reach conclusions. These authors also state that there is no single correct process for analysing qualitative data, rather insisting that the process of justifying the chosen method of analysis should be to establish 'fitness for purpose'. In this study, the data was descriptive and from the students' perspectives, therefore the researcher used the trusted computer software MAXQDA12 to analyse the qualitative data **(**Saillard, 2011**)** because it is familiar to the researcher and because it supports both the English and Arabic languages. The data was collected from the interviews and then transcribed and saved under the simple name of "student interview". The first step in MAXQDA12 was to create the codes or themes, which are called the "code system" e.g. "attitude". The data were then searched by the researcher, and any responses that linked to attitude were highlighted and categorised under this code/theme. Further on in the analysis, new sub-codes/sub-themes may be discovered under the main code/theme e.g. "positive expression" or "negative expression", etc. The codes were created as the transcript was read, and then when this step was repeated, some of the sub-codes/sub-themes were refined. This procedure was repeated for all the transcript files, 20 students (student interview 1, student interview 2, etc.) (see Appendix 6). The findings are reported in the thesis in Chapter Five under "Qualitative findings" and are interpreted in the discussion in Chapter Six.

Summary of the qualitative analysis using MAXQDA12:

- Conduct semi-structured interviews to collect the data
- Transcribe the interviews
- Import the transcribed information into MAXQDA12
- Use the interview responses to create themes/codes
- Drag responses to the codes from the transcript files linked to student interviews
- Describe findings, report findings and interpret the meaning given by the analysis of the qualitative data collated.

4.15 The researcher's position and reflexivity:

Tuckermann and Rüegg-Stürm (2010) view reflexivity as a concept employed to define the relationship between the researcher and the objects of the research. Reflexivity refers to a critical analysis of the relationships among researchers and participants (Riley et al., 2003). It also concerns social collaboration with individuals at the place where the research is taking place. In this study, qualitative research was applied and as Creswell (2014) states, qualitative results depend on the researcher's experience and how good they are at drawing conclusions from what the participants have said. This discussion of the researcher's role is associated with reflexivity.

In qualitative research, the researcher acts as an instrument of data collection and data analysis (Simon, 2011), and is "left to rely on his or her own instincts and abilities throughout most of this research effort" (Merriam, 2009:52). This approach may leave the research conclusions open to influence from the researcher's inherent biases, however (Simon, 2011; Unluer, 2012). It is unavoidable that there will be some subjectivity as the beliefs and values of the researcher can never be totally separated from the data gathered and the selected themes (Lincoln & Guba, 1985). Indeed, more generally, value-free research is difficult to achieve (Bryman & Bell, 2007). Qualitative research requires researchers to demonstrate honesty in research by stating, and reflecting on, their own background values and views about the researched topic. In this study, the researcher's background in teaching influenced the topic selected. The researcher had worked as a teacher in Saudi Arabia and had seen how teacher-centred the learning there was. She understood the importance of technology and wished to investigate a move towards student-centred learning with SRL and wiki technology. More specifically, the researcher's qualifications included computer science and in this type of field (computer

programming) the students learn by themselves. Then, when the researcher worked as a lecturer at Princess Nora University, she observed the learners in the Foundation Programme. Traditional methods were used, e.g. PowerPoint presentations. The learners did not have the benefits of social applications via the web and they also had very little or no knowledge of self-regulation skills (to know how to organise their learning). They depended on the teacher as a source of knowledge.

Moreover, the researcher's interests (in particular an interest in how students take responsibility for their own learning through utilising wiki technology as an online learning platform) influenced the collection and analysis of the data in different ways. The researcher was interested in the implementation of technology in education, especially in higher education, and the possible barriers to its use, including students' attitudes. An assumption was made that the ability to learn and teach online is linked to positive attitudes and a creative, flexible nature. Some of the findings from this study were in line with this assumption (for example, choosing appropriate wiki tasks is required on the part of the teacher to help successful online learning, and students who made good use of the wiki had a positive attitude towards it). In the present study, the research context was the researcher's workplace, and she therefore collected data as an insider participant, observer and contributor. When the role of the researcher is to contribute, continuity is an advantage in terms of data collection. The continuity of data collection means that the researcher is able to gather data that is more versatile and detailed, and therefore more trustworthy (Cohen et al., 2013).

Although the researcher was a former member of the teaching staff at the university in this study, she had no authority over the data provided because she had not been a member of this department and had left the institution over three years previously. She therefore did not know any of the members of staff or the students in this department. Being, in this respect, an outsider meant that it took a lot of time to negotiate access to the department, but the experience of teaching there was valuable when it came to teaching the Education Technology module. In addition, the researcher gained the impression (although admittedly, this was a personal view) that because she was not a current member of staff, the students disclosed information that they would not have disclosed to their teachers. In an attempt to avoid influencing the results, the researcher took care not to display bias and did not lead the respondents to answer in a particular way, so that they told the truth as they perceived it. Moreover, mixed-methods were also used, both quantitative and qualitative – the researcher could have no influence on the quantitative data.

Furthermore, it must be noted that any questions asked of the participants in an interview are subject to response bias, since the students may try to please the researcher, who in this case had created the wiki and taught them. Although this cannot be avoided entirely, efforts were made in this study to minimise the possibility of bias through the use of anonymous responses and the creation of a relaxed interview atmosphere, which resulted from the researcher making active efforts to build positive relationships with the students over the six-week period of the fieldwork. For the questionnaire, response bias was minimised by ensuring that the questions were clearly worded and did not lead the respondents to answer in a certain way. Students were also assured that their responses would not impact on their academic grades in Education Technology. It was not possible in practice for the responses to be fully anonymous, however, partly because a group of students elected to put their names on the document, but mainly because each document was labelled by the students with student ID numbers to enable the researcher to compare the changes in individuals' self-perception of their SRL skills between the pre and post - test.

Finally, as explained above (see section on pilot study) there were issues with the setting of the research, and the technological resources available. The researcher faced some difficulties with preparing and organising the requirements of the study, although this could be an issue in other countries or in the same country but on a different campus. For example, the researcher prepared the computer lab by providing a high-quality internet connection inside the university campus via the available external modems. Also, the researcher contacted the IT department and asked them to check all of the computers and the installation of any software that this study needed (software organisation or hardware organisation).

4.16 Research Ethics:

Ethics consist of guidelines and principles and they are used by people to assist them with upholding their values (Johnson & Christensen, 2011). Ethical issues in research are very important and need to be taken into account before embarking on collecting data. It is the researcher's responsibility to be truthful and respectful to all participants in the research (Gravetter & Forzano, 2015). Most countries have enacted laws to protect individuals' personal information from being misused (Cacciattolo, 2015). The researcher should therefore make sure that there are no types of psychological or physical harm associated

with participants' offerings during and after providing information. There are common principles that the researcher should abide by, namely: the voluntary nature of participation in a study, informed consent, safeguarding from harm as well as confidentiality or anonymity (Cohen et al., 2013; Cacciattolo, 2015). Two forms were therefore filled out by the researcher at the School of Education: one about ethics and the other, a consent form. The researcher was aware of all the issues mentioned above and carefully followed ethical procedure to produce ethical work and satisfy the School of Education and the University of Hull's requirements.

The same consent form and ethical procedures were carried out on behalf of the host university for the study in Saudi Arabia (PNU), and thus the Ethical Guidelines of the Ministry of Education in Saudi Arabia were also adhered to. In accordance with these guidelines, the researcher used a form to obtain permission from the university administration and the participants to take part in the research (see Appendix 7). The researcher also informed the participants in detail about the aims of the study and the fact that they should only participate on a voluntary basis. The participants were told that their personal data would only be used for the purpose of this research in accordance with the Data Protection Act, and that their information would be fully confidential and kept securely.

4.17 Summary

This chapter provided details of the methodology used in the study. It examined the various research philosophies available and provided justification for the mixed-method approach used in this study**.** The study employed a questionnaire, once before the teaching intervention in the form of a pre-test, and then again afterwards, as a post-test. The students in the study were also interviewed after the teaching intervention had taken place. This chapter presented the course design and wiki page design for this study. Additionally, the use of the Salmon model was further explored, in terms of its five individual stages. A pilot study was conducted before the main study, so that any necessary adjustments could be made to the main study. In this chapter, the sample of study was presented and how the sample was selected was also discussed. This chapter explained how validity and reliability of the questionnaire were verified and issues surrounding the trustworthiness of interview data was also discussed. It provided details of the analysis techniques employed. The chapter ended with reflection on the researcher's position and ethical considerations.

The next chapter will present the data from the questionnaires and the interviews.

5 Chapter Five: Data Analysis

5.1 Introduction:

Following from the explanation of the research methodology in Chapter Four, the present chapter is concerned with the data collected, the different statistical analyses performed on the data, the outcomes of these analyses and a discussion of these outcomes. This study sought to explore how wiki technology may be utilised to enhance self-regulated learning (SRL) skills in students studying an Education Technology module at PNU in Saudi Arabia. The data presented in this chapter represents the responses to each of the three research questions.

1. To what extent can using wiki learning enhance self-regulated learning among students? This is subdivided into two questions.

- To what extent can using wiki learning enhance executive function skills among students?
- To what extent can using wiki learning enhance evaluation skills among students?

2. What are the attitudes of students towards the use of wiki learning as an appropriate environment for learning?

3. What are the students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills?

To answer these questions, the work is organised into three sections to create a meaningful overview of the whole research project and its outcomes: Section One presents and analyses quantitative data collected through a questionnaire. Section Two presents and analyses the qualitative data obtained from a number of open questions in an interview. Section Three presents and contains conclusions on the outcomes of both quantitative and qualitative data, so as to start the process of triangulation, in which quantitative and qualitative data will be combined. At the end of this section, the researcher employs the five stages of the Salmon Model, as introduced in previous chapters (see sections 3.6.4.2 (a); 4.10), to evaluate the effectiveness of the wiki in encouraging students' engagement in the online environment based on students' interviews, observation of their interaction, and learners' potential progress in SRL skills.

5.2 Quantitative Data

5.2.1 Introduction:

This part of the analysis chapter presents the quantitative data collected from a questionnaire that consists of two parts. The first part records the background of the respondent. The second part consists of SRL skills as well as students' attitude towards the wiki. These skills can be broken down into executive function and evaluation skills. The researcher collected the responses of learners through questionnaires at two chosen times, before and after the wiki learning. Due to some students being absent during one of the tests (pre-test or post-test), only 83 of 105 participants completed the questionnaire on both occasions. Only these were included in the analysis, because having participants who completed both tests enables comparisons pre and post wiki learning and this will indicate how useful/influential this learning was perceived to be by students. Having some participants' responses at one time only would have distorted the comparison and would not enable the main objectives of the study, to be fulfilled.

The outcomes reported in this section are guided by the research questions and organised based on the main scales within the questionnaire. As explained in the methodology chapter, the questionnaire consisted of three scales: *Executive function, Evaluation skills and students' attitude towards* wiki *technology*. The executive function scale includes four sub-scales exploring goal setting, time management, self-record and organisation of the learning environment. Each sub-scale consisted of a number of items. The evaluation scale includes four sub-scales exploring self-evaluation, seeking help, peer learning and self-efficacy. The third scale is students' attitude towards wiki technology, which includes a number of items representing different attitudes, categorised as positive or negative attitudes towards wiki. Furthermore, as also explained in the methodology chapter, the questionnaire was answered on a 4-point ordinal Likert scale (never =1, sometimes =2, often =3 and always =4).

The following sections will explore the data generated from the questionnaire in a quantitative fashion. It is necessary to start, however, by examining the data type and thus determining the type of techniques suitable to analyse the data. Thereafter, the collation of data surrounding students' starting points prior to wiki use is summarised. Each of the scales will then be presented and explained separately. The explanation will include both descriptive and inferential statistics, in order to determine the distribution of the results

(pre-test and post-test) and also to assess whether or not there is a statistically significant difference between the students' perceptions of their skills before and after wiki learning. This is achieved by comparing the overall results of the pre- and post-tests.

5.2.2 Type of data and analysis techniques:

When collecting numerical data (via questionnaires) researchers need to consider the type of answers/options of answers given to the participant. This is influential when examining the data, both descriptively and inferentially. Questions can be answered following interval scales, ratio scales, ordinal scales, and categorical scales of measurements. The questionnaire applied a 4-point Likert scale (Never 1; Sometimes 2 ;Often 3; Always 4) which is a measurement scale that is considered to be ordinal i.e. numerical values are placed in a certain order, and the difference between any two points is not the same, but one point is higher or lower than the other.

In statistics, as mentioned above, the type of answers/scale of measurement used determines the type of data collected and ultimately the types of analysis techniques that could be used. There are two main types of data categories-parametric data and non-parametric data. The main assumptions of parametric data are normality of data distribution and the use of interval/ratio scales. Normality reflects the extent to which the data is normally distributed and that the majority of answers surround the mean score (bell-shaped distribution). Violation of those two assumptions requires researchers to assume that the data is non-parametric. In the current context, the data follows an ordinal scale, and hence the data are deemed to be non-parametric. For this reasons, non-parametric analysis techniques should be applied to examine them in detail (Field, 2009; Boone & Boone, 2012).

The following sub-sections introduce the range of statistical procedures that were used to describe and explore the current data in line with the research questions, both descriptively and inferentially.

1) Descriptive Statistics

There are a number of descriptive statistics that can explain ordinal data. The aim of descriptive statistics is to provide an idea of the distribution of the results within each of the scales and sub-scales. In the context of this study, and as a result of the data being

non-parametric, the research used descriptive statistics such as frequency (n) of answers; each number within the n will reflect one person/participant. This will also provide a table that is easy to read, without unnecessary information. To achieve this, numerical values were assigned to the response options, i.e. the higher the frequency, the higher the value. For example, always = 4 and never = 1. In this way, the change in level from pre- to post-wiki learning can be clearly demonstrated.

The different measures of skills before wiki and after wiki were summed, i.e. the total/sum of answers for goal setting, time management, self-record, organisation of the learning environment, self-evaluation, seeking help, peer learning, and self-efficacy were obtained.

The descriptive statistics (frequency) were worked out manually and through SPSS for each of the items and for the total answers per skill type. This enabled the researcher to see if there were improvements after wiki learning.

2) **Wilcoxon Signed Rank test (Z):**

This technique was used in order to check whether there was any difference in the values of the students' responses (reflecting their perceptions of their SRL skills) between time 1 and time 2, where time 1 is the pre-test questionnaire completed before wiki learning, and time 2 is the post-test questionnaire after wiki learning. The null hypothesis is that there was no difference in the value of students' SRL skills between time 1 and time 2.

This technique was used because it is appropriate for dealing with ordinal data for two classes in two groups (McDonald, 2009). The Wilcoxon test is a non-parametric statistical procedure for the analysis of two paired samples using the Z statistic and it converts values to ranks (Pallant, 2013; Benavoli et al., 2014). It measures whether or not there is a significant difference between the same distributions of values for variables over the two different applications of the instrument (two different times they are applied). This is the core analysis technique in this study as it allows the researcher to answer the key research questions around whether or not wiki learning was useful and beneficial. In this case, a significant difference means that the differences in the students' skills between the pre- and post-test, based on the students' reports, have an alpha level of 5% or less ($p < 0.05$). The alpha level reflects the likelihood of the results (effect of difference) being down to chance. The alpha level has three different thresholds that are commonly used in

statistics: $p < 0.05$, $p < 0.01$ and $p < 0.001$; the lower the alpha level, the less the possibility that the results are due to chance (Pallant, 2013). By applying the rule of $p < 0.05$, the researcher is willing to accept a chance of up to 5% that apparently statistically significant differences in values are accidental and not due to intervention.

The results here will focus on the overall value given for each sub-scale/skill, as per the study's aim e.g. a combination of the values. This means, in effect, that groups of items under the same sub-scale or skills are combined into a single value .

In this study, it is the overall value for each sub-scale that demonstrates the significance associated with the difference between the pre- and post-test values. Hence, the Wilcoxon Signed Rank test is used in this study for examining/measuring and comparing the difference in pre- and post-test, based on the students' responses in the questionnaire. It is important to note that a high value for the Wilcoxon Z score reflects a significant result, as it means that the post-test value is higher than the pre-test value.

3) **Spearman's Rho Correlation Coefficient:**

A correlation test examines the distribution of scores on two variables in order to see whether and how they correlate, that is, whether there is a regular pattern or relationship between them (high-high, low-low, high–low etc). Spearman's rho correlation coefficient was used to discover whether there was any correlation between any two of the sub-scales of SRL (Appendix 10, task 2) or between those sub-scale variables and any of the variables given in Appendix 10, task 1 (background information scale). The null hypothesis is that there is no correlation between any two variables.

In this study, the variables examined were ordinal (ranked) data; that is, data that could not be precisely quantified but could be ranked in order.

Moreover, as mentioned before, the data was non-normally distributed. The researcher therefore used the Spearman test because it is a non-parametric technique that is suitable for handling ordinal data and measures the strength of the correlation between variables (McDonald, 2009; Coolidge, 2012). The correlation coefficient ranges between ±1. The absolute value of the correlation coefficient indicates the strength of the relationship between the compared variables, while the sign (+ or +) indicates its direction. The value of +1 reflects a perfect positive correlation between two variables (an increase in one variable is correlated with an increase in the other variable) while a value of -1 reflects a

perfect negative correlation (an increase in the value of one variable is correlated with a decrease in the other variable). The alpha level of ($p<0.05$) determines whether such a correlation is significant or not.

It is important to note that a correlation between variables does not necessary imply causation, because that observed association could be caused by the influence of one or more external factors common to both the correlation variables.

5.2.3 Background information:

All of the participants were asked to provide essential background information directly related to the main topic of the research, wiki. The aim of gathering the background information was to provide information regarding the wiki tool in order to check the students' awareness of web 2.0 technologies, particularly wiki technology. This was necessary, in order to assess whether the students reported developing higher SRL skills in the online learning environment during this module. Furthermore, if the students had no experience with web 2.0 technologies, particularly wiki technology, then this was valuable information. Although the results (reported later) show that the learners had no prior experience of using wiki, some had experience of using web 2.0 technologies in general. The researcher took care before starting wiki learning to try to ensure that the students were able to begin at a similar level with regard to their use of wiki technology. This was done by checking the students' work and observing them. The college (which had experience in research methods and Education Technology) also provided information on the students' ability levels and confidence, and the students were compared directly to ensure that they were at a similar level (e.g. student IW01 was at a similar level to student IW02).

Also, if learners had experience of web 2.0 tools, this could affect the enhancement of their SRL skills and their attitude towards technology in learning. It is also possible that negative attitudes towards wiki may jeopardise students' progress in SRL skills throughout the learning process. Participants were asked to provide information on the following:

- Level of GPA (Grade Point Average).
- Use of web 2.0 technologies.
- Time spent using web 2.0 for the purposes of study.

- Time spent using web 2.0 for non-study purposes.
- Personal evaluation of the student's level of use of web 2.0 tools.
- Prior knowledge and use of wiki.

Such details were included in the questionnaire, as they might have had an influence on the different skills measured in the questionnaire. The association between this background information and the different skills will be assessed later in the questionnaire analysis section.

Table 5:1 Participants' *background information*

1- Study sample by GPA			2- Use of web 2.0 technologies	
	N			N
Good	11		Yes	72
Very Good	36		No	11
Excellent	36			
3- The time spent using web 2.0 tools per week for study purposes			4- The time spent using web 2.0 tools every week for non-study purposes	
1-2 hrs	50		1-2 hrs	16
3-4 hrs	15		3-4 hrs	16
5-6 hrs	7		5-6 hrs	21
> 6 hrs	0		> 6 hrs	30
Missing	11		Missing	
5- Evaluation of skills level when using web 2.0 tools			6- Any prior use of wiki technology (e.g. wiki Spaces)	
Weak	3		Yes	0
Good	19		No	83
Very Good	34			
Excellent	27			

The table above shows that some of the students stated that they had a very good or excellent GPA (n=36 out of 83) and that a high number of students already had prior experience of using web 2.0 tools (n=72 out of 83). Interestingly, some of the students claimed that they spent more than 6 hours a week using web 2.0 tools for non-study purposes and they rated their skills in using web 2.0 technology as very good (n=34 of 83). These results gave the researcher an overview of the learners' experience of using wiki technology in general. This previous experience of web 2.0 tools in general may mean that they would face fewer difficulties learning to use wiki technology. It can be

observed, however, that none of the study sample had used wiki technology before (n= 0 out of 83).

5.2.4 Analysis of the main scales:

The following sections separately present the three main scales and the sub-scales within these. Each of the sub-scales is descriptively explained and then inferentially tested (comparing pre-test and post-test results). Before explaining the said scales, it should be noted that a total value (total of the values for all items' results) was created for each sub-scale. This was due to the fact that the purpose of the study was to reflect results for each sub-skill as a whole and not for each item within it. Following the descriptive analysis of each sub-scale, a Wilcoxon Signed Rank test examined the difference between the overall values for students' skills for each sub-scale (see Figure 5.1) before wiki learning and after wiki learning.

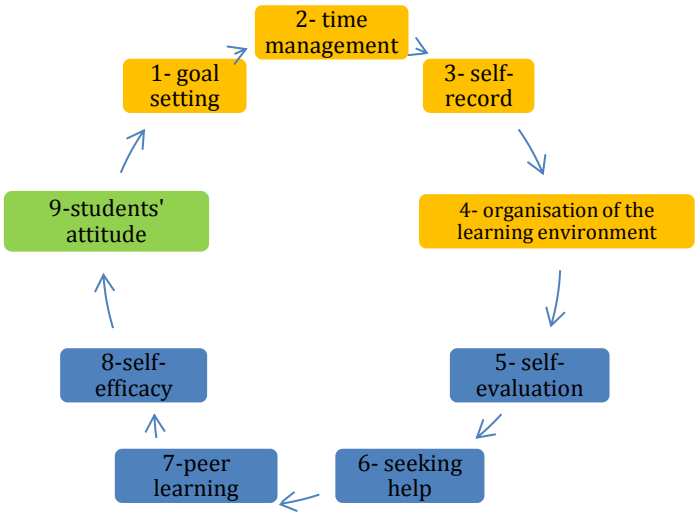


Figure 5:1 The nine sub-scales

5.2.4.1 Executive function

This scale includes four sub-scales measuring aspects of executive functioning: goal setting, time management, self-record and organisation of the learning environment. The following paragraphs set out and explain each sub-scale separately.

5.2.4.1.1 Goal setting analysis

Goal setting means that the learners are able to set their own goals for tasks and to prepare a plan for their learning. They can then track their own task progress against this plan and determine whether they have achieved the learning goals (see section 3.7.3.1). Goal setting is the first domain within the executive functions and includes six items. It should be noted that item number six was a negative item: "I find it difficult to develop practical, educationally applicable goals". Thus, the researcher in the data cleaning stage reversed this negative item to a positive form when recoding the responses (1→4, 4→1, 2 →3, 3→2). This allows all items to follow the same form when calculating an overall value.

Table 5.2 presents the frequency of response options across the 4-point Likert scale for each of the items. This was conducted for each item at the pre- and post-test stages, along with results from the Wilcoxon Signed Rank test.

Table 5:2: Descriptive statistics of items within the goal setting sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	Often 3	Sometimes 2	Never 1	
1	I develop specific goals before starting my work in any educational task.	Pre	29	30	22	2	.000
		Post	42	35	6	0	
2	I develop short-term (daily/weekly) and long-term (monthly) goals for educational tasks.	Pre	18	29	30	6	.000
		Post	30	40	13	0	
3	I develop goals that help me to manage my time when carrying out educational tasks.	Pre	25	26	25	7	.000
		Post	37	38	8	0	
4	I determine goals that guide me towards learning effectively.	Pre	20	25	32	6	.000
		Post	34	39	9	1	
5	I develop practical steps to achieve my educational goals during learning tasks.	Pre	23	24	35	1	.000
		Post	34	36	13	0	
6	I find it easy to develop practical, educationally applicable goals.	Pre	13	44	17	9	.000
		Post	22	38	21	2	

Z= 6.155, P<0.001

In respect to the goal-setting skills listed in Table 5.2 the Wilcoxon Signed Rank test (Z=6.155) shows that the difference between the pre- and post-test is statistically

significant at a 1% level (p-value<0.001). The table shows that, in respect to the goal-setting skills, the students consistently reported that they had these skills before they experienced wiki learning, since they mainly responded "often" or "always" for the items in the pre-test (in each item more than 50% of students reported having such skills in the pre-test, ranging from a low of 47 students (out of 83) for item 5 in Table 5.2 to a high of 59 students for item 1).

In the post-test results (i.e. after using wiki learning) they reported that they felt that their ability to set goals had improved on the whole. This is reflected in the fact that for all the goal-setting skills listed in Table 5.2 the proportion of students responding *often* or *always* in the post-test increased compared to the pre-test. Specifically, for item 1, 77 students responded *always* or *often* in the post-test, compared to 59 in the pre-test, meaning that 18 students shifted from "sometimes" or "never" to one of these higher categories. In comparison, for item 2, whereas 47 students felt that they set time- appropriate goals pre-wiki, 70 did so post-wiki (item 2). After wiki learning, however, there was a positive shift for each category that eradicated the answer of *never*, and saw only 13 out of 83 students choosing *sometimes.* Likewise, for item 3, 51 students felt that they had been able to develop goals to manage their time pre-wiki, but 75 did so post-wiki. For item 4, determining goals for effective learning, 45 students expressed that they often or always possessed this skill pre-wiki, compared to 73 post-wiki. This represents the largest enhancement of all the goal-setting items. For item 5 (the creation of sub-goals) the often/always pre-test / post-test results shifted from 47 to 70, while in item 6 the numbers professing to find goal setting easy increased from 57 to 60. With respect to this last item, while the increase was relatively smaller than with the other items, there was a notable shift from just 13 students (16%) saying that they always found goal setting easy in the pre-test, to 22 saying this in the post-test (26%). It could be that, for some students, the six-week period may not have been sufficient to hone their skills to the optimum perceived level. The disparity in the numbers answering "*always*" between this item and other goal setting items shows that students' reported frequency of goal setting was not necessarily linked to the perceived ease of setting goals. Students may have set goals despite finding it difficult.

It should be made clear here that these were the students' own perceptions of their level of skills, and their goal-setting skills were not verified by the researcher.

5.2.4.1.2 Time management analysis

Time management refers to the ability of students to plan their study time and tasks to accomplish their learning goals within a certain time (see 3.7.3.2). The sub-scale of "time management" in the executive function scale includes eight items reflecting different time management skills. Item number 5 in this scale was a negative item: "I don't have enough time to review my feedback or reading before the lecture". For the purposes of analysis, this was transformed into "I have enough time to review my feedback or reading before the lecture", while values within this item were reversed, as with the parallel item in the previous sub-scale. It is essential that all items of the sub-scale are in the same direction to enable the researcher to create a total value for time management. Table 5.3 below presents the data analysis of students' responses in the pre- and post-tests for the time management sub-scale. With a p-value <0.001, the Wilcoxon Signed Rank test (Z=4.909) indicated that there is a statistically significant difference in students' responses between pre- and post-test values at a 1% of significance level. This shows that, after using wiki learning, learners reported higher perceived time management skills.

Table 5:3 Descriptive statistics of items within the time management sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	**Often 3**	**Sometimes 2**	**Never 1**	
1	I attend classes regularly.	Pre	59	19	4	1	.0150
		Post	64	17	2	0	
2	I don't take a lot of time on the requirements of the educational course.	Pre	7	37	34	5	0.062
		Post	14	37	30	2	
3	I can manage and arrange the time for the requirements of the educational course well.	Pre	12	36	30	5	.000
		Post	25	41	16	1	
4	I perform the required educational tasks on time.	Pre	40	24	18	1	.062
		Post	44	31	7	1	
5	I have enough time to review my feedback or reading before the lecture.	Pre	7	36	20	20	.006
		Post	12	38	21	12	
6	I develop a schedule for my educational tasks on a daily or weekly basis.	Pre	12	26	30	15	.006
		Post	21	26	34	2	
7	I never waste my time in any work, especially while I am working on educational tasks.	Pre	22	15	31	15	.150
		Post	18	29	27	9	
8	I review my compliance with my schedule regularly in order to analyse the effectiveness of my learning.	Pre	10	24	43	6	.005
		Post	22	22	37	2	

Z=4.909, P< 0.001

As can be observed in Table 5.3 above, although even before using wiki a large majority (78 out of 83) of students reported attending classes regularly (i.e. always or often), this increased further to 81 out of 83 students after using wiki. In item 2, twice as many students reported always devoting a lot of time to the course after the wiki as before (7=pre, 14=post). Regarding item 3, 66 students reported often or always being able to manage their time well after using the wiki, compared to 48 before using the wiki. Furthermore, after using the wiki only one of the 83 students reported never being able to manage their time, and the overall number of students claiming to be struggling in this area was halved from 35 to 17. This positive shift is partially corroborated by the perceived enhancement of time efficiency for individual tasks (item 7) which experienced a greater shift towards the category of *often* (15=pre, 29=post). Regarding item 7, despite

a small decrease in the number of students stating that they *always* used their time efficiently for tasks (n=22 → 18) and some students still declaring they *never* did so post-wiki (n= 15 pre-, n= 9 post), this difference between items 3 and 7 indicates that the *goal* form, may have affected time efficiency in tasks, due to the requirement to match timeframes with sub-goals. In other words, maintaining time management with individual tasks and goals saw a less clear increase compared to students' perceptions of the improvement of their overall time management skills. When we observe the students' perceptions on creating time schedules (item 6), we see that more students (n=12 pre- and n=21 post) agreed that they were always able to set plans than prior to the wiki experience and fewer reported an inability to do so (n=15 pre- and n=2 post). A similar pattern appears for item 8 (reviewing schedules). The positive shift may have come about as a result of wiki's broad appeal to the students' efforts to set out motivational sub-goals that could then be more easily adapted to suit a personal calendar, and amended if needs be, making them more likely to be achieved. This feeds through to students perceiving that they were generally better at meeting overall deadlines in their course (item 4: *often* and *always* n=64 pre- and n=75 post), and to have built in time to review their teachers' feedback prior to a lecture (item 5: *often* and *always* n=42 pre- and n=50 post).

These results will be explained in the discussion chapter (section 6.2.1.1.2).

5.2.4.1.3 Self-record analysis

Self-record means the ability of learners to keep a record of their learning activities in order to help achieve their learning goals, through different methods such as taking notes, keeping learning files, listing the errors made and keeping a draft of all tasks. Self-record is the third sub-scale in the executive function scale (see 3.7.3.3). This sub-scale includes seven items. Table 5.4 below shows the descriptive statistics of items within this scale. Overall, with a p-value < 0.001, the Wilcoxon Signed Rank test (Z=4.906) indicated a statistically significant difference at the 1% level of significance. It could therefore be said that the learners felt that after using wiki learning they had improved their self-record skills.

Table 5:4 Descriptive statistics of items within the self-record sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	Often 3	Sometimes 2	Never 1	
1	I type up my personal feedback from the lecture.	Pre	38	29	13	3	.032
		Post	43	24	15	1	
2	I type up my feedback in a serialised manner.	Pre	31	25	21	6	.099
		Post	37	25	18	3	
3	I type up short and brief statements so that they may be remembered easily and to ensure my new-found learning is recalled at a later date.	Pre	45	21	11	6	.735
		Post	42	27	13	1	
4	I monitor my errors in educational tasks to avoid making the same mistakes in the future.	Pre	25	14	32	12	.019
		Post	33	19	21	10	
5	I record (collect) and file my class work.	Pre	11	10	19	43	.000
		Post	12	21	41	9	
6	I record positive praise and grades in order that I may monitor my own performance.	Pre	47	14	15	7	.017
		Post	50	17	15	1	
7	I use technology to help me within the process of keeping and documenting the requirements of the educational curriculum.	Pre	21	22	26	14	.000
		Post	42	30	10	1	

Z= 4.906, P<0.001

Table 5.4 above sets out students' own experience of their self-record skills before and after using wiki. With respect to item 1 (in the first row of the table), 67 students reported that they *always* or *often* typed up personal feedback. This is exactly the same number as reported doing this after using the wiki, although there was a small increase in those reporting that they always did this after having used wiki (from 38 pre-wiki to 43 post-wiki). This suggestion of only small changes in self-record skills before and after the experience with wiki is replicated with the other items in Table 5.4. In item 2, for example ("I type up my feedback in a serialised manner") 56 students reported doing this *always* or *often* pre-wiki compared to 62 post-wiki. In item 3 (making summarised notes) 66 students *always* or *often* did this pre-wiki, compared to 69 post-wiki. Indeed, slightly fewer students (42 compared to 45) said that they always did this post-wiki, suggesting that the filing of notes online may have led some students to believe that writing brief summary notes to revise was no longer necessary. In item 4 (error-recording skills) the number who reported that they recorded errors *often* or *always* rose from 39 to 52, a 16% increase. With respect to item 5 (recording/filing class work) as many as 43 students never did this pre-wiki, and 19 did so only sometimes. Although post-wiki, over half of students

(50 of the 83) still made little attempt to file their class work, the proportion who *never* did this reduced dramatically (from 43 to 9). Item 6, meanwhile, reports how well students recorded positive praise and grades, with a slight increase here from 61 students *always* or *often* doing this pre-wiki to 67 post-wiki. The final item (item 7) highlights how students generally felt regarding using technology to aid the process of self-record. Here, the number of students stating *always* doubled to half of the cohort surveyed (from 21 to 42) and, overall, 72 students (87%) did this *always* or *often* post wiki, and only one student felt that technology was not helping them to self-record. It is therefore clear that students felt that wiki learning enhanced the extent to which they applied their self-record skills.

These results will be explained in the discussion chapter (see section 6.2.1.1.3).

5.2.4.1.4 Organisation of the learning environment analysis

Organising the learning environment is the ability of learners to prepare and organise the environment in which they learn in order to help them achieve their learning goals (see 3.7.3.4). Organising the learning environment is the last sub-scale of the executive function scale and includes four items, as presented in Table 5.5 below.

Table 5:5: Descriptive *statistics of items within the Organisation of the Learning Environment sub-scale.*

No.	**Items**	**Time**	**Frequency**				**P-value**
			Always 4	**Often 3**	**Sometimes 2**	**Never 1**	
1	I choose an appropriate place to learn.	Pre	64	10	7	2	.066
		Post	69	12	1	1	
2	I avoid visual and audio distractions as much as possible during study times.	Pre	60	17	5	1	.853
		Post	61	16	5	1	
3	I arrange an appropriate place for studying to increase my level of focus.	Pre	59	18	4	2	.387
		Post	65	11	5	2	
4	I am able to provide access to technology required for my studies such as a computer and/or a modem	Pre	59	14	7	3	.56
		Post	66	11	6	0	

Z=1.931, P<0.053

Overall, with a p-value = 0.053, the Wilcoxon Signed Rank test (Z= 1.931) showed that differences between the pre- and post-tests in the table below were not statistically significant at the 5% significance level. This means that the learners' reports indicate no difference in their perception of their ability to organise their learning environment before and after using wiki learning.

Looking at the detail in the Table 5.5, we can see that for all four items, consistently, between 73 (item 4) and 77 (item 2) of the 83 students perceived themselves as already taking appropriate actions to organise their learning environment before experience with the wiki. These figures increased very slightly at the post-test (from a range of 77 to 81) but, as noted above, the p-value indicated that this change was not statistically significant, and there was in any case little room for improvement given the high initial values.

It should be noted that students, although allowed to study from home, were required to complete wiki learning mainly on campus within a quiet university lab, where their organisation of the learning environment was closely monitored by the tutor.

This result will be analysed in the discussion chapter (section 6.2.1.1.4). The following section will break down the sub-skills under evaluation skills, following the same approach, as used for the executive function skills above.

5.2.4.2 Evaluation

The evaluation scale consisted of four sub-scales: self-evaluation, seeking help, peer learning and self-efficacy.

5.2.4.2.1 Self-evaluation of learning analysis

Self-evaluation represents the ability of students to evaluate their own performance in learning in the light of a particular standard or goal (see 3.7.4.1). Learners usually evaluate themselves regularly and objectively using self-monitored data to evaluate their progress in learning. Self-evaluation of learning is the first sub-scale of the evaluation skills scale. This sub-scale includes six items representing self-evaluation skills, as can be seen in Table 5.6 below.

Table 5:6 Descriptive statistics of items within the self-evaluation sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	Often 3	Sometime 2	Never 1	
1	I summarise what I have learnt to test my understanding of the curriculum.	Pre	29	25	22	7	.039
		Post	34	32	14	3	
2	I evaluate my understanding of course content after completing educational tasks.	Pre	26	16	32	9	.001
		Post	30	35	18	0	
3	I evaluate my performance in educational tasks immediately after completing them.	Pre	23	32	20	8	.006
		Post	32	34	16	1	
4	I review my degree of achievement of personal goals after completing educational tasks.	Pre	16	32	30	5	.001
		Post	35	30	16	2	
5	I confirm that I use all available facilities to support my learning, e.g. technological media as well as university references including books and scientific journals.	Pre	7	26	31	19	.000
		Post	19	38	25	1	
6	I evaluate the choices I may have in learning in terms of how I might complete a task when several methods are presented to me.	Pre	17	34	23	9	.026
		Post	23	39	19	2	

Z=5.051, P<0.001

As can be observed in Table 5.6 above, the students felt that there was an improvement in all items in the self-evaluation skills sub-scale after wiki learning. This can be seen in the greater numbers of students who answered *often* or *always* in the post-test rows of the above table compared to those who answered *often* or *always* in the pre-test rows.

Interestingly, prior to the wiki experience, students felt that, overall, they were better in *summarising* what they had learnt (item 1, in first row in this table) compared to *evaluating* their understanding after completing a task (item 2). After the wiki learning experience, however, their *evaluation* ability increased more markedly than their summarising ability. Specifically, whereas 66 students said that they *often* or *always*

summarised what they had learnt post-wiki, compared to 54 who did this *often* or *always* pre-wiki, 65 students said that they *often* or *always* evaluated themselves post-wiki compared to just 42 pre-wiki. Furthermore, whereas nine students said that they *never* evaluated themselves pre-wiki, none said the same post-wiki. The data for item 3, which dealt with the students' ability to evaluate their learning in a speedy and timely fashion after task completion, also revealed students as being, overall, more confident post-wiki (66 students saying *often* or *always* post-wiki compared to 55 pre-wiki). This highlights that students, post-wiki, took more of an interest in evaluating their process of learning rather than just focusing on their results. This is illustrated by the increase in the *always* and *often* categories and decreases in the *sometimes* and *never* categories for items 1-3. This is corroborated by the data given under item 4, which shows a large increase in the participants who *often* or *always* review their achievements against their own, self-set, goals, (from 48 students pre-wiki to 65 post-wiki, and with only two students *never* doing this post-wiki). Enhanced use of facilities and resources like online libraries, textbooks and adjunct materials was also reported by students after their wiki experience (item 5). A significant number of students reported *never* having accessed such resources (n=19) or only having done this *sometimes* (n=31) prior to their wiki learning experience. After the wiki-learning experience, however, remarkably, only one student said that they *never* accessed such resources, 25 said that they did so *sometimes*, 38 *often* and 19 *always* (compared to just seven pre-wiki). These changes in behaviour are some of the biggest of all the items in all the skills evaluated as part of this research. Finally, students overall learnt to consider the methods they used to reach their goals more post-wiki (item 6), with 62 students doing this *often* or *always* post-wiki, compared to 51 pre-wiki, and only two saying that they never did this post-wiki compared to nine pre-wiki.

Overall, with a p-value < 0.001 as seen below the table above, the Wilcoxon Signed Rank test ($Z=5.05$) shows that the difference is statistically significant between the pre- and post-test at a 1% level of significance.

It can therefore be suggested that, based on their responses in the questionnaire, students rated their self-evaluation skills as being better after wiki learning compared to pre-wiki learning. This result will be analysed in the discussion chapter.

5.2.4.2.2 Seeking help analysis

Seeking help refers to learners assessing by themselves when they need to call upon outside resources for assistance with specific learning tasks (see 3.7.4.2). This sub-scale includes four items, as can be seen in Table 5.7 below, all reflecting students' evaluation of when they need help during learning and who they ask for help (e.g. teachers or peers).

Table 5:7: Descriptive statistics of items within the seeking help sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	Often 3	Sometime 2	Never 1	
1	I communicate with the curriculum teacher to gain help when needed.	Pre	33	26	21	3	.001
		Post	43	30	10	0	
2	I ask my peers to help me when necessary.	Pre	49	21	13	0	.455
		Post	45	23	15	0	
3	I ask for help from others when I find it hard to perform educational tasks (such as from family members and/or experts).	Pre	45	16	19	3	.967
		Post	41	23	18	1	
4	I rely on my own personal knowledge when faced with difficulties in completing educational tasks.	Pre	33	28	20	2	.565
		Post	39	21	21	2	

Z= 1.239, P= 0.215

As can be seen from Table 5.7 above, students' responses did not differ much between pre- and post-test results for all items when observing frequencies across the 4-point measurement scale in the last four columns. With respect to item 1 (communicating with the teacher when needed help), students reported communicating more with their teacher to seek help when it was needed post wiki, compared to pre- wiki (item 1), as is illustrated by the increase in the combined *always* and *often* categories options of students responses moving from 59 pre-wiki to 73 post wiki, as well as in the elimination of the never options/responses. In contrast to this, there was almost no change in responses regarding asking others for help (item 2), with consistently more than 80% of students seeking help from peers.

Similarly, there was little change in the number of students who, post-test, reported seeking help from others (family members, experts) when it became hard for them to solve problems alone (item 3). It must however be noted that the students already reported seeking help rather frequently pre-test. Consistently, around 75% of students sought help from others such as family members or other experts, and a similar proportion (between 72% and 74%) relied on their own personal knowledge when they needed help with educational tasks, avoiding help altogether (item 4). Linked with the previous three items, it does not come as a surprise that students still showed a slight preference, post-wiki, to rely on themselves and their own knowledge. This may account for the slight decrease in *always* for items 2 and 3.

If we interrogate the quantitative results more deeply, however, two interesting findings emerge. Firstly, there was a statistically significant change in the frequency of seeking help from the teacher (item 1 in Table 5.7). As shown in the detailed list of p values, the p-value for this item was 0.001, reflecting the fact that whereas 71% of students said they sought help from the teacher *always* or *often* pre-wiki, this increased to 88% after experiencing wiki learning. The extent of this shift becomes more evident if we look at it from the other way round, i.e. considering the students who said they consulted the teacher *sometimes* or *never.* Whereas 25% of the students said that they only *sometimes* sought help from the teacher pre-wiki, this dropped to 12% post wiki, while those who never did this dropped from 3 (4%) to zero. These results strongly suggest that use of the wiki led to a significant increase in students' willingness to seek help from the teacher.

By observing differences in the overall score of "seeking help" subscale (i.e. total score of items), the Wilcoxon Signed Rank test showed non-significant ($p>0.05$) differences between students' answers pre and post intervention ($Z= 1.239$, $P= 0.215$), as observed in the students' reports set out in Table 5.7.

As a result, it can be said that the learners only perceived a slight increase in the likelihood that they would seek help, after using wiki learning. This may be because they rated this skill as already high before the intervention. These results will be explained in the discussion chapter (section 6.2.1.2.3).

5.2.4.2.3 Peer learning analysis

The peer learning sub-scale, as part of the evaluation skills scale, included four items as presented in Table 5.8 below (see 3.7.4.1). This sub-scale enquires about the level of interaction among students in order to see and evaluate their peers' work on the wiki.

Table 5:8 Descriptive statistics of items within the peer learning sub-scale

No.	Items	Time	Frequency				P-value
			Always 4	Often 3	Sometime 2	Never 1	
1	I explain solutions to peers when we have a task to complete.	Pre	50	19	12	2	.055
		Post	52	26	5	0	
2	After considering tasks, I share my own ideas with classmates.	Pre	48	20	13	2	.024
		Post	52	26	5	0	
3	I communicate with my peers in order to evaluate my performance in educational tasks.	Pre	24	19	29	11	.002
		Post	28	35	19	1	
4	I aid my peers in evaluating their own learning.	Pre	22	25	18	18	.003
		Post	24	38	18	3	

Z=3.584, P<0.001

As seen in Table 5.8, with a p-value < 0.001, the Wilcoxon Signed Rank test (Z=3.584) shows that the difference between pre- and post-test in the whole scale values was statistically significant at the 1% of significance level. This shows that, overall, skills were perceived to be better after wiki learning.

This section looks at this data in more detail, especially by comparing the frequencies of the responses of *often* and *always* for the items in the pre- and post-tests. Students' questionnaires actually reveal that over half of the cohort surveyed (50 students) *always* felt that they explained solutions to peers when they had a task to do (item 1) pre-wiki, while a further 19 students did this often. Also, 48 students said that they *always* shared ideas with classmates pre-wiki (item 2), while a further 20 students did this often. In general, therefore, at least 82% of the students were actively engaging with peers to share information and ideas even before experiencing wiki learning. Despite this high starting base, the experience of working with peers through the wiki led to a continued increase in these figures, with students who had previously said that they shared information and ideas only *sometimes* or *never* increasingly saying that they did this often (the figures for

often increase from 19 to 26 for item 1 and from 20 to 26 for item 2, while the figures for *never* decrease to zero in each case).

It is interesting that, compared to items 1 and 2, which focus on communicating with peers to share ideas, items 3 and 4, which focus on, respectively, working with peers to evaluate one's own performance and working with peers to evaluate their performance, reveal less frequent application of skills pre-wiki. In item 3, 24 students *always* evaluated their own performance with peers pre-wiki, and a further 19 did this *often*, while 22 students *always* helped peers evaluate their work pre-wiki, and 25 did this *often* (item4). This represents an average of about 55% of students demonstrating peer evaluation pre-wiki compared to about 82% who were simply sharing ideas with peers. Nonetheless, there was a big increase in students who reported that they performed evaluation with peers post-wiki. 63 students evaluated themselves with peers *often* or *always* and 62 evaluated peers *often* or *always* post-wiki (about 76% of the sample), with particularly big increases in those who did this often, reflecting decreases in those who said that they evaluated with peers only *sometimes* or *never*. What is particularly remarkable in these results is the big drop in those who reported that they *never* evaluated themselves with peers (reducing from 11 to 1) and in those who reported that they *never* evaluated peers (reducing from 18 to 3).

Overall, these results demonstrate quite powerfully that students' experience with wiki learning increased both their overall interaction with peers about their studies, and, especially, their willingness to evaluate their own work with peers and, indeed, evaluate their peers' own work. These results will be explained in the discussion chapter (section 6.2.1.2.2).

5.2.4.2.4 Self-efficacy analysis

Self-efficacy records how well the learner thinks he/she will be able to complete by the end of the module (see 3.7.4.3). This sub-scale included six items reflecting students' self-evaluation of their ability to learn independently. Table 5.9 below includes descriptive statistics for all six items.

Table 5:9: Descriptive statistics of items within the self-efficacy sub-scale

No.	**Items**	**Time**	**Frequency**				**P-value**
			Always 4	**Often 3**	**Sometime 2**	**Never 1**	
1	I will gain a high grade in this course.	Pre	34	36	13	0	.004
		Post	49	29	5	0	
2	I expect my performance in the course-based tests will be excellent.	Pre	35	34	14	0	.006
		Post	48	28	7	0	
3	I can overcome any difficulties that face me during educational tasks.	Pre	36	39	7	1	.023
		Post	41	36	6	0	
4	I have great trust in my ability to understand the content of the curriculum.	Pre	44	27	12	0	.078
		Post	52	25	6	0	
5	My performance in educational tasks is excellent.	Pre	42	26	15	0	.005
		Post	54	23	6	0	
6	I have the required skills to perform educational tasks.	Pre	36	33	11	3	.012
		Post	51	25	7	0	

Z= 3.444, P<0.001

Table 5.9 above shows that learners' belief in their ability to evaluate their independent learning skills and how they applied them to the Education Technology curriculum increased after using wiki learning. This section looks at this data in more detail, especially by comparing the frequencies of the responses of *often* and *always* for the items in the pre- and post-tests. In item 1, there were 70 students who reported feeling that they *often* or *always* thought that they would achieve good marks within their course pre-wiki, whereas 78 thought so post-wiki. Unsurprisingly, therefore, students also reported a greater sense of positive expectations regarding their performance in tests (item 2) and other tasks (item 5), with 69 *often* or *always* thinking they would do well in tests pre-wiki and 76 thinking so post wiki, and, strikingly similarly, 68 *often* or *always* thinking they would do well in tasks pre-wiki, compared to 77 post-wiki. Feelings about the ability to overcome obstacles were broadly the same pre- and post-wiki, however 75 students reported an ability to overcome obstacles pre-wiki compared to 77 after. There was a

slight decrease in the number of students reporting that they could *often* overcome obstacles (39 pre-, 36 post), indicating a likely shift to the *always* category. Although, an enhanced sense of self-trust in overcoming obstacles on an individual level can be observed, when evaluating item 3 post wiki, the improvement was only slight.

With respect to item 4, slightly more students reported sense of confidence in understanding complex curriculum areas (71 *often* or *always* thinking they understood complex curriculum areas pre-wiki compared to 77 post-wiki) and, unsurprisingly, most of the students reported that they felt their performance had improved in tasks, post wiki (item 5). As a culmination of the above, and the students' perceptions of their other sub-skills post wiki learning, the responses to item 6 reveal that students felt that they, on the whole, possessed better learning skills post wiki, in preparation for achieving in their tasks. Here, although the increase in those responding *often* or *always* was relatively small (from 69 to 76), there is an increase in the number of students who saying that they *always* felt that they had the required skills (from 36 to 51), whereas those who *never* felt that they had sufficient skills dropped from 3 to zero.

Overall, with a p-value < 0.001, the Wilcoxon Signed Rank test (Z=3.444) shows that the difference between the pre- and post-tests is statistically significant at the 1% a level of significance.

Thus, it could be said that the learners reported a higher sense of self-efficacy in learning after wiki learning. These results will be explained in the discussion chapter (section 6.2.1.2.4).

5.2.4.3 Students' Attitude towards the wiki

This scale analysed students' attitude towards wiki technology, based on the students' own perceptions. This data was gathered via a numerical questionnaire. This scale was represented by six items focusing on ease of use, usefulness and level of interest in the wiki as a learning tool. In this case, the result was only tested in the post-test because students did not have any prior knowledge or any preconceptions about wiki at the time of the pre-test (see section 5.2.3). Their confidence in such skills was tested based on a 4-point Likert scale (not confident at all=1, not very confident=2, quite confident=3, very confident=4).

Table 5:10 The frequency of answers within the attitude scale at post-test

No.	**Items**	**Frequency**			
		1	**2**	**3**	**4**
1	I believe that wiki technology is easy to use.	0	2	19	62
2	I believe that wiki technology has a significant value in the educational process.	2	6	23	52
3	I believe that wiki technology has helped me to develop my performance in my studies for the better.	1	4	14	64
4	I now feel positive about using wiki technology during my studies.	1	8	11	63
5	I believe that wiki technology has helped me to better understand the course.	0	4	15	64
6	I believe that wiki technology is interesting to use.	2	5	14	62

In the table above, one can see the majority of the learners answered, "very confident" (ranging between 52 and 64 learners out of 83 participants) for all answers. Clearly it can be observed that the attitude and the confidence in wiki among students seem very positive. Although this was not tested at time 1 (pre-test) (due to the fact that students had already stated that they had no knowledge of wiki as a learning environment), the results suggest an overall high level of confidence in wiki technology and in what it has to offer to learners, after having experienced it.

It is worth noting that the questionnaire data were used as part of the triangulation process for mixed-methods of data collection, with the statistical data complemented through the use of text via an interview (see section 5.3.2). This was in order to create a fuller understanding of whether or not student skills in those tested domains had increased or not, in their own perception, and what attitude towards wiki learning they had formed after exposure to this new experience. The results of these interviews will be discussed in further detail later in this study under the title of qualitative findings. It is now necessary to discuss the correlation between scales in order to identify possible links between sub-skills under executive function and evaluation skills.

5.2.5 Correlation between scales:

Correlation investigations are very valuable to the research at hand. Although work on correlation does not lead to a direct answer to the research questions, it certainly enables a better understanding of the relationship between two investigated variables. It also allows for a better overview of the individual skills as a whole as well as an improved, deeper analysis of the individual, potentially interrelated sub-skills in Chapter Six (see section 6.2.1.1.1).

This section presents the correlations between the nine sub-scales of SRL explained previously. The correlation is measured and described based on the overall value of each sub-scale. The correlation is tested through the use of Spearman's rho correlation coefficient (see section 5.2.2, point 3, for a more detailed explanation). According to Hadzikadic and Avdakovic (2016), Spearman's rho correlation coefficient describes the strength of the relationship between two variables: an absolute value of r=0.20 to 0.39 indicates a weak relationship; r= 0.40 to 0.59 is moderate and 0.60 to 0.79 is strong. The correlation coefficient is meaningful when it is significant ($p<0.05$).

As noted in 5.2.2, however, positive correlations do not suggest causality (Johnson, 2001), as indirect effects affecting both scales could create an auto-correlation without direct causality between the variables. For example, an improvement in the learning environment might positively affect time management and self-evaluation, creating a positive correlation between both of these variables, but without a direct causal relationship. This effect is, however, unavoidable due to the study design, which does not incorporate a true independent variable.

This research is exploratory in nature and aims to offer a greater understanding of the phenomena in question. This test specifically seeks to investigate the strength and direction of any relationship between the different sub-skills of self-regulated learning. This is done in the specific context of Saudi Arabia, where the culture does not promote extensive use of technology in learning and passive learning is still widespread.

Table 5.11 below presents a correlation matrix showing the spearman's rho correlation coefficients between sub-scales of SRL, along with the significance level (sig.) and the number of participants (83).

Table 5:11 A correlation matrix table showing Spearman's correlation coefficient and the significance level between different sub-scales

		1	2	3	4	5	6	7	8	9
1.Goal setting	Correlation coefficient	1.000	.603**	.419**	.493**	.482**	.377**	.425**	.525**	.413**
	Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000	.000
2.Time management	Correlation Coefficient	.603**	1.000	.481**	.336**	.552**	.471**	.416**	.404**	.360**
	Sig. (2-tailed)	.000	.	.000	.002	.000	.000	.000	.000	.001
3.Self-record	Correlation Coefficient	.419**	.481**	1.000	.457**	.542**	.529**	.369**	.247*	.412**
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.001	.024	.000
4.Organisation of the learning environment	Correlation Coefficient	.493**	.336**	.457**	1.000	.466**	.397**	.314**	.291**	.456**
	Sig. (2-tailed)	.000	.002	.000	.	.000	.000	.004	.008	.000
5.Self- evaluation	Correlation Coefficient	.482**	.552**	.542**	.466**	1.000	.370**	.476**	.383**	.392**
	Sig. (2-tailed)	.000	.000	.000	.000	.	.001	.000	.000	.000
6.Seeking help	Correlation Coefficient	.377**	.471**	.529**	.397**	.370**	1.000	.437**	.293**	.292**
	Sig. (2-tailed)	.000	.000	.000	.000	.001	.	.000	.007	.007
7.Peer learning	Correlation Coefficient	.425**	.416**	.369**	.314**	.476**	.437**	1.000	.254*	.316**
	Sig. (2-tailed)	.000	.000	.001	.004	.000	.000	.	.021	.004
8.Self-efficacy	Correlation Coefficient	.525**	.404**	.247*	.291**	.383**	.293**	.254*	1.000	.389**
	Sig. (2-tailed)	.000	.000	.024	.008	.000	.007	.021	.	.000
9.Attitude	Correlation Coefficient	.413**	.360**	.412**	.456**	.392**	.292**	.316**	.389**	1.000
	Sig. (2-tailed)	.000	.001	.000	.000	.000	.007	.004	.000	.

*. Correlation is significant at the 0.05 level (2-tailed). N=83

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficients showed that there was a positive and significant correlation between all scales ($p<0.001$). This indicates that an increase (i.e. higher answer pattern) in any of the skills in any of the sub-scales associated with an improvement in other skills, and a decrease in one is associated with a decrease in another. Taking the first row in the table as an illustrative example, this refers to the goal setting domain; there is a significant correlation between goal setting and all of the sub-scales, which are time management, self-record, organisation of the learning environment, self-evaluation, seeking help, peer learning, self-efficacy and attitude. It is a positive correlation, which means that goal setting had a correlation with the other sub-scales – as the level of goal setting skills increased in the learners, then the values on the other scales also increased concomitantly. Furthermore, the correlation between the items in each group would suggest internal consistency within the sub-scales.

In the table above, taking goal setting skills as an example, the strength of the correlations (all are significant) between the value for goal setting and other sub-scales was small or

medium, with values between r=0.37 and 0.52. The exception was the correlation between the values for goal setting and time management, which could be considered strong at 0.63. This is discussed further in section 6.2.1.1.2. The next section will present whether there is any correlation between any two of the variables given in the background information scale and the SRL skills sub-scales, as well as the attitudes towards wiki sub-scale.

5.2.6 Correlation between background information and scales:

This section investigates the relationship between background information and the SRL sub-scales listed on the questionnaire. Spearman's correlation coefficient was used to measure the correlation between background details such as GPA, the use of web 2.0 for study purposes and for non-study purposes, as well as participants' skills in using web 2.0 with sub-scales given in Appendix 10, task 2. For example, if there was a positive correlation between the "use of web 2.0 technology" and the goal setting domain, then the students who answered "yes" to the item on the "use of web 2.0 technologies" had better goal setting skills. If there was a significant difference in values between those who answered yes and those who answered no, then that shows that one group had a significantly higher value than the other, based on the students' reports. This would then give a better understanding of the extent to which sub-skills of the eight SRL skills had been developed, if at all. The individual approach to each sub-skill in result collation would also allow for a more in-depth analysis of the data in Chapter Six (see 6.2.1.1.1). Table 5.12 illustrates all the correlation coefficients between any two variables along with the significance of each correlation coefficient.

Table 5:12 Correlation matrix for background information and sub-scales

		GPA	Web 2.0 Study	Web 2.0 non-study	Web 2.0 Skills
Goal setting	Correlation Coefficient	.088	.010	-.133	.099
	Sig. (2-tailed)	.430	.936	.230	.373
	N	83	72	83	83
Time management	Correlation Coefficient	.089	.124	-.188	.089
	Sig. (2-tailed)	.425	.300	.089	.424
	N	83	72	83	83
Self-record	Correlation Coefficient	-.126	.082	-.131	.018
	Sig. (2-tailed)	.258	.491	.239	.871
	N	83	72	83	83
Organisation of the learning environment	Correlation Coefficient	-.093	.012	-.244*	.033
	Sig. (2-tailed)	.401	.920	.026	.769
	N	83	72	83	83
Self-evaluation	Correlation Coefficient	.031	-.114	-.248*	.029
	Sig. (2-tailed)	.783	.341	.024	.796
	N	83	72	83	83
Seeking help	Correlation Coefficient	-.079	.132	-.087	.038
	Sig. (2-tailed)	.477	.269	.436	.734
	N	83	72	83	83
Peer learning	Correlation Coefficient	.086	.117	-.201	-.049
	Sig. (2-tailed)	.441	.328	.069	.660
	N	83	72	83	83
Self- efficacy	Correlation Coefficient	.373**	.019	-.061	.258*
	Sig. (2-tailed)	.001	.871	.585	.018
	N	83	72	83	83
Attitude	Correlation Coefficient	.067	-.069	-.275*	.007
	Sig. (2-tailed)	.547	.565	.012	.950
	N	83	72	83	83

From Table 5.12, the students' responses show that a few items in background information (e.g. GPA, evaluation of skills level when using web 2.0, and the use of web 2.0 for non-study) had a significant correlation with the following sub-scales: organisation of the learning environment, self-evaluation, self-efficacy and attitude. The other sub-scales (goal setting, time management, self-record, seeking help and peer learning) did not have significant correlations with the variable of background information, based on the students' responses to the questionnaire.

More specifically, the only statistically significant correlations were between the sub-scale of self-efficacy and the item of GPA in the background information scale (r=0.373, p=0.001) – this correlation was positive, but weak. Also, there was a weak correlation between self-efficacy and the variable "evaluation of skills level when using web 2.0" (rho=0.25, p=0.01). It could be said that if the participants had better self-efficacy skills they were slightly more likely to have a better evaluation skill level when using web 2.0 tools. However, the information indicates that there was a statistically significant correlation between the sub-scales of organisation of the learning environment (r=-.244, p=0.026) and using web 2.0 for non-study purposes as an item in the background information scale. This correlation was negative, however, and the variable of using web 2.0 for non-study purposes also had a negative correlation with the sub-scale of self-evaluation (rho=-.248, p=0.024). The negative relationship between the variable of using web 2.0 for non-study purposes and the sub-scales of organisation of the learning environment and self-evaluation skills was very weak. Hence, we cannot claim with confidence that greater use of web 2.0 for non-study purposes is associated with weaker skills of self-evaluation and organisation of the learning environment.

5.2.7 Summary of quantitative findings

In summary, this study aimed to find out how students respond to teaching in the use of wiki learning in respect to the potential for the site to enhance a set of eight SRL skills and to identify attitudes towards wiki. Using a pre- and post-test design, the researcher explored the participants' perceptions of their development in these skills (goal setting, time management, self-record, organisation of the learning environment, self-evaluation of learning, seeking help, peer learning and self-efficacy) at two times separated by the completion of wiki learning. This was conducted on female students. It should be noted that the same sample participated both times, but only 83/105 completed the questionnaire both times. Using SPSS, the data was analysed descriptively and inferentially; the data provided by the students indicated that they all had no knowledge of using wiki prior to this study.

Each of the three scales: executive function, evaluation and attitude (and their respective sub-scales) was analysed separately and the overall statistical differences were measured using the Wilcoxon test. The results of this test clearly showed that after online learning with wiki, the students reported perceptions of increased skills in the areas of goal setting,

time management and self-record, listed under the executive function scale, as well as in self-evaluation of learning, peer learning and self-efficacy under the evaluation scale. They did not, however, report perceptions of increased skills for organisation of the learning environment under the executive function scale or for seeking help under the evaluation scale.

Correlation tests using Spearman's rho indicated that there is a significant positive correlation between all of the sub-scales. This suggests that an improvement in one skill is associated with an improvement in other skills (post-test) e.g. those who have high values for goal setting are also likely to have high time management values. The attitude towards wiki was only tested in the post-test questionnaire, and the data showed that there was a clear positive attitude towards this technology, reflected by all items within this scale.

As for the background information scale, the data results show that the GPA was found to have a weak positive correlation with self-efficacy only, while the use of web 2.0 for study purposes was not correlated with any of the sub-scales. The use of web 2.0 for non-study purposes was shown to have a weak negative correlation with organisation of the learning environment and with self-evaluation of learning, as well as attitude towards wiki. Lastly, students' skills in using web 2.0 were weakly but positively correlated with self-efficacy only.

The results from the questionnaire analysis can be compared to the results generated from the interview data. The purpose of triangulation in this case is to obtain confirmation of the findings through the convergence of different perspectives (see section 5.4). The next section will present the qualitative data from the learners' interviews and the thematic analysis of this data, which was carried out using MAXQDA12 software.

5.3 Qualitative Data

5.3.1 Introduction:

This part of the analysis chapter presents the qualitative data collected from semi-structured interviews (see Appendix 8), with the aim of exploring students' attitude towards using wiki for learning in the Education Technology module at Princess Nora University, and understanding the reasons why they express positive or negative views. The chapter also aims to explore students' perceptions of how utilising wiki can enhance self-regulated learning skills, based on their learning experience. Participants were 20 female students who were, at the time of the study, enrolled in their second year of an Education Technology course at Princess Nora University in Saudi Arabia, and who were interviewed after the six weeks of wiki learning. The interviews included questions on students' attitudes towards the use of wiki technology in learning, the concept of self-regulated learning, specific self-regulated learning skills, and how wiki could potentially help the students to develop them.

As discussed in the methodology chapter (see section 4.8), this sample of 20 students was selected from 83 students who attended the course at the time of pre- and post-test. In an effort to maintain continuity in the study, students were selected if they had completed the pre-course questionnaire and had also volunteered to respond to interview questions post-course. In an effort to ensure confidentiality and anonymity during student interviews, and therefore to encourage freedom of speech in participants, each student who participated in this study was allotted a code. This code consisted of a number and letters denoting the subject of the interview. For example, the first participant was given the acronym IW 01; (01) is the student's number, "IW" symbolises the area of the interview referring to wiki technology. Participants' responses were labelled using these standard codes to ensure anonymity.

The method of analysis was thematic analysis; this technique is flexible for use with inductive or deductive approaches or combined inductive and deductive approaches, as in the current study. A deductive approach was used to identify the themes that were derived from the research questions. These were further broken down inductively, based on the student data, into sub-themes or categories, for example "flexibility". These were in turn broken down into codes. For example, flexibility yielded two codes derived from the data, "attractiveness" and "manageability".

The themes were developed from the theoretical framework and from the questions. The codes were labelled with MAXQDA12 software (see section 4.14.2) and a word or phrase actually used by the participants in order to preserve the students' words in describing their experience of how using wiki technology may have enhanced SRL skills and their attitude toward this technology. The main themes labelled were as follows:

- Attitude towards wiki
- Awareness of self- regulated learning
- Skills development
- Students' views on developing regulatory skills via wiki

The next section will describe each area and which theme and sub themes were identified under each topic.

5.3.2 Attitude towards wiki:

Q1*: Over the 6 weeks working with* wiki *technology on the Education Technology course and taking on the responsibility for your own learning, what is your attitude towards using* wiki *as a learning environment?*

This was a vital initial question that could aid the discovery of an answer to the research questions. It sought to address students' attitudes towards using wiki as a learning platform in the context of a very culturally-influenced country that makes little use of wiki technology and other web 2.0 technologies at higher education level, as discussed in Chapter Two (see sections 2.9; 2.10).

Theme: Attitude

Within this theme, and based on the students' answers to this question, which reflected different opinions based on the students' personal experience, two main sub-themes were identified, namely positive and negative attitudes. Under each sub-theme several codes were identified based on the students' responses, which express the reasons why learners had a positive or negative attitude towards using wiki in their learning. The following table delineates the sub-themes which emerged within each theme.

Table 5.13: Summary of the main theme and emerging sub-themes and codes from Q1

Main Theme	**Sub-theme**		**Codes**	
Attitude toward wiki	Positive	User-friendliness	Ease of use	
		Psychological benefits	Self-confidence	
		Flexibility	Attractiveness	Manageability
		Learning facilitation	Exchanging Information	Gaining understanding
		Social benefits	Interaction	Future usage
		Enjoyment		
		Excitement		
	Negative	Obstacles	Technical	Institutional

As seen in the table above, there was an imbalance in number between the positive and negative attitude sub-themes. Students' predominantly positive attitude towards using wiki in their learning may be related to the fact that this generation of students had grown up as "digital natives" so using wiki fitted well with skills that they had already acquired, which helped them to experience success and a sense of accomplishment; learners' acceptance of technology is reported by Helsper et al. (2010) to be critical to improving their learning skills and perceiving the usefulness of that technology in learning, although this point will be discussed further in later sections in this chapter.

The next sections will explain each sub-theme and code, with representative quotations.

5.3.2.1 Sub-theme: positive attitude

Sixteen of the 20 students expressed a positive attitude towards using wiki and explained several reasons for these feelings, as follows:

5.3.2.1.1 Sub-theme: user-friendliness

Half of the students (10 of 20) said they liked wiki and had a positive attitude because they found this way of learning easily accessible and easy to use.

For example, Student IW05 explained her positive attitude towards using wiki in learning by indicating,

"*I like it, the distinctive feature of the* wiki *is that it is available all the time and I can access it from home or any other place*".

Student IW07 also pointed out that,
" *I like wiki; I can access the site anytime and anywhere*".

Students IW05 and IW07 deemed the accessibility of wiki to be highly advantageous.

Student IW15 also elaborated that the advantage of wiki was that they were easily accessible across various devices. She stated that:

"*the* wiki *has so many advantages, such as being able to access the* wiki *page from any desktop, laptop or even mobile phone*".

Furthermore, approximately half of the students (9 of 20) expressed a similar feeling towards wiki in regard to ease of use, even for first time users. For example, Student IW01 mentioned:

"*It is my first time using wiki, and yet I learned how to use it really quickly. You don't need a lot of skills to use it.*"

Students liked the wiki because this technology is easy to use and does not need previous experience. It is important to mention that the researcher prepared a user's guide to the wiki in manual and electronic forms (see Appendix 4), which could have contributed to learners' having this view.

This positive attitude with regard to user-friendliness was mainly linked by students to the fact that the wiki could be accessed very easily and at any time or in any place.

5.3.2.1.2 Sub-theme: psychological benefits

One code was generated under this sub-theme, namely, self-confidence.

Self-confidence:

Just over a quarter of the students (7 of 20) expressed positive views towards using wiki in learning because they found this way of learning built their self-confidence. Student IW04 claimed that:

"*This technique also… contributes to increased self-confidence, removed the barrier of shyness and fear, and promoted freedom of expression and participation in a positive way".*

This response suggests that learners can feel nervous or anxious when exposed to the traditional face to face learning method but also that they found online learning via the wiki less intimidating. Students IW05 and IW09 similarly expressed positive attitudes towards this way of learning because they found that it built their confidence, as these quotations show:

"*I like* wiki *because it builds my self-confidence"* (IW09).

"I love wiki, *after I used this way of learning I had increased my level of confidence*" (IW05).

It is important here to take account of the traditional learning culture in Saudi Arabia. Most teaching in Saudi Arabia in method is didactic and students are accustomed to seeing the teacher as a superior, powerful figure, who controls learning. Typically, students are shy to speak in class, for fear of making a mistake and there is little inter-student interaction. By contrast, the interview data suggest that wiki technology may have empowered students. They had the opportunity to participate and obtain responses from their peers, which they find less intimidating than the teachers' scrutiny. They perceived that they had begun to take control of their own learning and gain a sense of achievement as they solved problems and gained mastery.

5.3.2.1.3 Sub-theme: flexibility

Flexibility differs from user-friendliness in that the former refers to the ability to use the wiki at all (accessibility and ease of use without necessitating extensive instruction) whereas flexibility reflects the quality and value of the user experience. The wiki had two main features, content and history. The main page of the wiki was the one most frequently used by the students to contribute to a document. The history pages recorded previous versions of students' contributions and the recent amendments they had made. In other words, they could trace back to view the previous work and changes made that required editing. This could help students to manage their work and to correct and revise their work, while also allowing teachers to monitor activity easily. Another feature of wiki technology is that it allows insertion of multimedia data such as photos, audio and video. Also, it has the ability to set permissions in order to limit who can edit, upload and download data. Learners raised those points and highlighted some of the wiki characteristics, which they suggested generated positive feelings. Here, therefore, flexibility is addressed under two codes, attractiveness and manageability.

a) Attractiveness:

This code reflects students' appreciation of the of the design of the wiki and its ability to allow editing or modification of content and downloading and uploading of data, whether in the form of texts, documents, links or media data such as photos, audio and videos.

Almost half the students (8 of 20) attributed their positive attitude towards the wiki as a learning environment to the features available with this technology. Five students mentioned the ability to insert different media from different sources. Student IW12 pointed out:

"*It is useful and attractive to look at, it is easy to download videos from YouTube or files and folders from Microsoft office software, such as Word, or images from a device or websites, it enables the inclusion of different types of files such as video clips, images and links, all via an easy layout*".

Furthermore, an important feature of the wiki that made it stand out was the ability for multiple users to edit content, as student IW02 pointed out:

"*Among other things, the* wiki *was new technology to me and has the increased ability to add, insert and share pages with more than one person, edit and modify the contents of others' publications* ".

There are many features of wiki technology such as the possibility for multiple users to edit content which were attractive to the learners and this had a positive impact, as did the availability of the wiki functions and buttons incorporated into the design chosen by the researcher.

b) Manageability:

Almost half the students (9 of 20) appreciated the archive feature of wiki technology, which allows learners to manage their work and see previous work. Students said they liked the wiki because it allowed them to keep older work or files, as student IW16 mentioned:

"*I like wiki; by using the archive system in the wiki, we can refer to lectures and restore any deleted lectures. Also, earlier I used to lose my paper pages on a regular basis*".

Other students expressed appreciation of the benefit they derived from being able to return to material at any time, as this quotation illustrates:

"*It has a record to save page dates (wiki history) and the ability to save student work, discussions, which can be referred to at any time to trace or update my tasks, in order to benefit from them later*"-(IW14).

It is important to mention that, in general, there was not enough time to finish or review work within the class (lecture time). It is also difficult and time consuming when students try to write everything down following lessons. This could explain students' positive attitude towards the archive feature available in the wiki. Students appreciated the value of keeping their work, discussions or files to return to later, at any time. This may be a good way for learners to support their learning tasks or to keep their files without losing material, compared to traditional paper archives.

5.3.2.1.4 Sub-theme: enjoyment

Just over three-quarters of the students (16 out of 20) attributed their positive attitude towards the use of wiki as part of their learning to *enjoyment*, which they expressed with various words such as *entertaining* (5 of 20), *interesting* (3 of 20), *enjoyable/ pleasure* (6 of 20) or *fun* (2 of 20). In some cases, these were attributed to specific features of wiki. For example, student IW01 stated that,

"*The wiki is useful in networking and communication. It's enjoyable way to learn*".

Some students liked the wiki because of the features available, while others expressed interest in wiki in general. For example, student IW09, stated,

"*It is a pleasure to use and is very useful*".

The interview data indicated that the students considered the wiki technology to be an enjoyable tool to use for learning. As mentioned in the previous sections, wiki has many features as well as ease of access, which could have led to the students feeling enjoyment and interest while using it.

5.3.2.1.5 Sub-theme: excitement

The sub-theme excitement reflects the arousal of a feeling of excitement in learning, which involves thrill and breaking out of routine. More than half the students (12 of 20) expressed positive attitudes toward using wiki in learning because they said it aroused excitement when they used the wiki as a learning environment in this module. For example, students IW03 & IW10 pointed out that:

"It has added an element of excitement/thrill" and "broke through the boring routine of dictation".

Student IW04, states that she was:

"*… excited about this method of teaching that has an element of thrill and is a rejection of the usual routine in the traditional dictation learning method*".

Students found the wiki attractive in learning and felt that it motivated them to learn because it marked a change from the traditional way of teaching and learning and introduced more variety and liveliness.

5.3.2.1.6 Sub-theme: learning facilitation

Learning facilitation means wikis support the achievement of learning outcomes. Just over three quarters of the students (16 of 20) expressed positive attitudes toward using wiki as a learning tool on the grounds that it helps students to understand lessons and exchange information. These views are defined in two separate codes.

Gaining understanding:

Half of the students (10 of 20) expressed a positive attitude toward using wiki in learning because it helped them to understand the content of the module. It is important to mention that, as explained in the methodology chapter, there was a type of task where learners built the content of the module as individuals on a specific wiki page. Students IW18 and Students IW11 had similar feelings about this, represented by student IW11's indication that,

"*The* wiki *introduced learning methods that led to a better understanding of the content of the curriculum*".

Similarly, student IW09 claimed,

"*The* wiki *has simplified the process of learning and understanding the content of the lecture through work tasks compared to the traditional way of learning ".*

Also, students IW01 point out,

"The wiki has simplified the process of learning and understanding the content of the lecture by allowing us to search for and strengthen information knowledge, all instead of dictation and retrieving [old] paper files".

Learners' positive attitude towards wiki was thus shaped by the perception of the contrast between this learning environment and the traditional way of delivering content in a didactic way. The latter approach sometimes faced learners with a problem if they did not understand the content of lessons and that could lead to other problems such as low achievement caused by misunderstanding. The layout of the wiki, materials, the way of learning and the ability to organise the content could be a factor that helped to support the learners' understanding of content.

Exchanging information:

Just over a quarter of the students (6 of 20) had a positive attitude toward using the wiki because of the way it enables learners to arrange and exchange information easily. Students IW15 and IW17 expressed a similar reason for liking wiki learning based on exchange of information. Student IW17 pointed out,

"*The* wiki *system has helped me gain a lot of new information and get useful information from fellow students; when they put in new information that I did not know, or was not clear to me and to others, then it is useful for everyone*".

Student IW15 confirmed that wiki helps in exchanging information quickly:

"*Wiki helps the high speed of access to comprehensive information*".

Also, student IW06 expressed appreciation of:

"*sharing information with fellow students and being able to check on (her) and their performance".*

This highlights the benefit of sharing information in terms of enabling students to review their own performance on tasks.

Another student, IW09, mentioned the feedback benefit of exchanging information, stating,

"*I like wiki in regards to the ability to find out information in more than one way through seeing the work of fellow students. This helps to improve the information available*".

Moreover, student IW14 pointed out that:

"*It helps the learner to know how to arrange and exchange their information and ideas in a good way*".

As these examples show, some learners liked the wiki and had a positive attitude towards it due to the ease of exchanging information and obtaining additional information from others, or improving on their current information through checking and comparing with each other. This could be done quickly, saving time and effort. Other students liked the wiki because they found it a suitable tool to arrange information during work on learning tasks that required them to build the content themselves.

5.3.2.1.7 Sub-theme: social benefits

Students expressed a positive attitude towards using wiki as a learning environment, since it provides the social benefits of interaction and future usage as discussed below. Social benefits in this study were defined as communication/ interaction socially with each other (peers and teacher), as well as the benefit for future education in general.

a) Interaction:

Just over half the students (11 of 20) expressed a positive attitude toward using the wiki in learning because it allows learners to easily interact with each other in a positive way. Learners can join together in online groups and form relationships which enable them to communicate with each other to their mutual benefits.

As student IW18 said,

"*It is a useful and distinguished type of software in providing channels of communication and opportunities for interaction among students. It helps me to find out other students' opinions on the subject of the lecture through discussion forums on lecture subjects*".

Student IW11 confirmed the view of student IW18, referring to the discussion board that helped students to interact with each other easily. She pointed out,

"*The wiki has added an element of interaction in a discussion space between students and the lecturer, and among the students themselves*".

Another student, IW05, focused on the way wiki learning facilitates positive interaction. As she mentioned,

"*Wiki contributed positively to interaction between students*".

The responses of the students concentrated on the effect of discussions on the learning process as a whole. They also featured the appropriate and helpful presence of a teacher to moderate any discussions that took place and the positive results of the discussion on the mentality of the users of the wiki. Finally, the students drew comparisons between the traditional, didactic method of teaching that they were used to, and this new method of using discussions to learn.

b) Future usage

Just over three quarters of the students (16 of 20) had a positive attitude towards the possibility of using wiki in learning in the future with other modules. In this sub-theme, learners in interviews indicated that their positive attitude towards future usage was due to the points they had already made, related to, for example, learning facilitation, excitement and social benefits. By expressing a wish to continue using wiki, students confirmed their appreciation of this way of learning and the value they gained from it. For example, student IW17 said:

"I'd like to use wiki in future because it provides the opportunity to gain information from others via interaction who in turn may gain new information from me as well, and allows [users] to express [their] opinions to all and correct wrong information if any, so that everyone will get the benefit thereof."

Student IW10 also pointed out that,

"*It is a pleasure to use and very useful, and [that she is] thinking of using it in the future when [she] becomes a teacher*."

One learner, IW19, stated her willingness to use wiki in future drawing in indications of negative attitude towards internet connection which will be discussed under section 5.3.2.2 below.

" *I want to use wiki in all topics to organise my information and the purpose of these topics, provided that the problem of communication among computers in the university is solved"*.

Overall, as represented in the sections above, over three quarter of students (16 of 20) had a positive attitude towards using wiki in learning, reflected in various sub-themes. Sometimes learners gave different reasons for their feelings but expressed the same ultimate feeling, e.g. they may have demonstrated enjoyment in using the wiki but may have all given completely different reasons. This could make it appear that only a minority of students had a positive feeling towards each of the researcher's chosen themes, despite high levels of positivity demonstrated as a whole through the linguistic analysis of the vast array of reasons given in interviews. It is therefore sensible that positive feelings towards wiki are grouped together as one data set since it is the overall level of

positivity which will help in answering the research questions and not the very individual, unique, reasons given by students.

The next section will explain the negative attitudes towards using wiki in learning.

5.3.2.2 Sub-theme: negative attitudes

Despite the many positive comments, as analysed in the above section, some students mentioned other factors that generated a negative effect. The reasons are discussed below:

5.3.2.2.1 Sub-theme: obstacles

Obstacles were classified into internal obstacles related to the wiki, that is, technical obstacles and external institutional obstacles related to external factors, such as problems with the internet connection on the university campus, as discussed below.

Internal technical obstacles:

Only four of the 20 students expressed mixed feelings; they had positive attitudes towards wiki in regard to its value for learning, as indicated by some statements by the same students quoted above, but at the same time, they identified some weaknesses while working with wiki, which led to negative attitudes. The main criticism that students had of wiki technology was the fact that it did not support the Arabic language, and this could be viewed as a technical deficit, especially since the lack of Arabic as a core user language on the wiki page resulted in a linguistic barrier for students with a lower proficiency in English. For example, students IW07 and IW08 claimed that wiki pages needed better Arabic language support. Student IW08 stated that:

"The disadvantage that I have noted is that wiki pages need better Arabic language support and better internet connection…Although they do not support the Arabic language. Overall, I would like to use wiki in my learning".

The language issue arises because, as explained in Chapter Two, the study sample were all native Arabic speakers. For this reason, it may have been difficult for some students to understand the meaning of the icons on the wiki pages, or to understand how to carry out certain tasks such as text editing and adding audio-visual files. It would therefore

benefit students to have a basic level of English, or to have explained to them the meaning of the language on the wiki pages.

Other students' criticism concerned problems faced during working with wiki learning in regard to the lack of availability of a setup application for mobile phones for easy 24-hour access, as student IW13 stated:

"*Its drawback is the absence of a mobile phone application to run on Apple or Android, as this app would provide notification services in case there is a response to an inquiry that I posted earlier on the wiki page, which will show the contents of the message without the need to access the wiki page".*

Similarly, student IW19 indicated that:

"*The problem that I have faced is that at times I could not open the page properly on my mobile phone when my computer was not working*".

The above-quoted students had somewhat negative attitudes towards using wiki technology for learning because it did not provide a mobile phone application. This problem refers to specific phone models (Apple and Android). As noted earlier under "user-friendliness", the ability to use the wiki on a mobile phone was one of the features appreciated by some students. Thus, the problem raised by students IW13 and IW19 was more one of compatibility. They preferred technology that allowed access on a mobile phone, as this was easy to use at any time and in any place. They were offering constructive criticism about the limitation regarding access on many kinds of devices or the setup of applications on a mobile phone. Today's students use many technological devices and, in particular make extensive use of mobile phones. Compatibility with their devices could possibly influence students' attitude towards new technological tools.

External institutional obstacles

In order to be able to benefit from wiki, both the researcher/teacher and the students needed to have access to a good quality internet connection on the university campus, due to the course's online nature. This was sometimes a challenge; external factors that induced negative attitudes towards wiki, were often linked to internet connection problems.

Only four of the students (4 of 20) had mixed attitudes toward wiki in learning caused by external obstacles they faced when working with the wiki, such as the poor quality of the internet connection on the university campus. For example, student IW19, referred to such external obstacles, stating that:

" ..the current problem is with the university's network, which is relatively slow".

It is important to mention that those students had a positive attitude towards using a wiki in general, but at the same time expressed some inconvenience when they worked with the wiki due to these factors.

In this study, only a minority of students had some negative attitudes towards using wiki in learning. It cannot be assumed that all students in all contexts would be equally favourably inclined, however. It may be that, as students taking an Education Technology module, the participants in this study were already favourably disposed towards technology and comfortable with using it, which might help them to accept wiki. As can be seen, the above- quoted students said they liked the wiki, which could imply that the learners had accepted this technology. At the same time, they faced some challenges while working with this technology, which modified their attitude towards using wiki for learning.

Overall, by way of summary, the over three quarter of students (16 of 20) who partook in the interviews had a positive attitude towards wiki technology and these results are therefore consistent with results generated from the questionnaire in which most students responded that they had a positive attitude (64 of 83) towards the wiki.

5.3.3 Awareness of Self- Regulated Learning skills:

Q2: *What does the concept of self-regulated learning mean to you?*

This question was asked to see if the sample had a clear understanding about the concept of self-regulated learning and training in self-regulation skills in practice.

The concept of self-regulated learning is becoming increasingly relevant in the study of how students learn in Saudi Arabia, especially in higher education, as discussed in Chapter Two. This question served as a way to investigate whether or not students already felt they possessed SRL skills, and also helped the researcher to find out if the students valued them.

Sub-theme: awareness

Based on the learners' responses, over three quarter of the learners (18 of 20) had an awareness and understanding of the meaning of self-regulated learning (for which an equivalent term exists in Arabic) and some learners even mentioned individual self-regulation skills to highlight a fuller understanding of the process they were undergoing with wiki. Students expressed this in a variety of different ways based on their own experience. The following quotations from students' interviews are examples of the views expressed. Student IW19 indicated that for her, SRL means:

"*It is self-dependence– of learning, including setting goals, searching for information and self- evaluation*".

Another student (IW05) defined it as:

"*To depend on oneself to implement learning skills while using the wiki. I have noticed that the wiki supports this kind of learning*".

In other words, she considered that the wiki tool played an important role in supporting this type of learning. Student IW04 claimed:

"*It is that the student teaches themselves in terms of their capabilities and activities, while the lecturer's role is to provide guidance to the student"*.

These students, including other students, alluded to the fact that their awareness and understanding of SRL skills came as a potential result of the teacher's guidance in this area although the learners did also affirm that they, as the active students, had to take responsibility for their own learning and skill development.

5.3.4 Development of Self-Regulated Learning skills

Q3: Do you think wiki enhanced your Self-Regulated Learning skills? If yes, please tell me what are the skills that you think you have enhanced after using wiki *learning?*

This question was an introduction or key question to other questions in the next sections, related to the main research questions. This question was posed to discover the potential of using the wiki to enhance learners' SRL skills. The data in this question could be linked

to the data from the questionnaire in order to increase the validity of the findings. Also, it was important to discover if there were other skills developed through wiki learning that helped to enhance learning, as this could open a door to other research in the future, on aspects not covered in the current study.

When students were asked if wiki learning helped to enhance self-regulated learning skills, over three quarter of the students (16 of 20) answered " yes", and four of them said "strongly yes". It is important to note that the self-regulation skills focused on in this study are the executive function and evaluation skills (and students had training in those skills as part of their wiki –assisted learning). Students mentioned in the interviews these two categories of SRL skills, and also other learning skills, which the sections below will discuss in detail .

5.3.4.1 Theme: development

This theme is key to identifying the perceptions of students in their enhancement of SRL skills while using wiki. The sub-themes identified include; executive function, evaluation, self-dependence, computer skills and research. The sections below will explain each sub-theme in detail.

a) Sub-theme: executive function

Most students responded that wiki learning helped them to enhance their executive function skills, and they mentioned various skills under this category such as self-record, goal setting, time management and organisation of the learning environment. For example, around two thirds of the students (13 of 20) responded that using wiki learning helped to enhance goal setting skills. Student IW03 stated,

" *The wiki also had a positive impact on goal setting*".

Another student IW14 shared a similar view, as she said that:

"*I have improved my ability to identify targets, which is much better than before*".

A similar proportion of students (13 of 20) agreed that wiki contributed to enhancing their time management skills. For example, student IW07 claimed:

"*I had some poor independent learning skills, such as time management, but after working with the wiki page through the learning tasks, this skill has improved and I'm able to manage and specify the time needed to accomplish these tasks*".

Also, student IW15 pointed out:

" *After wiki, I have an excellent ability to manage time in the right way and finish learning tasks within the allocated time, by writing the expected time I should take to learn in the table on the page*".

Two thirds of the learners (13 of 20) confirmed that experience with this way of learning via wiki led them to develop better time management skills and to have greater appreciation of time than before. This could result from the way of learning and/or the learning task itself. This will be explained in detail later (see section 6.2.1.1.2).

Almost half the students (9 of 20) pointed out that wiki helped to enhance their self-record skills. For example, student IW03 indicated:

"*The wiki has promoted improvement in the process of taking notes and recording performance marks in learning tasks; and helped by saving files on the record keeping page*".

Students confirmed that the designed wiki page called the *record keeping page* (see section 4.9.1) could help them to enhance or practise those skills and students may prefer this way of recording information electronically compared to the traditional way based on pen and paper notes, which could easily get lost or have been associated with a subjective feeling of disorganisation .

Furthermore, there were individual students (2 of 20) who indicated that the wiki helped them to organise their learning environment better, for as student IW06 claimed:

"*The wiki has helped me to organise my learning and shut out distractions, such as … mobile phones*".

Also, student IW17 reported enhanced ability in "*organising the environment: a gradual adaptation to the wiki technique and the ability to handle the software*".

In this regard, the students' responses indicate that wiki contributed to the development of their executive function skills, the most frequently mentioned being goal setting and

time management skills. Students highlighted the benefit of wiki in terms of saving time and helping to enhance those skills. Wiki technology, as explained in Chapter Three, offers a calendar function, possibly enabling students to be reminded of important dates related to the module and helping them to take notes related to the module. Furthermore, the students demonstrated in their interview responses that they felt that utilising wiki could have improved their SRL skills in terms of executive function skills. This data, combined with data from the questionnaire in the same area, could help support the reliability of the students' responses. This is not true for the organisation of the learning environment skill, however, where interview and questionnaire data conflict, although it must be noted that this conflict is only based on the feelings of two out of 20 students.

b) Sub-theme: self and group evaluation skills

Students indicated that wiki learning enhanced their evaluation skills, such as self-evaluation, seeking help, self-efficacy and peer learning. For example, in regard to self-evaluation skills, three quarters of the students (15 of 20) pointed out the benefit of wiki learning in enhancing those skills. Student IW18 claimed:

"*The wiki could develop evaluation skills. Now after this experience, it helps me to evaluate my learning tasks"*.

Also, half the students (10 of 20) indicated that wiki learning helped to develop peer learning skills, including evaluating peers on learning tasks. As student IW11 noted:

"*Wiki helps to support peer learning through exchanging opinions between us and improves students' ability to assess their fellow students clearly and easily*".

Furthermore, a quarter of the students (5 of 20) replied that wiki learning encouraged them to seek help from the teacher or peers when they needed it to complete tasks. Student IW07 said:

"*After working on the wiki, I developed the skills of getting helping from peers and the teacher*".

Student IW17 shared the same view and confirmed the development of help seeking skills, because the offer of wiki facilitates the process and saves time, for as she pointed out:

"*The wiki page has simplified seeking help from others, by identifying and getting information from them and saving my time*".

Moreover, just over a quarter of the students (6 of 20) claimed that wiki learning enhanced their self-efficacy with respect to the module, and gave them a more positive view of their ability to learn and achieve an excellent grade (whether in class quizzes or the final test on the module). Student IW01 claimed:

"*After using wiki, I think my academic achievement will be excellent*".

Students pointed to various types of evaluation skills developed after their experience of using wiki for learning compared to their previous abilities. The most frequently cited were self- evaluation and peer learning skills. It is important to mention that the wiki offers a discussion forum which helps learners and teacher to interact with each other in an easy way and thus contributes to peer learning.

c) Sub-theme: self-dependence:

Self-dependence refers to one of the experiences that could represent SRL skill development in a more obvious way (Field et al., 2014). Two thirds of the students (13 of 20) responded that, after using wiki, their self-dependence in learning had improved. For example, student IW12 indicated:

"*The wiki has contributed a lot to developing skills such as undertaking the responsibility of learning individually*".

Another student pointed out that the aim of wiki learning was to provide self-learning and enhance all self-regulation skills (particularly executive function and evaluation skills), as she claimed that:

"*The wiki is aimed at independent learning; all skills are developed in the* wiki *software in a comprehensive manner*" (IW16). Moreover, student IW07 claimed that:

"*It is an important technique because it is based on being self-dependent in completing tasks in a way that is different from conventional methods that use traditional dictation".*

The students reported that wiki learning contributed to improving self-dependence and many studies mention that wiki enhances collaborative learning. This is supported in this study in the findings on peer learning, mentioned above. In this case, however, it is also found that wiki supports independent learning. Learners may also have been influenced in respect of self-dependence by contrast with the traditional way of teaching and learning, based on students' views in sub-themes above such as "excitement". Also, it is important to note that the education system in Saudi Arabia, as discussed in Chapter Two (see section 2.3.1) may not be actively encouraging students to take on responsibility for their own learning. Nevertheless, students did appear to like this new way of learning via wiki, which allowed them to take responsibility for learning online, since it was a novelty to them.

d) Sub-theme: computer skills and experience

A small group of students (3 of 20) responded that using wiki in learning as a part of the computer field added to their computer experience, particularly as these learners had used wiki for the first time, with no previous experience. For example, student IW03 claimed:

"*The wiki has also helped in improving my computer skills compared to before when I only knew about Microsoft PowerPoint presentations. This is a new skill that I have learnt, and which did not exist before in the usual [and traditional] way*".

Student IW16 confirmed this point, as she stated that:

"*My skills in using the software have developed through my ability to include images and change the font type and size*".

Students in this category mentioned improved computer skills through working with wiki, as they gained experience through dealing with different aspects of the wiki. It is worth noting that students' limited previous skills reflect the limited experience they have in actively using technology: most of their exposure to technology for learning likely occurred while their teachers controlled the content of a PowerPoint. The wiki in this study offers more benefits for students as they can be more active in learning by interaction with this technology.

e) Sub-theme: Research skills

Over a third of the students (8 of 20) thought that wiki learning helped them to develop research skills. They stated this when discussing how they had used the wiki to search for information over the internet. They saw wiki as a tool that would help them to gather knowledge about the subjects in the curriculum, but they also believed that they would use it to find information on extracurricular activities and subjects. Student IW16, supported by IW06, stated:

"*I had the skills before, but the wiki has developed them to be better than before through the educational tasks introduced. For example, by using the skills of independent learning, the skill of looking for information myself has developed*".

The students stated that they felt that using wikis would broaden their use of the internet and improve their searching skills. They were confident that they could use different sources to find information and then put it on the wiki page.

5.3.5 Students' views on developing Self-Regulation skills via wiki:

Q4: Based on the six weeks working with wiki *learning on the Education Technology course and using this way of learning, how can you develop these skills? (SRL skills). Explain in detail, please.*

For the purpose of this study, this question is very important to understand how we may be able to utilise wiki to enhance SRL skills in online learning. It was a relevant question to ask students after asking them about different aspects related to attitude and whether wiki learning helped to develop SRL skills. If there was any new way of learning, it could have a positive effect on learning, particularly as the researcher understands the teaching culture in the population concerned. This question is vitally connected to the main research questions: the researcher would gain even more insight into how wiki could be utilised positively in learning, which could be developed further and perhaps used even more effectively among students at Princess Nora University.

5.3.5.1 Theme: Reasons

Included in this theme there were several sub-themes: tasks, guidance and practice, building content, design, evaluation tool and discussion. These sub-themes were

identified from students' responses to the interview on question about how wiki can be utilised to enhance self-regulated learning in online learning.

5.3.5.1.1 Sub-theme: Tasks

In this sub-theme, there were two codes, which are guidance and practice, and building content:

a) Guidance and Practice:

Just over half of students (12 of 20) responded well to tutor guidance and the increase in responsibility that this ultimately gave them, after practising independently. As student IW09 stated:

> *"My SRL skills have improved after wiki… thanks to the practice tasks and guidance provided by the teacher: you encouraged me to follow steps that will develop my SRL skills including filling in tables with my goals and time plan prior to starting a task. After I had completed a task, you gave me clear feedback, all the while encouraging students to peer learn by actively intervening if a student did not participate. When I finished my work, you reminded me about the critical form that I must download and use to evaluate, always encouraging me to follow the appropriate steps to develop my learning skills".*

This student confidently confirmed the experience of more than half the students (12/20) who felt that their SRL skills developed as a direct result of the teacher providing guidance on the steps to be taken. The guidance was a clear contributor to the well-informed practice that students undertook and benefitted from, as was reported in their interviews, mostly directly, ensuring that they ultimately perceived a development in their independence levels and therefore their SRL skills overall.

Student IW20 also argued that *informed practice* of SRL skills via wiki tasks could easily help to improve these skills, as she stated:

> "*With these topic-related learning tasks, and the practice of applying the skills of independent learning to solve them, I was able to manage and complete the final curriculum project via wiki. This was done by specifying the goals, steps and duration before starting it".*

Student IW02 considered that training on wiki tasks helped to improve these skills, as she stated that:

"*The type of activities introduced via wiki require that prior to starting, specific goals are set by each student. This requires students to think about the required steps and timescale to achieve the objectives of the set learning tasks which in turn helps in the development of learning skills*".

Student IW14 confirmed these views as she stated:

"*SRL skills are supported through the table of targets on the wiki page, where every student has to understand and set general and specific targets, write them in the right way, specify the right steps to take to achieve these targets and show how to achieve them sequentially*."

She refers to the fact that learners were expected to complete a blank table, including the subject heading, aims, steps and time for achieving each individual task, before starting to solve these tasks. Thus, based on this way of learning, students responded in interview that the training or practice in SRL skills via wiki helped to contribute to the development of skills such as goal setting and time management skills.

b) Building content

Almost half the students (9 of 20) responded in interview that the task of building the content of course topics on wiki pages enhanced their SRL skills. For example, student IW11 mentioned several ideas about wiki features and argued more specifically that through managing their own learning to complete the construction of their knowledge, learners would be able to develop SRL skills. She indicated that:

"*The participation of students in writing and outlining the content of the curriculum on* wiki, *where every student participates in the section allocated to them in order to enrich the content of the lecture, helps in improving these skills.*"

Other students (IW04 and IW08) pointed out that building knowledge individually, in the first instance, leads to improving other SRL skills such as organisation and memorisation, for as student IW07 stated:

"*Wiki helps to ensure everyone contributes to enriching the content of the course and provides information on lecture topics. This, in turn, helps them to understand the topic and enables them to find out about the contribution of fellow students and the kind of information they have added, and this contributes to improve the regulation skills better than before*."

Different learners had different experiences of constructing their own knowledge by using wiki technology and this naturally led to a different levels of perceived skill enhancement by each student. Wiki allows students to construct the content of the course via multiple learners.

Students enriched the content on the wiki page by adding new ideas on the module via a link to add new material. They did this first as individuals and then exchanged ideas with the group. Furthermore, students work on learning tasks as individuals by researching, collecting materials or resources to contribute to the development of wiki pages about course topics and publishing these on the wiki.

Students thought that building content on course topics led to them taking responsibility for learning and they used wiki pages as a tool to enrich the content of various course-related topics. Thus, students working on these tasks felt that their SRL skills were developed by using wiki.

5.3.5.1.2 Sub-theme: Design

The result shows that the more than three-quarters of the students (17 of 20) had the view that the design of the wiki pages was a factor in developing SRL skills. For the purpose of this study, as explained in the methodology chapter, the researcher designed multiple pages including a home page, a record- keeping page, a seeking help page, an ice-breaker page, a getting-to-know-you page, a contact page and other pages detailing the content of the course.

The record- keeping page design allows students to keep their own files and take notes about the module which can be well organised so that they can easily access course content. The ice-breaker page incorporated a list of students who are doing well in various weekly learning tasks and this, in turn, motivates all learners to compete positively and demonstrate their own prowess in a particular subject area. The Help page on the wiki

was to allow students to ask each other or the teacher when they faced any difficulties, while the other pages related to the learning tasks, with each page including tables for students to complete about aims, steps and time within which the learners were expected to complete the tasks. Furthermore, the getting-to-know-you page allowed pupils to interact with each other, facilitating proactive learning relationships and friendships.

According to student IW08, the design of the wiki pages helped her to enhance her SRL skills such as self-record skills, as she stated:

"I can say that I used to have these skills, but the wiki helped me and simplified them for me. For example, the wiki record-keeping page helps us to save files, write notes and create completed files to save the curriculum requirements for projects, assignments and quarterly completed tasks, because earlier I used to lose my paper pages on a regular basis."

Other students indicated that the design of the help page on wiki had the effect of enhancing help seeking skills , as student IW14 said ：

"You can overcome difficulties easily by using the help page on the wiki site. For example, when a student needs help related to the software or anything else, I might be capable of helping and directing them towards the right steps to take. In other words, the existence of the ability to seek help on wiki enables the student to explain the problem that they are facing; this ensures that it is solved quickly by the lecturer or their fellow students. This creates a spirit of mutual assistance".

Students mentioned that the design of the help page on wiki allowed them to improve their skills in seeking help. They felt they could easily understand when and how to give help or receive help from their peers or from their tutor.

Other features appreciated by student IW10 was the getting-to-know-you page and the ice breaker page.

"The getting-to-know-you page on wiki helped me to get to know fellow students; this process is also very helpful for communication when we learn with each other and also the ice breaker page helps to motivate students to learn and I think this helps students to perform better in the module".

She mentioned that the design of the wiki page facilitated an excellent relationship with peers through an improved level of communication. Students pointed out that the design of wiki pages helped them to enhance SRL skills. This can be seen as a reflection of the fact that the idea behind the design of those wiki pages was based on the reflection from the Salmon five stage Model, as explained in previous chapters, since this model was used to reflect on learners' progress in developing SRL skills.

5.3.5.1.3 Sub-theme: Evaluation tool

Three quarters of the students (15 of 20) responded in interview that using wiki as an evaluation tool through the availability of evaluation criteria on the wiki page to evaluate each learners' performance on tasks would help to develop SRL skills, particularly self-evaluation skills. For example, student IW06 claimed,

" *The skills of self-assessment and assessing fellow students have also developed by using the evaluation criteria on the wiki page. Wiki made it easy for me to keep track of my performance in learning tasks and the performance of fellow students."*

Wiki offer many opportunities by allowing each student to trace and evaluate their performance on tasks. This, in turn, may contribute to student progress since students are better able to understand their current level of learning and perform assessments of their own strengths and weaknesses. Students evaluated their performance on tasks based on a critical evaluation form available on the main page of the wiki (see appendix 9) and this feature was prepared by the researcher based on literature reviews and expert feedback, as mentioned in the methodology chapter.

Furthermore, student IW05 agreed with student IW06's view, as she stated:

"*Wiki has improved the ease with which I evaluate my performance and check what I have accomplished after completing the learning tasks. The existing assessment measures on wiki have helped me to make a scientific assessment based on critical evaluation."*

Furthermore, student IW03 and student IW15 emphasised that students can feel a great sense of achievement and they feel fairly treated while performing the evaluation tasks on their own. For example, student IW15 commented that:

"Assessment performance improves as the existence of assessment criteria on wiki introduces the students to how to assess themselves fairly and what grades they are entitled to."

This student mentions the issue of fairness; when students evaluate their performance on tasks, it gives them an idea of what grade they could achieve on the module. The interest in this idea and students' perceptions that learning via wiki achieves fairness could imply a problem with the traditional manner of performance assessment. This was mentioned by student IW20 who recalled,

"*It improved the assessment skill since, because evaluation criteria are available on the wiki page, the students had the ability to assess the performance individually and in a group. Take, for example, what happened to me personally when I was a member of a group doing a collaborative project (in the traditional system). During that period, I encountered a particular issue shortly before the deadline for the collective project and I could not complete my part of the project. This of course affected all the group members and their assessment scores, because of me. The other students had to pay unfairly for my mistake*".

The fair assessment of each student's contribution led to satisfaction with this way of learning.

The students' views indicate that using wiki as an evaluation tool is highly effective and that wiki develops not only self-evaluation but peer evaluation as well, through the availability of critical forms for evaluation tasks on the wiki page.

5.3.5.1.4 Sub-theme: Discussion

Just over half of the students (11 of 20) responded that the availability of the discussion board on the wiki helped learners to enhance skills such as peer learning. For example, student IW20 indicated that:

" *It supports peer learning, as the wiki has a place for discussion and communication between students, and between students and the lecturer".*

Also, student IW04 stated that:

" The facilities available in the wiki environment such as the forum, provide an encouraging environment for students to learn in and get guidance from the lecturer".

Wiki offers a discussion forum which enables students to communicate with each other in an easy way by allowing students to work both individually and on group tasks to bring up ideas, solve problems or give comments related to the module. This communication also tended to have a social element.

Learners confirmed that peer learning skills were enhanced through the availability of the discussion forum, since this tool could allow students to discuss task related matters with many students at the same time, as well as with the teacher.

This works positively in conjunction with the lecturer corresponding with students on a regular basis via wiki in the role of a "facilitator " or "reader". This enables the students to train themselves in SRL skills as it may encourages them to manage their learning effectively (Kitsantas, 2013; Peeters et al., 2016) and to learn from their mistakes and successes, both as individuals and in a group.

5.3.6 Summary: Qualitative Data:

In summary, this study aimed to explore the utilisation of wiki technology by students working on an Education Technology in terms of their self-regulated learning skill development. After six weeks of teaching learners on a wiki –assisted course, the researcher used subsequent interviews to ask learners some open questions related to the purpose of this study. The interviews explored some aspects of students' attitudes towards using wiki in learning, awareness of self-regulated learning skills, skills development (executive function and self- and peer evaluation) and how wiki learning can be utilised for the possible development of SRL skills. The results show that the majority of students formed positive attitudes towards using wiki for learning, because wiki learning gave them a feeling of enjoyment and excitement, helped to build confidence, provided learning facilities and facilitated social interaction. Also, the findings showed that students had awareness of the concept of self-regulated learning skills and indicated that wiki learning helped them to enhance these self-regulated learning skills in terms of executive function and evaluation skills, and other skills such as computer skills.

The findings increase understanding of how wiki learning can be utilised for the possible development and enhancement of self-regulated learning skills, based on the students' perceptions. Learners indicated several reasons for their enthusiasm such as the nature of tasks; for example, the guidance of SRL skills via wiki as well as building content for the module, and specific page design. These could all have potentially helped to enhance SRL skills, according to data collated from the questionnaires and interviews.

Also, the design of wiki pages could contribute to the development of SRL skills, e.g. the design used on the keeping record and help page, where a table clearly laid out all information for students to access the best way possible to develop SRL skills effectively (see section 4.9.1). Lastly, using wiki as an evaluative tool in order to analyse learners' performance could enhance self- and peer evaluation skills through the use of an easy-to-understand critical form for individual and group work evaluation. Overall, the possible development of self-regulated learning skills among learners via wiki technology could contribute to better results in the learning process.

The next section will discuss the triangulation of the quantitative and qualitative data.

5.4 Triangulation of data

This section will combine the quantitative and qualitative data in a process of triangulation. The researcher will compare the similarities between, and connect data from, both quantitative and qualitative outcomes. As discussed in the methodology chapter, (see section 4.5.1), drawing on multiple perspectives through both quantitative and qualitative data analysis can help to overcome biases and problems that might arise from using a single perspective and could give stronger evidence of the trustworthiness of the outcomes.

Using quantitative data, the researcher explored the participants' perceived SRL skills and attitude towards the use of wiki technology in learning via a questionnaire. Two types of SRL skills were investigated: executive function skills such as goal setting; time management; self-record; organisation of the learning environment; and evaluation skills such as self-evaluation of learning; seeking help; peer learning and self-efficacy. These were explored at two separate times, before and after learning with wiki, in order to examine whether students thought that their skills had improved. Using qualitative data, the researcher explored if students had a clear awareness of SRL skills. The researcher

checked which skills were developed through wiki learning and how wiki could be utilised to enhance those skills from learners' perceptions, via interviews conducted after the completion of the learning.

The researcher found similarities and connections across the quantitative and qualitative data that support the findings. With regard to executive function skills, the quantitative data findings (see section 5.2.4.1) showed that there were statistically significant differences in the values pre- and post-test in respect to the executive function skills of goal setting, time management and self-record. The participants reported higher perceptions of their skills after wiki learning, but no such difference in their responses was found for the skill of organisation of the learning environment (see section 5.2.4.1.4).

These results can be supported and confirmed with qualitative data from students' responses in interviews, expressed under various sub-themes. Firstly, most learners mentioned that they had an awareness of SRL skills and understood the meaning of SRL (see section 5.3.3). Learners explicitly mentioned the skills of executive functioning such as goal setting as well as evaluation skills such as self-evaluation when answering an open question regarding the concept and meaning of SRL (see section 5.3.3).

The students may have had an awareness of SRL skills before using wiki learning, but after using it, they perceived those skills to have improved. This point was confirmed by some of the learners' responses (see sections 5.3.3 & 5.3.4.1, (e)) for example, " *I had self-regulated learning skills before, and after using wiki to learn, these skills improved"* (IW16). Quince (2013) points out that if students have self-regulated skills, they are more likely to achieve success in an online course.

Secondly, the results show that the students perceived that their skills in executive functioning such as goal setting, time management, self-record and organisation of the learning environment had improved, based on the comments by the students in the interviews (see section 5.3.4.1 (a)). For example, in regard to the possible development of self-record skills, the students expressed their feeling that those skills had been enhanced in answering questions on skills development (see section 5.3.4) and also when explaining their attitude towards using wiki for learning. For example, learners expressed appreciation of the way that wiki allowed them to save and retrieve previous work and files (see section 5.3.2.1.3, (b)), as student IW16 mentioned:

"I like wiki; by using the archive system in the wiki, we can refer to lectures and restore any deleted lectures".

It could be noted that there were close connections between the theme of attitude, in terms of positive attitudes with ability as a sub-theme (see section 5.3.2.1.3) and the theme *development*, in the sub-theme executive function (see section 5.3.4.1, (a)).

As noted above in this section, in the findings on executive function skills, the quantitative and qualitative data support each other regarding learning skills in the domains of goal setting, time management and self-record. That is, the quantitative data show that students rated their skills higher in the post-test than in the pre-test (see sections 5.2.4.1.1; 5.2.4.1.2; 5.2.4.1.3), while in the interviews they explicitly described their sense of improvement in those areas (see section 5.3.4.1 (a)). The same was not true, however for the organisation of the learning environment. The quantitative data revealed no statistically significant difference between the pre- and post-test perceptions of the organisation of the learning environment skills (see section 5.2.4.1.4). This was not emphasised in the qualitative data, although two individual students mentioned the development of this skill. For example, student IW06 claimed:

"*The wiki has helped me to organise my learning and shut out distractions, such as the use of mobile phones"* (see section 5.3.4.1, (a)).

The second aspect of SRL examined was evaluation skills. The learners' reports in the quantitative data findings showed that after wiki learning, they perceived a positive difference between pre- and post- wiki learning, in terms of evaluation skills, namely, self-evaluation of learning, peer learning and self-efficacy. There was no evidence, however, that they perceived an improvement in the skills of seeking help (see section 5.2.4.2.2). The findings in respect to evaluation skills from the quantitative data could be supported with comments on evaluation skills from the qualitative data (see section 5.3.4.1, (b)). The findings on evaluation skills (see section 5.3.4.1, (b)), show that a group of students said in interviews that wiki learning contributed to the development of evaluation skills such as self-evaluation, peer learning, seeking help and self-efficacy (see section 5.3.4.1, (b)).

As for seeking help skills, using the quantitative data, it is possible to observe that there was no statistically significant difference in the students' perceptions of their skills after using wiki, as is confirmed by the majority of the qualitative responses. The qualitative

data show that only a minority of the students (5 of 20) felt that wiki learning enhanced their seeking help skills (see section 5.3.4.1, (b)). While these few students expressed their view that the design of the wiki help page specifically helped learners to improve skills in seeking help (see section 5.3.5.1.2), three quarters of the interviewees did not give any indication that they perceived improvement in seeking help skills.

The final section was students' attitude towards using wiki for learning. The quantitative and qualitative data supported each other on this. In the pre-questionnaire in the section on background information, the learners reported no prior use of wiki, so the learner's attitude was investigated only in the post-questionnaire. At this point, more than half of the learners had reported a positive attitude towards the use of wiki for learning as they answered "always" to most items of this aspect (see sections 5.2.4.3; 5.3.2.1).

The quantitative findings indicated that the majority of students (62 of 83) had positive attitudes towards using wiki in learning. This finding was supported by the qualitative data. Learners explained their feelings in depth and gave reasons for their positive attitude towards using wiki in learning, such as building self-confidence, gaining understanding and exchanging information (see section 5.3.2.1). There were only a few (4 of 20) minor, negative comments made in regard to obstacles relating to technical features and institutional factors (see section 5.3.2.2).

As represented above, triangulation gave the researcher a clear view of how wiki technology may be utilised to enhance SRL skills in online learning for students studying an Education Technology module at Princess Nora University. Furthermore, the mixed-method helped the researcher to get a better, and more in-depth, understanding of students' attitude towards using wiki for learning. Collecting and analysing data on students' attitude towards using wiki for learning would have been difficult using only a quantitative approach. The use of the mixed-method design, however, helped to identify quantitatively that the learners perceived that wiki learning had enhanced their SRL skills – there was an increase in the frequency of the total number of students who chose "always" for most items in all sub-scales in the post-test compared to in the pre-test. This gave an overview of their attitude. Then, by using qualitative data obtained from the interview, it was possible to investigate more fully the reasons behind the learners' positive or negative attitudes towards this way of learning. This may help to inform effective ways of using this type of learning at Princess Nora University in the future. The next section will discuss the measurement of online SRL skills by following the

students' achievements in the five stages of the Salmon Model through the analysis of interview responses and the use of screenshots of students' interaction on wiki.

5.5 Measuring online SRL skills in a wiki environment via the Salmon Model (2014):

To verify the extent to which utilising a wiki as an online environment can enhance students' SRL skills, Salmon's five stage Model (2014) was applied, as a framework for monitoring and evaluating students' interaction with a specifically-designed wiki site. Again, as discussed in the methodology chapter, the model suggests five stages of analysing online interaction, which are: 1: access and motivation; 2: online socialisation; 3: information exchange; 4: knowledge construction; and 5: knowledge development.

Stage 1 - Access and Motivation:

This initial stage required that, in order to take this module, the learners had access to wiki and were able to use it effectively as new learners. Any technical support required had to be provided on both a general, and where needed, a one-to-one basis, and thus was done by the researcher as the course tutor. Fulfilment of this stage was evidenced in two ways. The first way was to take screenshots of the first access students had to the wiki site. Please see the figure below for an exemplar screenshot and appendix 11, for further detail.

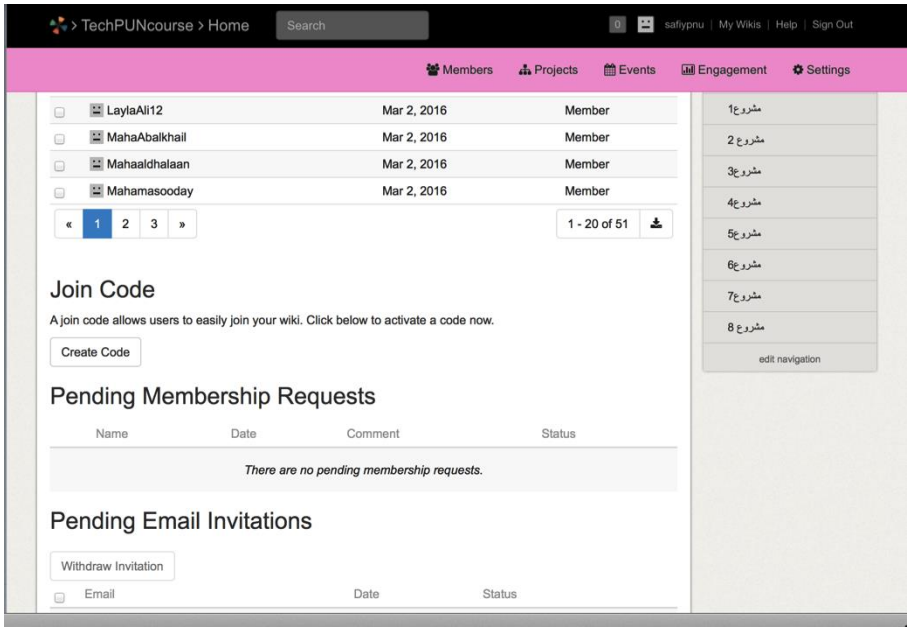


Figure 5:2 Screenshot of learners' login to the wiki page

As shown in figure 5.2, most students accessed the wiki at the beginning (in the first two weeks) of the intervention. The form of verification is evidence that the tutor's activities did in fact provide motivation, as revealed in the comments of the students in their post interviews. 12 of the 20 learners referred positively to the role of the tutor as a learning "encourager" since she responded to learning tasks via the wiki. For example:

"*Wiki develops SRL skills due to the guidance and supervision given by the lecturer on the topic*".

A small number of students (3 of 20) mentioned that access to the wiki was a problem. For example, student:
IW01 pointed out that she faced difficulty in accessing the wiki at first. She said:
"*I also became more independent as a learner, despite of all the hardships that I faced in the beginning technically. It was my first usage of wiki technology, but it was a new experience and I would like to apply this in other subjects*."

Also, in terms of motivation, it could be considered that understanding the aim of the study gave students a motive to use this way of learning and this also led to the learners' increased self-confidence, which can be seen as a source of motivation (Ao, 2012).
About a third of the students (7 out of 20) indicated that using the wiki helped to increase their self-confidence. For example, student IW03 pointed out,

"*The wiki removed the barrier of shyness and supported self-confidence and self-dependency*"

Thus, the evidence suggests that learners had a motive to use wiki technology and this environment helped to build their confidence (for more exemplar quotes, see sections 5.3.2.1.4; 5.3.2.1.2).

Stage 2 - Online Socialisation:

At this stage, learners begin to interact with each other as required in the module, in the same week (first two weeks) after accessing the wiki. During the six weeks of study, the students accumulated enough skills in using the wiki to be able to send and receive messages among themselves as well as to their teacher. More than half of the students explicitly mentioned these interactions. For example, student IW18 said that:

"*Wiki provided channels of communication and interaction among students. It readily helps in knowing other students' opinions on the subject of the lecture through discussion forums on lecture subjects*". Another student, IW05, stated:

"*I like wiki, it contributed positively to interaction between students*".

Furthermore, the wiki tasks and wiki *Getting-to-Know-You Page* (see Appendix 12) facilitated the development of online socialisation by constructing a clear, social interaction forum and peer learning environment. By way of example, student IW10 stated that she was "a new student to the class" and had "no prior friendships", but she was able to communicate more openly, and therefore integrate into the class through the implementation of a "personable, yet less confrontational learning experience". As explained in Chapter Four (see section 4.9), the researcher prepared learning tasks for students to complete as individual students and as part of a group. This helped to develop a mutual respect between the students, which facilitated the constructive exchange of views.

Please see Appendix 13, for screenshots of students' interaction with peers and their tutor via wiki through posts and received messages regarding course topics.

Stage 3 - Learning Exchange:

After students had become more familiar with wiki learning and had become more familiar with each other in the first week, in the second week of the module, they were expected to move on to the next stage, termed Learning Exchange, which relies heavily on independent student interaction. Students interacted with the wiki via learning tasks as well as with peer learners. On completion of a task, they were able to exchange information and knowledge and improve their answers for the later evaluative stage. There are two sources of evidence for fulfilment of this stage. The first was by screenshots of learners' interaction with tasks via wiki to exchange information as individuals, and as a group, and also screenshots of the summary of learners' interaction via the discussion board on the wiki (see appendix 16 &17). The second source is quotations from learners' responses in the interviews, which could provide evidence of students' achievement in this stage. Six of the 20 students specifically referred to exchange of information. For example, student IW17 commented:

" *The wiki system has helped me gain a lot of new information and get useful information from fellow students; when they put in new information that I did not know, or was not clear to me and to others, then it is also useful for me and other* ".

Also, during the post-interview stage of this project, student IW14 pointed out that,

"*The best point about wiki is the ability to exchange information or files with others*".

Student IW06 reiterated this point by stating that,

"*The best part of the wiki course on Education Technology was being able to exchange knowledge with other students*".

Moreover, Student IW08 pointed out that,
"*The Discussion Board enabled some enlightening discussions with each other through the exchange of contrasting views*."

Further support for the claim that students were achieving the aim of this stage is found in the fact that they edited the work and contributions of other students and provided feedback and comments, as student IW02 pointed out:

"*Among other things, the* wiki *has the increased ability to add, insert and share pages with more than one person, edit and modify the contents of others' publications* ".

As discussed in the previous chapter (see sections 4.9& 4.10), at this stage the teacher's role was to encourage learners to contribute to the wiki and interact with wiki features, peers and their teacher through specific learning tasks.

Stage 4 - Regulated Knowledge Construction:

In this stage, students became more responsible for the regulation of their learning via wiki. Students were encouraged to regulate and manage their learning independently during the completion of wiki tasks, which required them to make contributions to setting goals, creating clear steps, managing time, collecting resources, uploading learning materials, adding new information, adding multimedia as well as links to better understand the course content. Most students reported that the wiki helped them to regulate their learning online as indicated in the qualitative section. For example, student IW07 stated that,

"*Wiki technology helped me to regulate my learning by enabling other students to contribute to the course content which enabled me to glean a better understanding of the course content*."

Furthermore, Student IW01 pointed out that,

"*Wik*i *helped me to develop self-regulated learning skills by providing a guidance page on collecting and collating information*."

It can be concluded that, after choosing the topic at this stage, students were able to regulate knowledge and construct their learning through interaction with the learning tasks, such as by collecting multiple sources of information to build the content of the Education Technology module, by engaging in activities and interactions with other students (see appendix 15, which contains an explanation of this stage).

Stage 5 –Development

The success of the development stage is demonstrated by students' ability to reflect on their learning experience, evaluate their performance and comment on the strengths and drawbacks of the wiki they had used. This stage was fulfilled by a variety of comments in the interviews. During the final stage of the model, learners identified more benefits

of wiki learning: they perceived that they could acquire help in achieving their own goals, in exploring how to integrate their online experiences into other forms of learning and in transferring and applying their learning.

The overall results revealed that most students perceived that they had achieved their goal of developing their SRL skills by increasing their proficiency in executive function and evaluation skills. This was evidenced by the significant difference between students' pre- and post-test values, reported in section 5.4. For example, as student IW16 astutely pointed out,

"*I had the skills for self-regulated learning before, but the wiki has developed them to be better than before through the introduction of educational tasks that promote independence*".

Another student, IW09 stated,

"*The wiki helped to enhance … SRL skills by helping students to undertake the responsibility of learning individually, to gain knowledge, search for information, set and manage targets and time management"*.

The next chapter will provide a detailed discussion of the findings of this study and will seek to answer the main research questions.

6 Chapter Six: Discussion

6.1 : Introduction

The previous chapter presented the findings from data generated from the questionnaire and interviews with a sample of students undertaking an Education Technology module in PNU, Saudi Arabia.

This chapter interprets the findings presented in Chapter 5 in an attempt to highlight the meanings and implications of these. These findings are discussed and compared with related studies reviewed in Chapter Three, in order to establish whether the collected data supports or contradicts the reviewed theories and emerging trends.

This research sought to obtain a deeper insight into the perceptions of the participating students in terms of how utilising wiki as an online environment for learning during teaching module could enhance SRL skills. By combining the learning enhancement functions of wiki with tasks specifically based around the enhancement of SRL skills in a Saudi context, it was possible to determine that wiki is of particular interest in terms of what it can offer to student personal skill development. Gathering different forms of data (both quantitative and qualitative) from the cohort that were the focus of this study allowed the researcher to reach the conclusion that wiki, according to students' perceptions, engaged them in the enhancement of their own SRL skills. This highlighted the fact that the functions that wiki offers students may help not only to enhance SRL skills but also to increase their interest in the positive aspects of the previously largely untapped resource of online learning within PNU. The discussion in the following sections corresponds to the order of the research questions.

6.2 Discussion of the research questions:

6.2.1 Research question one:

To what extent can wiki learning enhance Self-Regulated Learning skills?

The pre- and post-tests were separated by a period of six weeks in which all students were immersed in learning for an Education Technology module using wiki learning, the main focus of which was the development of their SRL skills in an online environment. The students felt that, after completion of the wiki learning course, their executive function

skills and evaluation skills had improved, with the exception of *organisation of the learning environment* and *seeking help*. This was mainly highlighted in questionnaire responses (see section 5.2.4).

In addition to the above, the qualitative data received and analysed from the one-to-one interviews on wiki learning complemented the quantitative results, i.e. they both, in the main part, highlighted students' positive responses to using wiki learning and its perceived enhancement of executive function and evaluation skills. As discussed in Chapter Five (see section 5.3.3), students expressed in the interviews that they already had an awareness of SRL skills (see sections 5.3.3; 5.3.4.1, (e)) before using wiki learning but felt they had developed them further during the course, regardless of their individual starting points. In the interviews, students referred to specific examples of SRL skills to corroborate the data tables provided in the findings chapter (see section 5.3.4.1).

6.2.1.1 Executive function scale:

This section discussion responses to the various activities comprising the executive function scale, in order to interpret the main areas of change and possible reasons for them. Each activity is discussed separately below.

6.2.1.1.1 Goal setting

Goal setting refers to learners being able to plan and set goals for their learning tasks. This section discusses the data presented in the data analysis chapter (see section 5.2.4.1.1), interpreting the reasons behind the change in students' self-perceptions of their goal-setting skills between the pre- and post-wiki learning periods.

It seems likely that the main factor behind students' perceived improvement in their goal-setting skills after using wiki learning for six weeks was their level of motivation. This was shown in depth through the interviews, since most students indicated that they had a positive attitude towards using wiki (see section 5.3.2.1) and that they had made progress in their goal-setting skills via wiki (see section 5.3.4.1,a). This view was also supported by the finding of a statistically highly significant link ($p < 0.01$) between goal setting and attitude towards using wiki learning (see table 5.11, section 5.2.5).

This finding is in line with the literature. For example, Chen et al. (2015) mention that motivation is an important factor both when evaluating the attitudes of the participants

related to learning via technology, and in terms of encouraging students' work in learning tasks. Likewise, Moeller et al. (2012) identified a significant correlation between goal setting and level of persistence or motivation to complete a task well among a large cohort of students in Spain. Zou and Zhang (2013), meanwhile, found that students in China who had clearer learning goals were also more motivated, more confident and, therefore, put in more effort.

We may surmise, therefore, that wiki learning creates a virtuous circle: provided students have some initial motivation to use wiki learning they are likely to find that the process of using it will encourage goal setting, and that this act of goal setting itself improves motivation to learn (and in this case use wiki), thereby further reinforcing the positive effects.

In this study, the researcher actively encouraged students to practise setting goals before starting any wiki learning tasks (see section 4.10, Table 4.3). This continued to be actively developed as a skill over the six-week period since students were encouraged to fill in goal tables (see Appendix 14). Further, for each task, the students had to take responsibility for planning and setting goals (see section 4.9). In this case, the sub-goals most likely resulted from the teacher's regular and consistent feedback and encouragement to review goals throughout the learning process. The researcher also took steps to support motivation, for example by identifying successful students each week (see Table 4.2; row on "ice breaker").

The outcomes for students' goal setting suggest a shift from the traditional teaching situation described in Chapter Two, which pointed out that the Saudi education system in general is didactic. When goals are set in the didactic Saudi education system, they are more generic or set solely by the teacher, who would be responsible for the creation of short-term and long-term goals. The wiki developed for this project sought to counteract this by actively encouraging students to set their own goals and encouraging an initial motivation to do this. The findings indicate that, in line with the literature, as students became familiar with setting their own goals, and saw the benefits in this for their learning and time management, they became more motivated to continue with this practice. This is reflected in the findings of consistently enhanced goal-setting skills set out in 5.2.4.1.1. Even though students continued to find the task of goal setting to be challenging, they were engaged with this task and recognised its benefits.

Finally, the finding that students did find goal setting relatively difficult (Table 5.2, item 6) suggests that more examples of appropriate goals as guidance may have been necessary for some students with lower pre-wiki goal setting skills. Revisions to the *goal* form used in the study may also be necessary in the future to increase understanding of the process and therefore also the level of perceived ease.

6.2.1.1.2 Time management

Time management involves learners setting aside periods of time to study, as well using this study time effectively and setting goals. This section discusses the likely reasons behind the changes in students' self- perception of their time management pre- and post wiki learning (see section 5.2.4.1.2).

The quantitative and the qualitative results in respect to time management were consistent (see section 5.5). Table 5.3 in section 5.2.4.1.2 shows that students generally felt themselves to have improved in respect to their time management skills after wiki-assisted learning. The interviews, meanwhile, revealed that, with respect to time management, two thirds of the participants believed they had made progress with time for learning and had a scheduled time before starting any wiki tasks (see section 5.3.4.1,a).

It is interesting to compare the results reported in this study and those reported in previous work on student time management using wikis. Some previous work has found that wiki use does not promote time management; indeed, the collaborative nature of wikis can hold back students, since they are dependent on others completing work on time. For example, Allwardt (2011) reported that students using a wiki were frustrated by other students not posting submissions until the last minute thus interfering with their own time management plans. However, the present findings may be more consistent with Sigal's (2013) view that the combination of an online calendar, and round the clock accessibility, can benefit students' time management, especially if they are given active involvement and support from the teacher.

In this study, the teacher actively promoted time management among students through setting deadlines on an online calendar that was prominently displayed on the home page of the wiki (see Table 4.2) and following these up with reminders. Also, compulsory attendance in the computer laboratory at the university campus at the time of lectures is

likely to have contributed to the slight improvement in these skills. This seems to support Sigal's (2013) contention that the active involvement of the teacher, use of calendars and clear deadlines help students develop time management skills. Given that the improvements in time management, especially in relation to individual tasks (Table 5.3, item 7) were relatively small, however, it may be that students needed further guidance and deadline indicators related to acting on feedback (Table 5.3, item 5). This does, however, raise questions about how practical such intensive support would be, if wiki were rolled out more widely.

It should also be noted that Kwan's (2014) work on time management (see section 3.7.3.2) makes it clear that the process of developing time management skills is a lengthy one (Kwan identifies four stages) and it may be that the six-week period of this study was insufficient to effect substantial change in these skills. Despite this, the overall results for time management via wiki are promising. Through a careful design that incorporated a focus on time management on every wiki page, careful guidance given by the teacher and the expectation to fill in timeframes on the *goal* form, students evidently felt that their skills experienced some form of enhancement.

6.2.1.1.3 Self-record

Self-record relates to the ability to keep and manage their own materials via wiki, note-taking and keeping feedback about their course. This section discusses the findings relating to how students perceived their self-record skills as changing pre- and post-wiki learning (see section 5.2.4.1.3).

There is very little prior research on wiki use and self-record skills. The work reviewed in 3.7.3.3 is either work on the development of self-record not specifically in a wiki context (Effeney, 2013), or work on wikis that only touches tangentially on self-record skills (Stafford et al. (2013). The results of this study, however, although looking directly at wiki use and the development of self-record skills are not able to shed much extra light on this area. As set out in Table 5.4 and discussed in 5.2.4.1.3, students reported only slight improvements in each of the items investigated under self-record skills. Improvements were consistently reported across all seven items, but they were generally small, suggesting that the tutor may need to offer examples of an effective, serialised filing system on wiki as a model in order that students see the full benefit and emulate it for themselves – the mere presence of a wiki filing system is clearly not enough for the

skill to be developed among all learners.

An important point worth noting is that there was a wide variation in the starting proficiencies reported by students for specific items. For example, 80% of the students (66 out of 83) were already typing up short note's pre-wiki, and 74% (61 out of 83) were recording positive feedback (items 3 and 6 in Table 5.4). In these cases, the room for improvement on existing practice arising from the wiki use was relatively limited. In contrast, in respect to recording and filing classwork, 75% of students were never or only rarely doing this pre-wiki; hence they were starting the six-week wiki learning experience with a very low foundation of skills in this area (item 5 in Table 5.4). As Effeney (2013) has pointed out, the starting level of self-record skills is an important determinant of how far and how rapidly students can progress (see discussion in 3.7.3.3). In this case, the wiki learning experience did have a significant positive effect, but mainly in respect to reducing the number of students who never filed classwork (from 43 to 9) and increasing those who did this sometimes (from 19 to 41). This is an important change (alongside the 11 more students who now said that they often filed work post-wiki), showing that, even if overall skills remained low, just six weeks' experience with wiki could make a difference to this kind of organisational effort.

Another striking element of the results of this study was the large increase in the number of students who understood that technology *could* help them document their course requirements and their progress towards them (from 43 to 72 post-wiki, item 7 in Table 5.4). This idea was supported in the qualitative results, where the participants confirmed that wiki helped them in recording skills, since it was easier and safer to use technology to record material rather than in traditional paper form (5.3.4.1,a). This links to the idea that using technology to learn and build content and to write up lecture notes was easier than with pen and paper (see 5.3.2.1.3,b). The advantage that the records would be stored in one place may also have enticed students to do this more often. This supports Stafford et al.'s (2014) conclusion that wiki provided learners with a way of managing their learning materials easily.

Overall, therefore, it can be concluded that the students' experience with wiki had an important effect in educating them about the potential of wiki as a resource to record information about their learning, but that while many students were already practising such self-record skills, in other areas the starting skill level was low, and the wiki course was only able to make a start at changing practice.

6.2.1.1.4 Organising the learning environment

As noted in 3.7.3.4, Organisation of the learning environment refers to students choosing an appropriate physical setting; eliminating or reducing distractions; and organising study periods to be spread over a period of time (Reis & Greene, 2014), as well as organising the physical learning setting in order to make learning *easier*, e.g., by isolating themselves from anything that distracts them (Effeney et al., 2013).

According to the quantitative data for this skill in Chapter 5 (see section 5.2.4.1.4), students' perceptions were that this was something that they felt they already did regularly prior to using wiki, leaving little room for improvement, resulting in no statistically significant enhancement of those skills after using wiki learning. The only aspects in which some marginal difference can be noted in the quantitative results were in respect to finding an appropriate place to study (item 3) and having access to technology (item 4), where the number of students who said that they were always able to do these things increased by six and seven, respectively. Also, no student reported in the post-test survey that they were never able to access the technology needed for their learning. The qualitative data complements the quantitative data in this respect (see section 5.3.4.1,a). Although two students explicitly noted that the wiki learning helped them to shut out distractions and thus organise their learning environment, others did not mention this explicitly, and it was unclear to what extent any enhancement in this area was due to the requirement to use wiki in a regulated classroom environment.

Overall, both the quantitative and qualitative results suggest that the experience of wiki learning did not have much effect on students' ability to organise their learning environment. Although little previous research has been done in this area, the results of this study do not corroborate the study by Usta (2011), which appeared to show that online learning had a significant positive relationship with the ability to organise the learning environment. This may be because this was already an area that the students in this study (who were generally already reporting good to excellent GPA grades – see Table 5.1 in section 5.2.3) felt confident in pre-wiki, and thus any effects as a result of the wiki learning experience were marginal and possibly due to the tailored conditions established for this experiment. Outside of these conditions, requiring students to attend a regulated classroom environment, it would appear that using a wiki itself does not intrinsically offer students a way to avoid distractions in the learning environment. This is a self-regulated learning skill that students must develop independently from wiki learning.

6.2.1.2 Evaluation skills scale:

6.2.1.2.1 Self-evaluation

Self-evaluation refers to students' active involvement in monitoring and evaluating their own performance in learning tasks, based on specific criteria provided by their tutor designed to help them achieve their learning objectives. As was reported in Chapter Three (section 3.7.4.1), Zarei and Gilanian (2015) attribute the success of self-assessment online to the avoidance of the awkwardness of being assessed by another learner or teacher, resulting in enhanced independence in learning and therefore also SRL skills based on the students' views. Reflecting on both the quantitative (see section 5.2.4.2.1) and qualitative findings (see section 5.3.4.1,b), the following observations may be drawn**.** In general, significant changes were observed in students' reported abilities to benchmark their learning against standards set out concerning the skills of summarising learnt materials, self-evaluating the amount learnt and the quality of materials, as well as contrasting their own learning against what was expected by the tutor and evaluating their use of resources during task completion.

The quantitative results showed some remarkable improvements, especially in relation to the use of technology to support their learning (item 5 in Table 5.6). This may reflect the fact that the wiki tool included several easy-to-use, time-saving functions such as hyperlink buttons to YouTube and other external sites with university material. This may have encouraged students to take advantage of resources available to them when compared to having to make a physical trip to a library on campus, for example.

The quantitative results also showed that students became more confident in evaluating their performance in a variety of ways (items 2, 3 and 6 in Table 5.6). This enhancement was probably also due to a combination of the repeated practice with the critical form on wiki (see appendix 9; 5.3.5.1.1,a) and the guidance offered by the tutor in the self-evaluative process. The students had a great deal of practice in order to be comfortable with making informed decisions between the evaluation methods to reach their goals.

The impressive improvements suggested in the quantitative results were validated in the qualitative interviews, with 15 out of the 20 interviewed students commenting, often effusively, on how the wiki made it easy for them to evaluate themselves and guided them through this process through the tools available on the web page (see section 5.3.5.1.3).

The overall perceived enhancement in self-evaluation is promising, since it suggests that students are willing to consider the processes they use to learn and, most crucially, to improve on them using wiki as a learning platform. This result conforms with Zou and Zhang's (2013), view of the advantages afforded by technology compared to the traditional learning environment in terms of helping learners to progress in these skills. This is a point also made by Kitsantas (2013) specifically in relation to how wiki provide more assessment\evaluation features such as grading rubrics, which help learners to monitor their learning easily. The results in this study also confirm the work of Ng (2016) showing how authoring of wiki projects helped trainee teachers develop their self-evaluation skills.

It is also worth noting that the improvements in self-evaluation noted in this study are particularly interesting since cultural constraints in Saudi Arabia make students unwilling to highlight their errors in an academic scenario (see sections 2.3.1; 6.2.1.2.2). This is perhaps due to wiki's removal of face-to-face communication, which could help to combat the reported shyness mentioned in chapter 2 (see section 2.3.1).

6.2.1.2.2 Peer learning

Peer learning is the process of learning from and with peers in various ways, ranging from discussing work with peers, through collaborating with peers and ultimately being assessed by and assessing peers. At the heart of peer learning, therefore, is collaboration and, as noted in section 3.7.4.1, wikis are particularly well-suited to supporting collaborative learning experiences. Indeed, in many ways, collaboration is the fundamental point of wikis. Such collaboration offers the opportunity for shared creation of content, the use of discussion boards and community-based tasks, the possibility to trace history and learn from it and evaluate it (Alzahrani, 2013; Castañeda & Cho, 2013; Thornton, 2013; Hadjerrouit et al., 2014; Stafford et al., 2014). The wiki course in this study was designed to encourage students to take advantage of these peer learning opportunities through a specific group project in tandem with extensive encouragement and support from the tutor in respect to the active use of discussion boards (see section 4.9 and 4.9.1).

The findings set out in section 5.2.4.2.3 show that the peer learning potential of the wiki was recognised and exploited by the students in this study. Even though many students were already regularly discussing their work with their peers before starting the wiki

learning course, there were still increases in the numbers who reported doing this *always* and *often* after the wiki learning experience, driven by a big relative reduction in those who had previously said they only *sometimes* explained solutions to peers (from 12 to 5 students, item 1 to Table 5.8) or only *sometimes* shared ideas with peers (from 13 to 5 students, item 2 in Table 5.8). After the wiki learning experience no students said that they *never* used these skills (items 1 and 2).

What was particularly striking about the results, however, was that whereas students had been relatively less keen on peer evaluation (either of themselves or others) pre-wiki, they were much more comfortable with this after experiencing the wiki learning course. This change was reflected in a large increase in those who said that they *often* engaged in peer evaluation (items 3 and 4 in Table 5.8), and a large drop in those who said that they *never* did this (see the full articulation of these results in section 5.2.4.2.3).

In addition, the qualitative part of this study supports the above outcomes, as half of the students interviewed (10 of 20) mentioned how wiki helped them to engage in peer learning (see section 5.3.4.1, b). It is interesting that the quantitative results show that about 75% of students engaged regularly in peer evaluation and more than 90% discussed work with peers post-wiki. It might be argued, therefore, that the qualitative results, in which "only" 50% mentioned this point can be viewed as showing support for the point identified by the quantitative data. In respect to this, the interview discussion was more generally about self-regulated learning, without necessarily specifically teasing out peer learning, and since many students were already engaged in peer learning, they may not have identified the role of wiki in this without the specific prompts that were contained in the quantitative questionnaire. Nonetheless, the fact that half of the interviewees did specifically highlight the facilitation of peer learning is important.

For example, this dimension concerns the learner collaborating with her peers through dialogue and assessing their work using critical forms and rubrics (see appendix 9) to monitor their performance in learning tasks. The results from both the quantitative and qualitative data are the consistent (see section 5.2.4.2.3).

In general, based on the sample cohort's opinions, wiki learning appears to have had a positive influence on students' willingness to aid others with their learning. This is in line with the prominent studies by Lin and Yang (2011), Alzahrani (2013), Pange (2014) and

Zheng et al. (2015) Chu (2017) – (who all reported improved collaboration between students via wiki -see sections 3.3.2; 3.4.4; 3.5).

There is also a significant implication of these findings related to the Saudi context of this study. It has been noted that Saudi students are often reticent to engage with peers (see sections 2.3.1; 6.2.1.1.3), and that this reticence is both cultural and in fact encouraged in traditional classroom environments. As discussed in the literature review, there is a wide body of work in Saudi education that argues that Saudi students who have had little opportunity for interaction lack confidence and feel sensitive about discussion and making errors in front of their teachers and peers (Alsaedi, 2012, Altamimi, 2014, AlNajdi, 2014; Aldayel, 2017). Although the pre-wiki quantitative data reported in this study does not entirely support this picture of reticence about engaging with peers, the findings provide indications that wikis offer an excellent way to break through any such reticence and to create quite a high level of peer-to-peer interaction, even in the face of cultural constraints. Such a view is consistent with the work of Zou and Zhang (2013) who pointed out the potential for students to evaluate more, via the functions provided by an online environment, than they do in a traditional classroom.

6.2.1.2.3 Seeking Help

As discussed fully in section 3.7.4.2, self-regulated learners know when to seek help from others (Lin et al., 2016).

Both the quantitative and qualitative results show that students in the study sought help from others when they faced difficulties as a way of managing their learning. In the qualitative results, only five students actually highlighted the wiki as making a contribution in this area, and this seems to coincide with the picture from the quantitative results, which generally show little change in responses before and after wiki learning (see section 5.2.4.2.2, & 5.3.4.1,b). This may suggest that, as with peer learning, students already felt that they were proficient at seeking help from others when they needed it even pre-wiki. It is interesting, in fact, that some 84% of students said that they *always* or *often* sought help from peers before experiencing wiki learning, since this is very similar to the levels reported for sharing solutions and ideas with peers (see Tables 5.7 and 5.8). The consistent picture from the results is that, even pre-wiki, students felt that they were interacting extensively with peers. In this context, students may not have recognised any impact from the use of the wiki. What is interesting, however is the indication that using

the wiki increased students' willingness to seek help from the teacher, reflected in the statistically significant change in the pattern of responses to the item in question.

Although, overall, the results do not straightforwardly support the work of Dabbagh and Kitsantas (2005), Barnard-Brak et al. (2010b) and Cho and Cho (2013) who all found perceived improvements in the skill of seeking help, this may be due to the high levels of perceived help-seeking behaviour pre-wiki (of course this study was not designed to identify the actual extent of help-seeking behaviour, only perceptions). On the other hand, when designing this study, the researcher took careful note of the work of Roll et al. (2011), a key finding of which was that the availability of help from the teacher needs to be explicit and well-managed to be taken up effectively, especially by students who possessed low awareness of opportunities for help, or their need for it (see the discussion in section 3.7.4.2 and the description of the creation of a specific "seeking help" page as part of the wiki design in Table 4.2 in section 4.9.1). It can be suggested that the specific effort put in to this aspect of the wiki, backed up by the teacher's active involvement during the wiki learning course, was indeed highly effective in encouraging those previously reticent about asking help to do so (as reflected in the big drops in those who reported that they consulted with the teacher only *sometimes* or *never*). This study, therefore, lends support to Roll et al.'s (2011) conclusion that teacher support needed to be highly targeted and managed to make an impact on those who are reluctant to seek help. Furthermore, it does so in a context in which, as discussed earlier in this chapter, and elsewhere in the thesis (see section 2.3.1) collaborative learning and engaging with teachers is traditionally discouraged.

A final aspect of the results in respect to self-help that needs to be explored further, relates to item 4 in Table 5.7 – the propensity to rely on one's own knowledge when faced with difficulties. Both pre- and post-wiki, around 74% of students reported relying on their own knowledge and abilities; indeed, the number of students who said that they *always* did this increased from 33 to 39 after the wiki. This result seems counter-intuitive, since it appears to conflict with the other items that report a similar proportion of students in fact seeking help from others. The question is, how can students say concurrently that they were relying on their own knowledge but also that they were seeking help from a wide range of others (teacher, peers and family)? This cannot be interpreted easily, but it may be that participants did not see this question as implying an either/or choice between seeking help from others and using their own skills and resources to deal with difficulties. It could, however, be interpreted as a reflection of the greater confidence and willingness

of students to take responsibility their own learning, including the analysis of when and where for they needed help, and how best to obtain it.

6.2.1.2.4 Self-efficacy

As discussed in section 3.7.4.3, self-efficacy is defined as an individual's belief that they can accomplish different activities. It refers to how students perceive their abilities (Wigfield et al., 2011). Self-efficacy is a particularly important aspect of students' learning, as it represents a summing up of what the students feel they have become better at, pre- and post-wiki. It amalgamates the technical, behavioural, technological and simulative aspects of learning as well as the students' sense of self-achievement and value. Overall, the quantitative data appears to show a consistently small but statistically significant increase in the students' perceptions of their self-efficacy across all items (see table 5.9 and the full articulation of the findings in section 5.2.4.2.4). A number of students (6 out of 20) also picked out improved overall performance and self-efficacy as a consequence of using wiki in the qualitative interviews (see section 5.3.4.1, b).

Although the literature (Kitsantas, 2013; Zimmerman, 2011; Ozdemir & Erdem; 2011) consistently links self-regulated learning within improved self-efficacy (see the full discussion in section 3.7.4.3), there has been little work on self-efficacy in the specific context of the use of wiki. In so far as self-efficacy can be viewed as an amalgam or outcome of the overall improvements in self-regulated learning discussed throughout the previous two chapters of this thesis, it would be expected that we would see a large improvement in perceptions of self-efficacy. This is not really borne out in either the quantitative or qualitative results, however. There is some enhancement of perceptions of self-efficacy but, consistently, only a few more students report being more confident in this area. This may, again, be a result of the large number of students who were reporting themselves to be confident about their outcomes even before using the wiki (consistently well over 80% saying *always* or *often* for all six items). This perhaps reflects the generally high prior achievement of the students recruited for this study. As shown in Table 5.1, 72 of the 83 students already had a GPA of very good or excellent, and the remaining 11 were "good". It is perhaps unsurprising, therefore, that students were confident about their academic success before the using wiki, and that therefore the room for enhancement in this area was relatively small (although nonetheless, it must be emphasised that there *was* an enhancement, and this is important).

Summary

In view of all that has been mentioned so far, the research findings demonstrate in detail the extent to which using wiki learning appeared to enhance each skill under the executive function and evaluation skills, based on the students' perceptions in this case study, was discussed in detail. Discussing individual items for all sub-skills meant that extremely specific group perceptions could be selected, analysed and compared. This enabled a detailed answer to the first research question to be formed through the identification of more and less significant changes pre- and post-wiki. The indications are that the constant practice applied to all skills was perceived by a number of students to be crucial in the enhancement of most sub-skills, as were the constant support and guidance given by the tutor and the design of the tasks and pages used. Sub-skills such as *seeking help* and *organisation of the learning environment* came to light as being areas that wiki was not, in this study, able to substantially enhance. However, this opened up questions regarding the influence of the Saudi cultural context on the cohort of students in these skill areas, as well as the varying lengths of time that are required to truly enhance each of the sub-skills. Regardless of this, all other sub-skills under executive function and evaluation skills were, according to the Saudi female students' perceptions, significantly enhanced by wiki learning: wiki as a learning platform was deemed by the students to be, overall, a positive change to their way of learning, as can be identified in the many positive shifts in the response patterns reported in Chapter Five. The new wiki learning experience involving discussion with peers and teachers allowed the students to become active participants in their own learning, as well as allowing them to push against the boundaries of their usual learning experiences.

6.2.2 Research question two: What are the learners' attitudes towards using wiki within their learning environment?

To answer this question, it is necessary to draw attention to some points that could affect students' feelings towards wiki, positively or negatively. To begin with, as mentioned in Chapter Two (see section 2.10), Saudi culture affects all aspects of life as well as the education system and its practices. It especially influences whether sufficient training is given on using technology to teach and learn. The traditional ideologies that conflict with technology may have led to poor internet connectivity in educational institutions and culture may have also led to a lack of technology availability. Hence, this background

needs to be considered when we interpret and discuss results later in this section. Furthermore, as discussed above, aspects that aid students' vital learning processes, such as the design of pages and tasks, or guidance given, could also affect students' attitudes in regard to how useful they feel wiki is. As discussed in Chapter Four, therefore (see section 4.5.2), it is important to use a combination of methods to more fully understand learners' attitudes towards using wiki as a learning environment. Thus, students' attitudes as represented in the findings chapter under section 5.3.2, are discussed below, in light of results gleaned from the questionnaires and interviews above.

All students declared that in the pre-course questionnaire that they had no particular experience of using wiki, although, in general, learners (72 out of n=83) had previous experience with other web 2.0 tools such as Twitter or blogs (see section 5.2.3), which they had used for non-study purposes. In addition, about three quarters of the learners' responses (64 of 83) in the questionnaire (see section 5.2.4.3) showed a high level of positivity towards using wiki as a learning environment. The questionnaire focused on discovering students' attitudes towards using wiki in learning, the key areas being: (1) ease of use, i.e. whether wiki was easy to use in terms of technology, (2) benefits, i.e. whether wiki was useful or not, in relation to their learning and (3) interest, i.e. whether wiki provoked enjoyment in learning. With regard to these points, some learners indicated their attitudes in detail during the post-course interviews, which provided further insight into this matter. The reasons given by students for their attitudes will be discussed later in this section.

As the results indicate, there was a positive but weak correlation ($r=0.389$, $P<0.001$) between the scales of attitude and self-efficacy (see table 5.11, section 5.2.5). Consistent with the claims of Liaw and Huang (2013), whose learners demonstrated an increased perceived level of self-efficacy, among other SRL skills, as a result of a positive attitude towards the online learning environment, the current study demonstrated, also through the use of a questionnaire, that an astounding 72 of 83 students felt positively towards wiki as a developer of SRL skills, in particular self-efficacy. Sixteen of the 20 interviewed students also confirmed the same positive feelings towards wiki and the development of self-efficacy via wiki learning, allowing a strong assumption to be formed regarding wikis' likely ability to develop SRL skills with functions that students view positively. Furthermore, after six weeks of interaction with wiki learning, students had accumulated interactive posts and received messages as mentioned in the findings chapter (see section 5.5), demonstrating stage two of the Salmon Model, *online socialisation*. The attitudes of

the learners were mostly positive (16 of 20) as reported in the interviews (see section 5.3.2.1) based on their own experiences of wiki, and students supported their opinions with clear explanations. Nevertheless, there were a few students (4 of 20) who had negative comments to make with regard to technical issues and the university's problems with providing online courses that function well enough for students to access them easily and quickly in order to learn. Generally speaking, opinions given in the questionnaires and interviews suggested that *features of wiki*, *learning tasks* and *the specific design of wiki pages* could be the most important factors that would affect learners' attitudes towards wiki as a learning environment (see sections 6.2.3.1; 6.2.3.3). The measurement of the impact of these factors is not the aim of the current study, however. The main opinions given by students are summarised in the following figure:

Figure 6:1 Students' positive attitude summarised as a mind -map

The figure breaks down positive attitudes from the students' reports into particular areas, all of which will be discussed below, and each theme will be discussed separately for more clarity, as follows:

User-friendliness:

Two key areas were mentioned here by students in terms of wiki being "user-friendly": (1) wiki was easy to use and therefore prior teaching of the skills needed to use wiki was not required; (2) wiki was accessible at any time and from any place and also allowed access to be granted from any device, e.g. mobile phones (see section 5.3.2.1.1). These findings are similar to those of the studies by Witney and Smallbone (2011), Peled et al. (2014) and Chen et al. (2015), who stated that wiki tools should be easy to use so that participants can quickly create wiki applications themselves and therefore learn more effectively. Students reported that they had a positive attitude towards wiki because they

thought it was easy to use. In this case, it is important to note that in the pre-questionnaire the students reported that they had experience of using web 2.0 technology, but not wikis. It is therefore possible that the students' prior learning experience affected their attitude towards wiki (see Table 5.1). This result is in line with the study by Altanopoulou and Tselios (2017), where the author indicated that learning experience was considered to be a factor that affected students' attitude towards wiki.

Furthermore, they support Papadima-Sophocleous and Yerou's (2013) finding that learners liked the level of accessibility granted by wiki. Lai and Ng (2011) and Chen et al. (2015) similarly reported that wiki technology was easily adopted, with students relating that the user-friendly nature of the wiki platform made it easy to create wiki pages.

Consistent with Huang and Nakazawa (2010), however, students' comments also indicated that teachers need to encourage learners' activities online, because they may not be accustomed to wikis, only having been acclimatized to the ways and tools of the traditional classroom. This was the case for the participants in this study, who confirm that the tutor's role in helping learners is vital, when any new ways and tools for learning are introduced (see section 5.3.3). Moreover, as mentioned in Chapter Four and in Appendix 4, the researcher provided each student with instructions (a guide on how to use wiki) in the form of an e-guide and a manual guide in order to cater to every students' personal guidance preferences.

Self-confidence:

Self-confidence was reported to have increased after students had been exposed to wiki learning, since compared to traditional classroom learning, students were able to express opinions clearly, having thought about them before posting them and without a roomful of real-time observers who may pass more overt judgement. As was reviewed in Chapter Three (see 3.4.1), this study corroborates the comments made by Prokofieva (2013), who reported that students felt *uncomfortable–and uncertain* about editing others' content. They felt they were not confident enough in their own knowledge to *correct* someone else's point of view due to a lack of guidance in *positive interaction*. Students felt they had more confidence after wiki and there could be several reasons for this. One of them may be the provision of clear instructions; also, as mentioned in previous chapters, students worked alone as well as in groups in order to contribute content during the completion of tasks. In addition, students participated in some tasks where they evaluated

their own tasks and their peers' task contributions (see sections 4.9 & 4.10). The improvement in self-confidence was a particular success in this study, since *shyness* is a common phenomenon among Saudi female students in a traditional classroom (see section 5.3.2.1.2). The tutor's efforts to guide students towards sharing knowledge with others by providing physical and online guidebooks as well as simple encouragement proved effective. Peled et al. (2014) and Cai et al. (2017) also indicated that wiki learners feel more comfortable and self-confident outside of the traditional classroom. Furthermore, Chao and Lo (2011) found that online collaboration using wiki pages decreased students' anxiety, and the use of wikis increased the collaborative writing experience, which rarely exists in a traditional classroom. Also, a study by Liaw and Huang (2013) pointed out that there was a negative correlation between anxiety and internet use in online courses among students. In contrast to these findings, Witney and Smallbone (2011) reported negative learner responses after having used wiki, including expressing anger, frustration and unhappiness. Students in their study felt that face-to-face meetings were preferable. This was due to a lack of interaction with the tutor in that particular study, however, and wiki, crucially, was not a compulsory part of the module and therefore did little to attract learners who did not *need* to use it.

Furthermore, cultural influences and didactic pedagogy could affect a student's responses. In Saudi Arabia, teachers have control over all of the activities in the classroom and are seen as a source of knowledge (Alnassar & Daw, 2013; Hamdan, 2014; Al-Zahrani, 2015). This type of teacher-centred learning can be a barrier to students developing fluency in speaking (Alnajdi, 2014; Altamimi, 2014) and this could be a reason why Saudi learners feel anxious when they interact in the classroom. When students use wiki, however, they feel that it is much better thanks to the level of anonymity and autonomy that it provides, and these positive aspects, in turn, build their confidence. Furthermore, as mentioned in Chapters Two and Three (see sections 2.3.1; 3.2), Saudi students may feel self-conscious about discussion and making errors in front of their teachers and peers, as they do not want to be viewed as lacking in intelligence (Alsaedi, 2012; Alnajdi, 2014; Aldayel, 2017). The results, therefore, may be interpreted as indicating that wiki could help to build confidence in some learners due to the anonymity that it provides them, since 7 out of 20 students reported directly that it increased their self-confidence. Although this study is specific to the Saudi context, these findings may possibly also be applicable to other Middle Eastern countries which have a similar culture. The different findings obtained by Whitney and Smallbone (2011) may be attributable to

their study being conducted in an entirely different culture (a Western country) that relies on a different teaching method; however, more comparable studies would need to be conducted to investigate the true causes of self-confidence.

Flexibility:

In terms of flexibility, learners elaborated on the following two points: (1) wiki had a feature that enabled "history tracking", and therefore the manageability of the wiki. This allowed learners to return to previous versions of documents and to track any recent changes that had been made to them in wiki pages and (2) wiki also had attractive facilities that allowed multiple learners to edit the content as well as easily upload or download a range of resources, e.g. YouTube videos (see section 5.3.2.1.3). This is consistent with Chao and Lo's (2011) finding that a high percentage of students were satisfied with wiki as a tool for learning and praised the ease with which they could edit documents. Also, Hadjerrouit (2014) concurs with the current researcher, stating that the ability to edit content and browse history is regarded as a highly positive feature of wiki pages. Similarly, Lin and Yang (2011) report that most students in their study expressed positive feelings about their ability to use wiki, due to its flexibility.

Enjoyment:

Learners explained their liking of wiki in terms of experiencing a form of genuine enjoyment (see section 5.3.2.1.4). This supports previous studies. For example, Salaber (2014) pointed out that wiki learners may find features of wiki *interesting*; e.g. the layout of a wiki. This study agrees with those of Lin and Yang (2011) and Hadjerrouit (2014), who found that students viewed wiki as an enjoyable method of learning. In contrast to the findings from this research and the studies mentioned above, however, a study performed by Cole (2009) claimed that learners did not report a sense of enjoyment when using wiki in a learning context and argued that this was because whether or not technology is found to be *fun* or *enjoyable* depends on the participant and not on the website itself. The study by Cole indicated that, in an educational context, the social aspects in those technologies were not necessarily intrinsically enjoyable or useful. This may, however, be explained in part by Cole's finding that students found it difficult to distinguish between their personal and academic use of technologies. The current study, however, focused more deeply on the guidance and the design of a wiki in an effort to

create wiki learning that exploited every possible learning opportunity, the design being a focal factor that was not fully exploited in Cole's study.

In this case, learners at PNU enjoyed the innovative use of wiki learning compared to the traditional delivery of course content through PowerPoint presentation, which by comparison was not interactive, student-centred, or *interesting*.

Excitement:

Learners explained their positive attitude towards using the wiki in terms of the thrill of using something new, which represented a departure from the normal learning routine with which students were familiar (see section 5.3.2.1.5). Students found the wiki attractive in learning because it marked a change from the traditional way of teaching and learning and introduced more variety and liveliness. Although wikis being introduced in other curriculum areas would potentially inspire many students, this could also reduce the novelty of using technology to learn. It is, however, worth noting that the quotations under this theme and those quotations referring to the old-fashioned didactic methods, where the teacher plays the role of a knowledge transmitter (Allamnakhrah, 2013), indicate that wikis, even when less of a novelty, would still be a potential improvement on the didactic teaching methods relied upon for centuries in Saudi Arabia, because they have the potential to give students a more active role in the learning process (see section 2.3.1). In this study, it seemed that breaking this pattern and enabling students to be actively engaged, via wiki, generated excitement since 12 out of 20 students reported this in their interviews.

This study's findings on *excitement* are also consistent with studies in more technologically-advanced countries such as Wichadee (2013) and Chen et al.'s study (2015), where students reported that wiki technology was innovative, practical and appropriate to the module content, leading students to feel that they were achieving through an exacting means. It was also noticeable in this study that several students (n=12) overtly mentioned that wiki learning removed boredom.

Learning facilitation:

This area is also broken into two sub-categories indicating positivity among students: (1) it helped learners to *understand* the content of the module; (2) it was seen as a good way

of exchanging information, thereby *facilitating* learning once again (see section 5.3.2.1.6). The current research study was consistent with other studies in finding that wiki supports student learning and affects the learning process positively (Line & Yang, 2011; Alias et al., 2013; Papadima-Sophocleous & Yerou, 2013; Zhang, 2014; Page & Reynolds, 2015). As in these studies, the positive attitude of learners stemmed in part from their greater understanding of the academic content, as well as from the way in which this better understanding was reached, i.e. through interaction with peers and their tutor (Alzahrani, 2013; Roussinos & Jimoyiannis, 2013). In the current study, half of the students who undertook the final interview (10 of 20) stated that the wiki enabled them to better understand the content of the module. A further six out of 20 students also highlighted that wiki aided them in exchanging information, and therefore in building knowledge as part of a group of peers. These are encouraging results, although the proportions are lower than the generally high proportions of positive responses in the questionnaire. The difference may be due to the different nature of the questions posed; the questionnaire asked students to rate their perceived use of skills (some of which were already high before using the wiki) rather than to estimate the impact of wiki learning. Moreover, in interviews, students were not required to evaluate every specific skill that had been listed in the questionnaire, but were free to emphasise the issues they found most interesting and important in their own terms. Nevertheless, the interview responses demonstrate positive reactions to the experience of using wiki. The current study therefore goes part way to corroborating the findings of Lin and Yang (2011) who found that 32 students felt their collaborative writing skills were facilitated and improved by the use of an online learning platform, resulting in a wholly positive attitude towards online learning. Also consistent with the results in the current study are the results of Page and Reynolds (2015), who reported, through the use of pre- and post-online learning surveys, that learners responded positively to wiki since it helped them to understand concepts more clearly, possibly due to the fact that learning remotely using a simple layout allows students the time to assimilate information in their own self-regulated manner. Zhang's study (2014) as well as that of Alias et al. (2013) reported that wiki can be used to engage learners. In the current study's results, students also felt that the active role of the learner and the role of the instructor were important and needed to be clarified further. In the current study, 18 of 20 students affirmed the role of the teacher as a supervisor of self-regulation but also recognised that they needed to take responsibility for their own learning (see section 5.3.3).

Interaction:

As mentioned above, the ability to interact with others was deemed by the students to be a positive aspect of the learning experience when wiki was used as a learning platform, since wiki creates a social constructivist learning community where the roles of interaction, dialogue and feedback take precedence (Roussinos & Jimoyiannis,2013 ; Bryant & Bates, 2015). Students could form working relationships with one another and reap mutual benefits (see section 5.3.2.1.7,a). This finding supports many studies in the past that identified interaction in a social context as an effective way of learning (Twu, 2010; Li et al., 2011; Lin & Yang, 2011; Li & Zhu, 2013; Hadjerrouit, 2014). Furthermore, Sen (2015) points out that students were interactive with each other through wiki pages by posting and commenting. It has been claimed in some studies, however (for example, Judd et al. 2010), that learners responded with a delay to activities requiring interaction on wiki, often resulting in no measurable improvement in their studies.

Despite some studies declaring that the interaction factor may not have been a success for some students, it is clear that wiki's effectiveness as a learning platform requires students to accept interaction as an integral part of learning in this context, since interaction is also a key element of constructivist learning, as explained in Chapter Three (see section 3.6.3). The current study reveals that more than half the students (11 of 20) expressed a positive attitude towards using wiki in learning because it allows learners to interact with each other in a *positive way* that benefits their learning and skill development. This was also confirmed in the study by Abdullah et al. (2013) who stated that learners can join together in online groups and form relationships, enabling them to communicate with each other to their mutual benefit (see section 5.3.2.1.7,a). These results are in line with the results accumulated in studies by Alyousef and Picard (2011); Chu (2017) and Yusop and Basar (2017), each of which also highlighted the possibilities for effective interaction that wiki offers, based on student perceptions.

As can be seen from the literature review, an association has been found between constructivist learning and students' interactions during activities in their studies (see sections 3.6.2 & 3.6.3.1). The mutual interactions between students and teacher are vital since, according to Vygotsky's (1978b) Zone of Proximal Development (ZPD), students can surpass their current developmental level through problem solving under adult guidance or in collaboration with more capable peers. Students can, in this manner, reach higher levels of academic performance when they work on their own (Li & Zhu, 2013).

Sen (2015:2) points out that constructivist learning has been "approached from a variety of perspectives in wiki research, including reflective activity and communal or social constructivism". In the current study, the qualitative data gathered from the students revealed that they felt that wiki provided the necessary opportunities to *interact* and they also felt positively towards the use of wiki in their skill development (see section 5.3.2.1.7,a). This supports the view that, by facilitating interaction with the tutor and with peers, wiki potentially provides opportunities for students to construct knowledge. Under the theme of future usage (see 5.3.2.1.7,b), moreover, in the interviews, a surprising number of students confirmed that the opportunity to gain information from others via a form of guided interaction is attractive and would potentially allow them, in the future, to gain valuable new information and to discuss the validity of such information to avoid errors. This result, combined with the explicit references of students to interaction being a benefit of wiki as a learning platform, supports the case for constructivist learning as a rationale for using wiki, and provides a platform for future studies focusing on the development of interaction.

Furthermore, as mentioned previously, the level of interaction among students can be influenced by their cultural background; in Saudi classrooms, the teacher controls the educational activities and thus has a strong influence on learners with regard to their interactions and their visions. The teacher, as the central authority figure, assists learners' interactions via wiki learning. This type of learning environment emphasises the teachers' responsibility and control (see section 3.6.3.1) and may explain why the students in this study showed a greater willingness to interact when the teacher engaged and interacted with them more. As Peled et al. (2014) recognised in their study, educators still need to find different approaches for effective use of wikis as facilitators of interaction between students and their teacher.

Future usage

Learners had a positive attitude towards using wiki in learning and clearly recognised its value in learning, e.g. exchange of information or ease of communication with others. The interview data show the learners would like to use wiki in their future learning and with other modules (see section 5.3.2.1.7, b). This finding is in line with that of Page and Reynolds (2015), who reported that students enjoyed working together and liked the idea of collaborative writing in other classes using wiki. In contrast, these findings conflict with the study performed by Cole (2009), where learners indicated that they would not

want to use wiki as part of an optional module again, since it offered few benefits to them when used in this manner. In this case study, however, the researcher was able to actively improve the wiki experience based on feedback from the pilot study regarding the poor internet connection, potentially increasing the numbers of students referring to potential future usage at Princess Nora University.

In contrast to the wholly negative view of wiki in Cole's study, only four out of 20 students in this study reported any negative elements during their time learning with wiki. As mentioned in the findings chapter (see section 5.3.2.2) some negative attitudes may have resulted not from the use of wiki learning *per se,* but from the connectivity issue mentioned above, which actually identifies the internet as the source of negativity and not the wiki itself. The next section will explain the reasons for the negative attitude expressed by this small minority of learners towards wiki in learning.

Negative attitude:

This study received far fewer reports of negative issues than other studies such as Doolan (2011). Overall, learners made very few negative comments in the reflective wikis. The concerns they had were related to the poor internet connection on the campus and the fact that there was no mobile application for the wiki. These findings recall the warning of Karasavvidis (2010) that the introduction of any technology to learning will always bring barriers and challenges, such as computer access. The poor quality of the university network hindered its effective use. Although the participants agreed that the wiki was easy to use (see section 5.3.2.1.1), its slow response time meant that they found online working via the wiki more difficult than meeting face-to-face. This result is in line with the study by Chao and Lo (2011), who also reported that providing an adequate classroom environment, with a reliable internet connection, is essential if students are to be able to benefit from the wiki pages.

6.2.3 Question Three:

What are the students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills?

In order to answer this question in the context of Princess Nora University, one should revisit the key studies on which the researcher's decisions were partially based. Both

Hadwin et al. (2011) and Cho and Cho (2013) reported that the social element of SRL skill development would be vital in future research in order that a better understanding of students' perceptions of web 2.0 tools towards SRL skill development may be gleaned. Lai and Gu's (2011) study also highlighted positive perceptions of students towards the use of social interaction to enhance SRL skills. Cifuentes et al. (2011) correctly pointed out that the design features of learning environments need to be investigated more thoroughly in order to promote self-regulation among students that could, in turn, result in a more positive perception of wiki. Further to this, Chu (2017) and Yusop and Basar (2017) highlighted the necessity for a design that fosters engagement in students' learning processes as well as offers social interaction in the process.

In the present study, after critical analysis of previous studies in this area, it was possible to investigate the design of wiki functions that contribute to the social aspects of learning. In this regard, the researcher took important points into consideration such as the design of tasks and pages based on an adapted version of the Salmon Model (2014), and also ensured that guidance given by the tutor for the students had a clear approach that was maximally beneficial to the students. The researcher provided SRL skill training and allowed students the time needed to practise their SRL skills using wiki. The students were able to reflect on how they thought wiki could enhance SRL skills during the post course interview. During this process, they mentioned the following as key skill enhancers: the learning tasks themselves, the ability to build their own content, the design of the wiki pages used, the discussion board and the evaluation tool incorporated on the wiki pages of the course. Each sub-theme, as represented in the findings chapter (see section 5.3.5) is discussed separately below for further clarification.

6.2.3.1 Tasks:

Regarding the different kinds of activities or tasks set via wiki, the data from the interviews show that learners agreed that the tasks were very valuable in enhancing SRL skills, particularly the tasks that offered clear guidance or self-training to practise SRL skills on the purpose-designed wiki. They also agreed that the opportunities they were given to practise their skills enabled them to build their own content out of the taught module, enabling an improved and more effective learning process (see section 5.3.5.1.1,b).

As discussed in the methodology chapter (see section 4.9), there were some activities that the tutor/researcher prepared in order to train students in the experimental groups to practise SRL skills via wiki. Similar to the outcomes of Cho and Cho's study (2013)**,** 12 of 20 learners acknowledged the benefits of being expected to complete a blank table including the subject heading, aims, their plan of action and their deadline, before actually starting to solve those tasks. In other words, the aforementioned table or grid offered a breakdown of how to complete the tasks at hand and students, therefore, had to apply goal setting and time management skills during this process, in particular (see section 4.10).

Furthermore, the findings related to tasks support the evidence presented earlier regarding the tutor's role in encouraging learners to practise their SRL skills during task completion, it they are to achieve maximum improvement in their SRL skills. Students need to be, at least partially, motivated by themselves (Alzamil, 2014) but also, and perhaps most crucially, by their tutor, who communicates with them online as well as face-to-face (Lin et al., 2016), and learners' responses in the interview on their expectations of the teacher in this respect applied to task completion, also, even though 13 of 20 students felt that it was the student's responsibility to teach themselves how to be responsible for their own learning (see sections 5.3.5.1.1(a); 5.3.4.1(c)). This finding confirms that the guidance of the teacher during students' learning time helps to improve perceptions of their SRL skill enhancement while using wiki. This point is in line with studies such as those of Sardegna and McGregor (2012). Cho and Shen (2013) Rahimi et al. (2015 a,b), and Goulão and Menedez (2015), who indicate that such assistance enables students to develop their SRL skills as needed. As a learner's competence increases, the level of assistance given can therefore decrease. Similarly, a study by Dabbagh and Kitsantas (2005), which examined the self-reported effectiveness of scaffolding/guidance in multiple areas, including task strategies for various web-based tools, showed positive perceptions of the effectiveness of scaffolding or guidance. This study by Dabbagh and Kitsantas (2005) also highlights the importance of the role of the teacher, since they said students perceived content creation and delivery tools as useful in scaffolding or guidance.

The findings of the present study on students' and teachers' roles in tasks were interesting and unexpected, especially in the Saudi context with its didactic teaching, as mentioned in Chapter Two. Students in this study not only accepted these new roles for both themselves and the teacher, but they also liked these new roles as they helped them to improve their SRL skills in a wiki learning environment. The researcher observed that this was supported by clear instructions, based on the Salmon model (see 4.10) and the

teacher's encouragements to students during learning. It appeared that this helped them to develop those skills, as well as positive feelings towards the learning environment, consistent with the findings of Chu's (2017) study.

Furthermore, the current study also sets out a strong argument that the nature of the tasks on wiki could aid students in their development of SRL skills, with 13 of 20 students reporting that goal setting in a table prior to beginning and planning steps to complete the task, along with time management decisions, enabled a more effective completion of the task at hand. This is corroborated by the fact that the post questionnaire reveals that most students felt that their goal setting skills had improved post wiki (see section 6.2.1.1.1), thus clearly supporting the aforementioned results from previous studies.

Furthermore, a feature of wiki as an online environment for learning is the ability to practise SRL skills in an easier way, e.g. self-record (see section 3.3.2). For example, as mentioned in the findings chapter, participants in the interview (see 5.3.2.1.3) confirmed that the wiki history page and ability to record, save and return to students' work was a great asset, a benefit that was also reported in Lin and Yang's study in 2011. They argued that wiki fosters self-record skills, since the editing function allows users to compose content on a document and keep good record of revisions by different users, as did O'Bannon and Britt (2012). Nonetheless, just over half of the students did not explicitly state that using the *History Tracker* function was of benefit to them in their SRL skill development. It may be that students needed more time in order to practise and become familiar with this new function and some of these students may have been able to learn and develop skills without this wiki function, favouring other functions. In future studies, asking students to rank the importance of the available wiki functions may shed light on this.

Overall, the types of tasks chosen could help learners to enhance their SRL skills. 12 of 20 students in the present study found the independent and interactive activities, training tasks, presentations and reflection activities to be very effective and felt that they helped to transform them into more independent, self-regulated learners, according to interview statements. Ambreen et al.'s findings (2016) also confirm the above, since these researchers found that teachers reported that the course programme could benefit from being designed to be more interactive and promote self-regulation among *all* students (see section 3.4.4). The current study also fills the void in research declared by Ambreen et al., who stated that there needs to be an investigation into the development of tasks online

to promote SRL skills within a wider range of subject areas to ensure that the same results are true across the spectrum of subjects in higher education.

6.2.3.2 Building content:

Nine out of 20 learners specifically stated that the responsibility to build course topic content helped them to enhance SRL skills. Nevertheless, it cannot be ignored that just over half did not specifically allude to one of the benefits of wiki being its ability to foster knowledge or content building in students (see sections 3.4.1; 5.3.5.1.1,b).

As discussed in the methodology chapter (see section 4.9), each learner took responsibility for her own learning by having her own topic to focus on. They then built the content they required by researching, followed by filling in a table including the aims, the steps to build their own content, the time needed to achieve success in this area, then, add information to enrich the content of wiki. They later exchanged these new ideas with each other. Later, they evaluated their e-content via a critical form on the wiki page, all in an effort to develop SRL skills based on students' perceptions. Nine out of 20 students felt that the involvement they had in writing and outlining the content of the curriculum on wiki allowed them to enrich the lecture content themselves, teaching them responsibility for learning and therefore also improving SRL skills (see section 5.3.5.1.1,b).

The findings are consistent with those from a study by Zheng et al. (2015), whose sample of students surveyed and interviewed similarly confirmed that constructing knowledge helped to provide personal reflection, which in turn, facilitated the enhancement of self-regulation. The present study's findings were also in line with the findings of Rowe and Rafferty (2013), who they discovered that course content can be vital in stimulating SRL processes. Hence, it can be relatively safely assumed that when the students take the responsibility for understanding the subject content and for contributing to building the content of the module, this could lead to the development of SRL skills.

Students reported that they responded well to the detailed directions given for course content on wiki, therefore the provision of guidance and clear details on course requirements, deadlines and academic guidelines are likely to be indicators of the effectiveness of wiki and other online platforms in facilitating the building of content and, therefore, the enhancement of SRL skills.

As mentioned in a previous section (see section 6.2.3.1), another point indicated by the present study was that the content building tasks helped students to develop SRL skills, thanks to wiki's many features, which may not exist on other sites, such as the peer-work promoting features exclusive to wiki (see sections 3.4.1; 5.3.5.1.1,(b)). This finding confirms the claims of previous writers that the flexible learning tools and approaches wiki provides, as well as the allowance for real-time contributions from all learners involved in the process to create content from knowledge in an easy manner is advantageous to students (Carney-Strahler, 2011; O'Bannon & Britt, 2012; Biasutti & El-Deghaidy, 2012; Hadjerrouit, 2014; Cilliers, 2107).

The building of content is a key component of social constructivism, which underpinned the current study (see 3.6.3), in line with Zheng's (2015) comment that constructivist learning is used to design wiki activities that facilitate content building. Creating a bridge between new knowledge and existing knowledge is a principal aspect of constructivist approach (Gray, 1997). The results from the study at hand confirm that wiki technology facilitates this, as it allows users to build content using a range of wiki's features, mentioned appreciatively by just under half of the students (n=9 of 20). They also appreciated the discussion board and peer evaluation opportunities, specifically, when building effective content. It can be inferred that using wiki features for exchanging knowledge, experiences and new ideas would facilitate formation of links between the new knowledge students are acquiring through collaboration, and their prior knowledge. This is because wiki helps to ensure everyone contributes to the course content through the use of a discussion board and it is then possible to learn from the answers of peers. This is consistent with the claims of Camacho et al. (2016), who highlight that wiki users become active learners who are able to contribute to the building of content on the site, therefore improving their peer learning and self-evaluation as a part of SRL skills.

6.2.3.3 Design:

In the current study, as discussed in the methodology chapter (see sections 4.9; 4.9.1) and the literature review chapter (see sections 3.4.4; 3.6.4), the researcher proposed a design for the wiki pages based on the principles of the Salmon Model, while suggesting additions based on the main principles of Zimmerman's theory mixed with literature reviews in the design area. The design of the wiki appears to have been effective in captivating students and motivating them to learn through its use of instructional tasks

that promoted situated, authentic, collaborative and reflective opportunities (Guo et al., 2010; Chu, 2017; Cilliers, 2017). This is demonstrated in the positive response to the *icebreaker* page, which was also positively received by students in a study by Nami and Marandi (2014).

Learners reported that the design of wiki pages helped to enhance SRL skills; particularly the skills of self-record, seeking help and self-efficacy which could be largely attributed to the *help* and *icebreaker* pages (see section 5.3.5.1.2). According to half of the students, these pages provided notable aid and guidance to learners, and therefore provide the motivation they required to complete tasks associated with the module they were completing, ultimately offering opportunities for the development of self-efficacy skills. This is also confirmed in studies performed by Kitsantas (2013) and Salter (2014). They discovered that, based on students' perceptions, a specific design needed to be enforced for students' SRL skills to be truly enhanced. The idea to design the *record-keeping page* came from a study by Alexiaou and Paraskera (2013), who suggest that attention be paid to the potential of creating and enhancing e-portfolios to encourage increase in students' level of activity and responsibility for their own learning processes, thereby enhancing development of SRL skills.

Thus, the researcher designed the wiki pages used in this study in order to enhance SRL skills in learners, encouraging better organisational skills through guidance given on self-record, encouraging students to seek help from each other and their tutor when they needed to complete tasks, fostering better note taking and better communication between learners, as well as self-efficacy via an *icebreaker* page (see section 5.3.5.1.2). The students' responses to this were positive, and they liked that they could create several specifically-directed pages that focused on developing a particular skill (for example, the *help page* which fosters the skill of seeking help by encouraging students to use the page to ask each other for help or to use the provided guide) (see section 5.3.5.1.2), ultimately helping students to develop other SRL skills.

Like the study by Cifuentes et al. (2011), the present study indicated that a specific design using web 2.0 tools as an environment for learning had highly positive results for the development of SRL skills among students, such as goal setting and evaluation, which can be linked to Cifuentes et al.'s (2011) findings on performance objectives, guidance towards those objectives, production of generative responses, and feedback directly related to those responses. More particularly, in this study, as mentioned above, the

findings show that the design helped to enhance self-efficacy (see section 5.3.5.1.2), since students felt the design of the *Icebreaker page* encouraged better performance in the module task and this may lead to enhancement of feelings of self-efficacy. Also, with the *icebreaker page,* students felt that this helped to enhance peer learning skills, since it fostered easier communication between learners compared to in a traditional classroom. This point is consistent with a study by Nami and Marandi (2014) who suggested that the idea of an *icebreaker* on wiki pages encourages learners to interact with each other in order to complete learning tasks. The rationale assumed by Nami and Marandi is that, if learners have more motivation to interact with each other, then they would evaluate their performance in the course more effectively, thanks to increased levels of self-efficacy, and this is confirmed, at least partially, by the study at hand; 17 of 20 students specifically mention that, in their opinion, the design of the pages and tasks contribute to SRL skill development. Furthermore, the results from the current study are in line with results from a study by Martin and Rimm-Kaufman (2015), which showed that learners that interacted socially online increased their levels of self-efficacy in their learning. In the current study, approximately half of the interviewed students felt that the *getting-to-Know-You* page on wiki helped to facilitate communication, fostering positive ideas about learning as part of a team. The *icebreaker* page was also reported to motivate students to learn and was cited in some students' perception as having fostered better performance in the module, which may also indicate higher levels of self-efficacy among these students, as was assumed in studies by Wilson and Narayan (2013) and Martin and Rimm-Kaufman (2015).

Overall, based on the above discussion of the student responses to interview questions in this study, the specific design of any module in wiki as an online learning environment plays a key role in the effectiveness of wiki in promoting SRL skill development. The present study adds to the literature in this area by gleaning the learners' reports on the design of wiki pages and how wiki can play a key role in enhancing SRL skills. Results from previous studies, such as Ambreen et al. (2016), based on teachers' perceptions, when combined with the results from this study, seem to highlight that if teachers and their students were both interviewed in future studies, the combination of viewpoints, some similar and some contrasting, may potentially facilitate further SRL enhancement via a tailored design, since the teacher and student role are so crucial to the process (see sections 3.6.4.2 (a); 4.10).

6.2.3.4 Discussion

In interview, five of the twenty students specifically stated that the availability of the discussion board on the wiki helped them to enhance peer learning skills as a particular aspect of SRL skills. Although the number of students reporting this explicitly was relatively low, other answers given by 11 students alluded to the success of interaction with other students in terms of their development of SRL skills (see section 6.2.2, "interaction"), supporting the claims of Xia et al. (2013) that discussion boards can promote the enhancement of online classroom dynamics. This is because they afford students the possibility to exchange information and allow for a deeper reflection since it is not necessary to respond immediately. Unlike in other studies, where students found the lack of immediacy in answers to be rather frustrating, in the current study, 16 students enjoyed the fact they were able to reflect before giving answers on the discussion board, as well as during the completion of tasks. This supposedly avoided the awkwardness of immediate responses in a traditional classroom. (NB: The number of 16 students is a combination of 11 students who commented on interaction and 5 students who showed a positive attitude specifically towards the discussion board).

This finding was consistent with studies by Hadjerrouit (2014) and Cifuentes (2015), in which students using web 2.0 to learn were, in fact, able to effectively self-regulate through the use of the interaction functions via wiki. Also, the finding is in line with the study by Rowe and Rafferty (2013), who suggest that discussion boards and wiki are ways in which the SRL processes of planning, self-monitoring, and reflection can be activated. Furthermore, in line with other research literature reviewed in chapter 3 (Hadjerrouit, 2014; Zheng et al., 2015; Li & Kim, 2016), this finding suggests that wiki helps to promote communication and discussion with other students, which in turn deepens their comprehension of topics studied via a wiki. Li and Kim (2016) confirmed that the discussion function in wikis enhanced peer learning in their study. This may allude to the fact that a discussion board can be used at the onset of a course to begin the implementation of SRL sub-skills such as goal setting. It is believed that many factors, like the learners' life paths, learners' communicative strategies, personal circumstances, and the capabilities of the technology given to the students, influence how fully students participate in computer-based communal writing projects (Hadjerrouit, 2011).

An effective element in the current research was the way the stage of *online socialisation* in the Salmon Model (see section 5.5) supported the researcher in developing ways of

providing guidance and appropriate encouragement for the students, which the interviewed students acknowledged supported them to discuss their work actively, thereby improving their SRL skills through the sending and receiving of messages and working on setting goals or peer evaluation. All this happened through the discussion board via wiki.

6.2.3.5 Evaluation tool:

The qualitative data gathered through the interviews with students reveal that using wiki as an evaluation tool (through the availability of evaluation criteria on the wiki page to evaluate each learner's performance on tasks) would help them to develop SRL skills, particularly self-evaluation skills (see section 5.3.5.1.3). The above finding supports the view of Lai and Ng (2011), Zou and Zhang (2013) and Ng (2016), that using a web-based learning environment could develop levels of self-assessment among students and provide formative feedback, and that this, in turn, could promote the development of SRL skills.

As explained in chapters 3,5 (see sections 3.3.2; 5.3.2.1.3), the potential of wiki is that it possesses an easy-to-use evaluative tool for academic contexts that learners can use to monitor their own progress by using a *history tracker* to track contributions they and their peers have made (Lin & Yang, 2011). In other words, learners can assess their written tasks under examination or coursework conditions more formally. Students in this study were almost evenly split in their perceptions in this point. Nevertheless, the positive view of this tool reported by 11 of 20 students in the present study provides some support for the claims of Hadjerrouit (2014) and Stafford et al. (2014) that the use of wiki as an evaluation tool provides students with a skill that can be applied in many academic learning scenarios beyond that of the original course content. As was pointed out by Peled et al. (2014), the benefits of wiki in this respect appear to lie in the combination of a focus on the student, learning, and formative and summative assessment. These findings suggest that wikis can potentially be used as a formative evaluation environment because recurring feedback is required, which opens the possibility for performance to be improved. Students also stated in their interviews that fairness in evaluation of their tasks was heightened thanks to wiki's ability to highlight individual contributions to group activities, thus supporting the teacher in performing her assessments of her students.

In the current study, students felt that the wiki learning environment helped both them and the teacher to monitor their performance. For example, the teacher was able to monitor the contributions of *each* student throughout the whole period of learning. This provides an easy way to evaluate each student compared to the traditional way of learning in a classroom where group work, for example, often means that the individual student's progress is overlooked by the teacher (section 5.3.5.1.3). This could, of course, also mean that a higher level of fairness in the wiki process was perceived by the students since a more active role could be played by the teacher in terms of monitoring progress. It is also possible to see a link with a study performed by Zarei and Gilanian (2015), which was reviewed in Chapter Three, by considering the results in the current study in the area of evaluation: 11 of 20 students reported that self-assessment allowed them to be more autonomous and the same number of students favoured the removal of the perceived awkwardness of being immediately assessed by a peer or a teacher.

Overall, as an answer to the question *What are the students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills?,* students, on the whole, found the discussion board very helpful and it encouraged communication as part of peer learning. The design, and the variety, of well-purposed pages were viewed as easy-to-utilise, and the evaluative form that the students could use to evaluate their own learning, combined with tutor guidance, made for an enhanced learning experience that, according purely to students' perceptions, fostered their SRL skills, as can be corroborated by the majority of the reviewed literature.

6.3 Summary:

Through a detailed discussion of the data in respect to student perceptions of each sub-skill, this chapter has been able in each case to show the scale of the changes following the wiki-based intervention. Overall, the practice that the wiki environment encouraged students to devote to these skills was seen as instrumental in the (generally) positive changes that were brought about. Furthermore, the design and the variety of well-purposed pages were viewed as easy-to-utilise, and the evaluative form that the students could use to evaluate their own learning, combined with tutor guidance, made for an enhanced learning experience that, in students' perceptions, fostered their SRL skills, and increased their self-confidence and their ability to understand the content of the module.

Based on this discussion, a number of observations can be made about the implications of these results. It can concluded, for example, that in order to enhance SRL skills among students in higher education, wiki technology needs to be implemented with a design that is appealing to students and is able to develop SRL skills through functions that promote easy access by students of all abilities. It has already been established in many studies that wikis are a versatile tool and they do not require the provision of an extensive guide to be able to use and understand them (technically). Nevertheless, educators should still be aware that web 2.0 itself does not guarantee more effective learning and teaching. Simply replacing or supplementing traditional teaching methods with web 2.0 tools cannot realise the potential benefits to students and teachers (section 1.3). New technologies, when employed properly with clear goals and proper methods, can, however, help to improve teaching and learning practices. The current study supports these contentions in its, broadly successful, attempt to employ wiki in the most effective, well-designed form, in order to address the development of every SRL skill for every student throughout the course.

Furthermore, in this study, the teacher indirectly encouraged learners to participate by providing feedback and answers to other learners' interactions, for learning tasks that encouraged the possible development of SRL skills via wiki. Learners were seen to be more interactive when the teacher really showed engagement with them (see section 5.5). It should now be clear that the degree to which students actively engage in self-regulation may depend on the teacher and the *classroom* environment. Not using technology to achieve this could mean that students miss out on vital opportunities and have lower motivation. This demonstrates the importance of designing environments that very clearly foster the development of SRL skills and motivate students to be proactive learners by offering choices of different ways to learn. In the current research, as explained in the methodology chapter (see section 4.10), the researcher tried to ensure that SRL skills were supported at every opportunity, by asking students to fill in simple tables with their aims and time goals, as well as by encouraging the development of S|RL skills in many other ways, which facilitated interaction and the students seeking help from each other and from their tutor. It is clear from the above discussion that the instructor is of the main components in the potentially effective development of students' SRL skills, since he or she should encourage learners to take part, interact and complete tasks to the best of their abilities. Although the primary responsibility for developing SRL skills lies with the students, teachers should also take into consideration how they can facilitate this development; this study demonstrates that clear, well-thought-through guidance provided

by the teacher may, at least partially, be responsible for fostering more SRL skills. The information gathered from the interviews in the current study supports the statements above; students commented that the role played by the teacher was as reviewer *and* observer, in helping them to enhance SRL skills using wiki (see section 5.3.3).

Overall, this research has opened the door to other research in a specifically Saudi context. It has highlighted the benefits of using wiki to enhance SRL skills for the students in this study, and showed that wiki can be used for SRL skill development and not just the typical collaborative tasks. In addition, it has provided a stepping stone in the development of the use of wiki and other web 2.0 tools in institutions similar to Princess Nora University, as well as offered the Saudi Ministry of Education food for thought on how to introduce independent learning skills into the curriculum at higher education level via online learning platforms. It has also offered a potential, solution to the perceived issues surrounding fairness in group assessments. Overall, therefore, this study has also gone part way to addressing the concern set out by Albehai (2016) that Saudi Arabia needs to be able to actively train students (and teachers) how to use online learning tools effectively. The study at hand has provided indications that wiki can aid Saudi students in their development of evaluation skills, which is not currently a skill area that the education system actively seeks to develop in Saudi Arabia.

As with all research, this study has its strengths and limitations, and these will be discussed in the following chapter, along with proposals for future work in this area.

7 Chapter Seven: Conclusion and implications of the study

7.1 Introduction

The previous chapter discussed the findings from students' views collected via interview and a questionnaire. This chapter contains a summary of the key points of the research. It evaluates the research contributions with respect to the three main research questions. The limitations of the research are discussed and its implications and relevance for future research are unveiled.

7.2 Summary of research

This case study has been an attempt to research students' perceptions on how wiki technology could be used by Saudi female students studying Education Technology at PNU to possibly enhance SRL skills. Following a detailed review of the literature, a purposefully adapted version of the Salmon Model, complemented by social constructivist learning theory, was used as a structure for supporting SRL skills with a view to providing clear guidelines for tutors and active e-learners. In order to answer the research questions, two instruments were used for data collection. A questionnaire was used to collect quantitative data and interviews was conducted to collect qualitative data, pre- and post-wiki learning. These methods yielded clear and concise data that allowed detailed descriptive answers to the research questions detailed in Chapter One. The study findings highlighted how students felt that the use of wiki enhanced interest, confidence and active engagement in their learning and in turn their SRL skills. The study provided indications of the effectiveness of wiki as a learning tool within the Saudi higher education system, based on the perceptions of the research participants. Although not generalisable, the findings of this case study may, at the reader's discretion, be viewed as transferable to similar cultural and study contexts, especially where a didactic pedagogy leaves little scope for SRL (see section 7.3).

There were three main research questions posed in Chapter One. The research can be judged in terms of its success in providing answers to these. The answers to each of the research questions, as well as the contribution of the research are summarised as follows:

RQ1: To what extent can using wiki learning enhance SRL skills?

This section was broken down into two further sub-questions seeking to investigate the enhancement of executive function skills and the enhancement of evaluation skills. Based on students' perceptions, the comparison between the pre- and post-test data as well as the number of students who mentioned the SRL sub-skills in their post wiki interviews highlight students' feeling that they had improved in all sub-skill areas barring organisation of the learning environment (executive function skill) and seeking help (evaluation skill). Students attributed the perceived improvements to the reflection that was encouraged during the programmer guidance from the tutor, and the design of the site itself (see sections 5.2.4.1; 5.4.2.2; 5.4; 6.2.1.1& 6.2.1.2). The contribution of this two-part question was to offer a more detailed overview of wiki's potential to enhance eight known SRL skills, through the eyes of the learners themselves. By seeking the response to this question, it was also possible for this study to identify a number of possible reasons that might affect students' perceptions of the tool that wiki has to offer, such as motivation levels (see section 6.2.1.1.1) and the level of practice offered (see section 6.2.3.1). It was also possible in several cases to identify correlations between two individual skills (see section 6.2.1.2.1) and, most crucially to this study to identify contextual, social and cultural peculiarities that may affect the perceptions of a female cohort of students in a Saudi university (see sections 2.3.1; 2.10; 6.2.1.1.1). Combining the above, this study may help to increase Saudi female students' perceived ability to manage their own learning via wiki by offering an insight into the useful methods and functions that technology can offer in terms of SRL skill development, especially given the lack of studies in this very specific context.

RG2: What are the attitudes of the students towards the use of wiki as an appropriate environment for learning?

The results from the questionnaires and the interviews, again, based on students' perceptions, highlighted that the majority of students 72 of 83 from the questionnaires and 16 of 20 from the interviews possessed a positive attitude towards using wiki (see section 5.3.2.1). While seeking the answer to this question, it was possible to identify several reasons for this overwhelmingly positive attitude from the cohort in this study as well as a few reasons for negative attitudes. The positive reception of wiki among the Saudi female students in this study is reminiscent of the issues faced by women in access

to technology in Saudi Arabia (see section 2.10) and offers renewed clarification that using a web 2.0 platform for learning, specifically wiki, could be an effective teaching method that would comply with gender segregation rules and reduce issues surrounding traditional passive learning, where students become bored rather quickly through the lack of interaction with content, teachers and peers. The path to discovering an answer to the question unexpectedly showed that students perceived that their self-confidence increased by using wiki, which, as was laid out in Chapter Two, is a specific issue that female students need to address in order to learn effectively using SRL skills (see sections 2.10; 3.2, study reported by Tubaishat; 5.3.2.1.2). Students also unexpectedly pointed out that wiki offers a fairer method for grading group activities, in particular within the confines of PNU. Further to this, issues with internet connectivity and speed also required a solution during this research, which enables this study to offer ways in which these problems can be solved at PNU for the effective use of online courses in the future (for further information, please see below).

RG3: What are the students' perceptions of wiki learning and its contribution to the development and enhancement of SRL skills?

Students reported that wiki's positive contribution to their SRL skill development came as a result of clear training and guidance given by the tutor, very specific, goal oriented tasks, as well as the well-designed pages that incorporated functions such as the ability to discuss with peers and their tutor and to evaluate their own learning in a view to enhancing most skills (see sections 5.2.4; 5.3.5 & 6.2.1).The positive responses from the students regarding the areas mentioned above follow the use of the Salmon five stage Model, which was adapted for the purposes of this study. This suggests that this model could potentially be used as an initial guide for tutors and students wanting to embark on online learning in order to develop SRL skills, specifically with wiki.

7.3 Contributions of the Thesis

This study has made several contributions to the exploration of how wiki can be utilised to enhance SRL skills among Education Technology students attending Princess Nora University in Saudi Arabia. The following sub-sections will detail the key contributions in the areas of technology use in education, contributions to theory and to practice as well as to education policy in Saudi Arabia.

7.3.1 Contributions to technology use in education

This study forges a unique connection between SRL skill development and web 2.0 technologies via wiki within a Saudi context, where students are used to traditional, lecture-based teaching. This research adds to the rather small pool of research also performed in the two research areas of web 2.0 technologies and SRL in the Saudi context (see sections 1.3; 1.3.1). This study is the first of its type to combine wiki technology and SRL skill enhancement for the purpose of Saudi female students.

This study offers insights into how groups of learners, as well as individuals, operate as part of a wiki learning community. This is achieved through the use of screenshots demonstrating student activity on wiki as well as through the publication of responses given by students in interviews and questionnaires, in an effort to assess their achievement in terms of the stages of the adapted Salmon Model.

Furthermore, the qualitative approach used also enabled the unexpected discovery that fairness in assessment of learning tasks was perceived by female students to have improved as a results of wiki use (see sections 5.3.5.1.3; 6.3). This preliminary finding could be of particular interest to researchers working in a similar context in Middle Eastern universities. Perceived higher levels of fairness in group work online may encourage students to work more effectively together as a team, knowing that they would all ultimately be graded as individuals.

It was the critical self-evaluation form used in this study that was deemed to be a positive, fair element of the wiki course in this study. This was due to the fact that it enabled the teacher to recognise each student's personal contribution to each task, via the wiki functions that support remote monitoring. The students reported that they had previously faced problems with the evaluation of their performance tasks (in regard to unfair grading based on overall group performance) in this module and other modules at Princess Nora University. The interviews, corroborated by questionnaire data, also revealed that wiki was perceived by the students to alleviate the higher levels of shyness and social anxiety that Saudi female students are reported to experience (see section 2.10). This suggests the potential for the features of the wiki site designed for this study to be transferred to a similar female-orientated Saudi context since, as Alsaedi (2012) and Aldayel (2017) state, Saudi students possess, on the whole, a high level of shyness about discussion and making errors in front of their teachers and peers (for more information, see 2.3; 3.2&3.5).

From a theoretical perspective, by extending the understanding of how wiki technology as a part of web 2.0 tools can be used to develop SRL skills in higher education, this study may represent one of the first contributions to the field of wiki usage in a Saudi context, where the use of technology in learning is very much in a developmental stage, as is the concept of SRL in teaching and learning. In this respect, it offers an important contribution that can inform future research and policy in this area.

7.3.2 Contributions to theory

An interesting and important feature of this study was its application of social constructivism, a theory largely developed in the West, in a Saudi context. According to research reviewed in Chapter 3, there are several areas that need to be addressed to meet the validation standards of the social constructivist theory (see section 3.6.3). According to the reviewed literature, these include: a focus on increased student responsibility for learning, improved interaction within a social learning community where feedback and dialogue take precedence with both the teacher and peer learners and, finally, students potentially being able to actively construct new knowledge based on her experiences as well as to interact with each other. The research outcomes supported the value of a social constructivist approach, as implemented here via wiki technology in the Saudi context.

This study demonstrated that wiki can support the community and interactive aspects of the social constructivist way of learning, according to PNU students' perceptions. Students overwhelmingly highlighted the level of effectiveness and enjoyment provided by the course through the use of constructive tasks, among other task types, and through interaction with the content, peers and the teacher (see section 5.3.2.1.7, a). Students also highlighted that, over time, they felt that their abilities were enhanced, and they perceived that this allowed them to take on the responsibility for their learning, thus supporting the development of SRL skills, their construction of knowledge via building content tasks and their autonomy in their own education (see sections 5.3.5.1.1(b); 6.2.3.2).

The Saudi students' statements were also consistent with the success criteria of Vygotsky's (1979a) theory, created in the Western education field, which proposes that education works most efficiently if it concentrates on comprehension and not on rote memorization. This is something that the cohort in the study will have been used to in the traditional classroom (see section 2.3.1). His idea that social learning is critical and

changes learning for the better through purposeful interaction with peers is also an interesting concept that seems to be supported by students' positive statements in their interviews about learning through social interaction.

A further contribution results from the adaptation of the Salmon Model (see sections 3.6.4.2 (a); 4.10 & 5.5), built on the principles of social constructivism. Seeking to re-contextualise the existing Salmon Model, the steps were changed and extended to suit the Saudi context for female learners by incorporating tasks that would encourage more intensive practice of SRL skills (see sections 2.10; 4.10). These tasks included individual work and social interaction with their teacher and their peers. This was in an effort to increase awareness among students of SRL learning processes on wiki, since both technology as a learning environment and SRL were new to the cohort of students in this study. In other words, the model was applied in an entirely new context, which enabled it to be tested in a different setting with a different cultural background compared to its place of conception. This resulted in the demonstration, based on students' perceptions, of the applicability of the adapted model to a new situation, highlighting the learning process similarities between students in technologically advanced countries and Saudi Arabia, which is very much in a transitional phase with technology in education. This adapted version of the model allowed the researcher to meet the research objectives by enabling an analytical enquiry into students' perceptions of wiki as a learning platform. In addition, it highlighted students' feelings about individual SRL skills, their thoughts on the ease and appropriateness of interaction with others during the learning process, as well as their general organisation for learning, both pre- and post wiki. The assessment of students' perceived achievements using the stages of the adapted Salmon Model was achieved as accurately as possible through the use of screenshots (see appendices 11-17) to demonstrate student interaction with content, peers and their tutor, complementing perceptions gathered via the questionnaires and interviews.

Furthermore, a key contribution of the current study is that it may be deemed to be an extension of previous studies focusing on web 2.0 learning platforms, as well as SRL sub-skill enhancement as separate entities (Cifuentes et al., 2011; Huang et al., 2012; Cho & Cho, 2013; Ng, 2016). These studies identify fewer SRL sub-skills for analysis than in the current study: the decision to break down executive function and evaluation skills (see section 3.7.2) into further sub-skills appears to have increased the students' awareness of vital areas of self-regulation, and encouraged more specific control over their learning, and allowed for a more in-depth view of the development of students' learning processes

via the analysis of students' perceptions (see sections 5.3.3; 6.2.1). This may prompt future researchers to consider a more thorough breakdown of executive function and evaluation skills in order that they may better analyse the effectiveness of their studies against the criteria set out within the social constructivist theory (see sections 6.2.1.1; 6.2.1.2).

It is, however, important to note that two of this larger group of eight sub-skills were not as developed as well as they could have been (seeking help and organisation of the learning environment). It is not clear how far this reflects a limitation of the theory used, or is attributable to other, contextual factors and points to a need for further research to investigate social constructivist theory and the development of these skills.

Further to the above, this study also fills a void highlighted by Bol and Garner (2011a), who state that SRL frameworks often neglect *peer* interaction, represented in this study by the results for several sub-skills, but predominantly that of peer evaluation. The study at hand promoted positive interaction with peers during SRL skill development, as well as with teachers and subject content through a carefully thought-out design. The outcomes indicate that this increased perceived ease of use, enjoyment and therefore the general motivation among students to develop all of their individual SRL skills through the medium of wiki. This resulted in highly positive attitudes towards the use of technology in a culture where technology, by the Saudi Education Ministry's own admission, is not used effectively enough in the learning process of students, specifically with girls (see sections 2.10 & 5.3.2.1). As highlighted in Chapter Two (section 2.10), one reason for this could be fears by conservative elements in society that technology could have negative effects on the customs or values of girls in particular, since technology would allow for gender mixing. For this reason, there has been some opposition to the use of technology. This cultural factor has no doubt hindered the implementation of online learning for girls (Smith & Abouammoh, 2013; Alhareth, 2014).

Although the application of the social constructivist theory seems to have been effective in this study, the theory may not be able to demonstrate the degree to which interaction needs to take place in order for students to build content using wiki and then also to effectively and internally construct knowledge. This theory does, however, provide an appropriate foundation on which online learning communities can be developed, as has been demonstrated above (see sections 3.6.3.1; 3.6.4.2 (a), & 4.10).

7.3.3 Contributions to Practice:

Given the unique context within which this research is set, elements of this research could contribute to future research outside of Saudi Arabia, in countries with similar cultures with more advanced teaching methods as well as in countries with entirely different cultures to that of Saudi Arabia but which rely on similar, didactic teaching methods. This study, regardless of its unique context, has also made a contribution to pedagogy as is evidenced in the results, which are largely positive and may inform future research within the areas of wiki and/or SRL skill development.

The finding discussed in section 6.2.1.2.2 has important wider implications for the education system in Saudi Arabia, in that it is now recognized that the preparation and organisation of learning materials for group activity is of considerable importance. Numerous studies carried out in the context of Saudi higher education have suggested that the lack of success of some students can be attributed to their adherence to learning methods such as rote learning to pass exams (Alnassar & Dow, 2013). Thus, it has been claimed that teaching and learning using such methods has been responsible for high numbers of university students failing (Alnassar & Dow, 2013). This implies that it is necessary for teaching staff to develop their teaching techniques to offer learners the opportunity to develop their learning confidence; otherwise the students will not use self-learning skills or develop professional and cultural abilities (Alnassar & Dow, 2013). This study powerfully demonstrates the potential of wikis, with the support of distanced, non-face-to-face interaction, to help students to develop such skills within the specific cultural context of Saudi Arabia.

This study re-contextualises the use of the Salmon five stage Model as a guide to pedagogy in the online environment to suit SRL skill development via wiki. It also demonstrates how the model can foster activities for teachers and students to help each of them to be active in the online learning environment via wiki, as well demonstrating how the model can be used to encourage the practice of students' self-regulated learning in a manner that may be applicable in a Saudi female, higher education context. The re-contextualisation of the Salmon Model specifically contributes insights into how Saudi lecturers, seeking to use wiki with their classes, could amend the teacher's role in a wiki environment. The demonstration here is likely to be of interest to such teachers since, for many educators of females in this specific context, this is a new area to embark upon.

7.3.4 Contributions to the Policy in KSA

The female students at PNU may be inspired by this apparently positive experience to use technology more in their learning. This willingness to use wiki could be used to the university's advantage, as well as the Ministry's advantage to make steps towards fulfilling their own general aims for education in Saudi Arabia.

Further research at different levels of education would, however, be necessary if the Ministry of Education were to act on results from studies in this field; a didactic teaching culture is not something that can be changed overnight. Such a change would have significant implications for school set-up, infrastructure provision, a curriculum and teacher training. Therefore insights into students' learning from the lowest to the highest level of education would be necessary in order to identify the change needed to make the transition to effective SRL skill development via technology feasible and manageable.

7.4 Limitations:

All research has its limitations, and this study was subject to sample, time and procedure constraints: firstly, in this study, there was a limitation concerning the selection of participants. The sample for this study was just a small cohort of students taken from just one department in one university, incorporating exclusively female undergraduate students from Princess Nora University in Saudi Arabia over a period of six weeks. The sample size was 20 students who participated in the interviews used to collect the qualitative data, although the number for the quantitative data (pre- and post-questionnaire) was much higher (n=83 of 105). The small sample size used in this study does not allow generalisation to a larger population, since the breadth of the cohort used is not far-reaching or varied enough (Denzin & Lincoln, 2011; Flyvbjerg, 2012). Furthermore, the researcher included only female students in the research sample, due to the Saudi norm of gender segregation and education system policies surrounding the involvement of male students in a study involving the opposite gender (see section 2.3.1). A more complete understanding of the use of wiki for SRL in higher education could have been obtained, had it been possible to include students at other universities. This would ideally involve male students who might be used to different learning environments in terms of better infrastructure, technology use and SRL ability.

Lastly, an important limitation that needs to be noted is that this study gathers students' perceptions and it was not possible, nor was it the intention, to objectively measure actual SRL skill levels among students. This means that it cannot be assumed that the findings of this study demonstrate actual skill improvement, and they therefore need to be viewed with caution. Further to this point, it is not possible to guarantee that students' perceptions are, in fact, truthful, since students may have wanted to give answers that pleased the interviewing tutor, otherwise known as the Social Desirability Effect. Their memory of what actually happened during the wiki course may have also deceived them. The researcher did make every effort to minimise this issue by building a relaxed relationship with students over the 6-week time period and by using a prompt sheet in interviews to encourage expansion of truthful points of view. She investigated the level of trustworthiness for the interview tool used as well as the level of validity and reliability for the questionnaire tool (see section 4.13). Naturally, a measurement of skill development or a further observation tool could be applied by teachers and researchers to further minimise the effects of social desirability on students' responses.

7.5 Implications of the study

Although according to the theory of case study methodology (see section 4.6) generalisations cannot be made, as was discussed in the preceding section, this research could, subject to the qualitative research principle of transferability (Lincoln& Guba, 1985). The reader's discretion provides guidance and encourages future thinking on pedagogy in the context of Saudi Arabia and elsewhere, based on readers' recognition of circumstances and issues relevant to other contexts. Implications for research in terms of policy, practice and possible avenues for future research will be discussed below.

Policy does not have the same meaning in every country's education system. Therefore, it is possible that compared to other countries' curriculum aims and policies, Saudi Arabia's policies regarding the enhancement of technology skills may not be based on researched evidence. They are however likely based on an ambition to keep pace with international trend and for Saudi Arabia to become a leading developing country and member of the knowledge economy (Smith & Abouammoh, 2013; Alyami, 2014; Alqarni, 2015). Nonetheless, it is unsurprising that this has become an aim of the Ministry of Education since, as Alqarni (2015) and Lim (2015) state, education specialists across the world have driven a move in higher education towards learning technologies thanks to the many benefits they have to offer in comparison with the traditional, and often

limited, on-campus classroom. Lim also points out that students have driven this change because as so-called millennial learners (Coates, 2007), they have grown up in the digital era; they expect their academic lives, like their social lives, to be led through technology and many students find this to be their preferred method of communication.

Princess Nora University has highlighted the need to develop SRL skills among its female students in order to increase independence in study (see section 2.5). Although, in reality, little research has been performed to help to achieve this over the last decade. In this study, wiki technology has been effectively applied, according to a cohort of PNU's students, to develop their SRL skills, which demonstrates that the aims to enhance SRL skills, as well as to introduce more technology, may be combined effectively. Consistent with studies by Col (2009), Karasavvidis (2010) and Judd et al. (2010), which all revealed a certain level of negativity from students who used wiki (see section 3.5), it is noteworthy here that the four negative attitudes reported (4 students out of 20) were mainly linked to connectivity issues and not to wiki itself. In fact, this research highlighted a poorer quality of internet than expected. Although this was only in one university, nevertheless, if such problems apparently exist in the capital city, in a new university, seen as a flagship university in the Gulf region, it is not unlikely that they will occur in other remoter, or less economically advantaged regions. This would warrant investigation as part of any attempts to promote online learning in higher education. Obviously, if wiki, or other online courses, are to be effective, the internet should work at a satisfactory speed and not act as a barrier to learning. Princess Nora University has experienced internet connectivity issues in the past, although the researcher sought to resolve these for the purposes of this study so as to ensure that barriers to learning were minimised, as far as possible (see Chapter Five, sections 5.3.2.2.1, "external"; 4.11.1). This demonstrates that providing an adequate connection could be easily managed and would only be a financial issue (if one at all), since the researcher was able to offer temporary solutions to improve the internet connection using external modems (see section 4.11.1). The negative attitudes resulting from poor connectivity could impede the achievement of the ideals and aims of the Saudi Education Ministry (see section 2.3.1). This study, therefore, highlights the potential need for a more concentrated approach to providing internet connectivity to the university. This connection needs to be of an adequate standard and speed to ensure that learning can take place. Increased internet connectivity, according to students' perceptions, would not only would increase the level of positive attitudes towards wiki but also allow teaching to be conducted in a more time-efficient and effective manner.

This would help to alleviate time constraints, which are faced by teachers the world over (Ololube et al., 2015).

Based on the above, careful thought should be given as to whether it might be desirable for Princess Nora University to offer online courses using wiki in more curriculum and subject areas, to make the use of tasks geared around online social interaction more widespread on the campus and therefore the norm from the first year onwards. This would set a precedent for future academic years spent at the university, and highlight to students and their teachers, the need to develop SRL skills. If this were done, it might be possible for the university to implement other web 2.0 tools to encourage interactive learning, moving away from traditional, teacher-centred presentation slides that are traditionally associated with boredom, at least in terms of reports gleaned in this study (see section 5.3.2.1.5). In addition to this, based on the many comments given by students regarding the level of practice time afforded to them, it would of course be helpful for universities to provide ample opportunity for students to practise their SRL skills while using an online learning environment, all the while incorporating online functions normally carried out by the teacher, to ensure nothing is lost in the transfer from the traditional classroom to the online arena.

In addition, the professional development of teachers in regards to technology will need to be thought through carefully by policy-makers and having providers so as to ensure that the correct level of guidance can be afforded to their learners, which students perceived as a positive contributor to the enhancement of students' SRL skills. There is also a need to provide site designers with an insight into how to cater to a wide breadth of student needs, in the light of a range of learning theories. Such issues support the need for future research to build on the contributions of this study.

7.5.1 Implications for future research

Having combined two modern, well-regarded aspects of education (online learning using wiki and SRL skill development), this research has opened up numerous possible avenues for future exploration:

To begin with, this thesis seeks to discover information on a relatively new area to Saudi higher education and acts as a stepping stone to further research into perceptions of students about wiki and SRL skill enhancement. There is also, however, an opportunity

in the future to measure actual skills to corroborate the promising and triangulated perception and attitudinal data collated in this study. Additionally, the fact that the module that the female students were learning was within the realm of Education Technology suggests that they already have a passion for this elected subject and therefore may already feel more confident using technology for learning than students studying other modules, despite the participants citing a lack of knowledge of online learning (e.g. wiki), before the wiki course. Further studies could, therefore, develop this research by looking at students working online to develop their SRL skills in module entirely unrelated to Education Technology.

Furthermore, other web 2.0 technologies such as online platforms for learning like Facebook or Twitter could be further investigated as a contrast to the research already performed surrounding wiki, in order to gain an in-depth knowledge based on a comparison of learning platform advantages and disadvantages. This would help to inform Saudi teachers on the choices they have for their own classes, as well as inform the Ministry on avenues that may need exploring and funding.

The results from this study, demonstrating both lesser and greater perceived increases in individual SRL sub-skills, may be further built on by researching further practical applications of different task and page designs. For example, since students in this study perceived there to be very little difference between their time keeping and meeting deadlines pre- and post wiki in this study, it may be necessary to consider the investigative ways in which students can be supported remotely to meet deadlines. Frequent tasks used, such as the goal setting form, may be improved in further research to optimize the perceived improvement in goal setting. Further to this, within the same context, it would be helpful to investigate further the issues encountered in this study surrounding the enhancement of seeking help, time management and organisation of the learning environment via wiki. It is suggested that further study be conducted on these findings with a larger sample size, in addition to a further correlation study on the effect on performance and achievement of the reported time management indicators. In future studies, however, it would be advisable to recruit a wider range of student abilities to enable a better assessment of the effect of wiki use in improving outcomes among students who previously did less well (indeed this would be beneficial for other skill areas, not just self-efficacy).

Additionally, as this study applies to just one university in central Saudi Arabia, it would be interesting to conduct similar studies but in other regions incorporating the East and West, in order to work out the requirements of female students in the online learning process in these regions and thus further develop the picture of Saudi women's ability to access and use wiki learning.

Other ways in which future research could improve on the current study would be to extend the method of investigation to incorporate an observation element, in which cohorts of teachers could be actively involved. Students could then be interviewed after an observation and the points made by their teachers could be compared to their own points of view on using wiki as a learning tool, in an effort to corroborate findings, thus strengthening the process of triangulation even more and therefore also the level of reliability.

Other studies might also follow up emergent issues from this study. For example, the results of this study could lead to further research into how evaluation of students' performance in group activities is performed and how it can be developed to promote perceptions of fairness, such as were reported by students in the current study.

7.6 Concluding remarks

The main message from students' perceptions, expressed both in questionnaire and interview responses, is that wiki is a comprehensive, appreciated, purposeful program that provides students and teachers with a model site that could contribute to the enhancement of SRL skills. This research highlighted the importance of the preparation of learning tasks directed at individuals and groups of peers, the vital element of design decisions that promote students' skill development in an easy-to-follow manner, and the need for a well-struck balance between teacher intervention, support, encouragement and challenge.

From the researcher's perspective, this positive view of wiki as a platform for learning means that this research can become an extension to Western studies in this area and most crucially, an early stepping stone for future studies that may refine wikis' use and improve the possibilities of SRL skill development even more within a Saudi context. The willingness demonstrated by the female cohort in this study to use wiki could be used to

both the university's and the Ministry's advantage to make steps towards completing their own general aims for education in Saudi Arabia (see sections 2.3.1; 2.4).

It is recognised that, with social technology changing rapidly, wiki is likely to be updated in the coming years and other platforms are likely to be developed. Nevertheless, the results from this study are likely to have long-term relevance. Current uses of technology focus particularly on social interaction, which is the foundation of collaborative learning. It is therefore likely that technology will continue to aid collaborative learning, and by extension SRL. Whether or not wiki as a specific technology remains, the principles that contributed to its success with students in the current study are likely to survive, with positive implications for education and particularly SRL.

If technology, infrastructure and connectivity issues can be supported or solved, and if teachers and learners are provided with the correct, inspirational, guidance on effective SRL skill development using wiki, then PNU is set to begin the exciting process of extending the traditional classroom to include more independent approaches to learning. This could ultimately lead to students graduating with a higher sense of self-achievement and responsibility for their own learning processes, as was demonstrated in the majority of their similar and positive comments in the interviews, and in the positive changes for the pre- and post-test data taken from the questionnaire tool. The path from SRL and online learning theory to reality will be a highly interesting experience for everyone working within the education system in Saudi Arabia and it is pleasing that this research may help to begin this process.

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Appendices:

Appendix 1: PNU Strategic Goals

PNU Strategic Goals

The PNU 10-year strategic plan consists of the following seven goals:
First Strategic Goal: Academic Programms

"Provision of quality academic curricula that prepare students for success and enable them to excel in business with the proper professional ethics.

This goal can be achieved through the following strategic objectives:
1. Endorsing the quality of the current academic programs to comply with the latest scientific research and modern practices in various specializations.
2. Offering innovative graduate and postgraduate programms based on modern scientific research, and the best practices concerning labur market needs, leadership, and professional ethics.
3. Attracting locally and internationally distinguished leaders and faculty members for PNU colleges and academic departments.
4. Developing academic twinning programms with international universities.

Second Strategic Goal: PNU Alumni

Provide PNU students with the skills that enable them to achieve success in both life and work, through the provision of an innovative academic environment that focuses on the students.

This goal can be achieved through the following strategic objectives:

1. Providing innovative methods for education and learning that are integrated into the academic programms, such as e-education, cooperative education, self-learning, continuous learning, and leadership programms.
2. Providing a university environment for non-curricular activities that promotes students' innovation skills, and integrates critical and analytical thinking and communication skills.
3. Providing professional consultation and direction to students using the best practices in students' guidance.
4. Establishing an office to seek the participation of alumni by offering services and activities and building long-term relations.

Third Strategic Goal: Research and Partnerships

Acquiring and applying knowledge through international communications and incorporating this knowledge into academic curricula".

“This goal can be achieved through the following strategic objectives:

1. Establishing a comprehensive research strategy that includes giving priority to the main fields of research.
2. Encouraging the culture of creativity, distinction, innovation, and patents by establishing influential relations with researchers, partners, the business sector, and society.
3. Incorporating research knowledge into academic curricula in PNU colleges, and integrating them with society.
4. Supporting research centers and scientific chairs in PNU colleges.
5. Endorsing financial support of research, and establishing specialized research labs.

Fourth Strategic Goal: Societal Partnership

Serving women and family-related causes, and integrating community service into PNU programs.

This goal can be achieved through the following strategic objectives:

1. Coordinating and implementing a framework for community service activities within PNU.
2. Establishing an environment suitable for entrepreneurship and endorsing supporting mechanisms.
3. Promoting the role of society and women's issues into PNU academic programs.
4. Creating awareness of the importance of women's and family health, health education, entrepreneurship, and the culture of volunteerism.
5. Promoting PNU's image, locally and internationally.

Fifth Strategic Goal: Skills and Talents

Strengthen capabilities and improve the quality of PNU human resources working in the fields of education, research, and management, through the provision of relevant programs.

This goal can be achieved through the following strategic objectives:

1. Adopting, through partnerships with international accredited institutions, training programs that develop the skills and talents of PNU managerial and administrative staff.
2. Attracting distinguished personnel to lead the process of change and development within PNU academic and administrative units.
3. Developing the capabilities of faculty members in the fields of education, scientific research, and management.

Sixth Strategic Goal: Systems and Processes

Establishing the processes and systems necessary for achieving effective performance in PNU”.

“This goal can be achieved through the following strategic objectives:

1. Adopting an administrative system that determines authorities and tasks, and allows for follow-up and accountability at all PNU levels.
2. Developing the executive directives for PNU statutes to promote flexibility and transparency.
3. Promoting cooperation between the academic and administrative units within PNU.
4. Developing work procedures using the methodology of simplification and documentation.
5. Aligning tasks and roles with capabilities and skills in human resources.

Seventh Strategic Goal: Financing

The diversification of sources of finance in PNU to achieve financial autonomy and sustainability.

This goal can be achieved through the following strategic objectives:

1. Supporting projects for investing PNU resources and utilities.
2. Achieving sustainability through efficiency and effectiveness in operating PNU utilities and managing its resources.
3. Establishing the PNU endowment project.
4. Developing a structure for collecting and organizing financial donations and grant”.

Source : http://www.pnu.edu.sa/en/University/Pages/Objectives.aspx

Appendix 2: Review of previous studies

Methods

Inclusion criteria

The search was were restricted to papers in academic journals, books (academic studies), conference papers and PhD theses in the English language published -between 2010 and 2017.

Search strategy

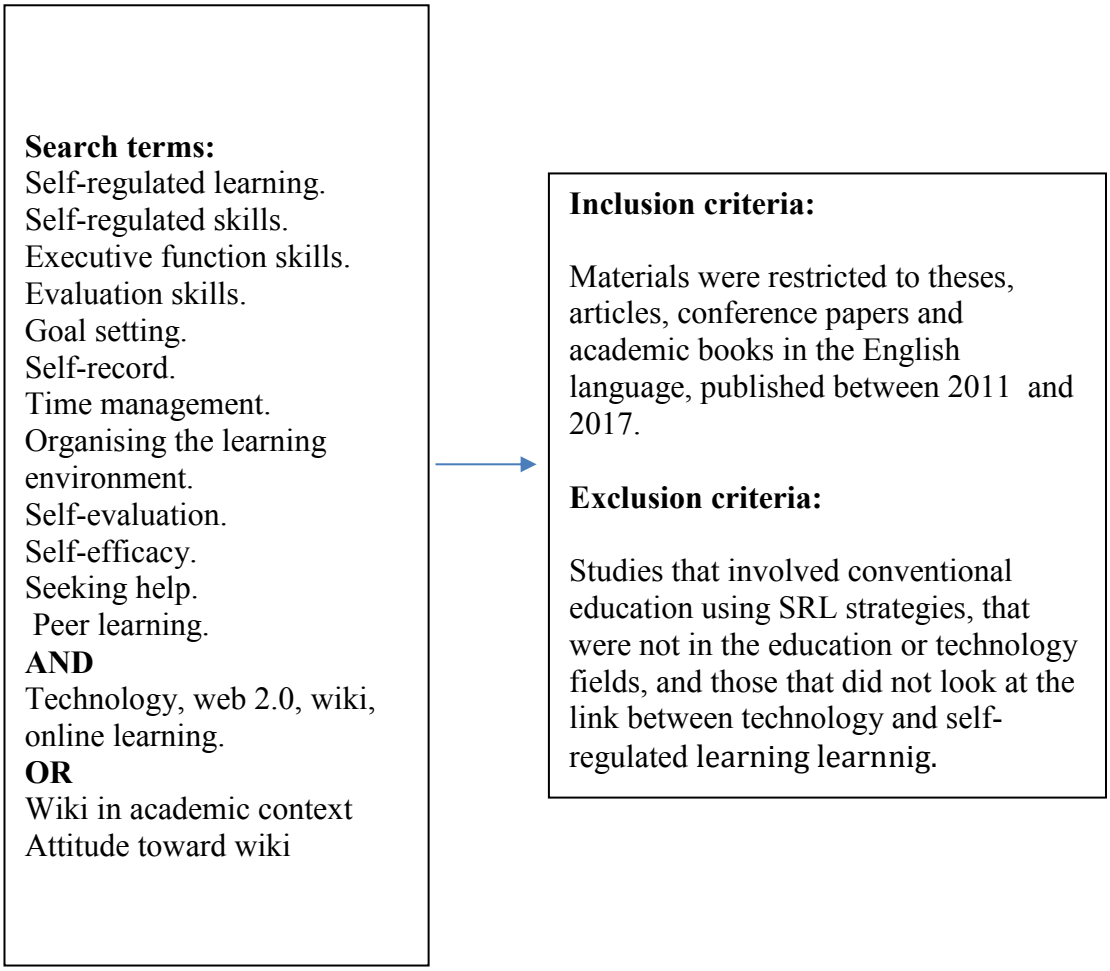
The search was conducted on different occasions. The initial search was performed in 2015. Another search was performed in 2016 and 2017 using nearly the same databases and keywords, so as to include any recent publications on the topic.

The search strategy used the electronic research database, Summon, which also provides lists from other databases such as Taylor Francis, ProQuest, Eric and Science Direct. A search was undertaken on studies that explored web2.0 technologies, wiki and SRL skills in education settings; also, SRL with technology in education settings. The aim was to maximise relevant findings for academic indicates published within the last decade. The sets of keywords are shown in the flow diagram.

Exclusion criteria

Studies on SRL in conventional education (i.e. not related to educational technology) were excluded, since they were not directly relevant to the study. Likewise, studies that did not look at the link between technology and self-regulated learning were also excluded, except if the context was Saudi Arabia (on the basis that these could provide useful background for the thesis).

The researcher found two other systematic reviews of the use of wiki in higher education. One was a study by Alia et al. (2012) in which the authors analysed 42 articles related to the use of wiki in learning. The other was a meta-analysis by Broadbent and Poon (2012) in the area of how learners use SRL skills in web technologies. These helped in constructing the literature review by giving a clear picture of the research in those areas.



Flow diagram of the process for the selection and exclusion of studies for this systematic review.

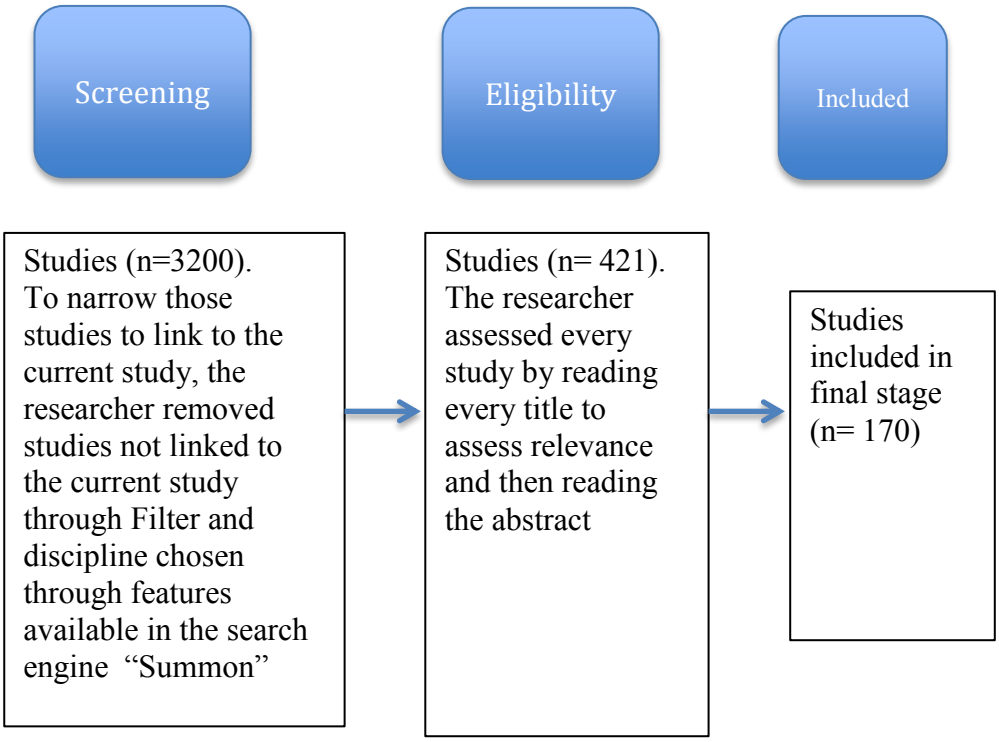


Table 2: Description of some of the studies included (This description is a summary of the literature so as to give the researcher ideas about methods, sample size and content of the previous studies, so as to inform the critical analysis stage of the review).

No	Author, year, setting	Purpose	Method	Sample size	Key findings	CASP Critical appraisal skills programme
1	Chu (2017)	Effectiveness of wikis for project-based learning in different disciplines in higher education	Survey Interview	71	"Wikis were found to be effective for project-based learning in higher education from the perceptions of most students and teachers. In order to enhance the effectiveness of wikis for project-based learning, some factors, such as students' previous learning experiences, their technical backgrounds and proper instructional design with wiki tasks, deserve more attention from teachers when they consider the adoption of wikis in their courses. Last of all, students' perceptions of wikis and their actions were consistent under some conditions, but contradictory under other conditions. It also contributes understanding of and confidence in introducing wikis in their course design, helping them make good use of wikis to improve students' collaborative learning in higher education".	✓Valid results ✓Results Help locally
2	Lai & Ng (2011)	Examine the potential of using wikis to develop teachers' capabilities in teacher-education programmes.	Analysis content	18	"Wiki-based activities are useful in developing a diverse range of student-teacher capabilities and can play a significant role in their learning".	✓Valid results ✓Results Help locally
3	O'Bannon & Britt (2012)	Examined the effectiveness of creating/developing/usin	Pre\post survey.	103	"Wikis can be used to increase knowledge. Additionally, the findings can serve as a guide to	✓Valid results ✓Results Help locally

	USA	g a wiki to increase knowledge of Web 2.0 tools.	Focus group interview.		educators who want to use wikis as a teaching tool".	
4	Prokofieva (2013) Australia	Investigates interactions that occur in a wiki-based collaborative learning project.	Component analysis. interview	83	"Students' interactions online were of two types, student-content and student-student, with student-content interaction being dominant. Discusses factors that influenced both types of interaction and suggests guidelines on how student-student interaction can be encouraged".	✓Valid results ✓Results Help locally
5	Hadjerrouit (2014) Norway	Investigation into wiki as a collaborative writing tool in teacher education: Evaluation and suggestions for effective use.	Analysis content Open-ended questions	16	"The level of collaborative writing was lower than expected. Possible factors that may influence wiki-based collaborative writing are discussed. Finally, suggestions for effective use of wikis as collaborative writing tools in teacher education conclude the article".	✓Valid results ✓Results Help locally
6	Zheng et al. (2015) USA	To explore and refine learning strategies via wiki, an iterative, design-based research method is used to create wiki-supported collaborative classroom activities.	Observation, surveys interviews	139	"The authors discuss the design approach as it relates to wikis and consider the strategies that develop over four design iterations, including suggestions for learning community management, inquiry-based topic selection, teacher scaffolding, student evaluation and supporting wiki technology with other social media".	✓Valid results ✓Results Help locally

7	Page & Reynolds (2015) UK	Investigation of Learning from a wiki way of learning	Survey Self-report	58	"Findings show that participation in the project had a positive relationship with student exam performance and web familiarity. Patterns of individual and group wiki project participation are discussed. Co-creating a wiki way of learning can significantly contribute to developing student digital literacies and social writing practices in higher education, in addition to improving learning of the subject studied".	✓Valid results ✓Results Help locally
8	Usta (2011) Turkey	Determine whether online self-regulated learning skills differentiate student attitudes towards the internet and web-based education in web-based learning environment	Questionnaire	169	"SRL skill levels are high. In terms of their online SRL levels, their lowest skill level is for time management. Also become more positive, goal setting; organising environment, self-evaluation and overall skills also rise".	✓Valid results ✓Results Help locally
9	Stafford et al., (2014) UK	Students' engagement with a collaborative wiki tool predicts enhanced written exam performance	Pre-post experiment design	216	"It is possible to account for students' tendency to score well on other psychology exams, thus statistically removing some obvious candidate third factors, such as general talent or enthusiasm for psychology, which might drive this correlation. Such an analysis shows that both high-	✓Valid results ✓Results Help locally

					and low-grading students who used the wiki got higher scores on the final exam, with engaged wiki users scoring an average of an extra 5 percentage points. The authors interpret the mechanisms of action in terms of the psychological literature on learning and memory".	
10	Zou and Zhang (2012) Chain	The exact effect of the different forms of web-based formative test on score reports on EFL students self- regulated learning	Questionnaire, interview, test	237	"Quantitatively, the new score reports show greater effectiveness in students' self-regulated learning than the traditional one in all aspects with the use of regulation strategies. Qualitatively, students have clearer goals and better learning motivation".	✓Valid results ✓Results Help locally
11	Cho & Cho (2013) USA	Investigate self- regulated learning skills training in social network system (SNS), use Twitter as a tool to enhance student SRL.	Questionnaire Content analysis	29	"Students in the experimental group used significantly more SRL skills such as planning and reflecting than those in the control group. The metacognitive awareness of students in the experimental group also improved significantly after the training on SRL skills".	✓Valid results ✓Results Help locally
12	Lawanto et al. (2014) USA	Study students' perceptions of course material in terms of importance, utility, and interest is related to their self-regulated learning	Questionnaires	57	From an SRL perspective, the results show a positive correlation between goal setting and performance. Significant positive correlations were also found between task value and goal	✓Valid results ✓Results Help locally

		(SRL) skills and project performance in a web-intensive undergraduate learning environment			setting, task strategies, help seeking and self-evaluation, especially within a web-based intensive course	
13	Huang, Huang, Wang, Liu, &Sandnes (2012) Taiwan	Investigate supporting self-regulated learning (planning, practices, reflection) in web 2.0 contexts	Pre-post survey Observation	39	Web 2.0 context with the SRL strategy increases both the learning and motivation of students	✓Valid results ✓Results Help locally
14	Lin & Yang (2011) Taiwan	Exploring students' perceptions of integrating Wiki technology and peer feedback into English writing courses	Exam interview	32	"Most students explicitly stated that they felt positive about their ability to apply Wiki and peer feedback to writing instruction. Meaningful social interaction appears to play a significant role with regard to students' perceived benefits of this collaborative writing process. Students nevertheless encountered both functional and psychological obstacles to using the new tools, indicating the need to alter their traditional learning practices to embrace new, technology-enhanced learning systems".	✓Valid results ✓Results Help locally
15	Cho & Kim (2013) USA	Students' self-regulation for interaction with others in online learning environments	Survey	407	"Results show that all the variables proposed above significantly explain 43% of the variance in SR for interaction with others. The combined variables show that instructors' scaffolding	

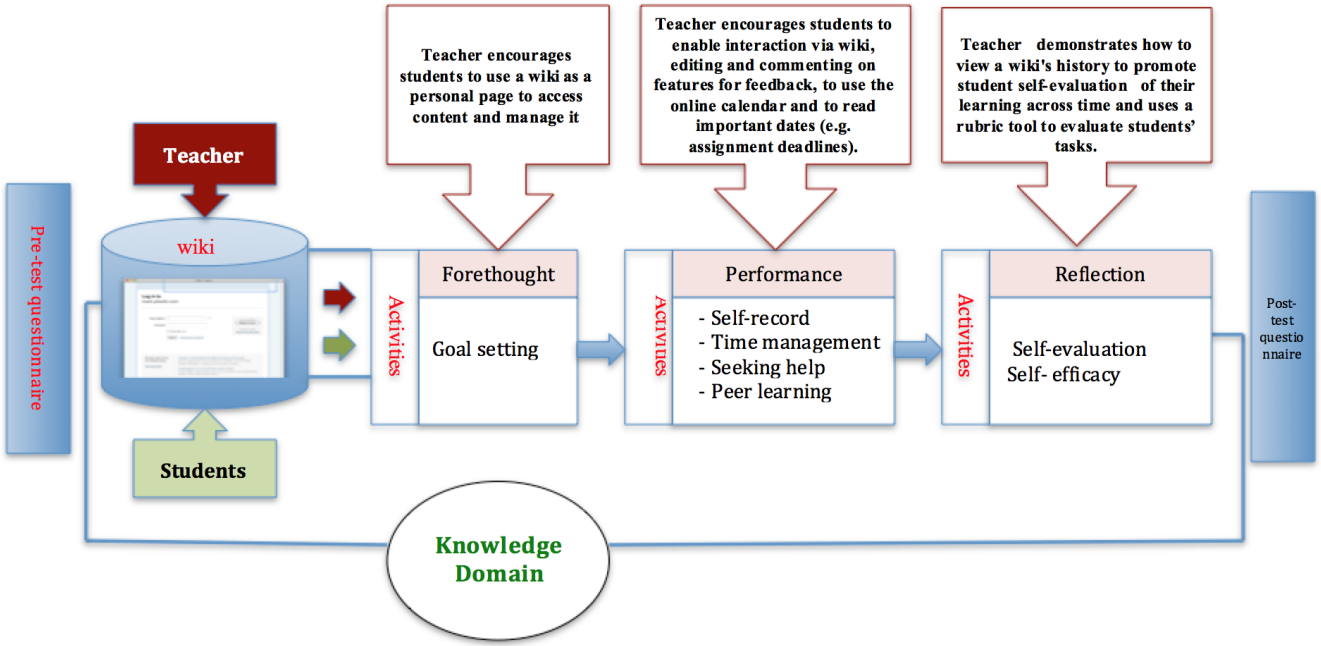
					for interaction with others most significantly explains students' SR for interaction with others. Along with individual variables (e.g., perceived importance of mastering content), the results suggest that instructor scaffolding is critical for students' SR for interaction with others in online learning settings".	
16	Lai & Gu (2011) Hong Kong	Identify the potential use of technology to self-regulate language learning	Survey interviews.	279	Students were actively engaged in the use of technology to self-regulate, but there were variations among the students as well as in the aspects of language learning that they chose to support using technology.	✓Valid results ✓Results Help locally
17	Rahimi et al., (2015) Netherlands	Facilitating student-driven constructing of learning environments using Web 2.0 personal learning environments	Content analysis	29	"The results suggest that the model can facilitate students' engagement in constructing their learning environment through influencing communication between teachers and students, involving students in adding tools, resources, and people into their learning environment, and enhancing their feeling of ownership over their learning environment".	✓Valid results ✓Results Help locally
18	Yusop and Basar (2017) Kuala Lumpur	Resistance towards wiki: implications for designing successful wiki-supported	Content analyses, focus-group	24	"Two categories of factors emerged from the findings: technical factors (slow Internet connection outside the classroom	✓Valid results ✓Results Help locally

		collaborative learning experiences	interviews, observations		and user-friendliness aspects of wiki) and individual factors (anxiety in using new technology, mental perceptions, and lack of student commitment towards learning experiences) with the latter representing the strongest resistance factors. Limitations of the study are discussed, and recommendations for helping other instructors in designing successful wiki-supported environment in their own contexts are offered".	
19	Altanopoulou and Tselios (2017) Greece	Assessing Acceptance Toward Wiki Technology in the Context of Higher Education	Survey	86	"The relationship between perceived ease of use and perceived usefulness was found to be of the highest magnitude. The most notable difference across the two scenarios was that the relation between perceived ease of use and attitudes towards use was significant only in the first scenario".	✓Valid results ✓Results Help locally
20	Chen et al. (2015) Hungary	Attitudinal Factors Affecting Wiki Group Collaboration for English Writing	Content analysis	29	The findings reveal high mean scores for all aspects. Further multiple regression analysis reveals that motivation is the most important factor associated with group collaboration, indicating the need to boost students' motivation	✓Valid results ✓Results Help locally

					to encourage effective collaboration in completing wiki writing tasks	
21	Ng (2016)	Investigates whether self-regulated learning of pre-service early-childhood teachers is a viable pedagogy to improve the quality of their wiki-based projects	Questionnaire Focus group interview	76	"The research findings from multiple sources suggested that the students were very responsible in their own learning and assessment process, and all seven of the self-regulation principles based on Nicol and Macfarlane (2006)'s model were implemented. It is interesting to note that the students tended to be more demanding of themselves than of their classmates. This finding differs from that of another study, in which some students were lenient both on themselves and others".	✓Valid results ✓Results Help locally
22	Cifuentes et al. (2011) USA (paper cites many studies)	Discover the effectiveness of specific design features and students'regulation of their learning in the Web 2.0 environment.	Self-report Survey	20	Web 2.0 tools can be applied to help learners meet the goals of self- regulated deep learning and cognitive flexibility when course design attends to cognitive load and when students are provided with guidance in self-regulation.	✓Valid results ✓Results Help locally

Appendix 3: Model Design for SRL

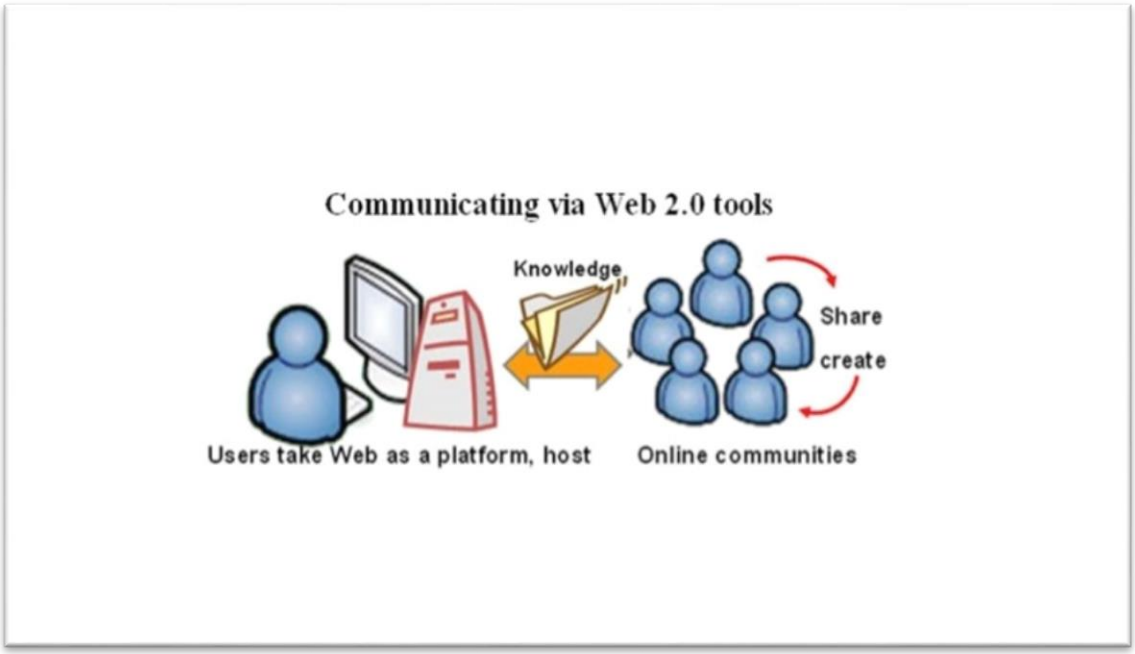
Model design for self-regulated learning skills (framework). This was then adapted with the help of the Salmon Model to encourage active skill enhancement among learners.



Appendix 4: Guide/ instructions for wiki usage

Screenshots of PowerPoint slides giving instructions for wiki usage

Slide 1



Slide2

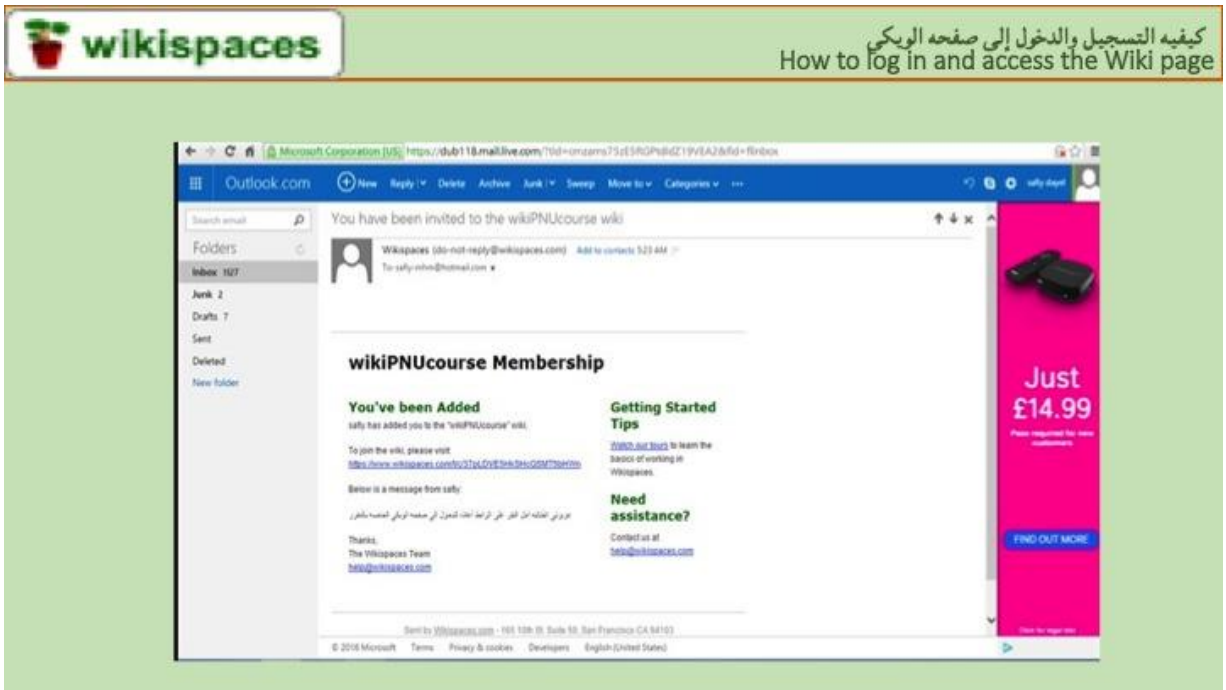
Wikispaces
الويكي
Wiki
إعداد: صفيه الدايل
by Safyah Aldayel
WIKI

Slide3

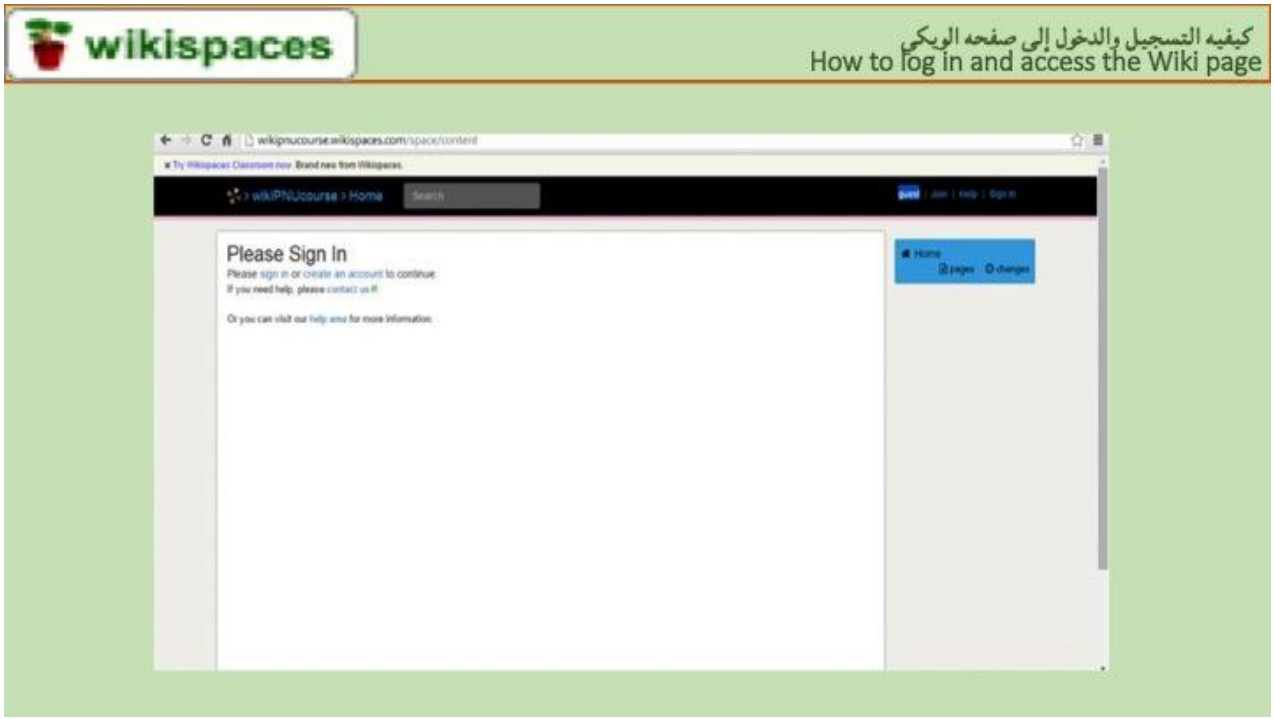
wikispaces
A
الويكي
ماهو الويكي؟
What is Wiki?
الويكي هو موقع انترنت يسمح لنا بسهوله الانشاء والتعديل واضافه عدد من روابط الصفحات من خلال متصفح الانترنت .
الويكي يعني أسرع أسرع كمصطلح في جزر الهاواي بحسب المنشأ
Wiki is a website that allows users to create and edit content as well as add multiple links or pages via a web browser .

Slide4

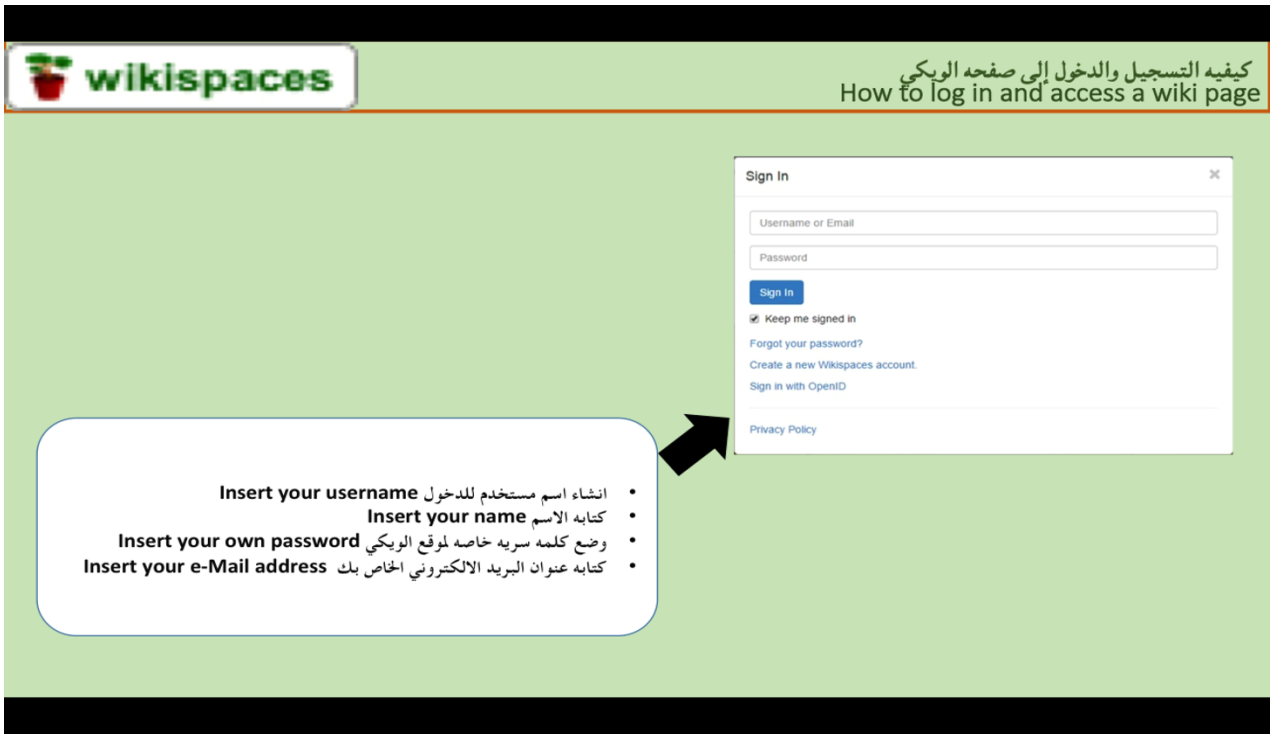
Slide5



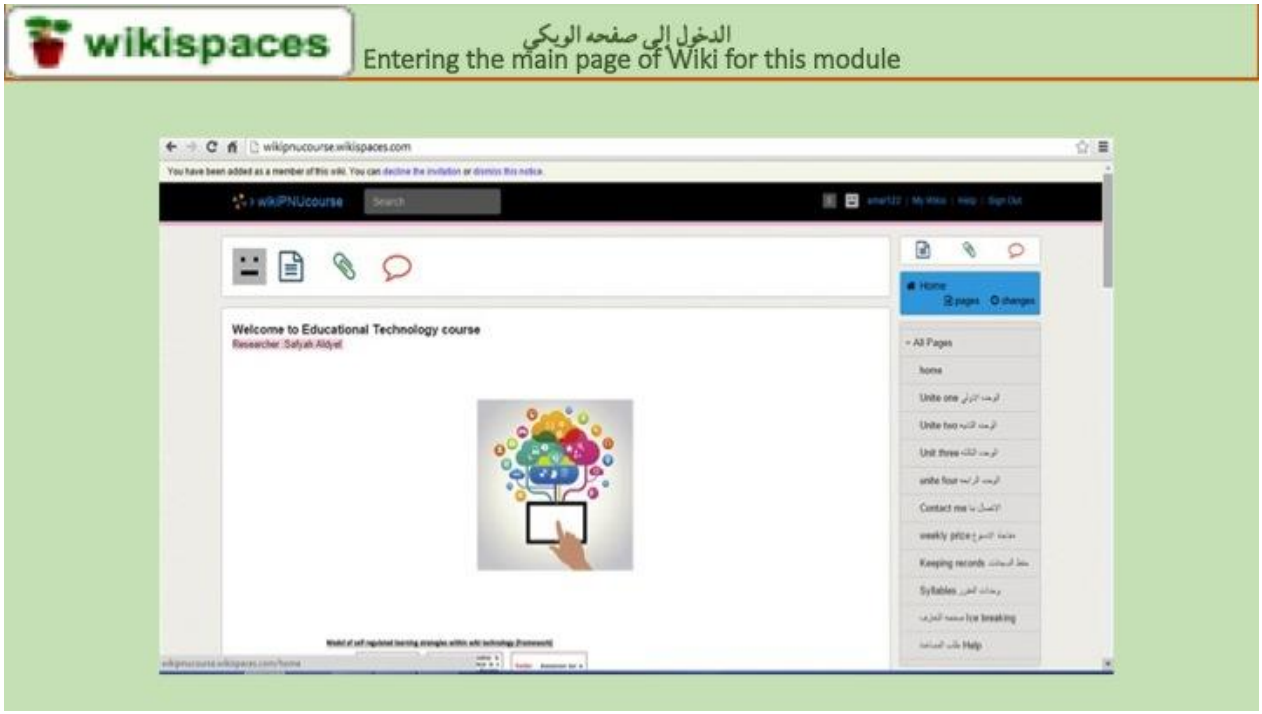
Slide 6



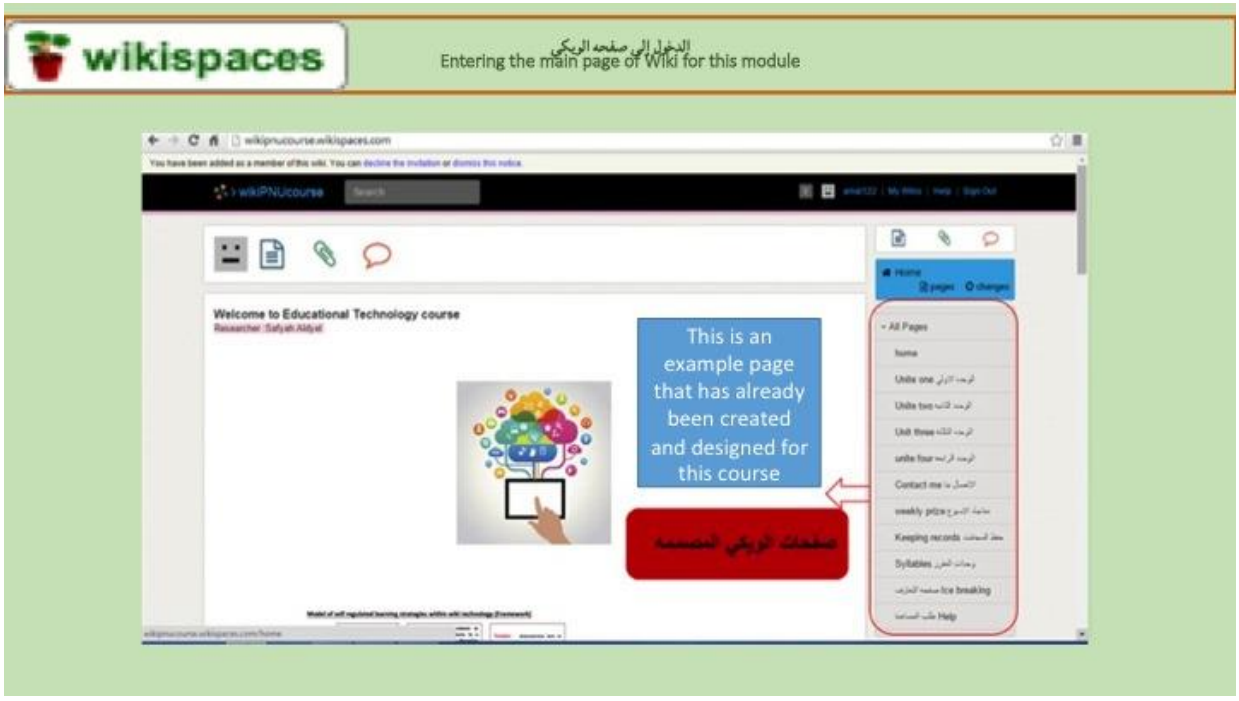
Slide7



Slide 8



Slide 9



Slide 10

wikispaces

التعديل والاضافه في صفحه الويكي
How to edit a Wiki page

Slide 11

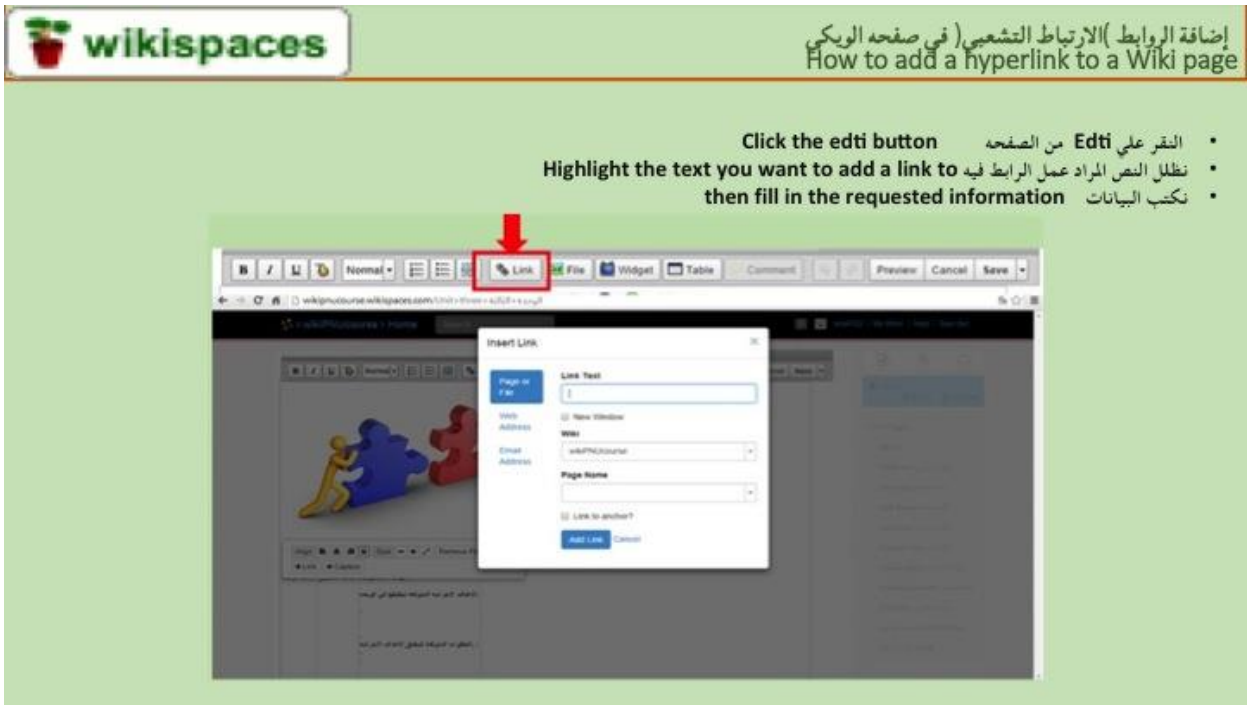
wikispaces

التعديل والاضافه في صفحه الويكي
How to edit and add to a Wiki page

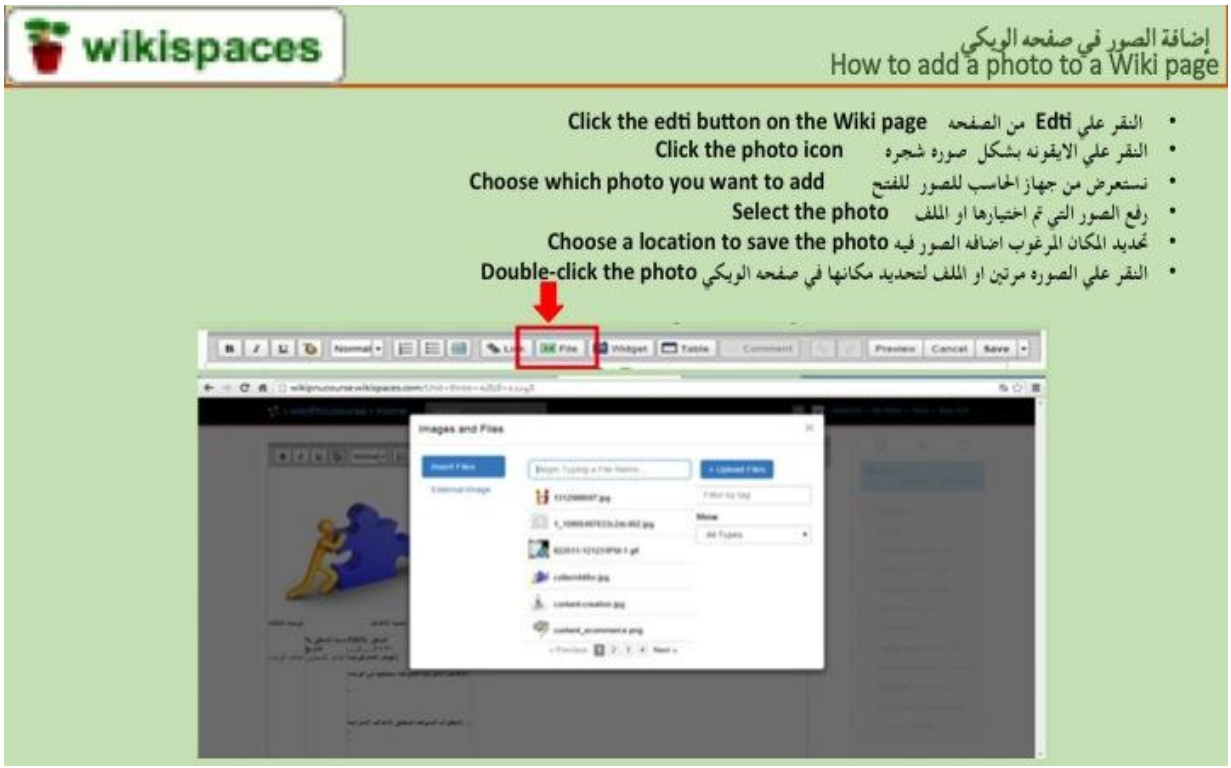
- Insert the text you would like to add اكتبي النص المراد كتابه في الصفحه
- You can change the format of the text to bold, fi you so wish تستطيعين اضافه تنسيق علي النص مثل خط غامق , مائل وهكذا
- Press save بعد الانتهاء من التعديل في الصفحه انقر علي زر حفظ

(When you have finished editing the Wiki page, you should click the *save* button to save your work)

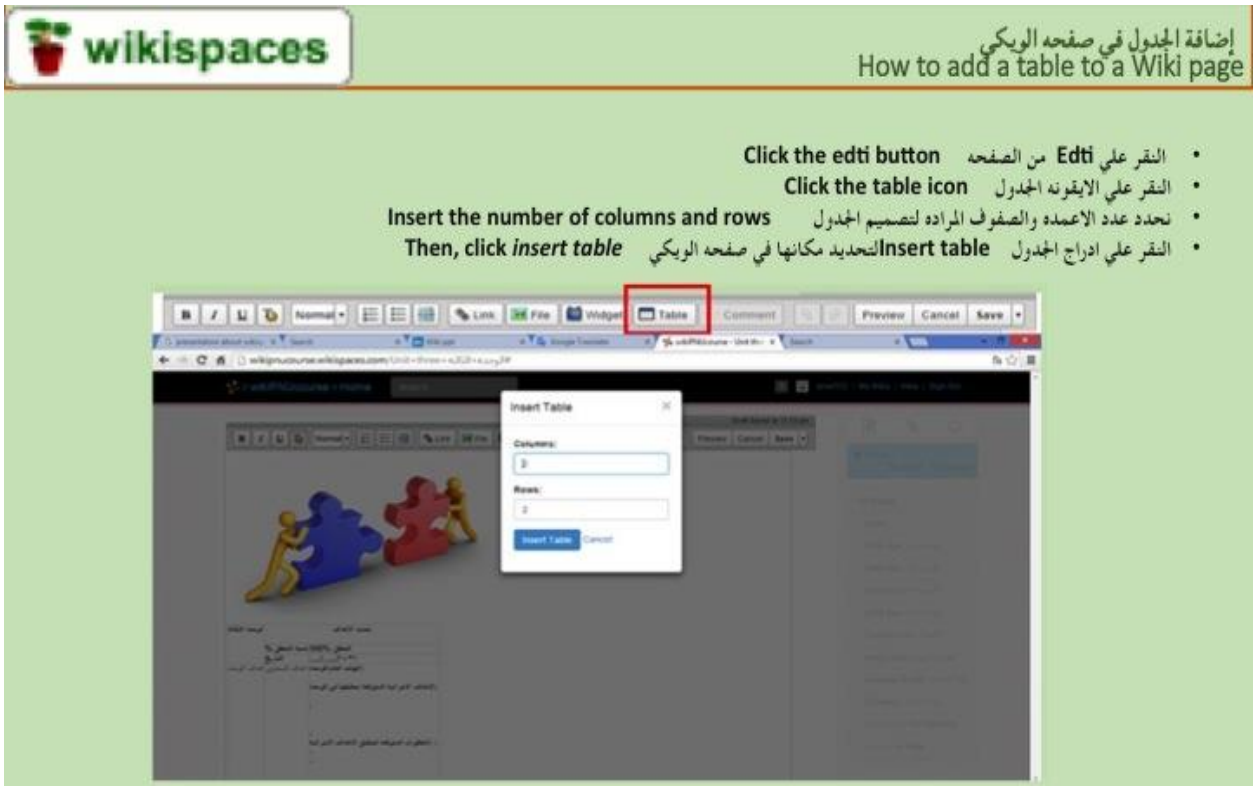
Slide12



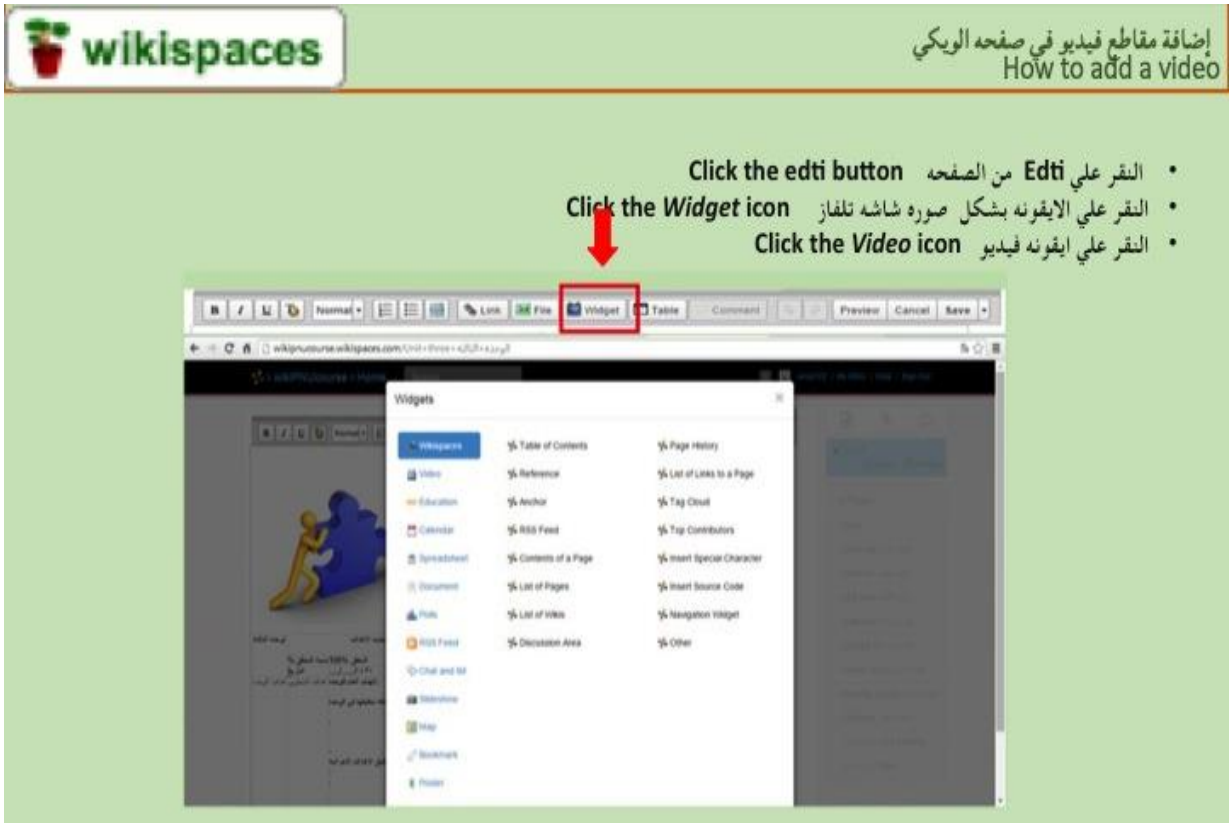
Slide13



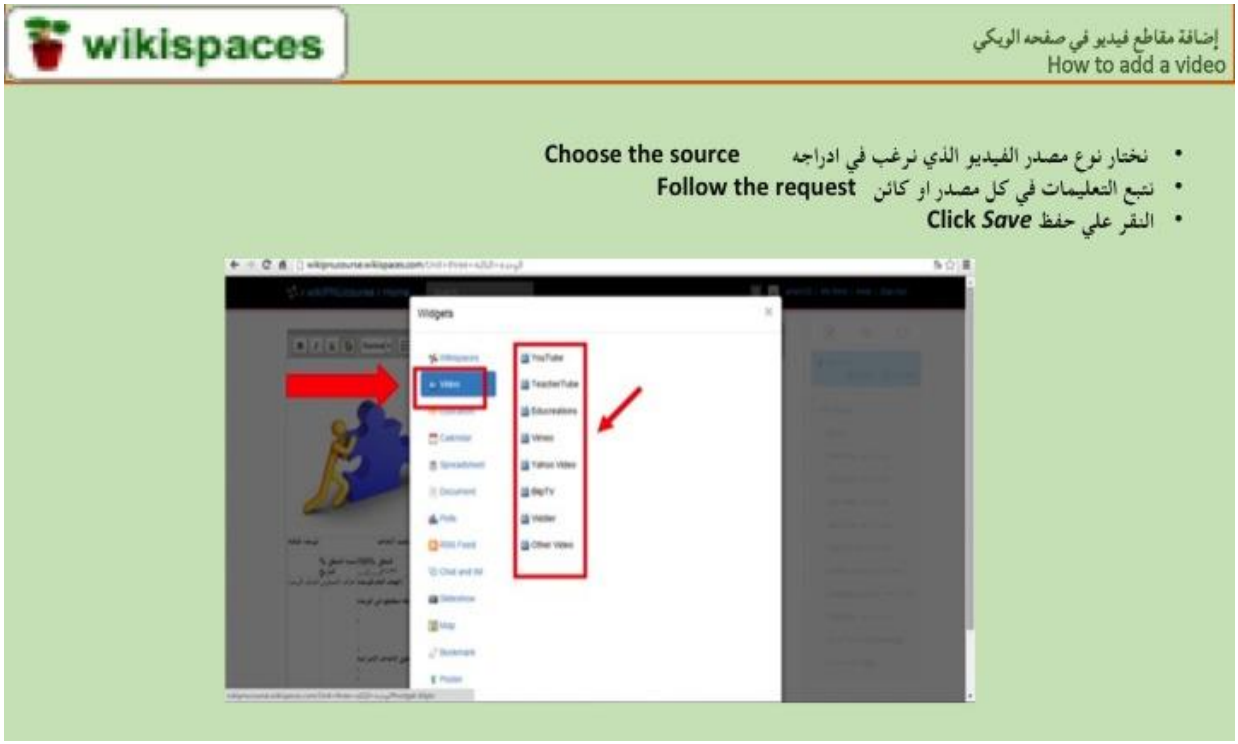
Slide14



Slide 15


wikispaces
إضافة مقاطع فيديو في صفحه الويكي
How to add a video
النقر علي Edti من الصفحه Click the edti button
النقر علي الايقونه بشكل صوره شاشه تلفاز Click the Widget icon
النقر علي ايقونه فيديو Click the Video icon
Widgets

Slide 16


wikispaces
إضافة مقاطع فيديو في صفحه الويكي
How to add a video
نختار نوع مصدر الفيديو الذي نرغب في ادراجه Choose the source
نتبع التعليمات في كل مصدر او كائن Follow the request
النقر علي حفظ Click Save
Widgets

Slide 17

wikispaces

إضافة النقاش في صفحه الويكي
How to add a message to the discussion board

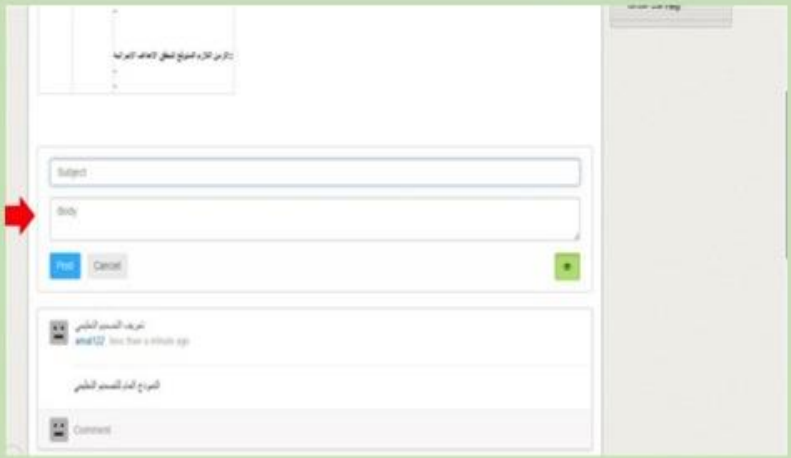
- النقر أعلى الصفحه او أسفلها علي ايقونه **Add a *Discussion***
Click the *Discussion* icon and add the information you feel is necessary

Slide 18

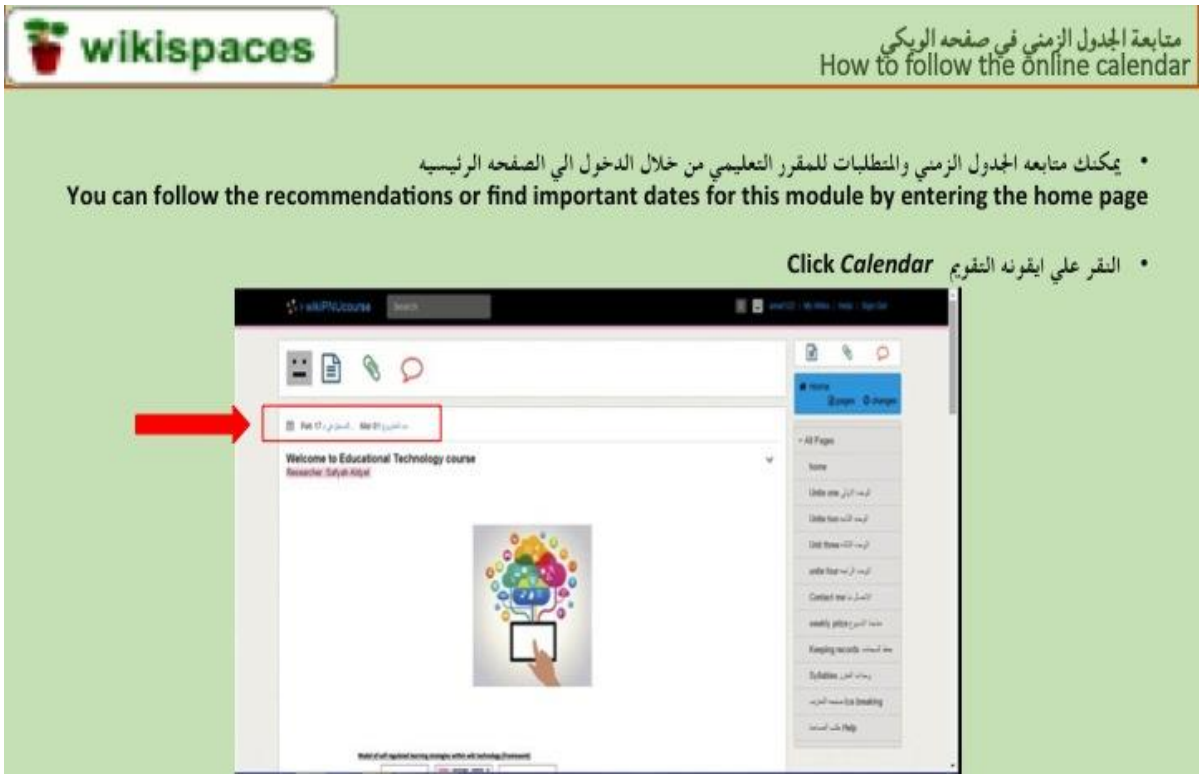
wikispaces

إضافة النقاش في صفحه الويكي
How to add a message to the discussion board

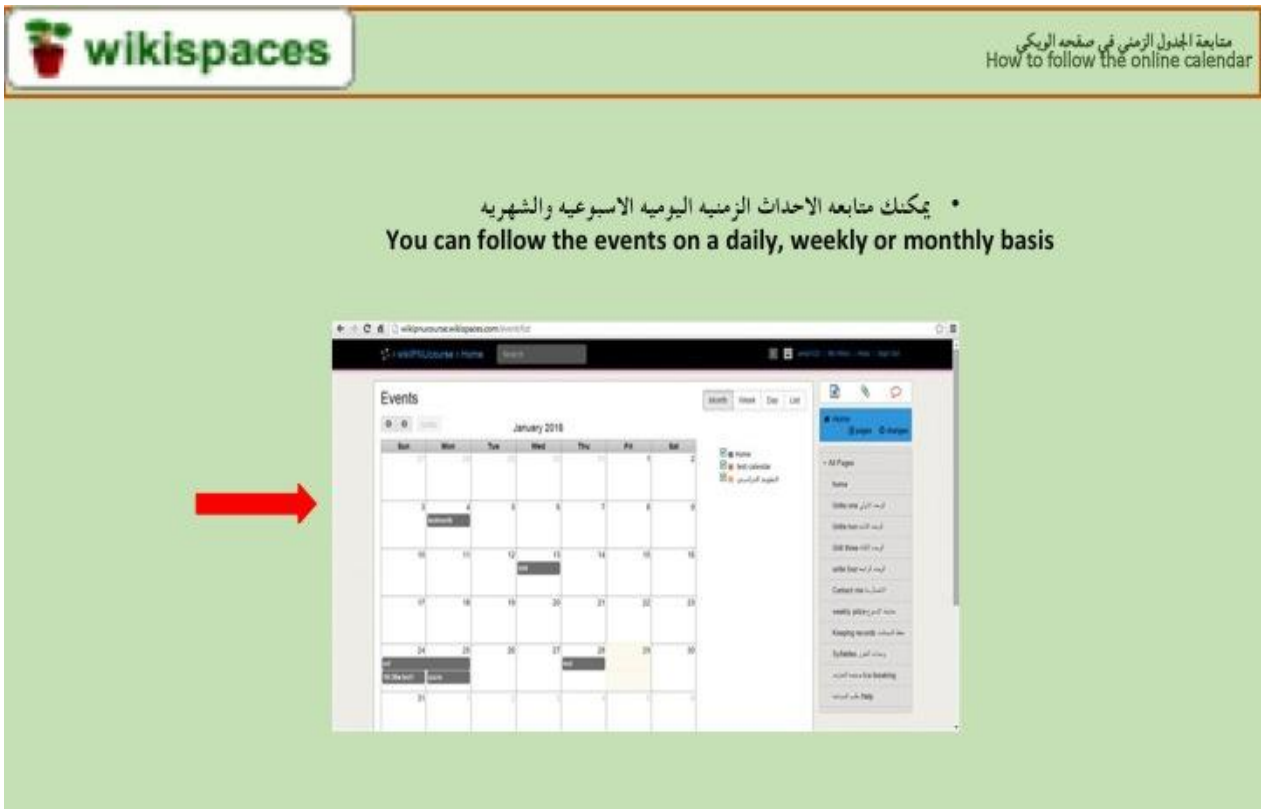
- كتابه العنوان المراد نقاشه في خانه **Wrtie the subject of the discussion in the blank box provided** كتابه النص
المراد للنقاش في خانه **Wrtie what you want to include in the *Body* box**
- النقر علي زر ارسال **Then, click the *Post* button**



Slide 19



Slide 20



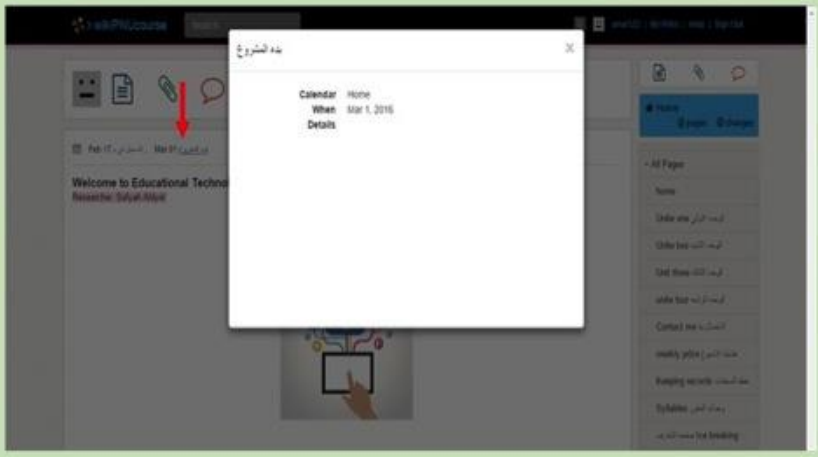
Slide 21

wikispaces

متابعة الجدول الزمني في صفحه الويكي
How to follow the online calendar

- أو يمكنك النقر علي الرابط العنوان

Alternatively, you can view the event information on the calendar via the link written underneath the title



Slide 22

wikispaces

انشاء المحتوى من خلال تقنية الويكي :
How to create content on Wiki

Screenshot of the main page: including a welcome message and the introduction to the module

Slide 23

wikispaces
انشاء المحتوى من خلال تقنية الويكي
How to create content on Wiki
Screenshot of the first page: including the title of the first topic in the module and a table stipulating the learning goals
wikiPNUcourse > Home
Members
Projects
Events
Assessment
Settings
مستحدثات تكنولوجيا التعليم الجزء الاول
Edit
All Pages

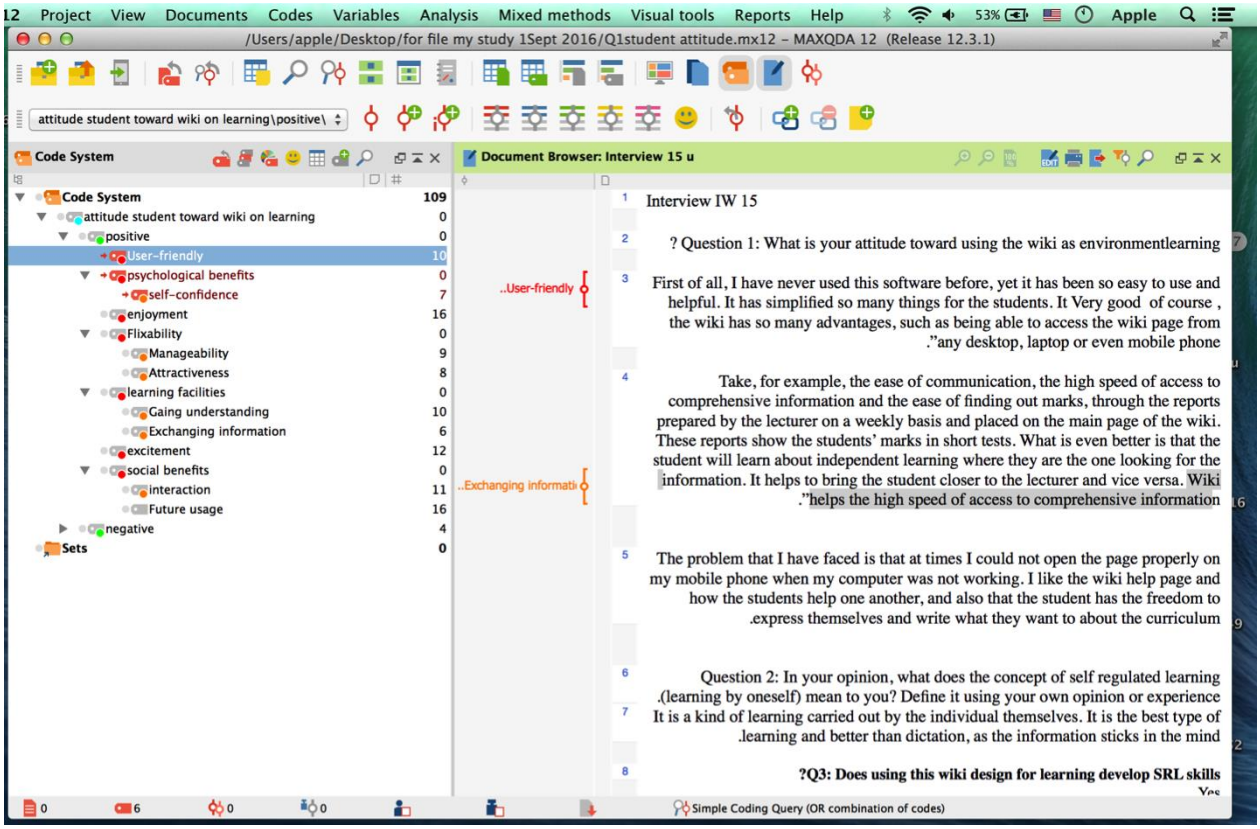
Appendix 5: List of Experts

	Name	**Position**
1	Prof. Badr Alsaleh	Professor in the Education Technology Department at King Saud University, Saudi Arabia (PhD degree from the United States)
2	Dr. Abdularhman Alamri	Education Technology Department, King Saud University, Saudi Arabia. (PhD degree from the United States)
3	Dr. Ibrahami Alzharani	Education Technology Department, Abha University, Saudi Arabia. (PhD degree from Southampton University, UK)
4	Dr. Seham Aljroui	Education Technology Department, Princess Nora University, Saudi Arabia.
5	Dr. Hayet Alamri	English Department, Taibah University, Saudi Arabia
6	Mrs. Reem Aldayel	Lecturer in the School of Education, King Saud University, Saudi Arabia

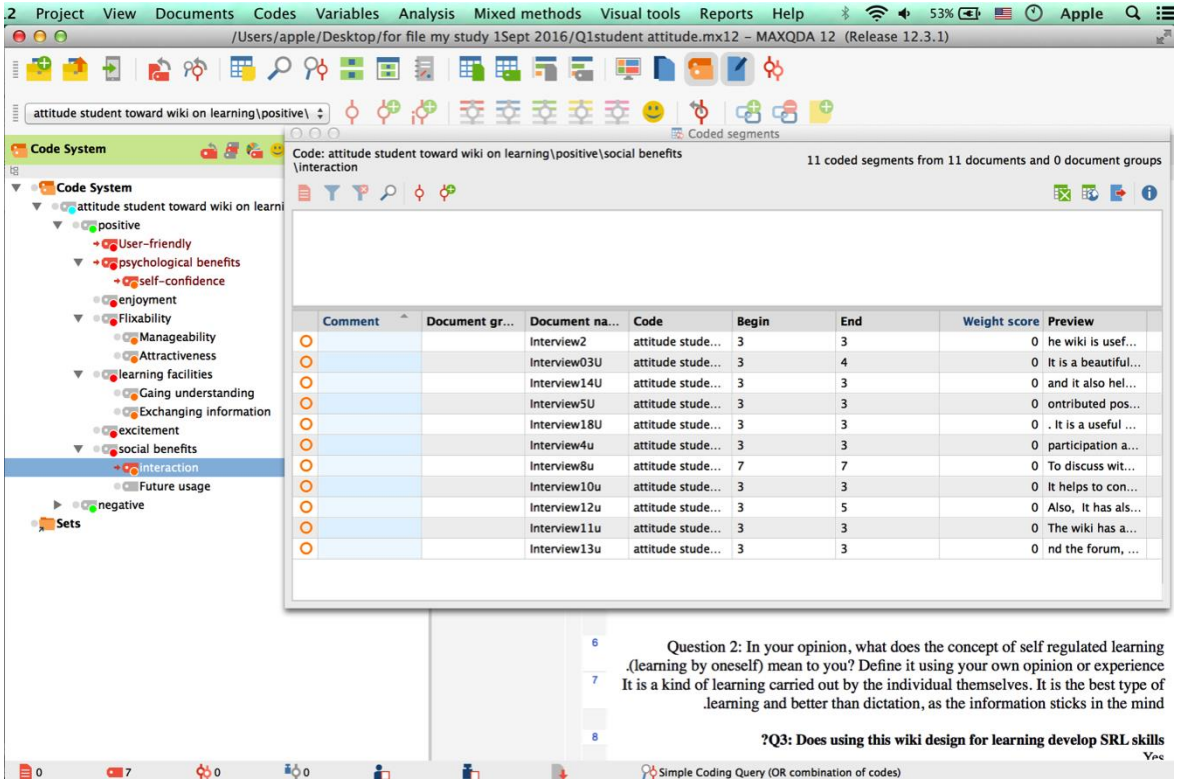
Appendix 6: Examples of screenshots of analysis transactions of learners' interviews in MAXQDA12.

Students' Attitude:

After creating codes such as "student attitude towards wiki as a learning platform", it was possible to create a full code system that was broken down into sub-codes and themes such as "positive attitude" and "negative attitude". This led to the creation of further sub-codes such as "user-friendly".



Another example: Importing data into MAXQDA12 (interview)



Appendix 7: Letters of consent

Centre for Educational Studies
T 01482 465031
E c.m.mckinlay@hull.ac.uk

ETHICAL PROCEDURES FOR RESEARCH AND TEACHING
IN THE
FACULTY OF EDUCATION

FORMAL NOTIFICATION OF ETHICAL APPROVAL

Reference Number:	**FoE15/16-116**
Name:	**Safyah Aldayel**
Programme of Study:	**Doctor of Philosophy (PhD)**
Research Area/Title:	***The investigation of using wiki technology to support self-regulated learning in the academic context at Princess Nora bint Abdullrahman University, Saudi Arabia.***
Image Permission Form	**N/A**
Name of Supervisor:	**Professor Stewart Martin**
Date Approved by Supervisor:	**27th January 2016**
Date Approved by Ethics Committee:	**2nd February 2016**

UNIVERSITY OF Hull

Faculty of Education Ethics Committee

To whom it May concern

We report noted that the Education Technology Department has no objection to cooperate with the researcher / Safyah Saleh Aldayel to conduct her research titled with "The investigation of using wiki technology to support self – regulated learning strategies in academic context at princess Nora University" During the second semester of the academic year 1436/1437 H.

Head of the Department of Educational Technology

Dr/ Reem Abdullah Muaither

جامعة الأميرة نورة بنت عبدالرحمن
Princess Nora Bint Abdul Rahman University

B) Consent to participate in the questionnaire

Cover letter

Dear participants,

I would like to welcome you and thank you for your participation in this questionnaire. Before we start, please let me introduce myself and give you some information about my work, the aim of the study and how the questionnaire will be conducted.
I am a PhD student at the University of Hull in the United Kingdom and I work as a lecturer at Princess Nora bint Abdulrahman University in Saudi Arabia. My study aim is to investigate the use of wiki technology as a way to support self-regulated learning skills in an academic context among students at PNU. The aim of this study is to develop the current ways of teaching at PNU by developing students' study skills in order that they may achieve higher academic grades as well as reap the benefits from using wiki technology as a platform for study. This questionnaire includes questions on the two above-mentioned areas: SRL skills and wiki as a platform for learning.

Please be informed: This is not a test. There are no right or wrong answers. Your answers will be kept confidential and fully anonymous and will be used for research purposes only. Your usual tutor will not see your responses to any of the questions. Your answers will not affect your grades in any way. You are free to stop at any time. Please answer the items as honestly as possible. Your cooperation in completing this questionnaire is much appreciated. The questionnaire will take approximately 20 minutes.

Your students ID :……

Signature:…….

Instructions

- Please write your Students ID on the questionnaire.
- Place your answers directly on this questionnaire.
- Fill in only one answer per question (e.g., do not circle two answers).
- Do not leave any answers blank.
- If you have any questions before or during completion of the questionnaire, please ask me directly.

Thank you in advance,
Safyah Saleh Aldayel
Safiy.mhm@gmail.com

C) Participant Information Sheet

Participant Information Sheet

Dear student,

You are being invited to take part in a research project. Before making a decision, it is vital that you understand the purpose of the research and what it will involve. Please take your time reading the information below. Please ask the researcher if there is anything that is not clear or if you require further information. Please do take your time deciding whether or not to take part in this study.

Thank you in advance,
Safyah Saleh Aldayel
Safiy.mhm@gmail.com

1. The study title :

An investigation into the use of wiki technology to support self-regulated learning among students in an academic context at PNU.

2. The purpose of this study:

The main aim is to develop the current ways of teaching at PNU by developing students' study skills to, in turn, improve academic performance. The findings of this study could be used as recommendations from the responsible and decision makers at the Ministry of Education to support the plan of development for teaching and learning as well as in planning for the implementation of an online course at PNU. For the purpose of this study and for data collection, the experiment sample selection of students will be taken from the cohort of students studying an Education Technology course. Data will be collected through a semi-structured interview and questionnaire.

3. Why have I been chosen?

To the group of students: You have been chosen because you are studying on the Education Technology course at Princess Nora University. You are the core of this study and your views and feedback will have a great effect on the results of this study.

4. Do I have to take part in this experiment?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep (and be asked to sign a consent form for all data tools). You can still withdraw during a specific time period without it affecting any benefits that you are entitled to in any way at all. You do not have to give a reason for withdrawing.

5. What will be required of me during this experiment?

You will be asked to take an Education Technology course module online using wiki as the online learning environment in order to practise your SRL skills during a set of specific tasks related to this module. Prior to beginning the online course, you will be asked to fill out a questionnaire as a pre-test about your experience of Web2.0 tools thus far, SRL skill and your attitude toward using wiki in learning. The same questionnaire will be given out as a post-test and an interview will be conducted with willing participants.

6. What do I have to do?

You will need to follow the tutor's instructions and guidance e.g. how to log in to the wiki site, how to complete tasks and you will be expected to give constructive feedback regarding the subject content that will be shared with other students. No real change or restrictions to the participant's regular study lifestyle should take place as a result of this.

7. What are the possible disadvantages and risks of taking part?

There are no predictable disadvantages nor are there any risks that should result from the proposed research process.

8. What are the possible benefits of taking part?

You could benefit from gaining experience of a new, more modern learning method and your personal learning skills may also improve. This work will hopefully have beneficial outcomes for the development of the education standards and the quality of the learning process and academic programs offered at Princess Nora University.

9. What happens if the research study stops earlier than expected?

The main data for this single case study is taken from the perceptions and insights of participants. Therefore, the researcher has selected two groups to increase the sample size in case any participants choose to stop earlier than expected, during the first 2 weeks of the study.

10 Will any further form of personal information be required of me?

The required personal information (e.g. your ID number, email and mobile number) has already been collated by the researcher and no further details will be required.

11. Will my taking part in this research be kept confidential?

All information provided will remain anonymous and will be treated confidentially for research purposes. Should a need arise to publish the data outside of the realm of the thesis; your permission would be sought and ethical procedures will be followed, as per the permission letters.

12. What will happen to the results of the research?

Post research completion, a copy of this study will be made available to readers at PNU in the main library or alternatively, a copy can be obtained directly from the researcher.

13. Who is organising and funding the research?

This research is self-funded by the researcher under the supervision of the University of Hull in the UK. It is part of the fulfilment of a Doctorate in the Education Programme at the University of Hull.

14. Who has ethically reviewed the research?

This research has been ethically approved via the School of Education at the University of Hull in UK and Princess Nora University in Saudi Arabia.

Contact for further information:

For further information and clarification, kindly contact
Researcher: Safyah Aldayel
Email : safiy.mhm@gmail.com

Your participation and cooperation is much appreciated.

*__Participants will be given a copy of this document together with a copy of a signed consent form.__

D) Consent form

Consent to participate in an interview

I would like to welcome you and thank you for your participation in this interview. Before we start, let me introduce myself and give you some information about my work, the aim of the study and how the interview will be conducted.
I am a PhD student at the University of Hull in the United Kingdom and I work as a lecturer at Princess Nora bint Abdulrahman University in Saudi Arabia. My study aims to investigate the use of wiki technology as a way to support self-regulated learning skills in an academic context among students at PNU. This is an important topic because exploiting the benefits of this new technology may help to enhance students' learning effectiveness. I would value your input, as the outcomes of the study may help to inform the university and Ministry of Education policy in the future. Throughout the interview, I will have several questions to ask you related to wiki technology and self-regulated learning skills in order to find out your own perceptions of this technology and the skills fostered by it. The interview will take approximately 20 minutes.
Your answers will be treated in the strictest of confidence in accordance with the Data Protection Act and used for research purposes only. This interview is voluntary. You have the right not to answer any question and to stop the interview at any time or for any reason. Your decision whether or not to participate will not affect your course of study.

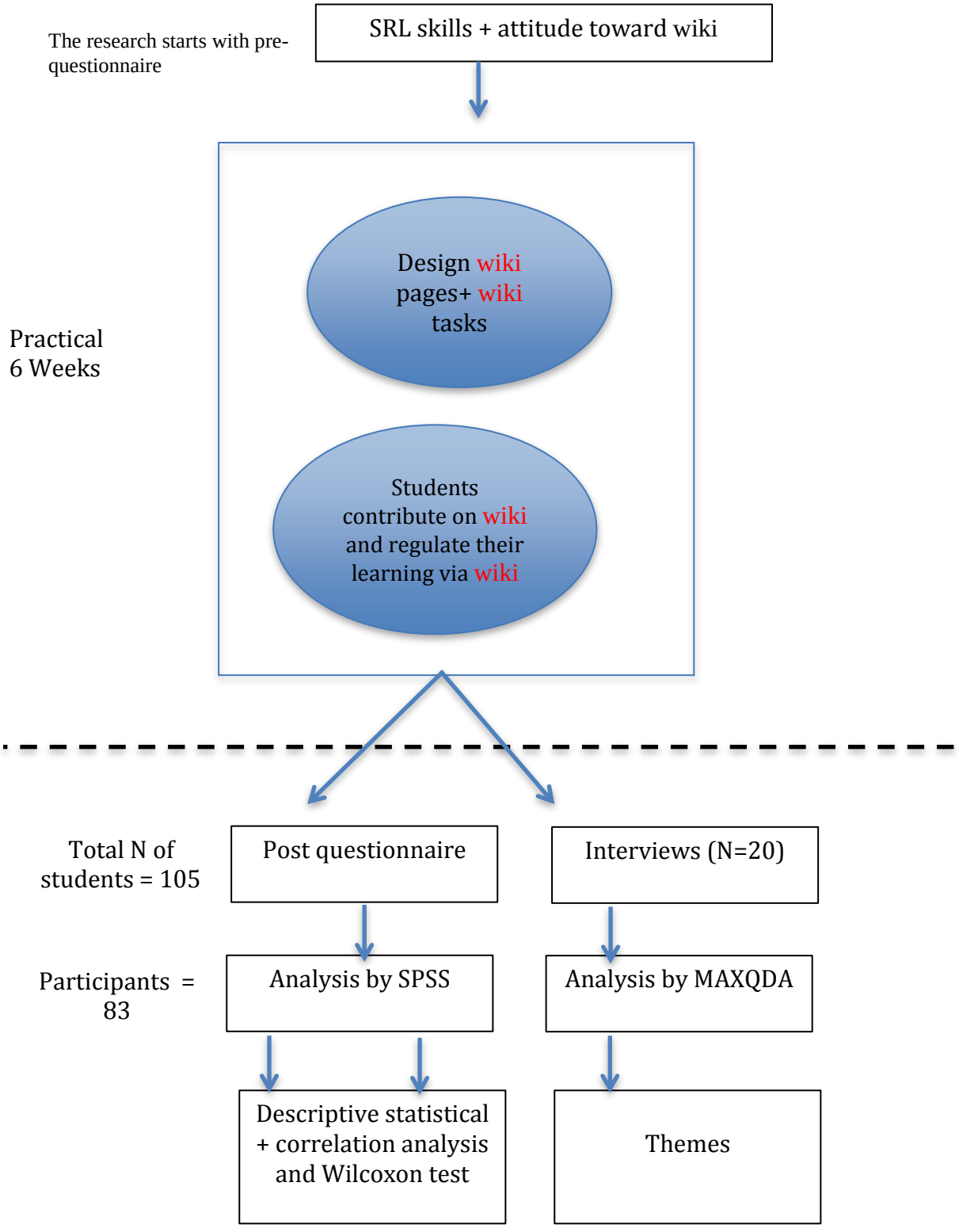
Your name or student ID (voluntary):……

Signature:…….

Thank you in advance,
Safyah Saleh Aldayel
Safiy.mhm@gmail.com

Appendix 8: Plan for data analysis

The wiki learning procedures



Exploring the study objectives:

- To examine how using wiki learning can enhance self-regulated learning among students.

This objective is divided into two sub-objectives:

- To examine how using wiki learning can enhance executive function skills among students.
- To examine how using wiki learning can enhance evaluation skills among students.

- To gain insights into students' perspectives and experiences towards the use of wiki as an appropriate environment for learning.

- To gain insight into students' perceptions of wiki learning and its contribution to the development and enhancement of self-regulated learning skills.

Instruments for Data Collection:

The researcher used different instruments to gather data through two stages, as listed below in this table:

Stage 1:Before using wiki	**Stage 2: After using wiki**
Pre-questionnaires	Post questionnaires
	Interviews

The below table describes each tool used to analyse student responses to wiki as well as aims, procedures and data analysis.

Tool	**Description**	**Aim of instrument used**	**Procedure**
Pre- and post questionnaire	1) The questions applied used the Likert scale which ensured that students had 4 options demonstrating attitude regarding each question with no option to take a neutral position. 2) The numerical scale type consisted of three axes: executive function, evaluation skills and students' attitude towards wiki.	The aim was to explore students' self-regulated learning skills before and after using wiki learning as well as to explore the students' attitudes towards using wiki in learning, based on the students' own views.	The researcher collected 83 of 105 student responses before and after using wiki learning.
	Post Analysis: - Attendance issues resulted in unreliable interview answers as not all students completed both core components (the pre- and post surveys). - As this is a case study, the reduction of participants in both interviews was not a large hindrance to data collection since enough data had already been collated and analysed sufficiently to produce reliable results. If it had been necessary to increase the number of participating students, the researcher may have implemented an electronic communication system for students to complete both tests.		

Student interview	It consists of 4-5 questions on the topics of: 1. student attitude towards using wiki as an online environment for learning. 2. the awareness that students possessed of self-regulated learning. 3. which skills under the title of self-regulation that they felt they had developed via wiki. 4. whether or not they had developed any additional skills. 5. how wiki learning helped to develop these skills.	1) To explore students' attitudes towards using wiki as an environment for learning. 2) To explore students' perceptions of what general skills in self-regulated learning are developed after using wiki. 3) To understand from students' perceptions how wiki as an online environment for learning can develop self-regulated learning skills throughout the online teaching of a module.	1) The researcher chose 20 students to complete a semi-structured interview and a post interview after using wiki learning . 2) The researcher chose students in two ways; critically and randomly: *Critical* manner: Regarding answers given in the pre-questionnaires, students who reported a low level of self–efficacy as well as students who reported high or equally, very low levels of skills, as well as students who left messages for the researcher on the forum seeking help in these areas were highlighted in the data analysis, since the progress could be more obviously demonstrated in this manner with these students. During data analysis, it was discovered that alike students produced similar responses and therefore overall results.

			) ***Random*** **manner** Students volunteered to take part in the interview, as was the researcher's intention: students in Saudi Arabia often exhibit shyness in one-on-one conversations and more honest, candid responses are most likely to come from those students who happily volunteer to demonstrate feelings and attitudes verbally. 3) To avoid the verbal constraints that shyness can often lead to during interviews, the researcher used prompt lists to encourage learners to talk. (see appendix 21)
	Post analysis: The questions were phrased with clarity to the students, so much so that only two students asked the researcher to clarify a question again. Students' responses to the post study interview were possibly, however, too subjective or biased respectively. The responses may have also been affected by cultural feelings towards freedom of speech in the chosen country of study. Different generations feel differently about freedom of speech, as they do in most countries, which may have unknowingly resulted in students being guarded with their opinions and body language, allowing the		

	researcher to interpret personal reaction to a lesser extent than had been hoped for although the researcher encouraged students to comment on their experiences as far as possible by employing an easy-to-access prompt list to encourage students to be more analytical in their answers. The points brought up by the students during their interviews were naturally subjective viewpoints and it was not easy to corroborate this with other evidence, although the depth of their answers was also increased by the relationship the tutor had struck up with the interviewees from the 2 focus classes over the 6 week period.

The table below describes each instrument used to analyse data as well as the result of any data analysis:

Instrument	Data results
Questionnaire	1) There is a statistically significant difference in scores between pre- and posttests as demonstrated using the Wilcoxon test - the most suitable test to deal with ordinal data. Areas covered include executive function skills (goal setting, time management, self-record - *excluding* organisation of the learning environment), evaluation skills (self-evaluation, peer learning, self-efficacy *excluding* seeking help.) 2) The analysis of the data highlighted key facts about students' attitude towards wiki in learning: More than 60 learners had a positive attitude for a range of mainly overlapping reasons.
Students' interview	There is a wealth of data within this realm however I will focus on the following areas that are key areas of the case study in hand: 1) first axis: students' attitude: Most students (16 of 20) have a positive attitude towards wiki in learning and have different reasons for feeling this way. Positive: such as user-friendly, enjoyment etc. Negative: such as technical obstacles. 2)second axis: SRL skills: a) students had awareness of SRL. b) students mention all skills under the title of *executive function* and *evaluation*. c) students mention other regulation skills (not a focus in this particular case study) d) students mention multiple benefits which can be categorised into sub-themes: improved skills (not a focus in this particular case study).

	3) third axis: how wiki can develop SRL: Students' perception of wiki are discussed under the following sub-themes: a) design b) reflection on tasks c) Discussion d) evaluation

The below table describes the study questions asked of the students and the data analysis of each appropriate instrument.

Axes of study questions:	**Instrument:**	**Comment on data findings and criticisms:**	**Most Appropriate Tool Used:**
The extent to which executive function skills were developed over time (goal setting , time management, self-record and organisation of the learning environment)	Questionnaire	In their answers, they cover all dimensions under the executive function axis.	Questionnaire – interview may be used to corroborate results collated by this tool
	Interview	- In their answers, they cover all dimensions under the executive function axis but not always in enough detail in terms of to what extent they have developed their self-regulated learning skills.	

The extent to which evaluation skills were developed over time (self-evaluation, seeking help, peer learning, self-efficacy)	Questionnaire	- In their answers, they cover all dimensions under the evaluation axis.	Questionnaire – interview may be used to corroborate results collated by this tool
	Interview	- In their answers, they cover all dimensions under the evaluation axis but they don't always analyse in enough detail to what extent they have developed in this area.	
Students' attitude towards wiki	Questionnaire -Likert scale	- The Likert scale is applied to the questionnaire and produces a numerical result but neither in the depth required to fully understand reasons for which students have a negative attitude nor in enough detail in terms of their positive attitudes. However, the data does cover the responses of a large cohort of 83 students which is more than sufficient for this particular case study in terms of data analysis. Furthermore, the researcher, as a Saudi citizen herself, decided to use interviews as the main resource for analysing student attitude towards wiki, as culturally, in her experience, some Saudi students may not have accepted one-to-one interviews, particularly females, as mentioned in chapter 2. It was therefore necessary to have an alternative solution for shy students and this was applied through the use of open questions in the questionnaire. It was however positively surprising that most students decided to participate in the interview which was of course, the ultimate goal of the researcher in terms of her work on attitude.	Questionnaire -Likert scale Student interviews
	Interview		

		- The interview format does however provide a sufficient overview of students' attitudes since most responses are explained in enough detail and therefore justified.	
Students' views on how wiki can develop SRL skills	Student interviews	It was vital that the researcher only focused on one data tool in the study since this study focuses predominantly on the benefits that students reap from wiki learning in terms of how SRL skills are developed online via wiki , therefore, despite being useful to back-up the information that the students said in their interviews, student responses were more personal and also far more detailed in terms of content which was another reason as to why student interview analysis was favoured by the researcher. The researcher felt students told the truth during the interviews because they also exhibited body language that supported their claims. They did not avoid any questions or appear nervous during interview (this is naturally a subjective view, not corroborated by other evidence).	Student interviews

Appendix 9: Assessment Criteria

The following is the performance assessment criteria for the content:

First criterion: Scientific content			
Mark Earned out of 100	Assessment Mark	Assessment Criteria	M
	1-10	The content is connected to the educational objectives	1
	1-10	The content is scientifically and linguistically accurate	2
	1-10	The content uses clear and understandable language	3
	1-10	The content supports multiple media formats that are related to the content (links, images, video footage)	4
	1-10	The content gives various examples	5
	1-10	The listed media is effective and clear	6
Second criterion: Written texts			
	1-10	The written texts are clear and legible	7
	1-10	The primary and secondary headings are differentiated from the body text	8
	1-10	The font types and sizes are clear	9
	1-10	Clear colours are used for lines	10

The following is the performance assessment criteria for the project

M	Assessment section	Assessment sub-sections	Earned mark	Notes
1	Choice of a good subject that is linked to education techniques	- The subject was linked to the education techniques (0.25) - The subject was new (0.25) - The subject was unrelated to the subject(s) of the lecture (0.25) - The subject was not repeated by other groups (0.25)	(/ 1)	
2	Student discussions in the discussion forum	- The students discussed choosing the subject before writing the content, using the modification date on the wiki page (0.5) - The students' discussions were logical and scientific (0.5) - All students took part in discussions (0.5) - The students discussed dividing and distributing the work between themselves (0.5)	(/ 3)	- This section is marked individually, not as a group, so individuals who did not participate will have their marks deducted, which will not affect the marks of other group members.
3	Writing and specifying the objectives	- Writing the general objectives of the subject (0.25) - Writing the specific objectives of the subject (0.25) - Designing the specific objectives in a scientific, accurate,	( )/ 3	- This section is important, so the mark earned may be increased depending on the students' chosen designs.

		and measurable way (0.25) - The objectives are aligned with the content of the subject according to each student (0.5) - Writing the necessary steps for achieving the specific objectives well (0.25) - Writing the expected time to complete the project, and delivering it within the period that the students expected it, according to the modification dates on the wiki page (0.5)		
4	The scientific content of the project	- The content covers all aspects of the subject (concepts, application in university education, advantages, disadvantages, practical steps for the programme) (1) - The content is supported by examples and illustrations (images, links, videos, PowerPoint slides, Word files) (1) - The content has been supported by scientific references (1)	(/ 3)	
5	The general presentation of the project	- The font type is clear (0.25) - Compatible colours were chosen to distinguish between primary and secondary headings (0.25)	(/ 2)	

		- The content is organised and flows logically (0.25) - The use of tables for presentation and organisation is well executed (0.25)		
6	The assessment of the project	- The student used the criteria that exists on the main wiki page (0.5) - The student assigned marks for the different sections and explained their reasoning (0.5) - The student's assessment of the project was logical and scientific (1)	(/ 2)	

Source

Abu Khutwa, S. (2011). Ma'ayir Dhaman al-Jawda fi Tasmim al-Muqarrarat al-Alectroniyya wa Intajiha. Research paper presented at the second international conference on electronic distant learning, 18-20/3/1432 H (7/March/2016). http://af4phd.blogspot.com/p/blog-page_4992.html [Access on 1/11/2015]

Appendix 10: A Questionnaire

Questionnaire

Task 1: Tick the most fitting response:

University ID number:				
GPA:	☐ Excellent	☐Very Good	☐ Good	☐ Satisfactory
Have you used **web2.0 technology** for the purposes of university study (such as Twitter, Facebook, blog etc.?)			☐ Yes	☐No
How long do you spend using **web2.0 technology** every week for the purposes of study? ☐1-2 hours ☐3-4 hours ☐5-6 hours ☐more than 6 hours				
How long do you spend using **web2.0 technology** every week for non-study purposes? ☐1-2 hours ☐3-4 hours ☐5-6 hours ☐more than 6 hours				
How would you evaluate your skills level in using **web2.0 technology** (such as Twitter, Facebook, blog etc.?) ☐Weak ☐Good ☐Very Good ☐Excellent				
Have you used wiki before?			☐ Yes	☐ No

Task 2: Please tick the most fitting response:

	Goal setting	**Always**	**Often**	**Sometimes**	**Never**
1	I develop specific goals before starting my work in any educational task.				
2	I develop short-term (daily/weekly) and long-term (monthly) goals for educational tasks.				
3	I develop goals that help me to manage my time when carrying out educational tasks.				
4	I determine goals that guide me towards learning effectively.				
5	I develop practical steps to achieve my educational goals during learning tasks.				
6	I find it hard to develop practical, educationally-applicable goals.				
	Time management	**Always**	**Often**	**Sometimes**	**Never**
7	I attend classes regularly.				
8	I don't take a lot of time on the requirements of the educational course.				
9	I can manage and arrange the time for the requirements of the educational course well.				
10	I perform the required educational tasks on time.				
11	I don't have enough time to review my feedbacks or reading before the lecture.				

12	I develop a schedule for my educational tasks on a daily or weekly basis.				
13	I never waste my time, especially while I am working on educational tasks.				
14	I review my compliance with my schedule regularly in order to analyse the effectiveness of my learning				
	Self-record	**Always**	**Often**	**Sometimes**	**Never**
15	I type up my personal feedback from the lecture.				
16	I type up my feedback in a serialized manner.				
17	I type up short and brief statements so that they may be remembered easily and to ensure my new-found learning is recalled at a later date.				
18	I monitor my errors in educational tasks to avoid making the same mistakes in the future.				
19	I record and file my class work.				
20	I record positive praise and grades in order that I may monitor my own performance.				
21	I use technology to help me within the process of keeping and documenting the requirements of the educational curriculum.				
	Organizing the learning environment	**Always**	**Often**	**Sometimes**	**Never**
22	I choose an appropriate place to learn.				
23	I avoid visual and audio distractions as much as possible during study times.				
24	I arrange an appropriate place for studying to increase my level of focus.				
25	I am able to provide access to technology required for my studies such as a computer and/or a modem.				
	Self-evaluation of learning	**Always**	**Often**	**Sometimes**	**Never**
26	I summarize what I have learnt to test my understanding of the curriculum.				
27	I evaluate my understanding of course content after completing educational tasks.				
28	I evaluate my performance in educational tasks immediately after completing them.				
29	I review my degree of achievement of personal goals after completing educational tasks.				
30	I confirm that I use all available facilities to support my learning, e.g. technological media as well as university references including books and scientific journals				
31	I evaluate the choices I may have in learning in terms of how I might complete a task when several methods are presented to me.				
	Seeking Help	**Always**	**Often**	**Sometimes**	**Never**
32	I communicate with the curriculum teacher to gain help when needed.				
33	I ask my peers to help me when necessary.				
34	I ask for help from others when I find it hard to				

	perform educational tasks (such as from family members and/or experts).				
35	I rely on my own personal knowledge when faced with difficulties in completing educational tasks.				
	Peer Learning	**Always**	**Often**	**Sometimes**	**Never**
36	I explain solutions to peers when we have a task to complete.				
37	After considering tasks, I share my own ideas with classmates.				
38	I communicate with my peers in order to evaluate my performance in educational tasks.				
39	I aid my peers in evaluating their own learning.				
	Self-efficacy **Rate your level of confidence in the following statements:**	**Very confident**	**Quite confident**	**Not very confident**	**Not confident at all**
40	I will gain a high grade in this course .				
41	I expect my performance in the course-based tests will be excellent.				
42	I can overcome any difficulties that face me during educational tasks.				
43	I have great trust in my ability to understand the content of the curriculum.				
44	My performance in educational tasks is excellent.				
45	I have the required skills to perform educational tasks.				
	Attitude towards wiki Technology	**Very confident**	Quite confident	**Not very confident**	**Not confident at all**
46	I believe that wiki technology is easy to use.				
47	I believe that wiki technology has a significant value in the educational process.				
48	I believe that wiki technology has helped me to develop my performance in my studies for the better.				
49	I now feel positive about using wiki technology during my studies.				
50	I believe that wiki technology has helped me to better understand the course				
51	I believe that wiki technology is interesting to use.				

Questionnaire: Arabic version

إستبيان: استخدام تقنية الويكي WIKI لدعم مهارات التعلم ذاتي التنظيم

أولاً : الرجاء إكمال البيانات العامة الآتية:

الرقم الجامعي:				
المعدل التراكمي	☐ ممتاز	☐ جيدجداً	☐ جيد	مقبول
هل تستخدمين تقنية ويب **web2.0** لغرض الدراسة الجامعية (مثال: تويتر Twitter, بلوق Blog , فيس بوك Facebook,.....ألخ)؟			☐ نعم	☐ لا
كم هو الوقت الذي تستغرقينه فى استخدام تقنية ويب **web2.0** أسبوعياً لغرض الدراسة ؟ ☐ 1-2 ساعة ☐ 3-4 ساعة ☐ 5-6 ساعة ☐ أكثر من 6 ساعات				
كم هو الوقت الذي تستغرقينه فى استخدام تقنية ويب **web2.0** أسبوعياً لغرض غير الدراسة ؟ ☐ 1 -2 ساعة ☐ 3-4 ساعة ☐ 5-6 ساعة ☐ أكثر من 6 ساعات				
كيف تقيمين مستوى مهاراتك في استخدام تقنية الويب **web2.0** (مثال: تويتر Twitter, بلوق Blog , فيس بوك Facebook,.....ألخ)؟ ☐ ضعيف ☐ جيد ☐ جيدجدا ☐ ممتاز				
هل استخدمتِ ويكي من قبل؟			☐ نعم	☐ لا

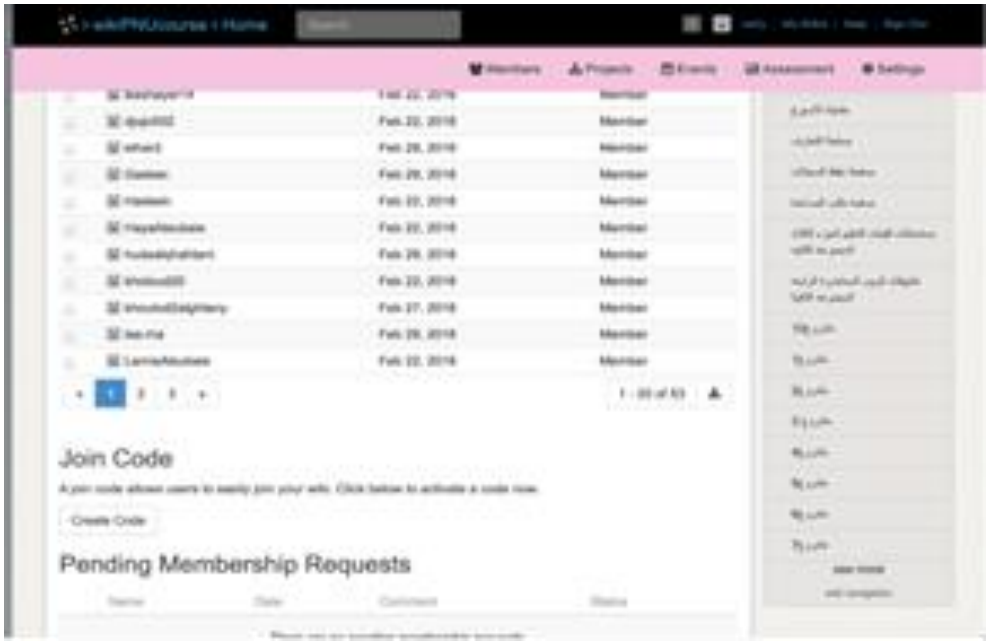
ثانياً: الرجاء وضع ☑ عند الخيار الذي يعكس وجهة نظرك وخبرتك :

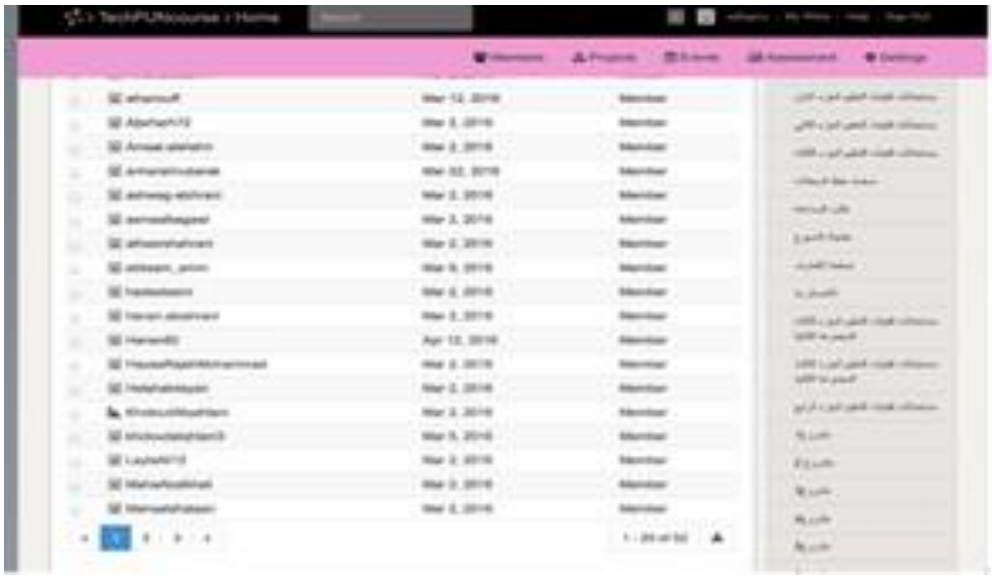
م	تحديد الأهداف	دائماً	غالباً	أحياناً	أبداً
1	أضع أهداف محددة قبل أن ابدأ العمل في أي مهمة تعليمية.				
2	أضع أهداف قصيرة المدى (يومية أو اسبوعية) وطويلة المدى (شهرية) للمهام التعليمية.				
3	أضع أهداف تساعدني في إدارة الوقت لإنجاز المهام التعليمية.				
4	أحدد الاهداف التي تساهم في توجيهي نحو التعلم.				
5	أحدد الخطوات العملية التي تحقق اهدافي التعليمية في أداء المهام التعليمية .				
6	أجد صعوبة في تحديد أهداف تعليمية عملية قابلة للتطبيق.				
	إداره الوقت	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
7	أحضر الفصول الدراسية بانتظام.				
8	لا أستغرق الكثير من الوقت في متطلبات المقرر التعليمية.				
9	لدي إداره جيده لتنظيم الوقت لمتطلبات المقرر التعليمي .				
10	أقوم بأداء المهام التعليمية المطلوبة في الوقت المناسب .				
11	لاأجد الوقت لمراجعه ملاحظاتي أو القراءة قبل المحاضرة.				
12	أ ضع جدول زمني لمهامي التعليميه بشكل يومي أو أسبوعي.				

13	أراجع مدى التزامي بجدولي الزمني بشكل مستمر .				
14	لا أشغل نفسي بأعمال تضيع وقتي عن أداء المهام التعليمية				
	حفظ السجلات	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
15	أدون ملاحظاتي علي المحاضرات.				
16	أحتفظ بالملاحظات المدونة بطريقة متسلسلة حسب موضوعات المقرر.				
17	أدون عبارات قصيرة ومختصره ليسهل تذكرها، للتأكد من قدرتي على متابعة الدروس.				
18	أحتفظ بنماذج من أخطائي في المهام التعليمية لكي لاأقع فيها مرة أخرى .				
19	أقوم بإعداد ملف (إنجاز) لحفظ أعمالي الصفية في المقرر .				
20	أسجل درجاتي المكتسبه في المقرر لمتابعه أدائي.				
21	أستخدم التقنيات لتساعدني في عمليه الحفظ والتوثيق فيمايخص متطلبات المقرر التعليمي.				
	تنظيم البيئة	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
22	أخصص مكان مناسب للدراسة.				
23	أتجنب المشتات السمعية والبصرية قدر الإمكان أثناء الدراسة .				
24	أرتب مكان مناسب يساهم في تركيزي للدراسة.				
25	أوفر التقنيات التي احتاجها أثناء الدراسة مثل جهاز الكمبيوتر , المودم.				
	التقييم الذاتي للتعلم	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
26	ألخص ماتعلمته لاختبارمدى فهمي للمقرر.				
27	أقيم مستوى فهمي لمحتوى المقرر التعليمي بعد الانتهاء من أداء المهام التعليمية .				
28	أقيم مستوى أدائي في المهام التعليميه بعد الانتهاء منها.				
29	أراجع مدى تحقق الاهداف بعد الانتهاء من أداء المهام التعليمية.				
30	أتاكد من مدى استفادتي من الامكانيات المتاحه في أداء المهام التعليميه (مثل: استخدام التقنيات, المراجع الجامعية من كتب ومجلات علمية).				
31	أعيد النظر في مدى سهولة أوصعوبة الطرق المستخدمة في أداء المهام التعليميه.				
	طلب المساعدة	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
32	أتواصل مع أستاذة المقرر لمساعدتي عندما احتاج ذلك.				
33	اطلب المساعدة من زميلاتي عندما احتاج لذلك .				
34	أطلب المساعدة من الآخرين عندما أواجه أي صعوبه في المهام التعليمية (مثل : أفراد الاسرة/ الخبراء).				
35	أعتمد على نفسي مهما واجهتني أي صعوبه في أداء المهام التعليمية.				
	تعلم الأقران	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
36	أناقش زميلاتي في أداء المهام التعليمية .				
37	أتبادل الآراء والأفكار مع الزميلات.				
38	أتواصل مع زميلاتي لأقيم مستوى أدائي في المهام التعليمية.				

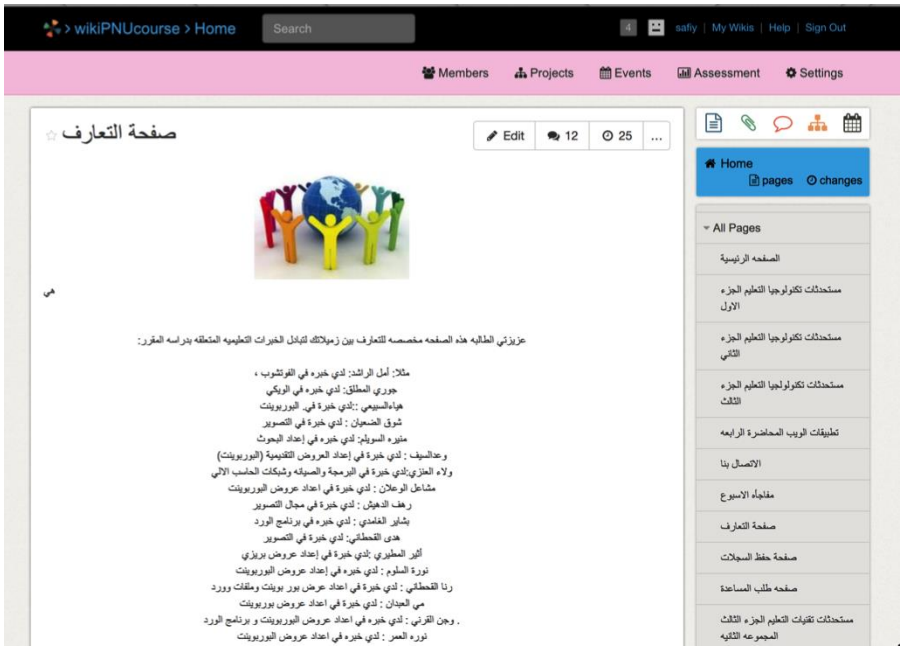
39	أشارك زميلاتي في تقييم مستوى ادائهن في المهام التعليمية.				
	الكفاءة الذاتية	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
40	أعتقد أنني سأحصل على درجه عاليه في هذا المقرر.				
41	أتوقع ان مستوى أدائي في الاختبارات لهذا المقرر ستكون ممتازه.				
42	أعتقد أنني أستطيع تجاوز اي صعوبات تواجهني في المهام التعليمية .				
43	أثق في قدرتي على فهم محتوى المقرر بشكل كبير.				
44	أتوقع أن مستوى أدائي في المهام التعليمية ممتاز.				
45	أعتقد أنني أمتلك المهارات المطلوبة في أداء المهام التعليمية..				
	الاتجاه نحو تقنيه الويكي	**دائماً**	**غالباً**	**أحياناً**	**أبداً**
46	أرى أن التعامل مع تقنية الويكي سهل الاستخدام .				
47	أجد أن التعامل مع تقنيه الويكي ممتع.				
48	أجد أن تقنيه الويكي ساهمت في تطوير ادائي التعليمي.				
49	أرى أن تقنيه الويكي ساهمت في فهمي لمحتوى المقرر.				
50	أرى أن تقنية الويكي ذات فائدة قيمة في العملية التعليمية .				
51	أمتلك شعور ايجابي نحو استخدام تقنيه الويكي في التعلم.				

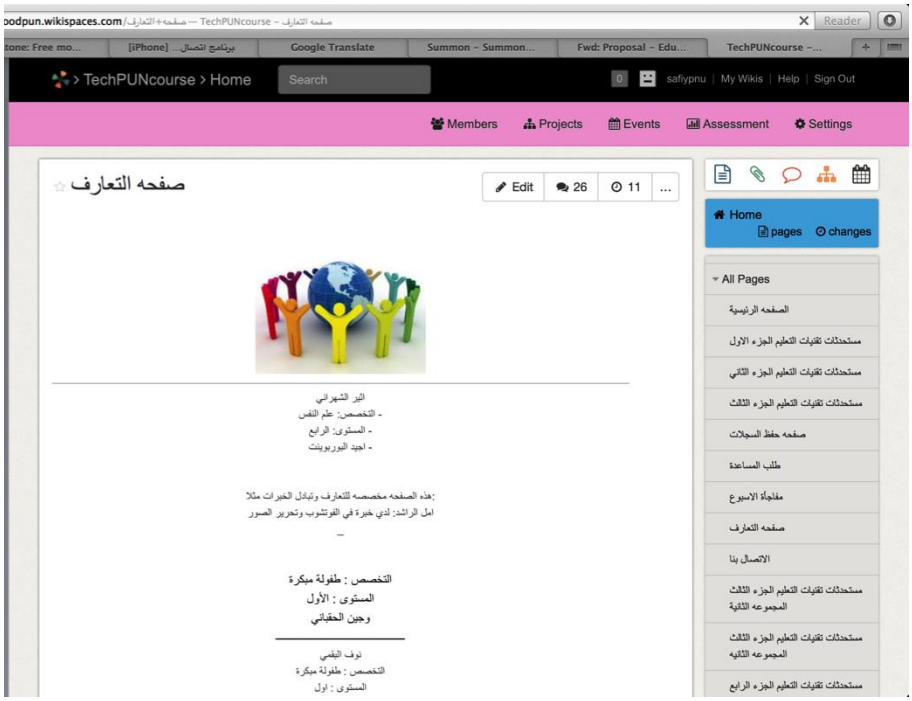
Appendix 11: Screenshot showing a register of logged-in learners who had joined the wiki page in both groups





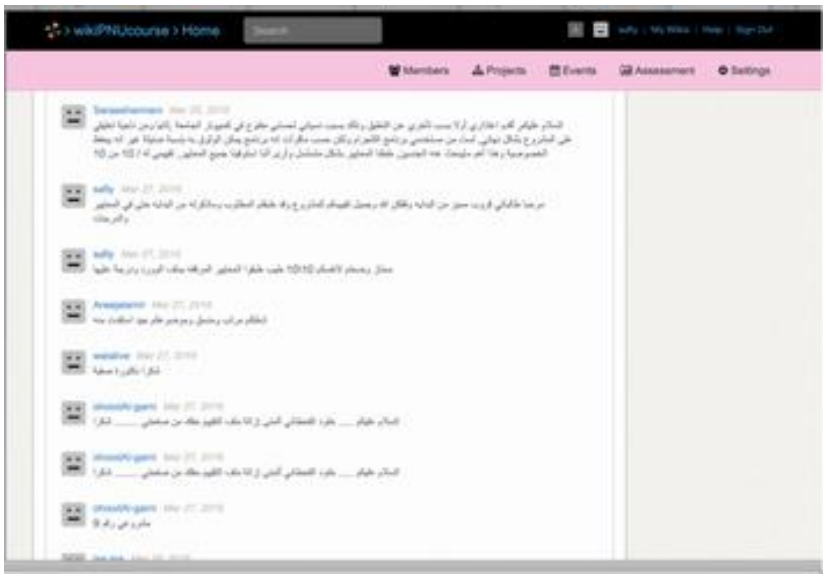
Appendix 12 : Screenshot of one student's messages sent and edits made to course content to demonstrate high levels of activity on the site

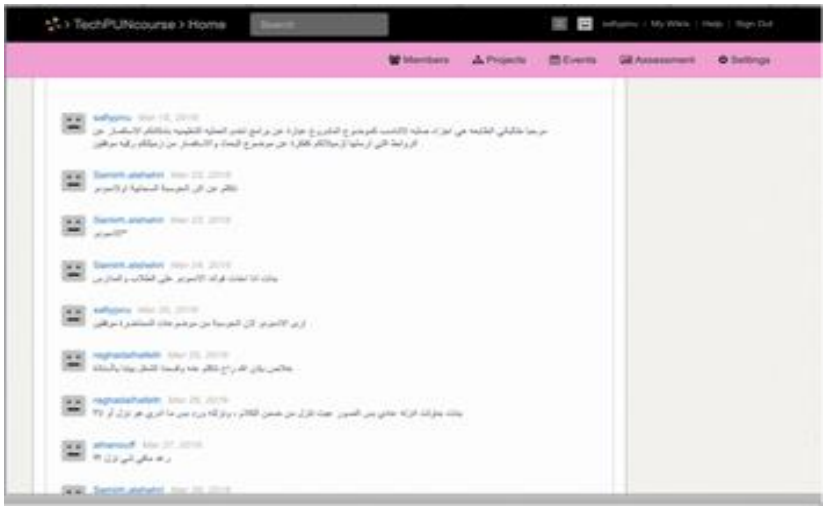




Getting to know you page:
Students write their names and their level of experience which may benefit others e.g. "I have experience of working on computers. That might be good for other students who need help in this area or if anyone has any questions."

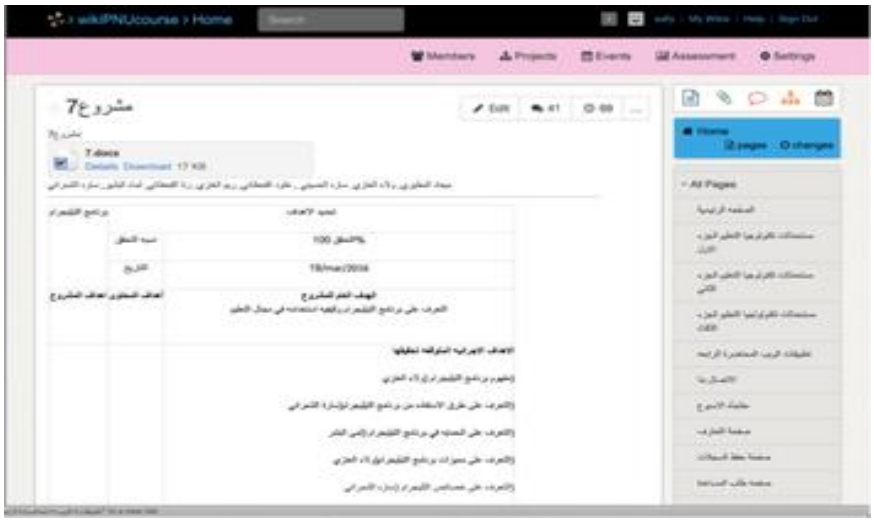
Appendix 13 : Screenshot from two groups as an example to show the interaction between students and the teacher (messages).

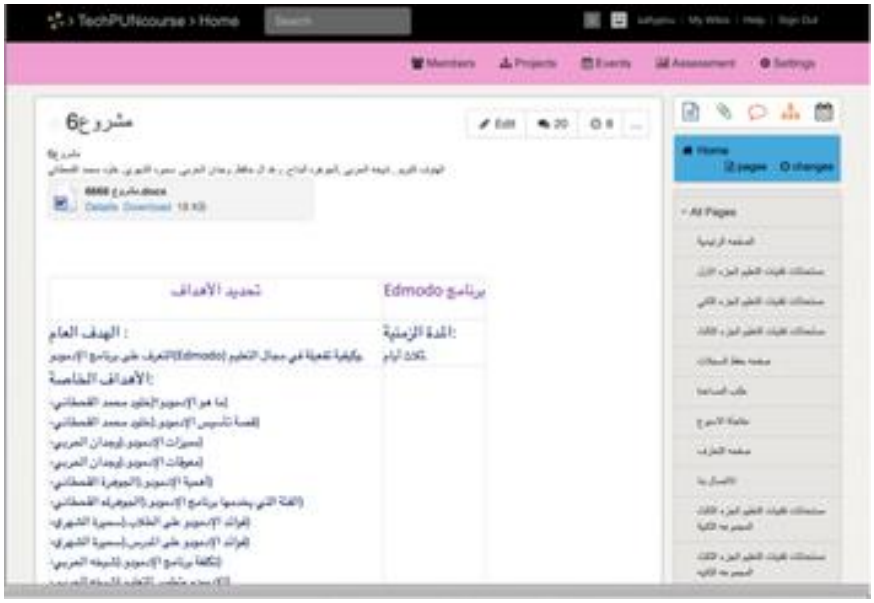




As seen in this screenshot ,the researcher's user name was "Safiy" or SafiyPNU, and the researcher and students posted and received many messages on the topic of their Education Technology module and messages, asking for advice on specific learning tasks.

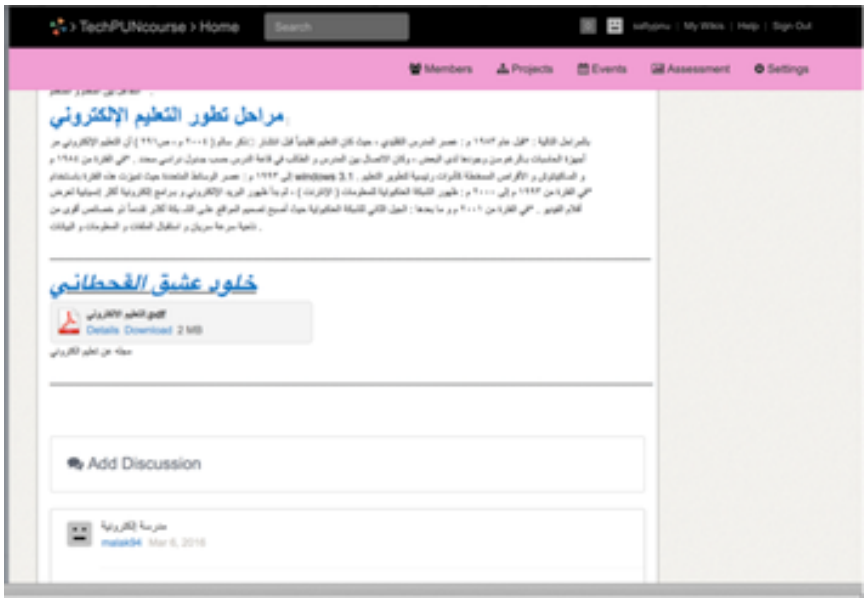
Appendix 14: Screenshots of students' messages sent to complete tasks (group 1 and group 2)



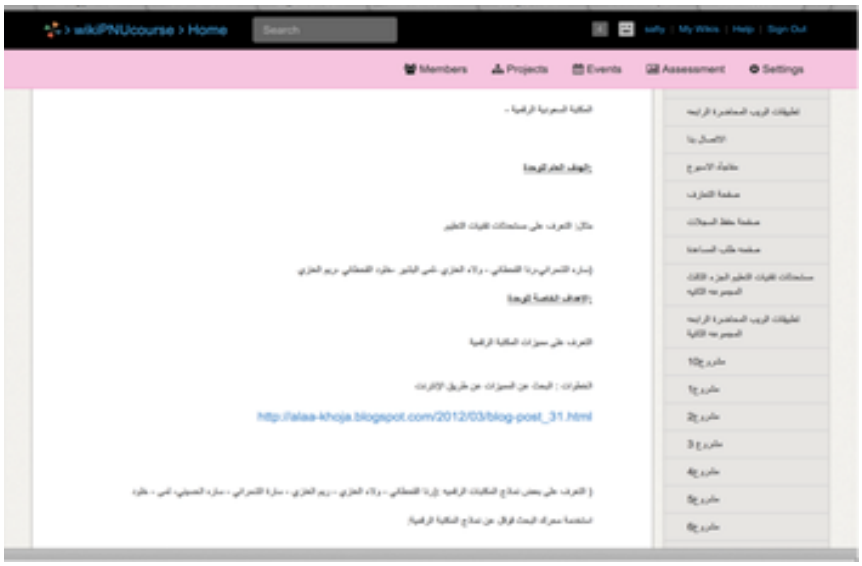


These pages are an example from two groups including "name of the project" , "name of students" and under the name of each student, the part of the project she was assigned to, the aim of project , the goals of the project, the plans , the allotted time and the content of the project .

Appendix 15: Screenshot to demonstrate how students regulate their knowledge construction

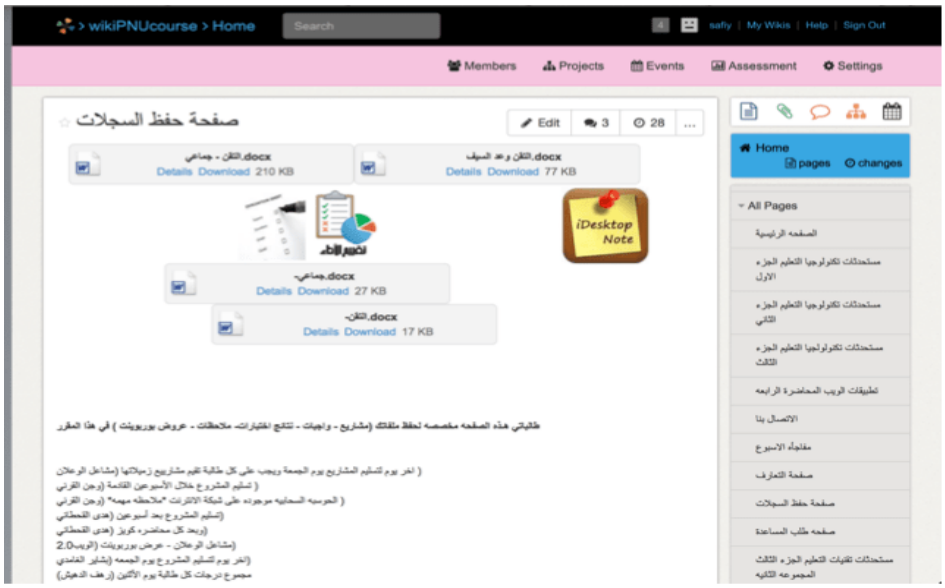


This page includes the specific goals, plans, allotted time and the content built by learners . Also there was a file upload from learners which enriched the content.

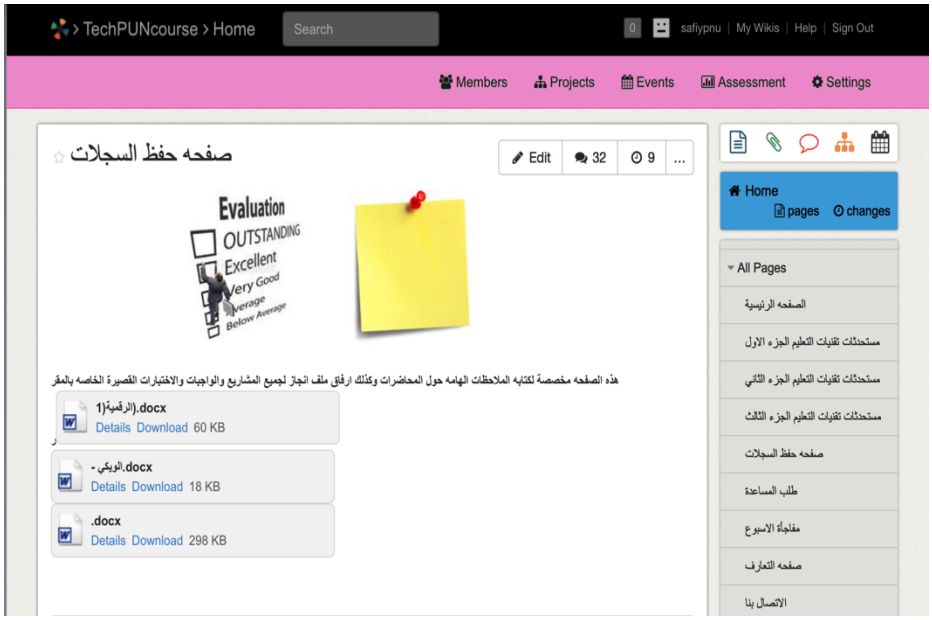


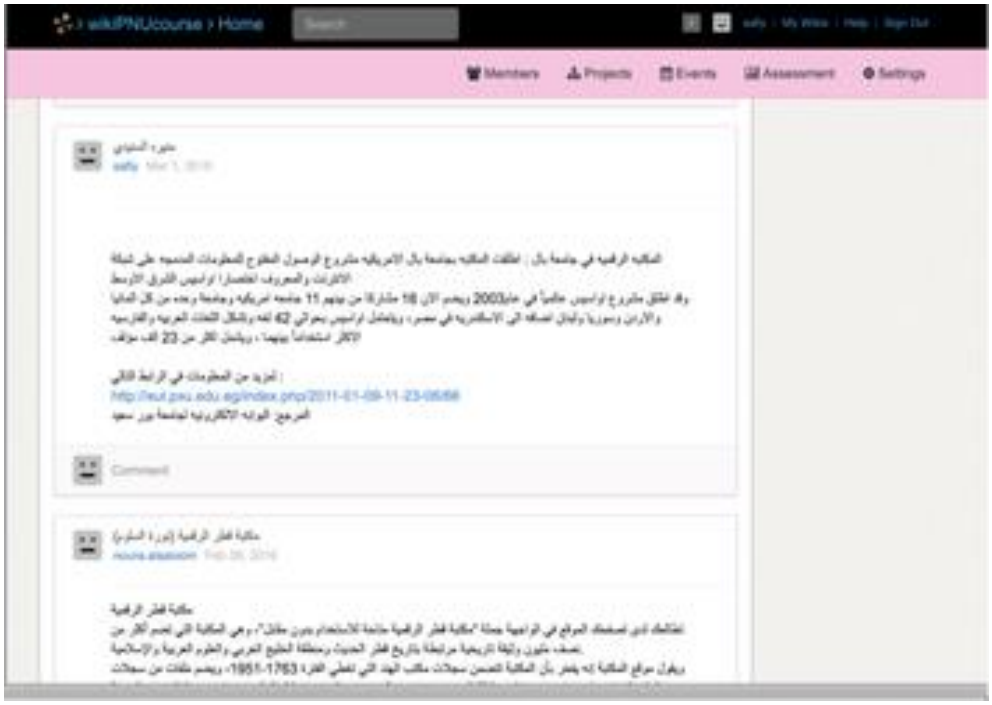
This page includes the specific goals, plans, allotted time and the content built by learners. Also there is a link to an upload from learners which enriched the content.

Appendix 16: Screenshot - a further example of the wiki page design used



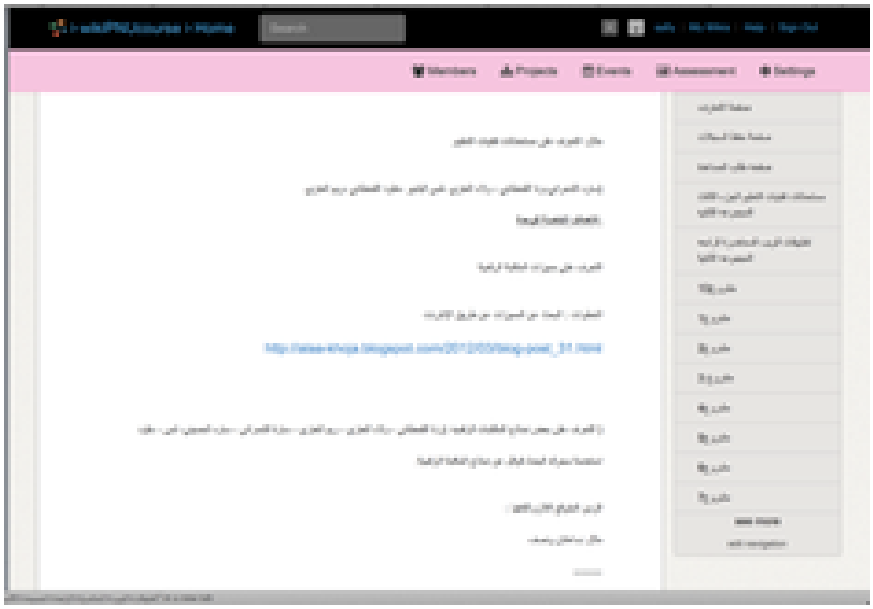
Contents of page:
Record-Keeping-page including students' own files and advice on taking notes for students as well as notes made by students themselves.

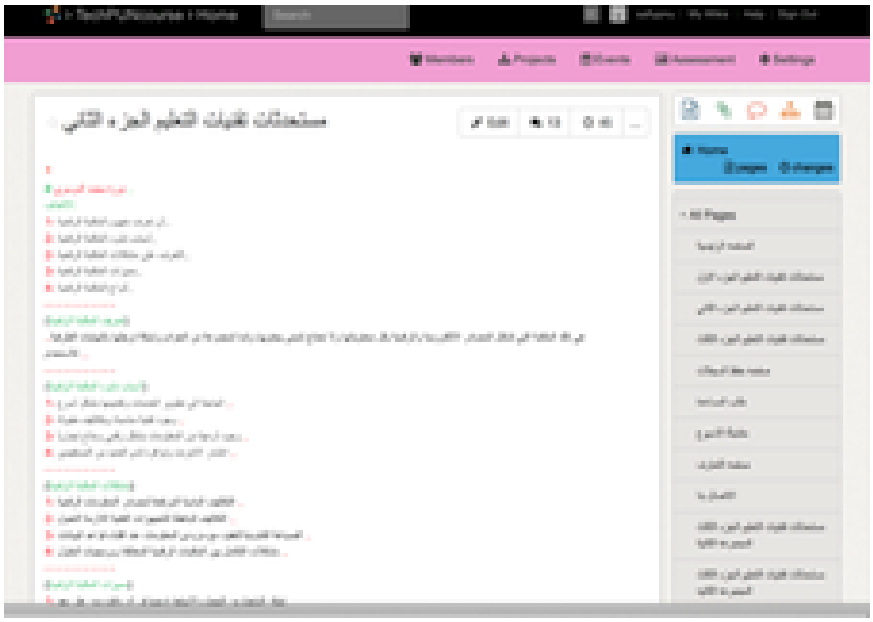




This page includes a summary of information about the content of the module which was searched for and built by learners after discussing with each other as a part of the task.

Appendix 17: Screenshots of students' messages sent on the topic of a completely individual task (student-built content of the Education Technology course) (group 1 and group 2)





Appendix 18: Models

In the current study various models were reviewed by Britain and Liber (1999; 2004); *the DialogPlus project* (Conole et al, 2004); e-learning ladder (See Moule, 2007); e-tivities, and e-moderating model for learning and teaching online (Watts, 2010).

The framework created by Britain and Liber (1999, 2004) was designed to facilitate resource negotiation, adaptation, self-organisation, monitoring and individualisation. These elements captured in Britain and Liber is (1999 , 2004) model are vital criteria for this study as it allows for networks of people to be brought together within organisations such as higher education institutions. However, the model lacks the focus on the *social* element that the researcher needed to demonstrate in this study.

The DialogPlus project (Conole et al, 2004) places emphasis on the desired *social* interaction between students and teachers. Unfortunately, this model focuses also primarily on learning outcomes and goal setting associated with course content, which is of course vital. In addition to these models is the e-learning Ladder developed by Moule (2007) which actually addresses the perceived weakness of Salmon's five-stage model. This model allows for diversity in learning activities including technology and face-to-face based learning. Like the five-stage model, the e-learning Ladder model is a model for developing online learning. However, unlike the five-stage model, which was designed for Open University, the e-learning ladder was developed for a campus-based institution. As such, it may not be suitable to be applied in this study which focuses primarily on distance learning.

Appendix 19: Topics covered on the Education Technology course

N	Main topic	Sub-topics
1	**eLearning**	- eLearning definition. - Principle of eLearning - Advantages and disadvantages of eLearning. - Virtual learning concept. - Virtual university concept .
2	**Digital library**	- Concept of digital library. - Reasons to create digital library. - Advantages of digital library. - Example of international digital library. - Saudi digital library
3	**Internet and network**	- Network concept. - Search engines - Google engines - Applications of Google
4	**Web 2.0 tools**	- Web2.0 tools concepts - Different between web1.0 and web2.0 - Advantages of web2.0 tools. - Application of web2.0 tools: YouTube, twitter , RSS, blog and Facebook.

Appendix 20: Students' Example Interview Transcripts

The following questions were posed to all students who took part in the interview including the prompt list questions. Please take the following as an example of the kind of responses that were provided by the students who took part:
It should be noted that students were asked to sign a consent form regarding their interview that took place inside room 22 on the university campus, within the Education Technology department**.**

Interview 20
Interviewer: Safyah aldayel
Students ID: 438112
Place: Interviewer student get education technology module at education technology at department **–** school of education-PNU.
Qualification: undergraduate – second year.

Interview IW20

Question 1: *Over the 6 weeks working with wiki technology on the Education Technology course and taking on the responsibility for your own learning, what is your attitude towards using wiki as a learning environment?*

It is a good approach because it is different from the traditional approach, and it enhances the process of learning. The wiki is easy to use and flexible, and provides a space for discussion and communication between students themselves and also with the lecturer. This supports peer learning. Also, there is the ease with which videos and images are added to the wiki. Also, the student can easily perform learning tasks individually or in a group, the student's ability to monitor their performance in learning tasks and the ease with which a lecturer can monitor the student's performance in learning tasks. Sometimes teamwork causes confusion and disrupts the work of the group. Take, for example, what happened to me personally when I was a member of a group doing a collaborative project (in the traditional system). During that period, I encountered a particular issue shortly before the deadline for the collective project and I could not complete my part of the project. This of course affected all the group members and their assessment scores, because of me. The other students had to pay unfairly for my mistake. But the situation in the wiki is different, as the lecturer can monitor and assess the students' performance individually and in a group.

Question 2: from your experience, *What does the concept of self-regulated learning mean to you?*

Define it using your own opinion or experience.

It is when a student depends on themselves to learn in their own way, where they have to search and decide what information they need, and where the lecturer takes on the role of a guide.

Q3: *Do you think using wiki as an online environment enhanced your self-regulated learning skills?*

Yes, of course.

Question 4: *If yes, please tell me what the skills are that you think you have enhanced after using wiki learning?*

The wiki has helped improve time management, the organisation of learning tasks and self-evaluation. The wiki also supports free learning, the search for different forms of information and video clips. With these topic-related learning tasks, and the practice of applying the skills of independent learning to solve them, I was able to manage and complete the final curriculum project via wiki. This was done by specifying the goals, steps and duration before starting it. I have noticed that the wiki has affected my academic achievement (tasks), as my grades were higher.

Q5: *Based on the 6 weeks working with wiki learning on the Education Technology course and using this way of learning, how can you develop these skills (self-regulated learning skills) in this way? Explain in detail please.*

For example, it improved the assessment skill as evaluation criteria are available on the wiki page, the students had the ability to assess the performance individually and in a group. It supports peer learning, as the wiki has a place for discussion and communication between students, and between students and the lecturer. Also, provided learning tasks have contributed to making the student self-dependent in learning and makes students able to choose their preferred method that is right for the task. The lecturer, on the other hand, takes on the role of a guide. With these learning tasks, and the practise of applying the skills of independent learning to solve them, the results were applied to the process of managing and running the final project of the curriculum on the wiki page. (as I said before).

Appendix 21: Prompt list

Num	*List*
1	*Can you give me an example ?*
2	*Tell me a bit more about that.*
3	*Why do you think that?*
4	*Could you give me the reasons?*
5	*Could you tell me how?*
6	*What do you mean?*
7	*And then…?*
8	*How did you develop your own time schedule via wiki?*

Appendix 22:

Research planning and time management for Data Collection in Saudi Arabia

Month/ Year	Actual Planning Activities	Limitation
Feb 2016	Go back to Saudi at the beginning of February. Start doing my data collection Make and confirm appointments.	Not applicable at the moment
March 2016	Data collection + Teaching Start doing data analysis, as first stage: Pre- questionnaire, pre-test of knowledge content of education technology course Second stage: recording observational data + weekly test Third stage: post questionnaire + post interview ** Skype meeting with my supervisor	1 week break for most universities in Saudi.
April 2016	Doing my data collection + Teaching + recording observational data + Questionnaire + interview	Final exams in most Saudi Universities
June 2016	Going back to United Kingdom, Send first draft report to my supervisor	Public Holiday in Saudi

Appendix 23: PhD time plan

Name of Task & Year	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter		
1st Year 2014-2015	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Read in Literature Review												
Write in topic research after specify												
Research Methodology												
2nd Year 2015-2016	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Prepare for Upgrade												
Work trip: Data Collection												
Data Analysis												
3rd year 2016-2017	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Data Analysis												
Revising the Literature												
Discussion of the Finding												
Research Recommendation												
Writing up the Dissertation												
Submit First Draft												