EVALUATING STUDENTS' PERSPECTIVE OF THE VALUE OF WORK PLACEMENTS AND SIMULATION-BASED LEARNING AS ASSETS FOR VOCATIONAL HIGHER EDUCATION

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Abstract

The challenges confronting students in higher education in today's competitive environments have highlighted the importance for graduating students to feel competent and prepared for practice. In vocational disciplines such as nursing and engineering, the significance of student work placement experience together with other elements of 'real-world' practice built into the courses are especially crucial in terms of achieving readiness of the new graduates for employment. This paper is based on the authors' experiences in two separate scholarship funded international projects beyond the context of the United Kingdom in nursing and engineering. The aim of the paper is to explain the significance of the nature and quality of student work placements and simulation-based learning as on-course practical activities in the two disciplines, demonstrating how the innovative implementation of active learning methods affect student motivation. Using student focus group discussion, the first author collected data in Singapore in the period between July 2012 and October 2013; and the second author collected data in Australia, North America and Continental Europe from September 2012 to January 2013. Work placements, albeit in different parts of the world and in very different disciplines; health and engineering, are regarded as important by students as a vital platform for linking theory to practice. While work placement environments are important for developing students' confidence and organisational skills and hence motivation to learn, effective learning occurred best when they were complemented by appropriate on course pedagogies, and placements were supervised by individuals with good disciplinary knowledge and at the same time, proficient pedagogic skills to guide students.

Keywords: engineering, clinical supervision, formative feedback, nursing, simulation-based learning, student motivation, work and clinical placements.

1 INTRODUCTION

Work-based learning has long been a feature in higher education in the United Kingdom, and this was particularly important for vocational disciplines such as nursing and engineering. Since the 1950's, undergraduate programmes in engineering and technology have introduced various forms of work placement in a wide range of subject areas based on the National Council for Technological Awards.[1] Similarly, when nursing education moved into UK Universities in the 1980's, the discipline continued to incorporate work placement in all undergraduate programmes[2], more commonly known as clinical placements.[2] Clinical placements are important component in nursing education, and they therefore, occupy 50% of the entire curriculum. In some UK engineering programmes, placements are optional, and in others, they are compulsory. Yet many of the old established universities do not include placements. The most common placement patterns for engineering in the UK today are U:U:P:A (4 year course) or U:U:P:U:U (5 year course) where U represents a year of University study and P represents a year-long placement in industry. These are commonly known at 'thick' sandwich courses. In some, however, the structure is similar to nursing programmes which were specially developed and offered to individuals to meet both academic and professional development objectives in parallel. In these cases, placements are compulsory and shorter placements are interspersed throughout the entire undergraduate programmes. This style was more common in engineering during the 1970s and referred to as 'thin' sandwich courses. These became less popular when fewer industrial placements were available during the contraction of the UK manufacturing base, but they are now making a comeback, mostly as integrated courses at master degree level. In other parts of the world, engineering degrees commonly incorporate shorter internships.

Otherwise, the interspersing of work placements with theoretical components in higher education did not change very much since its implementation. This was a result of the perceived benefits of learning

from work experience, which includes but is not limited to developing student personal and social skills, communication, problem solving, creativity and organisational skills.[3] Critically, work placements were believed to provide students with good opportunities to link theory to practice such that any complex concepts learnt in class could be reinforced for deep learning.[1] In addition, students who had work placement experience have been demonstrated to be advantaged in the labour market because employers hold positive views about them.[1]

Despite the assumed benefits, placement shortages, together with increased student numbers have sometimes led to the persistent exclusion of placements. but may have simultaneously contributed to a greater emphasis of on-course activities and there has been significant innovation in pedagogic methods to provide for the special needs of vocational courses, not least because of the availability of new teaching technologies. Consequently, large investments have been made to increase opportunities for hands on education, for example in simulation-based learning (SBL). Purpose-built simulation laboratories have been created and a range of low-tech simulators to expensive high-fidelity simulation tools are used to provide virtual reality for learning.

High fidelity SBL involves the use of '...a person, device, or set of conditions which attempts to present educational and evaluation problems authentically' has been widely used in medical education.[4] In nursing, from the early 2000s, full-scale high fidelity simulations using full body-sized human patient manikins (HF-HPSMs) programmed with actual medical equipment and supplies were used to provide physiologic responses to participants' actions in a realistic environment.[5] While the term SBL is not very commonly used in engineering, the discipline has, like nursing, striven to provide a firm grounding in the relevant scientific principles and technologies, while inculcating appropriate methods that enable graduates to tackle "real world" problems with creative yet practical results. Indeed, the best engineering degrees was believed to have the capacity to achieve the right balance between scientific and technical understanding and their practical application to solve real problems.[6] Students are motivated and engaged by industrially relevant course contents which should be integral within every undergraduate engineering course. Industrially relevant course content and large scale industrial simulation help students to link theory to practice, therefore, enhancing student engagement and improving retention. In terms of simulated industrial experience, the style of implementation varies widely, for example; at Aston University, Chemical Engineering spend time in a pilot plant and make an annual industrial visit; in Civil Engineering; the Constructionarium is a hands-on six day Civil Engineering construction experience, where groups of students take control of a construction site, in association with an industrial consulting engineer; while in mechanical and manufacturing engineering, the Loughborough (University) Teaching Contract is system of simulated industrial projects that operate within a university environment.[6] In general, engineering, students who had long been exposed to advanced computing tools have been, in recent years, introduced to more advanced and sophisticated manufacturing technologies and interactive 3-D simulation in virtual laboratories.[7]

Apparently, simulation laboratories have been used in conjunction with work placements to enhance student learning. In both nursing and engineering disciplines, many research studies had been conducted to investigate the benefits of the two approaches and also to determine how SBL could replicate reality. These were evidenced in a literature review of SBL and work placements in nursing[8, 9] and some empirical studies in engineering.[7, 10, 11] However, many of these research studies tended to focus on each approach separately rather than the way how each supplemented or complemented the other for learning. Given the case, students' perspectives as to how the two were simultaneously employed to motivate learning were certainly not explored. This was despite the fact that motivation in education has been a research interest of many since the 1930's.[12]

1.1 Motivation in education

According to the self-determination theory, it is when the 3 basic psychological needs for autonomy support, competence, and relatedness are satisfied that a learner becomes more motivated and self-determined.[13] The autonomy support was specifically the granting with an optimal degree of volition and sufficient opportunities for choices in learning. This support for autonomy, when satisfied by the teachers, would then lead to greater motivation and reduced anxiety[14] and consequently, students' perceived competence. Indeed, an autonomy-supportive environment was found to have similar effects on students' perceived competence,[15] which, in turn, improved self-efficacy and resulted in enhanced academic motivation and interest.[16] As for relatedness, it was about students' feeling accepted and valued by their peers and instructors, and studies demonstrated that students who perceived their contributions valued in their learning environment experienced a heightened sense of enjoyment by being able to attach greater value to an assigned task.[17]

Apparently, when all three psychological needs were satisfied, students' motivation would shift from one being depending on extrinsic regulation based on reward and avoidance of punishment to become more intrinsically self-directed and regulated, that learning was based on interest and enjoyment.[18] In view of the understanding on how students were motivated on learning, any educational strategies should be carefully put in place to help students achieve satisfaction in all three psychological aspects.

Autonomy or self determination is clearly an attribute that is particularly desirable in vocational graduates. Intrinsic motivation is considered to be self-determined motivation.[19] Movement across the motivational continuum toward intrinsic motivation takes place through internalisation, a process in which individuals attempt to reform their activity, or their perspective of it, in such a way that it can be perceived as aligning with the sense of self.[19] As the individual begins to value the activity and become more self-determined in their motivation, any external rewards or prompts become less salient. Hence, the overriding needed to provide on course and placement activities that are both stimulating and, moreover truly valued by the students.

Competence relates closely to the construct of self-efficacy and "refers to one's propensity to interact effectively with one's environment and to experience opportunities to exercise and express one's capacities".[20] This view of competence aligns with other motivational views, such as the expectancy-value theory[21] and is a widely-used motivational construct.

1.1.1 Research questions

This study explores the way work placement and simulation based learning impacted on students' motivation. Based on students' perspective, it attempts to answer the following research questions:

i. How did work placements satisfy the basic psychological needs of students in motivating learning?

ii. Were simulation-based learning as in-course activities of value in enhancing the satisfaction of the basic psychological needs of students

iii. How do work placements affect learning in the nursing which manages human care differ from engineering which involves machines and systems?

2 METHODS

2.1 Setting and participants

This study used a qualitative approach based on focused group discussions. The study design was based on the assumption that perceptions on a defined thematic area of interest could be obtained in a permissive, non-threatening environment.[22] This methodology was considered the most appropriate in this study. The choice of a 'convenience' sample for the student groups was made on the basis of practical and ethical considerations. All nursing students of the main provider of pre-registration nurse education in Singapore were invited by the first author to participate in a focus group discussion. These students were attending their clinical placements in a tertiary hospital in the period between July 2012 and October 2013. A total of 9 nursing students (4 final year and 5 year two) volunteered to participate in a 2 hour focus group discussions.

Similarly, engineering students from various years were invited by the second author to participate. The second author conducted the focus group discussions in Australia, North America and Continental Europe from September 2012 to January 2013. A total of 87 engineering students were interviewed at 9 universities

2.2 Ethical Consideration

Ethical approval was obtained from the various institutions and the ethical review committee of the Universities the authors are affiliated to. The purpose of the study was explained to all participants whose informed consents were obtained. All participants were made aware that data collected would be anonymised and kept confidential and participants could withdraw from the studies at any time.

2.3 Data Collection

The focus group discussions by students were held in placement areas in a quiet room. The discussions were carried out without any interruptions. They were digitally recorded and transcribed. Both researchers generated discussions by introducing statements which corresponded to the research questions.

2.4 Data Analysis

Focus group interviews were transcribed for content analysis. Themes were identified and coded based on the 3 basic psychological needs of motivation and their relationships identified and explored. The themes were re-read a few times by the two authors, interpretations were checked several times to check for further emerging concepts or relationships.

3 FINDINGS AND DISCUSSIONS

Initial analysis of the focus group discussions and observation data focused on the extent to which learner becomes more motivated and self-determined in learning via autonomy support, competence, and relatedness. The discussions based on the summary data of these three aspects are presented below.

3.1 Autonomy Support received in motivating learning

Students generally agree that time on placements were positive experiences. Indeed many students recognise work placements as a key motivator for learning. While nursing students claim that the busy clinical environment had provided them various opportunities and options to reinforcing a set of clinical skills which they have acquired in a simulation environment.

One nursing student expressed with excitement that clinical placements as to how the various options to choose from reinforcing a set of clinical skills had widened her view about nursing, which otherwise, was not known based on classroom learning. Students generally felt that they were encouraged to learn also because the clinical instructors were very supportive and allowing students the opportunities of choice of patients care based on the different diagnoses and the lecturers when supervising them in clinical placements seemed to focus more on learning than assessing. In this regard, students felt that the positive learning environment was created in which they felt well supported for their learning, and hence, motivated to learn.

Having said that, nursing students who were in their first year of the programme or were new to a placement felt that opportunities for learning, which were readily available, could be missed because of the stage of the programme they were at. Nursing students generally felt that the strict rules about the need to have passed a set of clinical skills based on SBL in school before students were allowed to use the skills in clinical, limited their choices and restricted learning. These inevitably introduced some negative learning experience.

> *"sometimes, I know I can do a certain skills and just because we had not had a SBL session we were not allowed to practise on real patients. This always kills my enthusiasm in wanting to learn about that skill when it was time I am allowed to do it*." – Year 2 nursing student.

Another student added:

> "*I feel that as a final year student, I should be able to be given a little more challenges to carry out the tasks*" - Year 3 nursing student.

While nursing student felt that they were not trusted with clinical responsibilities, which they had neither prior SBL or clinical experience, in contrast, engineering students were encouraged to have firsthand experience on placements and learn from it within a supportive environment. They are given real responsibilities and work under the same conditions as other employees of the company.

A year-3 Loughborough university materials engineering student on placement at Rolls Royce plc commented, *"while on placement, I've learnt several technical skills, some of which were not taught in school. By doing so, also learn other skills which can help you in every job, for example communication …….. and while I've been on placement I've had a tutor from my department who is one of the full time lecturers …… she has visited me three times and on the last visit I had to give an oral presentation to her and to some of my colleagues here at Rolls Royce."* He added *"I've gained a*

broad understanding of engineering while on placement and, in particular, where materials fit in with other disciplines,"

It was evidenced that the findings amongst nursing students was mixed; while needs for autonomy support was perceived to have been satisfied by the lecturers in clinical placements, students experienced a limited degree of volition and sufficient opportunities for choice within clinical learning. Although adopting a calculated risk-taking attitude is critical for successful learning,[23] this was less encouraged in nursing than in engineering. Engineering students were quick to point to their need to be allowed exercise creativity because it proved a strong motivator for most. Creativity was a prominent feature of some on-course design engineering exercises although these were not universally welcomed. Some had apparently found this element particularly difficult and so it became a demotivating force but those students were quick to point to a perceived lack of tutor support. In contrast, when students are on placement under the direct supervision of a company engineer, they normally find strong motivation and eventually become autonomous learners.

In this respect, clinical placements with strict rules imposed to safeguard healthcare practice had inevitably impeded the opportunity to enhance student autonomy in choices for learning. This had then led to a negative impact on their motivation in learning. It should be emphasised that teaching be conducted at the time when students are ready to learn. Therefore, it was important that opportunities for learning in clinical placements for nursing students be made readily available especially when support for autonomy was deemed as important key to motivate learning.[13, 14, 15] Instead of depriving students the opportunity for learning, nursing instructors and or nursing lecturers should make best use of the learning context to impart the clinical skills, especially when opportunity for acquiring the skills was not always readily available. Otherwise, while mechanical students enjoyed a sense of autonomy support, nursing students on the contrary would continue to be deprived from a full sense of having these psychological need met which was important for motivating their learning.

3.2 Competence achieved for motivating learning

Many students enjoyed SBL in educational settings and felt that it provided a good platform for them to practise. There was general consensus that SBL helps students to perfect a set of skills to reach the required competent level, which they then, perceive as an important motivator for learning more complex skills.

> "*The SBL in the ordinary lab is good for me to practice my clinical skills, and the more I do, the more I want to do it*.... once I know I can perform a clinical skills with no mistakes, I know *I am ready to take the test and then progress to learn new skills*" – Year 1 nursing student.

Another nursing student added that SBL in the form of high fidelity had further motivated her learning of more complex clinical skills, all of which were useful in preparing her for real world experience in work placements.

> "*I particularly liked the high fidelity SBL because it helps me to polish my nursing leadership and management skills, and gave me the confidence to work in clinical area where I could then learn more*" – Year 2 nursing student.

Apparently, engineering students shared similar experiences:

> *"I feel more motivated to work hard, motivated when":-*
>
> *"…. the topic engages my personal interest, employs relevant skills to an industry and professional standard"* - Year 1 engineering student (RMIT, Melbourne).
>
> *"…. I could see how it was relevant and the importance of it".* - Year 1 student (Central Queensland University).
>
> *"…. "when I can see a real life application for the course"* – Year 1 student (ITS, Portugal).

However, despite the above positive findings of SBL, there appear to be a recurring theme amongst the nursing and engineering students that work placements rather than SBL were a better marker for affirming students' competence and hence motivate them in learning.

> "*In simulation learning, I can practised a certain clinical skills repeatedly, however, it is robotic...the lecturer can create different scenarios but somehow I knew what was coming, but in clinical, the patients' response to my care might be different from expected....like it is totally*

different from what text books say. So if I can mange that care, I felt really great that I have achieve something, - this make learning nursing very interesting for me"- Year 2 student nurse.

While that was the case, some nursing students had explained that their motivation for learning was highly attributed to competence of their clinical instructors and the availability of timely feedback by nurse lecturers.

"*I am able to learn better from staff nurses who show confidence in their work, and I am certainly more inclined to learn when the lecturers were there to explain things to me...a staff nurse who is good at clinical skills may not be the best person in helping students link theory to practice.* " – Year 2 nursing student.

Similar perceptions were obtained the engineering students.

"I am better motivated……"

"when the topic is delivered by a teacher that makes me feel equal in the classroom and not like a child." - Year 1 engineering student (RMIT, Melbourne).

"if my teachers show they understand my difficulties" - Year 1 student (ITS, Portugal).

Engineering students, discussing their SBL projects also regularly commented like this:

"we can always tell when a lecturer has real experience" - Year 3 student, University of Queensland).

Based on these findings, it was important to appreciate that simulation-based learning could help to increase students' competence in a certain set of skills, however, these were limited to task-orientated in nature.[24] This was the case even in high fidelity SBL which was introduced to replicate the real world, that it has not optimally satisfied students' needs for competence. It was evident in this study that SBL might have motivated learning but to a limited extent. The most powerful experiences from this study, appeared to occur when use of practitioners' expertise are incorporated in the learning process in work placements.

In view of this finding, it was important that work placements were introduced to continue stimulating student motivation in learning. In other words, SBL would not be ideal to replace work placements. It should always be considered as an optimal complementary element of placements, this which should always be sought by academics and offered by practice colleagues for student learning. Also, if quality practices were expected to perpetuate in the real world, students' motivation to learning ought to be kept high by appropriate expertise in work placements. For example in nursing, a nurse lecturer should follow up closely with feedback on a performance which had been carried out by experienced nurses who might not have good understanding of pedagogic approaches to guide and support learning. Such close collaboration between lecturers and practitioners should be sought in the same way as observed in engineering; for example, Loughborough University's mechanical engineering students undertook significant university coursework and are visited at least three times by an academic mentor while out on placement.

3.3 Relatedness perceived for motivating learning

This final aspect of the psychological need for motivating learning was closely related to the other two previously discussed. For example, students felt that they were highly valued by the placement staff for their competence when autonomy of support was received; when they were asked to bear responsibilities at work placements. This was clarified by a year 1 student as follows:

" *when a staff nurse supervised me to perform a task which had not been taught in SBL in school, I felt really great that I was trusted, it also tells me that I am good at my skills – it is not the same having the nurse lecturer telling me I am ok. Somehow placements had the effect on me that I want to learn more* " - Year 1 nursing student

Many students generally saw placements more an environment for learning compared to the simulation laboratories at university. Students felt that the autonomy of support was more genuine based on the responses from practice supervisors and more important, from patients who received the care.

> "*In clinical placement, we can really tell if we are good at a certain set of skills, because the patients who receive the care will tell us, even if they don't we can see from their facial expressions, and the smiles from them really make me want to do more and learn from the patients...it's kind of different from scoring a high mark in exam"* - Year 1 nursing student.

Another year 3 nursing student added:

> "*the praises we received from the nursing staff and patients somehow were more affirmative of our clinical skills, well at least for me, I know I am ok at a procedure that I will then be looking forward to doing more procedures on real patients*".

Practice and acceptance by individuals in practice were equally viewed as important for motivating learning amongst the engineering students.

> *"I am more motivated when there are really inspirational people around me."* - Year 1 engineering student, (University of Queensland).
>
> *"I am particularly well motivated by group tasks and field trips*" - Year 1 student (University of Minho, Portugal).

In essence, work placements learning experience had provided students with the opportunity for feedback that students consider more meaningful than marks and grades. Generally, students were eager to work with their future colleagues and to seek affirmation from them. In terms of nursing, students were also motivated through their interactions with patients, who were on the receiving end of student performance and students considered their patients as the critical persons affirming their skills and knowledge. Similarly, in engineering, placement students were very often required to work with their company's customers or suppliers and saw them as important critics. In general, students tended to value placements more than SBL because, their competence could be reaffirmed by people they considered as critical and hence perceived by students. As such, students' self efficacy was likely to improve along with improved academic motivation and interest.[16] Also, there was much anecdotal evidence to suggest that engineering students who take optional placements actually achieve higher degree classifications. There was general consensus from both nursing and engineering students that they wished to have extended period of clinical placements which they saw as invaluable for the application of theory to practice within an environment where they could start building rapport with their future colleagues for career enhancement. This finding in both disciplines may not be surprising, because when all three psychological needs are satisfied within placements, the theory suggests that motivation is likely to shift from extrinsic to the more desirable intrinsic nature.

4 LIMITATIONS/STRENGTHS

Each focus group was limited to a small number of students. The reliability of focus group discussion might have been influenced by peer pressure.[20] However, since the views of individuals were expressed in a larger social context, the data that emerged from the groups includes both individual elements and collective elements, all of which served as useful fundamental units for analysis.[20] In essence, the findings of this study provide insights into students' perspectives and could inform future research on placements and student learning motivation, especially in these two disciplines.

5 CONCLUSIONS

Effective learning in work placements were shown to be effectively complemented by simulation based learning as on-course activities. The former, however, appeared to be the more important aspect in learning for developing students' confidence, organisational skills and also improving motivation to learn. In essence, work placements were generally perceived by students as superior to SBL. The current study demonstrated that work placements can meet the three psychological needs for motivation for learning in both disciplines. Nevertheless, in nursing, owing the fact that many aspects in placements were governed by rules and regulations to safeguard patient care, the autonomy of support for learning choices experienced by nursing students were less liberal than those experienced by in engineering.

Also, this study suggested that engineering students could achieve a high level of confidence in placements relatively easily, however, clinical placements were good for motivating learning only if nursing students were expertly guided in practice. The nursing students were motivated to learn only if they received supervision from clinical nurses who could offer themselves as good role models to impart disciplinary skills and at the same time from nurse lecturers for proficient pedagogic skills to help link theory with practice. The Singapore research project demonstrated that student motivation to learn demanded close collegiate collaboration between nurse teachers and clinical staff, to supervise and support students in the clinical placements.

6 ACKNOWLEDEGMENT

Both authors thank the Higher Education Academy for awarding the International Scholarships and all participants for taking part in the studies. They would also like to thank all the staff of the many overseas institutions who allowed access to their students and facilities, as without their assistance and hospitality, this research would not have been possible. The first author specially thanks personnel from Nanyang Polytechnic: Dr Chan Lee Mun and Miss Wong Luan Wah and Deputy Nurse Director from Tan Tock Seng Hospital: Miss Puah Lay Hoon for giving permission to access the students in the higher learning institution and clinical placements respectively.

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