

Supporting Research Informed Teaching using a Mobile Application

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A repositioning of research within teacher education is vital to the profession. Supporting teachers becoming active agents and producers of research within their school settings, is pivotal to their professional development and the development of the teaching profession. In this chapter, we present how the European Union-funded project, Building a Research Infrastructure for School Teachers (BRIST), progressed through the COVID-19 pandemic. The chapter presents a retrospective of the teaching and teacher education in fulfilling the project objectives which was designed to develop technology to coordinate and support teacher-research at a European level. The principled participatory design collaborative project, across five national jurisdictions, engaged with teachers and teacher education stakeholders in developing a mobile application to support teacher research. The challenges posed by the COVID-19 pandemic are captured, along with the innovative approaches in overcoming these roadblocks to progress the research.

HISTORICAL REVIEW

In meeting the challenges to educate our next generation, with the support of the globally networked human and ICT ecosystem, the BRIST project was commissioned to engage with teachers to research their own practice, moving them from being a teacher to a teacher researcher (Hammersley, 1993). The aim of the project was to make teachers research producers, not just consumers of research, thereby reducing the gap between research and practice and simultaneously strengthening the profile of the teaching professions (Hammersley, 1993).

Our previous work presented “a number of professional development, open educational systems which exist or are currently being developed to support teachers internationally, to engage with, use and do research.” (Connolly et al., 2020, p. 609). While the pandemic created a necessity to restructure or in some cases overhaul teacher education the opportunities in regard to adopting and adapting mobile technology were many (Hall et al., 2020). Designing and building a mobile application and a research infrastructure for teachers, supporting their lifelong learning through evidence informed ‘case studies’ was central to the BRIST project. Sharpe et al. (2006) determine that effective blended learning implementations are characterised by active learning designs which maintain face to face contact but respond to the local affordances and constraints. Alammary et al. (2014) distinguish between low-impact, medium-impact and high-impact blends ranging from adding extra online activities to a total course redesign. It has been suggested that innovative blended course design can be best achieved through an iterative design, utilising rapid prototyping and reflective practice (Stein & Graham, 2014), with blended learning having the potential to transform learning and teaching by compelling re-

reflection on educational design (Garrison & Kanuka, 2004). Digital education, and more specifically mobile learning solutions, are for many teachers a feasible solution ensuring access, functionality, and a continuation of education, facilitated by the portability of devices (Hall et al., 2020).

Another challenge presented, as a result of the COVID-19 pandemic, was a catalyst to reimagine project communications, embracing the digital infrastructure in fulfilling the project aims. The design based educational research approach, which guided the project, included the collection of evidence to measure impact and this was hampered due to the constraints, pressures and stress teachers and schools faced (Burke & Dempsey, 2020; Clark et al., 2021). Undoubtedly the pandemic shocked teachers and at all levels, pre-service as well as in-service teachers (Flores & Swennen, 2021; Mohamad Nasri et al., 2020) and this curtailed recruitment of participants for our project in some countries. From a project implementation point of view team meetings became virtual, collaboration was somewhat impeded and redesigned to online interaction. Involvement with stakeholders also. Nevertheless the project is fulfilling its objectives and the project process, implications and future developments are detailed in the following sections.

PROCESS/METHODS

A key output of the project was to engage with teachers and teacher education stakeholders in developing a mobile application to support teacher research. The project aim was to inspire teachers to look at their own practice with criticality so that they engage in researching their own practice moving them from being a teacher to being a teacher researcher (Hammersley, 1993). Complimenting the work by Hammersley (1993) our primary research question is ‘how do we support teachers to become teacher researchers and evidence-informed practitioners?’

The main project elements were in developing a systematic literature review on translational teacher research (Jones et al., 2022); the development of the mobile application and a training programme for in-service teachers; as well as the establishment of a Transnational Teacher Researcher Network.

This section details the adapted process we followed, due to COVID-19 travel restrictions. This output was underpinned by a preliminary systematic literature review (SLR) carried out by the team, that identified an initial set of themes, which highlighted the importance of certain factors influencing the ability of teachers to engage in research. One of these themes was ‘teacher agency’ which appears to be the pressing problem of practice (Wiliam, 2019). With this in mind, this study followed a Design Based Research (DBR) approach. DBR is ideally suited because of the principled, participatory, systematic, sustainable and valued approach which engages the diverse and dynamic variables that characterise universities, schools and classrooms (Penuel, 2019).

In light of travel restrictions, all meetings were moved online with the whole team meeting for 2 hours at monthly intervals and for two full days twice a year. We harnessed Zoom online conferencing and a suite of tools in Google Drive supported by a googling filing system and one Google Doc which acted as a list of contents for everything we created in the online space. To create the mobile application, we followed a 7-stage process:

- Stage 1 - Initial Designs: Following the SLR, in teams of 3 during a 2 day online team meeting, we adopted a blue sky approach to creating a set of initial designs for what a mobile application might look like.
- Stage 2 - Incomplete Narratives: On the following day at that same meeting, we developed a series of incomplete scenarios (Jarke et al., 1998) that we could use with teachers and teacher education stakeholders in a series of focus groups.
- Stage 3 - Focus Groups: Over the course of several weeks, each national team ran two online focus groups with teachers and teacher education stakeholders. The first one asked them to reflect on the SLR findings and the second asked them a) a set of questions about mobile application design using a survey, to determine the broad requirements for a mobile app and b) to complete the incomplete scenarios. Participants were selected from within each country’s professional networks and then cascaded out.
- Stage 4 - Focus Group findings per country: Each national team then assimilated all the findings from their country into a single structured report which was shared with the App developers.
- Stage 5 - Ranking Survey: The App developers used these reports to develop a ranking survey tool using Google Forms, which was then completed by teachers and teacher education stakeholders from across the five national jurisdictions. The ranking asked questions about the types of content that they would be interested in but also the kinds of interactions and networking opportunities that the App would be able to facilitate.

- **Stage 6 - Prototyping - (Diagram / App Pages xls / Badges & Gamification):** Based on these results, the App developer created a google spreadsheet that laid out a plan of the app which was discussed at a monthly online meeting and from this they created a mobile application design document using Miro. During this phase we again sought online focus group feedback from our focus groups to help refine the design and to address terminology concerns for multiple languages. The feedback from these focus groups led to minor amendments and the development of a prototype mobile application.
- **Stage 7 - Testing & Final Feedback:** We are currently still in Phase 7 which consists of revisiting the Mobile Application prototype with our online focus groups to identify any final issues and to give these early adopters (Rogers, 2003) the chance to populate the App with their own classroom-based research.

RESULTS

The project systematic literature review was completed just prior to the COVID-19 pandemic and the article recently published, Jones et al. (2022). Another component of BRIST is the design based research and development of a mobile application to support teacher researchers. DBR typically starts with a prototype design model, which is a conjecture of what the final design or technology will look like. Then, through iterations of conceptualisation and theorisation, implementation and evaluation of that design, the conjecture is refined until the distance between the initial problem and ultimate solution is minimized, and the technology/design aligns well with the educational context and attendant needs of teachers and learners.

The results presented in this chapter relate to this component of the BRIST project, the development of the teacher research mobile application. Over the course of the mobile application development, a scoping study online questionnaire was deployed to collect user requirements in the five countries before more in-depth focus groups were run. A total of 153 teachers and teacher education stakeholders across Greece, Ireland, Poland, Spain and the UK took part over the course of 3 months. The respondents worked across a range of roles, with 45.5% of the sample working in either primary or secondary schools and 34.7 % of the sample working in either higher education or teacher education. The remaining 19.6% worked in a range of associated areas such as Special Educational Needs (SEN), educational management and policy development.

Respondents highlighted that the design of the mobile application needed to be simple to navigate, clear and provide ease of access to the content. Respondents wanted opportunities to network with other teacher-researchers and experts in their field. Content needed to be subject specific, practical, including research on pedagogy and opportunities to discuss with the author, but also support for developing their own research. What respondents didn't want was lack of clarity, a non-intuitive interface, patronising content, too many clicks to navigate the App and too much detail or complexity. Overall time to use the App came out as an issue. The App needed to be quick to navigate and able to fit in with busy teachers working practices. Table 1 shows the top five types of content that participants suggested should be included on the App.

Table 1
Content Participants Suggested to be Included in the APP

Reading research summaries	80.3 %
Bite-size information (for quick engagement)	77.5 %
Interact with other teacher-researchers	74.6 %
Links to research training materials	73.2 %
Interact with experts	70.4 %

It can be seen from the table that access to research summaries and bit-size information were important, so that research can be quickly engaged with by the teachers. Thus in the App titles and summaries need to be engaging leading to longer, more in-depth pieces. Equally teachers wanted to network and interact with other teacher researchers but also with experts within the field. Research training materials were also highlighted as being important.

A further question on the usefulness of an associated teaching training programme found that 71.6% agreed that such a programme would be useful in reducing the distance between experts and in-service teachers and the majority of comments would like a training programme to provide credits towards further academic qualification such as Masters degrees and postgraduate professional studies. Furthermore 64.3% of respondents indicated that they would like research methods resources to be included in the App.

IMPLICATIONS

Future, ongoing research is needed to support the development of infrastructures, such as the BRIST Project that make research easily and openly available to student teachers, in-service teachers, researchers and teacher educators. The emergence of BRIST and related technology-supported platforms holds significant promise for bringing research to teacher educators, researchers and teachers in ways that they can really use within their educational practice. The BRIST mobile application development, corresponds to the emergence and need for increased technological immersion exacerbated by the pandemic.

As detailed in the above section, key implications of our research in the BRIST Project became manifest in the design of our app for teacher researchers. For example, signature features of the BRIST app include sharing, where teachers and researchers can post their research findings for others to access, review and use. They can also use the app to potentially connect with other teachers and researchers, thereby building a community for teacher research. Furthermore, as a methodology that tries to be theoretically-led in practice, DBR can help us avoid responding uncritically to practical issues but rather reflecting potentially more deeply on educational challenges and questions in classrooms and schools. This can help us to be more systematic and research-informed in our educational practice.

A further key implication to emerge from our project, and indeed this was reflected in educational developments globally, is the utility of design-oriented methods and, in particular, design-based research as a research and development methodology. The usefulness of DBR becomes very apparent especially when our educational future is uncertain and unclear, akin to what we have experienced over the last 3 years in education globally. As demonstrated in the above results, DBR has enabled us to respond creatively and flexibly to inevitably indeterminate problems and loosely-sequestered questions in educational contexts, in ways that are reflexive and responsive. Furthermore, DBR prioritises participatory methods of inclusive design, which helps us to embed the principles of agentic and agonistic democracy by engaging teachers as protagonist design researchers who lead and enact change in their classrooms and schools.

As we endeavor to enact this significant implication of teacher access to research, the approach to how we support teachers as researchers is paramount; it must be done in a fundamentally inclusive way. This starts with a strong philosophical orientation in our technology design, one that is avowedly and intrinsically collaborative and led by teachers. This leads us to strongly recommend that design thinking and educational design research/design-based research methodologies be integrated within teacher education programmes internationally. The design based research (DBR) approach of the BRIST Project repeatedly shows that teachers do not want patronizing research content, dictated to them in a manner removed from the exigencies and realities of their classrooms. In accessing and using research, they want to engage with other teachers and experts; however this needs to be done in a fundamentally participatory way; where there is parity of esteem between teachers as researchers and so-called professional researchers. Any efforts to promote research with teachers in schools must place their concerns and needs at the both the start and heart of the process. The development of the BRIST mobile application aims to facilitate this and support teachers to be research leaders.

Finally, when we think of pre- and post-COVID we contend that there are opportunities for learning and research from both, rather than necessarily regarding them as competing. Design-based research methods, including conjecture mapping, can enable us to systematically navigate difficult challenges we face in education and society, including a global pandemic.

Reflecting on our historical review of the BRIST Project, we conclude with this final thought, that the point is perhaps not to attempt to resume pre-COVID education practices but rather, using design-based research methods, inclusively involve in-service teachers as researchers, in new hybrid and hyflex practices that enable them to authentically and impactfully deploy research to enhance learning, teaching and assessment in schools and classrooms globally.

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