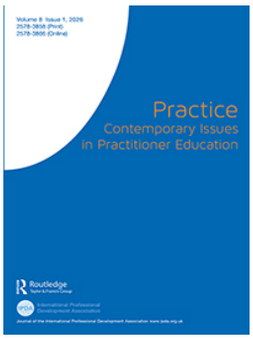

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Supporting the digital transformation of teacher education in Vietnam: developing and evaluating a teacher educators' digital hub (TEDH)

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ABSTRACT

This article presents a case study of the design, implementation and evaluation of a bespoke online training course to support teacher educators' (TEs) use of digital tools and pedagogies in two pedagogical universities in Vietnam via a bespoke Teacher Educators' Digital Hub (TEDH). The case study reports on two stages of data collection: baseline surveys of digital capabilities and confidence of TEs in the two universities to establish training needs ($n = 103$) and evaluation of the pilot of the online asynchronous training module and hub of resources which was created to address those identified needs ($n = 12$). The findings show that the TEDH platform and online training module met some key digital skills needs of TEs, but that more nuanced training opportunities related to subject specialisms and a broader range of digital tools would be welcomed. Key findings of the study are: the importance of providing a convenient 'one-stop-shop' where TEs can access information and training resources to support their digital competence; that TEs need to be given time to undertake independent training to support their developing digital practice; that TEs need to be given clear instructional guidance on the type of digital lessons they should be planning in each subject area and which tools and software they are permitted to use and that institutional technological infrastructure and equipment needs to meet the requirements of the digital transformation in teacher education.

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Digital transformation; teacher education; Teacher Educators' Digital Hub (TEDH); digital competence; Vietnam

Introduction

Digital technology (DT) has become increasingly important for education at all levels, with lockdowns due to Covid-19 often seen as augmenting the impetus for teachers and lecturers in schools, colleges and universities to embrace new technology in their teaching (Softić 2020, Bygstad *et al.* 2022, Duong *et al.* 2023, O'Connor *et al.* 2023). However, this situation merely accelerated the pre-existing global drive for digital transformation, with governments of individual countries and economic areas introducing new policies,

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action plans and strategic frameworks over recent years. These have a common aim of making technology more central and integral to education to respond to economic and social developments; for example, The European Digital Action plan 2021–2027 (European Commission n.d.) 'aims to support the adaptation of the education and training systems of Member States to the digital age', meanwhile the United Nations (United Nations 2022) has a 'Roadmap for Digital Innovation' and China launched a 'Strategic Action Plan for Education Digitalization' (China National Academy of Education Sciences 2023). In Vietnam, the Ministry of Education and Training (MOET) made education a priority area for digital transformation stating that it is essential for development (Yen *et al.* 2020), with a specific goal for 100% of institutions to be using online learning, with a minimum of 20% of the curriculum to be taught online by 2030 (Dinh and Nguyen 2020). Despite the plethora of policy documents, from an international perspective there is still a 'lack of clarity' concerning TEs' digital competences, thus 'creating uncertainty in the relationship between policy and practice' (Lindfors and Olofsson 2023, p. 3). This is particularly pertinent in Vietnam, where over 64% of the population (approximately 96 million) are internet users, and over one-third of these are young people aged between 15 and 24 years (Yen *et al.* 2020), there are approximately '22 million learners and 1.2 million teachers and educational managers' (Yen *et al.* 2020, p. 213).

It is important to note, however, that the entire education system in Vietnam has been conducting online teaching since 2020, and almost all teachers (from preschool to higher education) possess a certain level of digital competence. All teacher training programmes in Vietnam include modules that equip student teachers with digital competence (OECD 2025)

At national level, MOET (2022) recently produced criteria for promoting and assessing digital transformation within higher education (HE). These criteria include two key areas: training (teaching and learning) and university administration. The training criteria are assessed through various indicators including: developing an online training plan; deploying online software; implementing an online learning management system (LMS) and having forums and other tools for communication between teachers and students. Finally, it calls for online training for lecturers on digital transformation in teaching and learning.

The development of a Teacher Educators' Digital Hub (TEDH) was a collaborative project between a UK university, two pedagogical universities in Vietnam and a Vietnamese telecommunications company. TEDH was a response to previous research by members of the project team which identified the lack of digital skills and training among teacher educators (TEs) at universities across Vietnam which came to light during the transference to online teaching during the pandemic (O'Connor *et al.* 2023).

The two Vietnamese universities in this study are already embracing DT, with digital transformation considered to be a central goal for their future development. Some courses are already taught completely online at one of the universities, and both employ blended teaching using LMS platforms. However, they acknowledge that there is still much that could be improved upon before fully realising their ambitions for digital transformation. In particular, they are mindful that lecturers need support with DT, and as both universities have large numbers of trainee teachers (TTs), they are especially keen to find ways to enable their TEs to develop their own skills in order to promote the

implementation of digital transformation. This case study contributes to the growing evidence base of collaborative projects where knowledge and experience is shared across cultural and educational contexts with the broader aim of supporting digital transformation of HE in the global south (e.g. Enhancing Teacher Education Programme (ETEP) (Yen *et al.* 2020) and Digi-Doc (O'Connor *et al.* 2022)).

The next section reviews previous research concerning TEs' digital competence from a global perspective.

Literature review

The requirement for teachers to be competent and confident in using technology in the classroom has meant that most literature on DT in education has focused on students, trainee teachers (TTs) and teachers, however, the experiences and digital competencies of TEs, who are responsible for training teachers at universities, are often overlooked (Carpenter *et al.* 2020). Previous research into teachers' and TTs' competencies has argued that new teachers are 'ill-prepared to teach with technology when they enter classrooms' (Foulger *et al.* 2017, p. 418), which has led to a realisation that TEs' competencies and ability to support TTs effectively, needs to be explored (Amhag *et al.* 2019, Tondeur *et al.* 2019) and developed (Foulger *et al.* 2017). According to Instefjord and Munthe (2017) TEs' attitudes and use of technology may be crucial in positively, or negatively, influencing student TTs' attitudes and behaviours around integrating technology into their own teaching; however, they also argue that little is yet known about TEs' 'exemplary role' (p. 39) or their own perceptions. Indeed, TEs who are not sufficiently confident in using technologies and supported adequately (in terms of equipment and training), will themselves struggle to effectively train and support TTs with DT (Nelson *et al.* 2019). Preparing TEs to integrate and model DT in their own practice is a significant and growing challenge (Tondeur *et al.* 2019), however, despite the importance of TEs' roles there is limited research into *how* they develop digital competencies (O'Connor *et al.* 2023).

TEs have a 'dual responsibility' (Instefjord and Munthe 2017, p. 37) to be competent and confident with their own digital skills and to be able to model this for others; however, research shows that TEs often lack digital competency (Tondeur *et al.* 2019). In addition, TEs need to be able to integrate digital skills effectively with content and pedagogical knowledge, as proposed by Mishra and Koehler (2006) in their TPACK Model. This framework features in much of the literature (e.g. Foulger *et al.* 2017, Amhag *et al.* 2019, Carpenter *et al.* 2020) and is widely acknowledged as providing theoretical underpinnings for integrating technology, content and pedagogy in education (Herro *et al.* 2021). The TPACK model is shown below (Figure 1) and indicates how teachers need technological, pedagogical and content knowledge in order to be digitally competent in their practice:

A study by Phan *et al.* (2024) explored the application of the TPACK framework in online education during the COVID pandemic, focusing on its effectiveness in enhancing educators' abilities to integrate information technology with pedagogy and content knowledge. The findings suggest that educators equipped with TPACK are better prepared to design and deliver engaging, effective online learning experiences, ultimately leading to improved student outcomes, underscoring the importance for professional

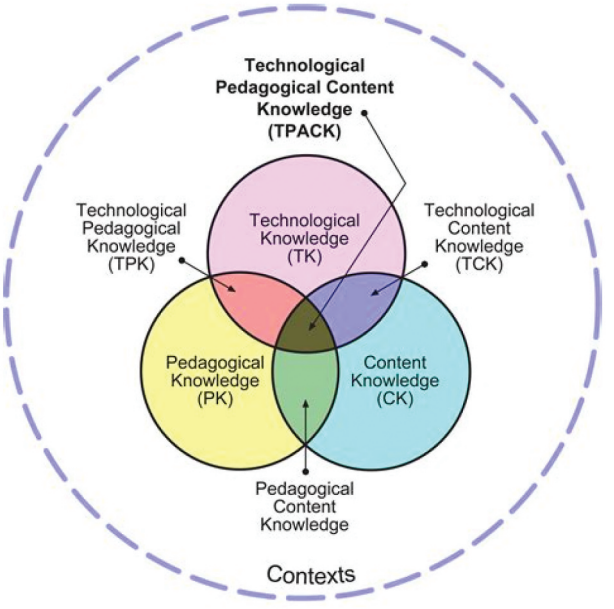

Figure 1. Mishra and Koehler's (2006) technological, pedagogical and content knowledge framework.

development programmes that emphasise TPACK to ensure educators are proficient in utilising technology in their teaching methodologies in higher education institutions.

In response to a gap in the research and a call from the US National Education Technology Plan (U.S. Department of Education, Office of Educational Technology 2017), Foulger *et al.* (2017) researched TEs' digital skills in the USA and developed a set of Teacher Educator Technology Competencies (TETCs), the first, and apparently only, digital competencies framework specifically designed for TEs. Also drawing on the TPACK model, Duong *et al.* (2023) argued that within university lecturers' overall digital skills there is a significant gap in understanding specific competencies needed in Vietnam for teaching online; they posit that online teaching is not a separate 'single competence' but linked to the other TPACK elements. This tallies with Tondeur et al'.s (2019) recommendations that TEs need to be supported with developing their own TPACK needs, with a close focus on individual requirements.

Duong *et al.* (2023) subsequently carried out a systematic literature review to establish commonalities between similar online teaching competency frameworks such as the Digital Competence Framework for Educators (DigCompEdu) (Redecker *et al.* 2017) as well as a range of scales for assessing these competencies. They used these to develop an 'Online Teaching Competence Framework – OCTFUL' and 'practice guide' which aimed to provide 'an inventory of expected knowledge, skills and attitudes that lecturers need to … achieve good results in online teaching' (Duong *et al.* 2023, p. 5). This comprised a quantitative survey of 311 Vietnamese lecturers from two public universities to better understand their self-reported digital competencies using OCTFUL in relation to their teaching. This enabled further refinement of the framework to five main competencies of 'understanding student learning, online session administration, digital content development and learning facilitation, technology, [and] online learning

outcomes assessment' (Duong *et al.* 2023, p. 18). Whilst this adds a useful framework for university lecturers in general, Duong *et al.* (2023) acknowledged that they were unable to establish any outcomes for lecturers with specific specialisms. In addition, their research did not refer to TEs within their data sample, so OCTFUL is not aimed at this important and distinct group of educators, who are likely to have different requirements of a competency framework.

The need for digital training is acutely recognised in Vietnam, with Yen *et al.* (2020) calling for Vietnamese lecturers and educators to be trained in relevant digital competencies, arguing that this cannot be achieved purely via initial teacher training programmes; instead, this should be incorporated into CPD sessions, which are individualised and accessible, including via online learning platforms. However, according to MacPhail *et al*'.*s* (2018) international study, TEs encounter significant challenges in engaging with ongoing professional development, with 'finding time' and 'work overload' (p. 850) being key barriers. Nguyen *et al.* (2024) conducted case study research at ten universities in Vietnam to explore the digital competence of university lecturers. They found that although lecturers self-rated themselves as scoring moderately on digital competence certain areas needed developing in order to make progress in this area. These included: increasing awareness about digital transformation in the teaching process, institutional investment in equipment and information technology infrastructure, provision of training and development opportunities for lecturers' digital competence and establishing support mechanisms and policies to support lecturers to enhance their digital competence (Nguyen *et al.* 2024, p. 26). Similar findings emerged from a study of high school teachers in Vietnam (Phan *et al.* 2024) which found that teachers possess basic technological competencies and familiarity with common digital tools, but demonstrate limited adoption of advanced educational technologies. Limited training opportunities and professional guidance further hindered their development of advanced digital competence.

Despite recent developments, there is scope for further exploration of TEs' digital competencies and, crucially, how TEs can be supported in developing their skills so that they are confident in modelling digital pedagogies with their students – TETCs on their own may, therefore, not be the full remedy. Carpenter *et al.* (2020) undertook the first significant examination into TEs' use of TETCs (with research mainly in the United States), and whilst they concluded that TEs found the framework useful, they also recommended several additions and changes. Pertinent to this study, they found that TETCs alone were not the solution to improving digital integration, but that a 'multi-pronged approach' is needed, including using mentor teachers and focusing on subject-specific technologies. Intriguingly, they also posit that although many TEs self-reported as being very competent in DT, they 'may have limited influence on the technology competence of the teachers with whom they work' (Carpenter *et al.* 2020, p. 9). This chimes with Pederson *et al.* (2024) who emphasise that possessing digital competencies in isolation does not necessarily 'transform TEds' teaching practices' (p. 3). In addition, Amhag *et al.* (2019) argued that TEs did not use DT for pedagogical purposes, instead they needed significant support to create digital teaching.

Meanwhile, TEs need to enable TTs to effectively plan their own digital lessons. In grappling with the challenges of creating well-designed, flexible teacher training courses, educators at University College London (UK) developed the 'ABC Learning Design Method' (ABC-LD), which they claimed was particularly suitable for use with blended curricula models (Young and Perović 2016). Focusing on the curriculum and story-boarding techniques, this collaborative planning tool centres on Diane Laurillard's 2013 'Six Learning Types' (Acquisition, Investigation, Practice, Discussion, Collaboration and Production) developed from her 'Conversational Framework'. The ABC-LD has subsequently been widely adapted as a curriculum and learning planning tool in HE in the UK (MacNeill and Beetham 2022). While this method features in various international conference papers (e.g. Young and Perović 2016, Milani *et al.* 2017, Steiner *et al.* 2021) there is a scarcity of empirical research on this approach. However, there appears to be agreement that it provides an efficient and effective way of helping teachers think about their interactions with students and, while simple to use, it enables all teachers, whatever their experience, to plan student-centred learning (ABC-LD n.d.). In addition, it is proposed that teachers can use the ABC-LD to plan their own training or CPD needs (Hasenknopf *et al.* 2019).

The literature reviewed highlights the need for initiatives to support TEs in Vietnam in effective use of digital tools and pedagogies in their practice with TTs. Therefore, the aims of this case study were to:

- Establish baseline training needs of TEs at two pedagogical universities in Vietnam;
- Work collaboratively to develop a Teacher Educators' Digital Hub (TEDH) of training and teaching resources;
- Evaluate the usefulness of TEDH for supporting TEs in Vietnam to increase their confidence and skills in using digital tools and pedagogies in their teaching.

Stage three will include the development of a bespoke mentoring and coaching scheme for TEs to support the sustainability of the project and will be reported on separately.

Methodology

The research was designed collaboratively between UK and Vietnam project leaders; ethical approval was obtained from the UK university's ethical committee prior to recruiting participants. Participation was voluntary, and responses were anonymous. The research employed a mixed methods approach with two data collection stages outlined below:

Stage one – baseline surveys of TEs' digital competencies and confidence

The surveys aimed to garner a clear and detailed picture of TEs' use of DT for teaching and to ascertain how confident they felt in using DT to identify any specific skills gaps. Online surveys were designed collaboratively by the team in English and translated into Vietnamese. Questions were derived from previous findings around key areas of digital confidence and competence for TEs (O'Connor *et al.* 2023) and JISC's diagnostic self-assessment discovery tool of digital competence in HE (JISC n.d.). The survey comprised three sections (i) experiences of using DT for teaching, (ii) knowledge of using DT for

teaching, and (iii) confidence using DT for teaching. The mixed-methods questionnaire included a range of closed questions (binary questions, multiple choice and Likert scale) and open-ended text questions. The survey was first piloted with five TEs from the two participating pedagogical universities in Vietnam who were experienced in training teachers, before being distributed to participants, including all TEs ($n = 150$) at the two participating universities in March 2023. Participants had a three-week window to respond.

There was a high response rate of 69% ($n = 103$) with an almost even split between the two universities. Most TEs (95%, $n = 98$) had been in role for over 5 years teaching a range of subject specialisms including maths, sciences, psychology, geography and early years. The findings were translated into English and analysed by the Vietnamese project members; surveys provided insights into strengths and gaps in TEs' current knowledge and competencies which were crucial for informing the design of the TEDH hub and online course.

Stage two – evaluation of the pilot of the TEDH hub and course

Once a prototype of the bespoke training course for TEs had been designed and developed with support from Educational Design Specialists (EDS) at the UK university (see Table 1), it was uploaded as a LMS course on the TEDH platform (which sits on the server of one of the VN universities) and translated into Vietnamese so that versions in two languages were available. The hub includes training, 'how to' courses, on core digital skills, and prototype digital resources that can be downloaded and/or adapted by TEs. TEDH also has a 'community support area' for sharing resources and teaching ideas, or educators can ask questions and seek peer support. A core group of TEs at the two universities were invited to trial the hub and course, and complete online survey evaluations (see Appendix A for survey questions). In addition, in Stage three it is intended that TEs will access a coaching and mentoring programme and resources to further support them using the hub.

Table 1. Overview of online course.

Session (Guided learning time, 1 hour)	Content Overview
Session 1: Understanding pedagogy for online learning	Theoretical knowledge of established pedagogical models which underpin online learning design (TPACK and ABC-LD model)
Session 2: Digital tools and features of HP5	Toolkit of H5P features to create interactive digital teaching and learning activities
Session 3: Effective lesson planning using digital tools and pedagogies	Guidance and worked examples of how to plan effective online lessons.

The course consisted of three one-hour asynchronous online sessions for participants to work through (see Appendix B for details of the course content). While it was felt the course needed to be practical, the researchers were keen to ensure that digital pedagogies underpinned the online training (often highlighted in the literature as largely absent from teaching using DT). Consequently, Sessions 1 and 3 engaged participants with pedagogical underpinnings by focusing on TPACK for effectively incorporating DT into lessons, and the ABC-LD for providing planning strategies and meaningful and engaging learning.

The online course was piloted with 12 TEs ($n = 8$ University 1, $n = 4$ University 2) from a range of subjects. The 12 TEs were recruited by the project leads in the two pedagogical universities in Vietnam using the following criteria: they were teacher educators and they had experience of designing and using digital resources in their practice. Once they completed the course, they were invited to complete an online survey to evaluate their learning experiences, their user experience of the online course and the potential impact of their learning from the course on their practice (Appendix C). The survey results were analysed using the analytical tools on Google Forms, the tool that had been used to collect the survey data.

Findings

Stage one – baseline evaluations

Many TEs felt confident and proficient in using key software for teaching and learning especially Microsoft Office Package ($n = 96$) and online teaching and learning platforms such as Zoom ($n = 89$), Google Meet ($n = 89$) and Microsoft Teams ($n = 76$)). Many participants also used online platforms e.g. Facebook ($n = 71$) and YouTube ($n = 65$). Specialised software, e.g. video-editing software ($n = 45$) and SPSS for statistical analysis ($n = 30$), were used by some participants, but they felt less confident with these. LMS (including Moodle) were used by 48 TEs, while 60 participants reported they use Kahoot, other similar interactive tools such as Padlet, Canva and Mentimeter were used only by a limited number of participants.

Eighty-three TEs had attended digital training courses; however, the qualitative data also indicated that TEs had mainly developed skills for both creating digital resources and delivering teaching using technology from self-study, or by seeking support from colleagues and other professionals and 76% of TEs agreed that working with technologies is an important part of education. Additionally, 41 respondents felt there was room for improvement, particularly in identifying the most appropriate technology to use and knowing how to apply DT effectively to suit various pedagogical situations. It is significant, that TEs particularly identified needing more support from technology specialists and help from more experienced colleagues in understanding the pedagogy of DT and learning, as well as development of skills to use a wide range of digital tools.

Forty-two per cent of respondents felt confident or very confident in creating digital resources for teaching, with one commenting that 'I am only confident with some software and applications that I have used and found useful in teaching. But I have not yet reached the expert level to be able to share with colleagues'.

Furthermore, 63% indicated that support of education digital technology specialists for implementing technologies would facilitate their effective use of digital technology in their practice

The findings from the baseline survey and the TEs need for support in selecting and using digital tools and pedagogies in their practice informed our design of the TEDH training course in the following ways: the course provided instruction for using and incorporating specific technological features into TEs practice; the course provided a convenient -one-stop-shop' where TEs could access reliable information and guidance on using digital tools and pedagogies and theoretically grounded guidance was provided

on how to plan sessions incorporating digital tools and pedagogies. Furthermore, TEs cited as a key barrier: 'Time to learn new technologies' (63,1 %) so the TEDH training course was designed to be as time efficient as possible (3 hours) and able to be completed asynchronously when convenient for the individual TEs, or to be dipped into when needed to access specific information.

Stage two – developing the hub and pilot evaluations

Two key findings of the baseline surveys which fed into the development of the online training course were the importance of creating a bespoke training course to meet the specific needs of teacher educators to create interactive learning and teaching content, and to provide pedagogical underpinnings for the use of digital tools and pedagogies in their practice.

Although confidence levels of producing digital teaching materials amongst the 12 pilot participants were quite high before embarking on the course ($n = 6$ were confident, and $n = 3$ were very confident), there were also high expectations of learning new skills and being able to apply these to their teaching.

After the course, all 12 participants gave positive feedback, indicating that their expectations had been partially ($n = 10$) or fully met ($n = 2$). In addition, TEs responded that the course had been 'useful' ($n = 5$) or 'very useful' ($n = 7$) both in helping them to develop digital content, and for learning to conduct online teaching and learning. Therefore, all participants felt they had gained valuable skills and theoretical knowledge that could be employed in their own teaching, indicating that each of the three sessions contained worthwhile content.

The open questions provided additional insights, TEs' responses highlighted three key areas where they had benefitted: development of practical skills (such as applying knowledge of H5P to create interactive materials); the development of specific learning materials (such as creating interactive videos with hotspots); and pedagogical knowledge (such as applying the ABC-LD and TPACK framework to their practice). Participants particularly valued learning to create digital resources and use H5P for interactive materials, understanding the ABC learning design model and knowledge of different learning styles.

For example, one participant said:

> *The program helps us gain more understanding of some of the methods and techniques of designing learning activities and how to promote active learning. The program also helped me gain knowledge and skills about H5P, . . . the ABC learning design model, . . . common learning styles.*

And another commented that:

> *It helps me have more ideas in designing lecture content in the future, such as being able to combine many types of learning in 1 lesson.*

Participants appreciated the support on creating an effective learning environment that focused on pedagogy:

> *TEDH also provides specific guidance on creating an interactive learning environment with the support of digital technology. This is a reference source to help pedagogical lecturers diversify teaching resources and styles, contributing to teaching effectiveness.*

Participants felt that they would be able to apply these new skills and understanding to their future teaching practice, for example:

> *Knowing digital tools is important, but how to apply them effectively is even more important.*

While another said it was already changing their approach:

> *Since then, the program has had an impact on how I design, organize, and implement online learning sessions. (synchronous and asynchronous)*

Just one participant was 'unsure' about whether they would apply these skills; unfortunately, they did not elaborate on their response, however the majority of comments were positive. This comment sums it up:

> *The program has provided useful digital knowledge and tools as well as how to plan sessions using appropriate digital tools. This not only improves the skills of using digital tools for lecturers, but also helps them choose the right digital tools in their teaching process, to achieve the highest efficiency for teaching.*

Whilst the overall results were positive, there were some suggestions for improvements, particularly concerning the technical usability of the course, such as some of the links not working, and the programme not retaining activities completed if the user took a break. This feedback was utilised by the EDS team to further improve content, activities, usability and accessibility, and create a final version that was ready to be rolled out to all TEs across the two universities.

In addition, some TEs felt they needed more real-world application examples to directly link to their actual teaching situations and/or subject area. The problems of bridging generic technical skills with specific subjects were identified above, and it is the researchers' intention to try to address this with the use of a mentoring and coaching scheme (Stage three).

Discussion

The rationale for creating the TEDH hub and training course was that by designing a bespoke set of freely available training resources for TEs in Vietnam the problem of TEs' lack of skills and confidence in using DT and pedagogies effectively in their teaching would be alleviated. The authors' invested role as designers and creators of the digital hub and associated training course should be taken into consideration in the following reflections on the efficacy of the intervention.

First though, the positive outcomes of the project. As well as creating and piloting a Digital Hub for TEs, the baseline evaluations gathered interesting data on digital competencies of TEs in Vietnam, thus helping to address a significant research gap in the scope and nature of the needs of TEs in relation to developing digital competence as identified by Duong *et al.* (2023). Additionally, evaluations of the pilot provided insights into the usefulness of a bespoke online asynchronous training programme for TEs.

Stage one findings largely supported existing literature as while TEs mainly felt confident with key digital competencies, they were less certain about using specific tools (in particular, specialist tools for their subject areas) supporting, to some extent, Tondeur *et al'.s* (2019) views that TEs often lack digital competencies. In the second survey TEs indicated they were confident, or *very* confident in creating digitally based sessions and learning materials. As this was a small cohort it is possible that TEs who were already interested, and therefore already competent in DT were participating; however, both surveys showed that even where self-assessed competence is high, TEs' *want* to develop both their digital skills and pedagogy, specifically wanting to know *how* to choose appropriate technology and be able to apply it effectively in various pedagogical situations. This tallies with Amhag *et al'.s* (2019) findings that even when TEs are digitally competent, they often lack underpinning digital pedagogies and, therefore, need significant support to create effective digital learning. Subsequently, the TEDH platform and course were designed to address these areas, particularly with the inclusion of underpinning digital pedagogies.

The pilot survey showed that TEs found the online course valuable, not just in helping them acquire new digital skills to create learning materials using H5P, but also in enabling them to ascertain which DT might be relevant for a session, and how to incorporate this effectively to maximise teaching and learning. As emphasised by Mishra and Koehler (2006) these pedagogical digital underpinnings are often absent, which continues to be an ongoing challenge (Tondeur *et al.* 2019, Carpenter *et al.* 2020); addressing these aspects is, therefore, crucial for the successful digital transformation of HE. Pilot participants reported that the content and activities on TPACK and the ABC-LD gave them a better understanding of how to plan for and blend DT into their sessions, as well as enabling them to expand their range of digital strategies. These findings add to previously established research that TPACK enhances effectiveness of lesson planning (see Foulger *et al.* 2017, Herro *et al.* 2021, Amhag *et al.* 2019, Carpenter *et al.* 2020). However, this research also builds on MacNeill and Beetham's (2022) proposal that ABC-LD is useful as a blended learning and curriculum design tool (Young and Perović 2016, Steiner *et al.* 2021) and extends this to also being useful as a lesson planning tool (online or blended lessons). TEs in this study also emphasised the desire to have more real-world examples, especially those specific to their subjects, echoing Carpenter *et al'.s* (2020) recommendations for DT training in subject specialisms; Carpenter *et al.* argued that this might be achieved by the use of mentors, so it will be interesting to see if Stage three – the mentoring and coaching programme – will be able to address these challenges.

These project outcomes have been partially successful, but much learning has occurred along the way which has illuminated additional institutional, structural and technological issues which are not easily addressed through a hub of resources and bespoke training, however well they may match the needs of the intended users.

Conclusion

Although conclusions from this project need to be conservative and cannot be generalised given the small number of participants who evaluated the hub ($n = 12$), findings suggest that the TEDH platform is a potentially effective channel for providing training and support to TEs in Vietnam in a practical and timely manner. In summary, evaluators

liked the ease of log-in, the logical lay-out of resources, and the independent, asynchronous nature of the course. They appreciated the efficiency of having all links to training, resources and information about digital teaching and learning in one place and liked the international aspects of the hub with links to research reports, international networks, conference proceedings and articles relating to their practice. However, certain issues emerged in both stages which need attention if TEDH is to reach its true potential as an agent for change in the field of TEs' digital skills and confidence in Vietnam.

Firstly, is the issue of time for TEs to undertake independent training to support their practice. The project struggled to recruit participants to Stage two, which was disappointing and surprising in light of the baseline evaluation results, MOET's emphasis on digital transformation targets, and the flexibility of the online programme. Researchers in Vietnam identified time pressures as being the issue, corresponding with MacPhail *et al'.s* (2018) views that lack of time and workload are key obstacles to CPD.

Secondly, TEs need to be given clear instructional guidance on the type of digital lessons they should be planning in each subject area and which tools and software they are permitted to use. This would allow bespoke subject-specific areas to be set up on TEDH where TEs can find materials and lesson plans pertaining to their practice, curriculum directives and student needs.

Finally, the ongoing technological issues around infrastructure, device availability and interface compatibility have been frequent barriers to the smooth running of the project and the accessibility of the hub and training course to TEs across Vietnam. There is no easy answer to this and to some extent it is to be expected in international digital educational projects when colleagues in different continents are using different systems and platforms when trying to work together to share expertise and create resources.

The key learning from this project in this respect is communication, patience and flexibility. The journey towards the digital transformation of education must be global if it is to address the inequalities of opportunity which have become entrenched in traditional educational systems (United Nations, 2022). The way forward is to collaborate on projects such as TEDH, to share knowledge and expertise, to involve as many educators and students as possible and to work towards a shared vision of well-trained HE professionals, including TEs, who use digital tools and pedagogies with the confidence to model this to their students, and have established systems through which to share their expertise with others. Further research focusing on the professional experiences of teacher educators incorporating an understanding of the challenges and opportunities inherent in the multi-faceted nature of their journey towards digital competence will support the broader digital transformation of education in Vietnam.

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Appendices

Appendix A. Survey questions for the core group of teacher educators

(1) Please rate your confidence level in creating digital resources for teaching.
- Very unconfident
- Not confident
- Relatively confident (average)
- Confident
- Very confident

(2) Please rate your proficiency level in using software/apps/platforms for the following purposes:
(a) Word processing (e.g. Microsoft Word, LaTeX. . .)
(b) Data analysis (e.g. Excel, SPSS, R. . .)
(c) Image processing (e.g. Photoshop, Canva. . .)
(d) Video editing (e.g. Video editor. . .)
(e) Presentation design (e.g. PowerPoint, Canva. . .)
(f) Online learning and discussion (e.g. Zoom, Microsoft Teams, Google Meet. . .)
(g) Online sharing of learning materials (e.g. Zalo, Facebook, email. . .)
(h) Supporting online tests (e.g. Quizzi, Kahoot, Google Forms. . .)
(i) Packaging learning materials for online publication (e.g. iSpring. . .)
(j) Learning management systems (e.g. e-learning systems, LMS. . .)

Multiple choice answers: Very unproficient; Unproficient; Relatively proficient; Proficient; Very proficient.

(3) Have you attended any training courses related to using software/platforms/apps/digital resources for teaching? If yes, please specify.
(4) What specific training courses do you need for your digital teaching? Please specify.
(5) What software/platforms/apps/digital resources are you currently using for your digital teaching? Please specify.
(6) What difficulties do you encounter when designing an online course for student teachers? Please describe.
(7) What difficulties do you encounter when implementing an online course for student teachers? Please describe.
(8) Please rate the quality of the technical facilities at your university for digital teaching of teacher educators:
- Poor
- Below average
- Acceptable
- Good
- Excellent

Appendix B. TEDH – Teacher Educator Moodle training course outline

Course title: Using digital tools and pedagogies to create effective and engaging online learning
Platform: Moodle
Length: 3 × 1 hours, asynchronous independent study

Session	Learning outcomes	Session content/activities
1. Understanding pedagogy for on-line learning (asynchronous)	• To understand the theorical underpinnings of effective on-line learning and teaching • To understand the ABC approach to lesson planning	Introduction to TPACK theory and the principles of on-line teaching and learning. Introduction to the 6 principles of the ABC approach and how these can be achieved digitally. Formative quiz to test knowledge of TPACK and ABC
2. Digital tools and features available to use on Moodle (asynchronous)	• To know what digital tools and features are available to use on Moodle and how to use them	Presentation and demonstration of digital tools/features including: quizzes, flip cards, youtube videos, . . . Instructions on how to produce each feature (or links to instructions) Worked examples of how each feature can be incorporated into online learning sessions.
3. Planning effective and engaging on-line learning sessions (asynchronous)	• To be able to critically evaluate on-line teaching and learning lesson plans • To know how to plan effective and engaging on-line learning sessions	Evaluation of a range of example lesson plans to identify strengths and weaknesses. Step by step guidance on planning an effective and engaging online lesson

Appendix C. TEDH training module evaluation survey

Overall aim of the survey is to find out to what extent the model course helps TEs to understand:

(1) How to effectively create online teaching and learning content
(2) How to effectively deliver online teaching and learning

Some possible questions connected to project aims and theory of change:

(1) How much of the content of this course were you familiar with before you started? (approx. %)
(2) How helpful did you find the course in helping you learn how to create online teaching and learning content? (Likert scale)
(3) How helpful did you find the course in helping you learn how to effectively deliver online teaching and learning? (Likert scale)
(4) Which parts of the course did you find particularly useful?
(5) What improvements can you suggest for the course?
(6) In what ways, if any, do you think the course will impact on your teaching?
(7) Would you recommend the course to other teacher educators?
(8) Would you prefer to learn this topic in an online course like this or in face-to-face sessions?