Digital transformation of post-pandemic learning and teaching: Utilising TPACK to support educator development in a flipped learning pilot

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\textbf{Abstract}

As higher education looks to continue on its path of digital transformation to support pedagogical approaches such as online and blended learning, lessons must be taken from the emergency distance learning response, during Covid-19, and steps implemented to move towards a more thoughtfully designed strategic approach to digital education.

This case study examines an Australian university’s global campus in the United Arab Emirates, a traditionally teacher-led institution, that aims to address ‘what’ post-pandemic education will look like by articulating an approach to the digital transformation of learning and teaching, specifically related to educator professional development. The specific focus of this research considers the ‘how’ by proposing a Technological, Pedagogical and Content Knowledge (TPACK) framework to guide the learning design of a faculty training pilot that supports educators in the development and implementation of a specific pedagogical model, namely flipped learning. The TPACK framework was used to inform the design of the flipped learning faculty training pilot and was used in the analysis coding of participants’ feedback to determine what domains of knowledge were touched and what domains require further attention.
The study found that the TPACK framework can be a useful learning design tool for the development of faculty training programs that look to digitally transform learning and teaching, however, while the framework prompts explicit consideration of pedagogical and technological knowledge development, it can be found lacking in the fostering of community elements for a more impactful approach. The author believes this study will provide valuable insight for researchers and policymakers concerned with the digital transformation of learning and teaching in the post-pandemic higher educational landscape, specifically those interested in the development of teaching practice for blended learning approaches.

1. Introduction

Digital transformation (DT) refers to a change in an organisation’s structure, culture, and strategy in order to best incorporate emerging digital technologies and innovative techniques (Mahlow & Hediger, 2019). DT should not be confused with simply the digitisation of analogue objects, such as the replication of a physical book to a digital PDF for example. DT is a comprehensive approach that is concerned with the human factor involved in the transformation and what skills and development needs may be required to facilitate the effective use of technology for transformative outcomes (Mahlow & Hediger, 2019).

In the higher education (HE) context the incorporation of digital technologies and digitisation of educational content has been prominent over recent years due to the increased adoption of pedagogical approaches such as blended, online and technology-enhanced learning (TEL) opportunities (Lazar et al., 2020). However, it can be argued that higher education institutions (HEIs’) structure, culture, and strategy have not kept pace with their technological uptake. Therefore, sufficient support for educators’ utilisation of digital technologies for effective digital transformation and the provision of innovative education has been lacking (Mahlow & Hediger, 2019; Mladenova et al., 2020; Oliveira & de Souza, 2022).

Furthermore, the need for HE readiness for digital transformation internationally has been highlighted by two recent catalysts. Firstly, the emergency shift to distance learning during the Covid-19 pandemic required HEIs to rapidly respond to demands for flexible forms of educational provision, particularly through the use of digital platforms, digital pedagogies and digital learning content creation (Aristeidou & Cross, 2020; Adedoyin & Soykan, 2020). Secondly, the explosion of generative artificial intelligence (AI) chatbots, such as ChatGPT, that have emerged into the mainstream since November 2022. This form of AI requires HEIs to rethink policies and approaches to existing educational praxis, assessment design and academic integrity (Rudolph et al., 2023; McMurtrie, 2023). While the two identified disruptions are different, they have accelerated a common theme, namely the need for HE educators to develop learning design skills to best incorporate technology and pedagogy (Carrillo & Flores, 2020). This assertion is supported by literature exploring the immediate impacts of HEIs rapid shift to digital and online learning stating that the experience has exposed the variability and at times the paucity of educators’ appropriate competencies to effectively utilise technology and design online and blended learning experiences (Huber & Helm, 2020).

In order to fully support educators in the continued DT of education, competencies need to be developed that appropriately utilise digital pedagogies and technologies that allow for learner engagement in either blended or fully online learning environments to support the ongoing DT of learning and teaching (Falloon, 2020; Huber & Helm, 2020).

Therefore, this case study will focus on the area of educator professional development for DT of learning and teaching at an Australian university’s global campus in Dubai, UAE. The university had previously been strategizing to bring innovative teaching practices, in the form of blended learning, before emergency measures hit during the pandemic. The flipped learning pilot, therefore, is the first tangible transition that aims to build upon the catalyst of change that occurred with mandated emergency online delivery by providing educators with a structured progression to future blended learning.

2. Literature review

The following review of the literature will examine emerging educator competencies along with pedagogical approaches to DT for learning and teaching along with learning design considerations to support the development of educator competencies.

2.1 Educator competencies for DT

Carrillo and Flores (2020) note the complexity of digital and online learning and teaching practice and the need for educator competencies to design, disseminate, engage, and interact with learners using appropriate learning materials that stimulate both affective and cognitive engagement. The quality and success of digital and online learning experi-
ences depend on learning design skills for the articulation of instructional presence, cognitive presence, and social presence between educators and learners and among the group being facilitated (Carrillo & Flores, 2020). According to Carrillo and Flores (2020), digital and online content and delivery must focus on learners’ needs, therefore certain aspects should be expressly designed into teaching sessions, activities, assessments, delivery, and other exemplar resources.

The literature shows that effective online learning and teaching are dependent on the establishment of certain ‘presences’, which improves supportive and productive interactions that mediate the learning process across presences (Carrillo & Flores, 2020). Therefore, to better serve learners, educators must invest in the development of learning design and digital content production competencies (Falloon, 2020).

### 2.2 A pedagogical approach to digital and online learning design

While recognising the need for educator skills development in digital and online learning design, the literature has yet to address how to best approach these imperatives. Thus, the following literature seeks to identify a pedagogical model for online learning to inform and guide educators in the design of digital and online education.

The design of digital and online education generally requires a complementary blend of ‘live’ (synchronous) and online (asynchronous) learning environments to improve student outcomes (Clay, 2020; Vaughan, 2007). The blended learning concept is broad and encompasses many models of delivery however the flipped learning pedagogical approach is one of the more contemporary models and can be used to guide the design of digital and online learning in higher education.

The flipped pedagogical approach promotes the digitalisation of key session content to be provided to the learner before the in-person session, either as online reading or other digital learning content, such as video (Bergmann & Sams, 2014). This method gives students flexible access to asynchronous content before the synchronous in-person group session. The pre-session content prepares the learner to investigate, collaborate with peers, and activate past knowledge to link new information to content already experienced in the in-person session (Talbert, 2017). Flipped learning allows educators to spend more time helping students during in-person sessions, which can lead to more active learning and experiential learning based on theoretical information. This more efficient use of time is due to in-person interaction between learners and educators being focused on needs rather than didactic delivery (Bergmann & Sams, 2014; Talbert, 2017).

Flipped learning may challenge higher education educators’ technological and pedagogical competencies as it relies on educators’ ability to design, develop, and deliver sessions with appropriate resources, including digital content provided in advance, and on appropriate activities for the in-class exploration of the topic (Bovill, 2020; Sahin & Kurban, 2016). In addition, higher education has historically relied on the predominant delivery approach of the lecture with faculty members identified as “lecturers”, for many of whom teaching is an aspect of wider expertise in a subject area, so a move to flipped learning, with a greater focus on facilitation, may represent a significant change and potential challenge for educators (Reidsema et al., 2017). Flipped learning also requires technical knowledge to restructure, alter, and distribute educational content (Papanikolaou et al., 2017). As a result, challenges to educators include varied experiences with digital technologies for creating educational content, availability of technologies and support for educators, varied pedagogical knowledge related to the effective design and delivery of flipped learning and workload difficulties that may require more preparation time.

### 2.3 Design considerations for flipped learning delivery

In considering how educators are supported to design flipped learning for higher education, there are a range of factors to investigate. One leading model concerning technological and pedagogical aspects— as digital content such as video lectures and approaches such as active learning techniques may be augmented in flipped learning—is linked with the work of Mishra and Koehler (2006). The TPACK (technological, pedagogical and content knowledge) framework associated with Mishra and Koehler (2006) seeks to represent the key considerations for educators involved in the DT of learning and teaching. There needs to be an appreciation of the content to be delivered, and the most appropriate pedagogical approaches to draw upon to deliver that same content: from this, there can then be an analysis of the most relevant technologies to support the meaningful engagement of learners in the subject via the educator’s teaching abilities (Mishra & Koehler, 2006).

Building on the seminal work of Shulman, 1987, who identified the importance of pedagogical content knowledge (PCK) the addition of technological knowledge to pedagogical, content knowledge, forms an overlap of the three domains considered in the TPACK model: this is where the
most meaningful and productive teaching and learning experiences are to be generated. The resulting effect of this approach is that if one or more of the three aspects of the framework are under-considered, then there is the potential for incomplete, inefficient, and unengaging experiences to be afforded as a consequence (Kurt, 2018; Mishra & Koehler, 2006; Shulman, 1987).

A benefit of the TPACK model is that it outlines the considerations that educators in higher education facilities must engage with when considering DT, such as in the introduction of a flipped learning approach as a strategic evolution of current teaching practice.

Criticisms of the TPACK model include that it is complex and that the borders between the three aspects of teaching, subject, and technology are not as distinct as the model suggests (Archambault & Crippen, 2009). Others suggest that the central TPACK overlap at the heart of its diagrammatic representation is less a function of educators' autonomy in the teaching and learning process and might be more accurately understood as a product of that consideration (Harris & Hofer, 2011). In other words, an articulation of technology, content, and delivery skills is essentially facilitative of the learning of others and should perhaps be seen in that light rather than as a process entirely under the educator's control (Harris & Hofer, 2011). Any consideration towards adopting TPACK as a means through which to support transitions toward flipped learning in higher education must appreciate that this moves some responsibility to learners for that learning to meaningfully take place (Harris & Hofer, 2011).

In summary, the supporting literature recognises that DT of learning and teaching requires a need for educator skills development in digital and online learning design, flipped learning has been identified as a pedagogical approach to support educators' DT of learning and teaching. Strengths and opportunities, as well as potential issues and weaknesses, of this utilisation of flipped learning, have been considered, as have the new responsibilities that a flipped learning approach suggests for educators. Finally, the prominent framework of TPACK has been discussed as an approach to designing flipped learning and guiding educators' design decisions and skills development.

While previous studies have looked at the utilisation of TPACK on a more individual knowledge development basis, the consideration in this research is that faculty development that encompasses the domains of TPACK in its learning design may offer a concise and scalable approach to empower educators' pedagogical and technological knowledge to support the development of flipped learning in higher education.

3. Research questions

To explore this further the following research questions will be addressed:

- **RQ 1** – Can TPACK informed learning design support educators’ flipped learning implementation?
  - **RQ1.1** – How can TPACK inform the design of faculty development for flipped learning?
  - **RQ1.2** – What was the experience of participants following a guided flipped learning pilot?

4. Theoretical framework

This research will utilise TPACK as its theoretical framework. An overview of the framework has been provided in the literature review and a visual diagram of the framework can be seen in Figure 1. While it has been suggested that TPACK development is an individual process (Gao & Mager, 2013), in this research the framework was selected to inform the researcher of key components or areas of knowledge that are crucial in the “highly complex” activity of designing and delivering educational experiences (Mishra & Koehler, 2006).

The study intends to use the TPACK framework in the following two ways: (i) to categorise and inform the learning design of a faculty development content in-line with the hybrid domains of the framework—pedagogical content knowledge (PCK), technological content knowledge (TCK) and technological pedagogical knowledge (TPK)—to provide a rounded opportunity for educators’ knowledge development, (ii) the TPACK hybrid domains, as mentioned, will be used to code data collected from educators’ experiences of the faculty training pilot.

5. Methodology

5.1 Research site

This case study focuses on an Australian university’s global campus in Dubai, UAE. It is the oldest private university in Dubai, UAE, established in 1993 and part of a global network with the main campus in Australia and additional campuses in Hong Kong and Malaysia. The university had
previously been strategizing to bring innovative teaching practices, in the form of blended learning, from Australia to Dubai before emergency measures hit during the pandemic. The flipped learning pilot, therefore, is the first tangible transition that aims to build upon the catalyst of change that occurred with mandated emergency online delivery by providing educators with a structured progression to future blended learning.

5.2 Participants

The flipped learning pilot study consists of 10 university educators who volunteered to be part of the faculty development pilot. All participants were involved in teaching a post-graduate module during the second trimester, running from January 2021–April 2021. The educators were teaching in modules across the university’s 3 faculties of Humanities, Business and Engineering.

5.3 Aims of the flipped learning pilot

- Build institutional capacity of learning design for blended learning by adopting an iterative redesign approach to their course
- Initiate a reflective practice approach to reflect on the concept of learning design in the context of applying flipped learning to their teaching.
- Develop knowledge around pedagogical and technological domains.
- Identify future faculty development needs
5.4 Pilot design approach

The participants were required to develop a minimum of 3 flipped learning sessions from the 10 sessions of their module. This incremental approach aimed to develop educator’s confidence in designing flipped learning sessions by allowing for manageable redesign over a minimum of 3 sessions while also proposing an iterative mindset, to evaluate the implementation of their flipped sessions and to improve future deliveries while adding more and more sessions to the flipped learning approach over time (Hrastinski, 2020).

5.5 Data collection

Qualitative data was collected as this study focuses on the complex phenomena of designing learning experiences and capturing the perspectives and experiences of the participants. Therefore, qualitative methods offer more flexibility and adaptability than quantitative methods, allowing researchers to modify their approach as they gain new insights or encounter unexpected findings (Punch, 2013).

The research collected data from two main sources visual learning designs, see Figure 2, and semi-structured interviews. The visual learning designs of participants were chosen as they represent participants’ ability put the training course curriculum into practice and semi-structured interviews allow for further understanding and exploration of participants’ experiences.

5.5.1 Visual learning designs

Participants in the training course were required to complete one visual learning design template for each of their course sessions. The template along with a supporting workshop prompts participants to map their own session content and activities to the model, considering the sequencing of their content and the alignment of content, activities, and assessments for a constructively aligned design.

Figure 2. Visual learning design template

![Visual learning design template](https://example.com/visual-learning-design.png)
5.5.2 Semi-structured interviews

Each participant was asked to take part in a semi-structured, one-to-one interview following the completion of the flipped learning pilot. Interview questions were sent in advance to the participants and availability was identified and booked via the organisation’s email system. The individual interviews carried out with each participant were conducted by video conferencing tool (WebEx) and averaged 30 minutes in length. The video conferencing tool recorded the interviews, and the recording along with an automated transcript was sent to me soon after the completion of the live interview. The transcripts of all interviews are stored on a secure hard drive for later analysis.

5.6 Data analysis

In order to identify areas of knowledge that would require further development for flipped learning implementation, the TPACK framework was used to analyse the data collected. The domains of the framework served as codes for the data. In the initial round of data analysis only hybrid domains were used, PCK, TCK, TPK and TPACK. In addition to the structure of utilising the TPACK framework for initial coding, I was open to identifying other, more focused codes if they emerged and did not fit in the TPACK coding system (Charmaz, 2006). To verify accuracy, the analysed data was shared back to the participants, utilising a ‘member checking’ approach to ensure the accuracy of the interpretation of data (Merriam & Tisdell, 2015). All participants confirmed that the analysis showed a true reflection of the data they provided.

6. Findings

Following the completion of data analysis, the following findings are classified into five categories, consisting of the four domains of knowledge from the TPACK framework (i) PCK, (ii) TCK, (iii) TPK and (iv) TPACK with the addition of the identified area (v) ‘community’ that is not captured in the TPACK framework, however, emerged as necessary during the data coding. The findings will be presented in two sections. The first section will address RQ1.1 ‘How can TPACK inform the design of faculty development for flipped learning?’ by presenting the design of the flipped learning pilot training program. The second section will address RQ1.2 ‘What was the experience of participants following a guided flipped learning pilot?’, by presenting the evaluation of participants in the pilot.

6.1 Design of the flipped learning pilot

The flipped learning pilot was designed by the researcher and aligned to domains of TPACK to ensure a comprehensive approach for the development of participants’ knowledge domains i.e., some educators needed support in pedagogical aspects, some with technological aspects and sometimes with both. The following sub-headings of training program (addressing all domains of TPACK), digital learning environment (addressing all domains of TPACK), learning design consultation (addressing PK, CK and TK), and visual learning design template (addressing PCK and TPK) identify the development opportunities provided to educators during the pilot.

6.1.1 Training program

A flexible training program was offered to participants that aimed to address various domains of TPACK development in relation to the design of flipped learning (see Table 1). The training consisted of a combination of synchronous ‘live’ workshops and asynchronous ‘microlearning’—a self-directed learning digital resource. Workshops ran for approximately 60 minutes, while microlearning was intended to take no longer than 30 minutes and was broken down into ‘chunks’ of content. All training was accessible via the dedicated digital learning environment.

6.1.2 Digital learning environment

The pilot was hosted within a shared Moodle Learning Management System (LMS) (see Figure 3). This digital environment allowed participants in the pilot to have flexible access to curated and created learning resources, including self-directed learning and activities (PCK) EdTech tools (TPK/TCK), and research (PCK) and to share and discuss developments together. An added advantage of the digital learning environment is that it replicated the LMS that participants would use to develop their own course offerings. Therefore, engagement in this component of the pilot was intended to showcase good practice in the design of the LMS space (TPK) and help participants to get more familiar with navigating a digital environment (TK).

6.1.3 Learning design consolation

Educators were given the opportunity to meet frequently with an experienced learning designer to gain guidance and support in the design (PK) and development (PK & TK) of flipped learning and to encourage educators to apply approaches in relation to their existing subject content knowledge (CK) to develop a rounded TPACK approach to
Table 1. Overview of training provided

<table>
<thead>
<tr>
<th>Name</th>
<th>Workshop (Synchronous)</th>
<th>Microlearning (Asynchronous)</th>
<th>TPACK domain addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flipped Learning Rational workshop</td>
<td>x</td>
<td></td>
<td>TPACK</td>
</tr>
<tr>
<td>Creating the learning environment (Moodle)</td>
<td>x</td>
<td>x</td>
<td>TPK</td>
</tr>
<tr>
<td>Create a visual learning design</td>
<td>x</td>
<td>x</td>
<td>PCK</td>
</tr>
<tr>
<td>Introduction to Learning Science</td>
<td></td>
<td></td>
<td>PCK</td>
</tr>
<tr>
<td>Introduction to Active Learning</td>
<td>x</td>
<td></td>
<td>PCK</td>
</tr>
<tr>
<td>Introduction to designing Blended Learning</td>
<td></td>
<td></td>
<td>PCK</td>
</tr>
<tr>
<td>Rethinking Assessment</td>
<td></td>
<td></td>
<td>PCK</td>
</tr>
<tr>
<td>Learning Design</td>
<td></td>
<td></td>
<td>PCK</td>
</tr>
<tr>
<td>EduCreators</td>
<td></td>
<td></td>
<td>TPACK</td>
</tr>
</tbody>
</table>

Figure 3. Overview of the Moodle LMS environment

Educators looking to redesign their Subject or session for blended learning often start by thinking about content. However, we should take a step back and think about the following:

- WHAT – do you want your learners to do or know?
- HOW – will you and your learners know that they’ve achieved what you set out to teach?
- WHAT – teaching content will support these two elements
their flipped learning offerings. The learning design consultations started with a group briefing with the participants and the learning designer. Training program options were discussed as participants had the flexibility to select what they engaged with and when (if it was an asynchronous offering). The learning designer was also available for individual consultations with participants to guide and support their flipped learning design and development of digital learning content.

6.1.4 The visual learning design

To support participants in their flipped learning design, a visual learning design template, along with training, was provided to guide the planning of individual sessions. The template depicted the session-level structure of the flipped learning model, the agreed percentage of synchronous and asynchronous learning to aim for and key components to be included in each session, shown in Figure 2. The intended use of the template was to provide guidance on three fronts: (i) to prompt participants’ reflection on practice and pedagogy (PCK)—considering how best to identify and deliver their content—through the completion of the template for each session; (ii) to help participants identify content that could be delivered in the asynchronous learning environment (TPK); and (iii) to offer a level of constancy across the institution that would allow for more detailed evaluation in the future. An example of a complete visual learning design can be seen in Figure 4.

As a requirement of the pilot, each participant produced at least 3 visual learning designs as part of their course redesign. This meant that participants redesigned at least 3 out of the 10 sessions of their course. The visual learning designs were shared with the other pilot participants for feedback and iterative improvement.

6.2 The experience of participants following a guided flipped learning pilot

Each participant was asked to take part in a semi-structured, one-to-one interview following the completion of their training. In total 6 out of 10 participants agreed to be interviewed. The interview questions aimed to prompt participants to share perceptions of their experience during the flipped learning faculty pilot. Responses were transcribed and coded to domains of TPACK and the additional code of community was included. A summary of responses is reported in Table 2.

Figure 4. An example of a visual learning design from a participant teaching a Finance subject

*EXAMPLE* Session – Cost Concepts & CVP

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Table 2. Summary of interview responses

<table>
<thead>
<tr>
<th>Knowledge domain</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPK</td>
<td>In addition to the Learning Management System, participants reported that they were introduced to tools such as Padlet (virtual collaboration space), Mentimeter (polling), Vimeo/YouTube (video hosting) and Flipgrid (video creation) were utilised to create educational content and learning activities. Camtasia video editing technology was used by some to design and create ‘chunks’ of information.</td>
</tr>
<tr>
<td>TCK</td>
<td>All participants reported satisfaction with the Moodle site templates and support to structure their sites. There was a desire for more support in setting up activities in the LMS in a more intuitive way. There were requests from a majority of participants for training and support in video creation, specifically editing.</td>
</tr>
<tr>
<td>PCK</td>
<td>Participants shared an appreciation for the contemporary definition of blended and flipped learning that was provided. Participants overall relied on and adhered to the visual learning design template and reported it was useful for both designing sessions and communicating approach to learners. A number of participants felt the pilot required them to rethink their approach to teaching, one said he shifted from “instructivist to constructivist”, others acknowledge a move away from the lecturing approach in the ‘live’ synchronous session time. Those that reported a successful transition stated that clear, concise communication with learners was a key in their success. There was acknowledgement of the shift role of the learner, with more emphasis on them ‘doing’ with active learning. This was seen as a plus for educators, “taking pressure off” to deliver for the full time.</td>
</tr>
<tr>
<td>TPACK</td>
<td>One participant identified the importance of aligning learning outcomes, goals, innovative pedagogies, and appropriate technology.</td>
</tr>
<tr>
<td>Community</td>
<td>Appreciated opportunities to discuss with colleagues across disciplines. Valued the opportunities to share approaches and challenge with the group. Feel that there is a support network of colleagues now available.</td>
</tr>
</tbody>
</table>

7. Discussion

This chapter discusses the findings of the study, the aim of which was to explore the role of the TPACK framework in supporting educators’ flipped learning design. It is divided into two sections, each of which corresponds to one of the sub-research questions (RQ1.1 and RQ1.2). The first section focuses on how the TPACK framework informed the design of the flipped learning pilot (RQ1.1). The changing role of educators, due to digital transformation, and how emerging pedagogical and technological competencies were addressed in the pilot are also discussed. This is followed by a discussion related to educators’ experience following their participation in the flipped learning
pilot (RQ1.2). The discussion of finding for this section is grouped around the two aspects of technological competencies and pedagogical competencies. Finally, the next steps and limitations of the study will be discussed.

### 7.1 The design of the flipped learning pilot

The findings section showed how the TPACK framework was used in multiple ways to inform the learning design of the flipped learning pilot, specifically, training was provided to participants via a digital learning environment that was aligned to all domains of TPACK. As proposed by Mishra and Koehler (2006) the training encouraged participants to consider appropriate pedagogical approaches and relevant technologies that could be incorporated with their existing content knowledge and subject matter expertise to best offer meaningful engagement with learners.

In addition, learning design consultations were provided to support participants’ development of PK, CK and TK, and a visual learning design template was offered to guide participants’ design structure and support the development of PCK and TPK. The two components were included in the design of the flipped learning pilot with the aim of guiding the shift of educator role to have a greater focus on the design and facilitation of learning experiences, highlighted as a potential challenge area in the previous literature (Carrillo & Flores, 2020; Reidsema et al., 2017). The components of the flipped learning pilot were purposefully developed to address requirements from the literature relating to TPACK, specifically from the original authors of the TPACK framework, Mishra and Koehler (2006), and to address the changing role of educators to move away from delivery of content and towards designer and facilitator of learning experiences (Carrillo & Flores, 2020; Reidsema et al., 2017).

As this was a pilot, the components offered are simply the first iteration and are not intended to be a settled state. The next redesign of the pilot will draw upon the experiences of participants during this pilot to further refine and improve version two.

### 7.2 Experience of educators following the flipped learning pilot

#### 7.2.1 Technological competencies

Findings from the semi-structured interviews indicated an appreciation of the technology tools selected along with the support that educators received to leverage the tools in the design and delivery of their flipped learning experiences.

Papanikolaou et al. (2017) echoes the importance that technological knowledge to restructure, alter, and distribute educational content. The pilot intended to introduce participants to user-friendly technology that could be easily utilised to transform the learning experience. Examples of this were the Padlet tool to foster virtual collaboration with students and the Mentimenter tool to support assessment for learning activities.

#### 7.2.2 Pedagogical competencies

Participants shared their appreciation for the contemporary definition of flipped learning that was provided, stating that Flipped learning, part of the blended learning concept, uses the purposeful combination of synchronous and asynchronous learning to improve student outcomes (Clay, 2020; Vaughan, 2007). This definition gave a very clear starting point to participants that they could build upon through the use of the visual learning design template. Commentators such as Falloon (2020) and Carrillo & Flores (2020) have argued that educators must invest in the development of learning design competencies to succeed in flipped learning design. In line with this theme, participants shared an appreciation for the visual learning design template that guided the design of individual sessions in-line with the agreed flipped learning model. While participants benefited greatly from support and guidance in the area of PCK and community participants did request future training in the areas of TCK in relation to developing learning management system environments and video editing.

Some participants commented about their personal reflections on their teaching practice that had taken place during the pilot. As highlighted in previous literature the process of designing flipped learning requires an articulation of technology, content, and delivery/facilitation skills (Harris & Hofer, 2011).

Designing flipped learning may also challenge educators’ technological and pedagogical competencies as it relies on educators’ ability to design, develop, and deliver sessions with appropriate resources, including digital content provided in advance, and on appropriate activities for the in-class exploration of the topic (Bovill, 2020; Sahin & Kurban, 2016). This is really an intention of the pilot to encourage reflection and development of competencies for future iterations of educators’ flipped learning designs.
8. Conclusion

The goal of this study was to investigate the role of the TPACK framework in assisting educators with their flipped learning designs. This goal was part of identified educator competency development in the domains of technology and pedagogy to prepare for the continued digital transformation of higher education.

The TPACK framework was used to inform the learning design of the flipped learning pilot, which provided training to participants to consider appropriate pedagogical approaches and relevant technologies. Learning design consultations were provided to support participants’ development of PK, CK and TK, and a visual learning design template was offered to guide participants’ design structure and support the development of PCK and TPK. These components were developed to address requirements from the literature relating to TPACK and to address the changing role of educators to move away from the delivery of content and towards the designer and facilitator of learning experiences. While the development in the technological and pedagogical knowledge domains is clear from the finding, there are still seen as somewhat separate domains and therefore more work needs to be done to synthesize the benefits of developing holistic TPACK in educators’ teaching practice for the long-term digital transformation of learning and teaching.

Participants responded positively in relation to efforts around technological and pedagogical competencies development however due to the nature of the pilot, the sample size of 10 was too small to be significantly significant. Therefore, future research related to the next iteration of the offering would need to increase the number of participants to ensure a significant contribution to the research topic. In addition, future research may look to explore augmenting the TPACK framework to include an element that would foster community in the learning design as this was a positive aspect that emerged without too much consideration in the initial design. An exploration of a framework such as Garrison et al., (2004) community of inquiry framework could be looked at in collaboration with the TPACK framework or as an alternative learning design lens. Finally, alternative models of blended learning could be conserved, again either in addition to the flipped learning model or as a replacement.

References


About the author

Christopher Tuffnell is the Lead in Innovative and Digital Education at the University of Wollongong in Dubai. Chris has been working in learning and teaching for over 14 years, mainly focused on faculty development, digital education, learning design, healthcare simulation and innovation in education. Chris has developed and delivered online and blended learning courses on topics related to Education and Innovation in Health Science for an audience of students, faculty, clinicians, and teachers. Chris has experience in supporting organisations in their transition into blended learning delivery and continuing excellence in teaching practice that leads to improved learning outcomes. Chris’ research interests are related to the identification and development of 21st-century skills to prepare students for the future of work; learning design for blended learning; and Teaching Excellence in Higher Education.

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