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Moving beyond the tools: Pre-service teachers' views on what they value in a digital literacy short course

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Background: A digital literacies short course, rooted in a pedagogical model of authentic learning and mapped against the TPACK model, was conceptualised and implemented to enhance the existing digital literacies and technological pedagocial content knowledge of student teachers and to promote an awareness of technology-enhanced curriculum practices.

Aim: In aiming to inform course improvement, our study interrogates student teachers' perceptions of the aspects that they valued in the short course.

Methods: Guided by social constructivism and situated within a qualitative paradigm, twenty-four 2nd and 3rd year Bachelor of Education (BEd) students who completed the course participated in three semi-structured focus group interviews whereby data was analysed by means of constant comparison analysis.

Results: Findings suggest participants found value in authentic tasks and assignments as well as the process of knowledge creation. They did, however, differ in their views of the purpose and aim of such a course.

Conclusion: This study contributes to the gap in South African research and the growing South African interest in preparing teachers in adopting technology-enhanced practices and curriculum changes in schools, and argues that standardised theoretical training courses ignoring psycho-socio-cultural factors and individual differences should be reconsidered.

Keywords: authentic learning; digital literacy; learning technologies; teacher training; TPACK model.

Introduction

Within the higher educational context, numerous discussions continue regarding the notion of digital literacy and expectations about student skills and attributes related to learning technologies. It is, for instance, expected of higher education (HE) institutions to promote graduate attributes that will assist students in being engaged and responsive citizens and to be prepared for the world of work (Barnett 2012). It requires a careful reconsideration of the curriculum and learning opportunities in order to support students in this quest (Bozalek, Ng'ambi & Gachago 2013). Furthermore, it is expected of academics to stay abreast of digital developments that could further assist students when entering the job market (Shahroom & Hussin 2018). An accelerated global economy requires employees and thinkers who could respond to the exponential growth and demands of an economy driven by digital technologies (Gleason 2018).

To address such growing needs, the digital literacy levels of students should be carefully monitored. Role-players should consider the various 'cognitive, motoric, sociological and emotional skills' related to digital devices as opposed to only focusing on the ability to negotiate and use such devices (Eshet 2012:267). Such an approach also highlights the importance of what the role and value of learning technologies should be when promoting students' digital literacy skills. We would like to draw on the work of Rushby and Surry (2016) to emphasise that reference to learning technologies argues for a diminished status of technology, and rather a focus on the practice of learning. Such an understanding underlines the importance of impacting performance and not to foreground the technology per sé.

Often, it is expected of HE students to have access to a variety of technologies as well as the display of highly sophisticated technological skills in the use and application of such devices

†, 1956 – 2018.

(Kennedy et al. 2008). Yet, despite the apparent seamless use of technology in the social and personal contexts of HE students, the question could be asked whether these users demonstrate the sophisticated digital literacy and information skills required to become autonomous learners in the 21st century. The case is made that students are not always fully skilled and eager to use technologies to acquire and construct knowledge for academic purposes, to develop content, to critically analyse and to evaluate (Benton-Borghi 2013; Flihan, Fragnoli & Margolin 2010).

From a pre-service teacher training perspective, it is argued that students should be equipped for flexible work opportunities, to prepare them to participate actively in different communities and to respond and reflect on the different needs of the learners they teach in schools (Burnett 2011). In particular, in the South African context, it is expected from school teachers to continuously reflect on and actively evolve new teaching ideologies that embrace equal education in post-apartheid South Africa (Mukeredzi & Mandrona 2013). Teachers are also required to critically interrogate, analyse and discuss available information, communication technologies and e-education resources (Department of Education 2004). Within the 21st century education environment, it is furthermore projected that teachers (and lecturers) model and apply digital literacy skills within the respective classrooms and educational contexts (Geer & Sweeney 2012). However, it is often argued that teachers lack confidence and competence in terms of the use of learning technologies and that they feel intimidated by learners who they perceive as more technologically skilled than themselves (Burnett 2011; Harris, Mishra & Koehler 2009; Koehler & Mishra 2009). Martinovic and Zhang (2012) describe the importance of creating opportunities for positive experiences using learning technologies within an authentic learning environment so as to ensure that teachers utilise their skills. It, therefore, becomes clear that there is an increased need for the integration of these tools and skills into the respective curricula and professional development opportunities of pre-service student teachers, whereby such initiatives should not only focus on the effective use of digital tools, but also to raise skills and confidence in creating knowledge and meaning and to critically engage with knowledge and tools alike (Flihan et al. 2010).

During pre-service teacher practice at a South African higher education institution, it has been observed that there often manifests a disconnect between student experiences and expectations in the workplace (schools) regarding the integration of learning technologies. At the faculty, although expected of academics to model such innovative approaches and practices during pre-service education, such a paradigm shift and the development of appropriate skills prove to be a slow process. Therefore, in order to create an opportunity for pre-service teachers to not only observe good technology integration practices within the Faculty of Education, but also to develop transferable skills that could be applicable during in-service teacher practice and when entering the world of work, a voluntary digital literacy short course was conceptualised and implemented with the view to enhance the existing digital literacy skills and knowledge of pre-service teachers and to promote an awareness of learning opportunities with the aid of learning technologies in the curriculum. The purpose of this article is not to evaluate the short course content nor to report on the expected development of students' digital literacy skills, but rather to highlight the aspects and approaches included in such a course that were of value to pre-service teachers. Our article, therefore, aims to identify those aspects and approaches included in a digital literacy short course that are deemed of value for pre-service teacher training. These results could assist us in future courses and help us identify areas of development. We start the article with a literature review and reference to how social constructivism, authentic learning principles and the technological pedagogical content knowledge (TPACK) model guided us in the conceptualisation of this short course. This is followed by the methodology and a discussion of the results. The article concludes with recommendations to be considered when extending the digital literacy levels of pre-service teachers.

Literature

Social constructivism

Education instruction experienced a paradigm shift in thinking about learning during the 1990s (Land, Hannafin & Oliver 2012) whereby the constructivist paradigm provided possibility for more social and learner-centred opportunities as opposed to traditional teacher-led learning methodologies reminiscent of many early learning experiences of students. A similar trend has been observed within the learning technology environment where a shift appeared from a behaviourist approach to that of constructivism (Herrington, Reeves & Oliver 2010). It suggests a movement away from knowledge transmission from an expert to a learner to a more co-constructed approach to learning (Land et al. 2012). Social constructivism explores a social component to learning, offering insight into learning that occurs in the classroom as well as outside the classroom setting (Kim 2001). Such a paradigm makes the case for the prominence and value of parents, teachers, the community, peers and so forth to create a learning opportunity that is socially engaging (Patel et al. 2011).

According to Vygotsky, it is through social and cultural interaction that learning and knowledge realities are constructed (Mills 2010). When learners are given the opportunity to actively explore learning with the mediation of other role-players, they begin to construct new understanding by building onto and reorganising previously constructed and assimilated knowledge, skills and understanding, within a specific learning frame referred to as the zone of proximal development (ZPD) (Gould 2012; Newman & Newman 2008). Vygotsky (1978) referred to the ZPD as:

> [*T*]he distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers. (p. 86)

That is, the learner will likely reach a ceiling of understanding when learning without assistance, and in order to push beyond this conceptualisation ceiling, interaction with more knowledgeable others (MKOs) is necessary for personal learning development. The MKO refers to any source of knowledge that holds more understanding and/or experience of a particular topic, and which can provide the necessary facilitation for the learner to renegotiate his or her own ZPD (Koenig & Sabbagh 2013). The required support can be provided in the form of scaffolding, which involves individual guidance to deconstruct topics into smaller manageable concepts for the learner (Crosby Bergin & Bergin 2014). Within such a paradigm, teaching with technologies requires skills, knowledge and a deep level of understanding of how learning technologies could potentially aid the learning experience. Effective use of scaffolding, the role of the MKOs and the seamless facilitation of the learning experience within the digital age pose many opportunities and challenges to teachers.

We attempted to include the above-mentioned principles in our course design by placing emphasis on the value of social and cultural interaction of the course participants. We paid particular attention to the value of MKOs which included not only facilitator experience and knowledge, but also tapping into the diverse levels of digital skills of the participants. Throughout the design of the course, scaffolding was used to gradually include those participants who had limited knowledge and/or experience of digital tools and devices.

Short course conceptualisation: Knowledge domains

Teaching with learning technologies requires the development of certain knowledge domains in order to seamlessly and effectively integrate such tools within a specific curriculum. It is expected of teachers to understand and continuously develop and adapt between different cases, classrooms and disciplinary environments (Koehler & Mishra 2009). Learning technologies afford the opportunity to begin to address learning barriers experienced by the full spectrum of learners, especially those with disabilities and those at risk (Benton-Borghi 2013). Learners learn how to access a plethora of information and how to engage with each other to negotiate and create unique knowledge (Edyburn 2005; Englert, Manalo & Zhao 2004). Within this complexity, teachers are expected to demonstrate multifaceted knowledge structures. Drawing on the work of Koehler and Mishra (2009), the authors underline three intersecting knowledge domains as those imperative in developing skills and attributes in the use of learning technologies in the classroom. The TPACK model is made up of technological pedagogical knowledge, technological content knowledge and pedagogical content knowledge. To productively integrate technologies in teaching, all three domains as well as the inter-related knowledge between them need to be considered and developed. As such, a well-balanced understanding of subject matter, as well as discerning use and further development of effective teaching tools and strategies, forms part of the successful teacher training (Koehler et al. 2014). The framework extends Shulman's (1987) notion of pedagogical content knowledge and '… emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology' (Koehler & Mishra 2009:1025).

Content knowledge refers to the subject matter and the disciplinary content that should be taught to students, and encompasses theories, frameworks and different approaches to learning. Pedagogical knowledge represents a deep level of understanding of theory and practices associated with the art of learning and teaching, as well as an appreciation and working understanding of different teaching methodologies. Lastly, technological knowledge seems to be more complex to describe because of its ever-changing evolution. This requires teachers to access, develop and include novel technologies and resources that complement their subject content knowledge to engage learners in their learning (Martinovic & Zhang 2012). It is suggested that, within an educational context, technological knowledge moves beyond the basic digital literacy skills of users, and includes not only an understanding of the potential but also possible constraints in achieving learning goals (Tyner 2014). It is suggested that users develop deeper levels of understanding between the alignment of affordances of tools, connections and constraints of tools and different approaches. It, furthermore, requires users to develop transferable skills and to adjust with time and new technologies. It, therefore, assumes an ability to adapt and develop skills related to technologies – irrespective of the type of tool (Mishra & Koehler 2006). However, challenges do arise; for instance, Unwin (2005:121) expressed concern that emphasis was placed on 'getting [*African*] school's connected' so as to meet the New Partnerships for Africa's Development (NEPAD's) e-School initiative of increasing learners' technological skills, ahead of developing teacher praxis to support such use. These findings are further corroborated by the work of Krönke (2020) who emphasised the clear differences of digital readiness of learners in African schools. Because of the exponential growth and development of emerging technologies, increased needs therefore arise in terms of assisting teachers in identifying the potential, challenges and affordances of such tools within a complex framework of different social, cultural and economic variables (Chai, Koh & Tsai 2010; Koehler & Mishra 2009).

However, the effective integration of learning technologies in the classroom goes beyond the mere understanding and acknowledgement of the three knowledge domains (i.e. content, pedagogical and technological), requiring an approach to embrace an emergent form of knowledge that moves beyond the three separate domains to a more integrated approach. It requires teachers to develop an appreciation of the integration of pedagogical techniques and approaches appropriate for a particular learning experience, sufficient content knowledge and working knowledge and understanding of appropriate technologies

that could contribute to or enhance a particular learning experience (Mishra & Koehler 2006).

Despite the complexities surrounding the inter-relatedness of such knowledge domains, it also remains imperative to understand the nature of knowledge associated with such practices. For those involved in education, it remains important to extend pedagogy and learning beyond the exact context of the learning activity. It is aspired to equip students with the ability to build on previous knowledge and to apply and transmit it to other relevant contexts (Maton 2014). Within a social constructivist paradigm, such practices could be associated with collaborative knowledge building. As such, opportunity is created for distributed or collective knowledge building where all the knowledge of the individuals in the community is aggregated (Bernstein 2000; Maton 2009).

It is within this theoretical paradigm that the pilot digital literacy short course was conceptualised. The need to create a learning opportunity whereby a formal course could translate into the practical and operational needs of a work environment posed interesting challenges and guided the authors towards a pedagogical model rooted in authentic learning (Herrington et al. 2010). The true nature of authentic learning is not to provide a traditional instructional design approach, but rather to create a learning opportunity that speaks about real-life challenges and whereby outcomes are valued and where it contributes to the collaborative creation of useful artefacts and resources (Herrington 2015). By adopting such a framework, it is argued that knowledge created is more accessible to problems within real-world situations. Often, learning at HE institutions is separated by 'knowing' and 'doing', which often provides challenges when access to such knowledge is really needed (Herrington et al. 2010:4).

Short course conceptualisation: Authentic learning principles

Authentic learning and then also authentic tasks consist of an authentic context that reflects a real-world context where knowledge will be applied. In such a learning context, ill-defined tasks that are applicable to real-world situations and challenges guide the learning process. To guide students through such an approach, learning takes place with the aid of experts and modelling of required skills and processes. It remains important that students develop the skills to critically investigate the environment from all possible angles and therefore multiple roles and perspectives are encouraged. An important element of authentic learning and tasks is also the co-construction of knowledge whereby students are granted the chance to collaborate on the design of tasks. In order to provide a meaningful learning opportunity, students are encouraged to reflect on their learning and also to develop the ability to articulate whereby groups or individuals are able to defend a position or to create a public presentation of a particular case. The teacher or facilitator provides students with the necessary coaching or scaffolding to accommodate, assimilate and build new knowledge structures. And finally, an authentic assessment whereby students demonstrate knowledge and are provided with an opportunity to display or share their new products or skills set, the scene for a learning opportunity differs from the traditional mode of instruction (Herrington 2015; Reeves, Herrington & Oliver 2004). Table 1 presents the key learning dimensions related to authentic learning and how it translated to the conceptualisation of the short course.

To further our understanding, we were also guided by the approaches and lessons learnt from other institutions. By investigating various pre-service training programmes, challenges and triumphs were scrutinised for the influence they may have in the current digital literacy short course. What was evident is that the authors could not find explicit reference to such a short course of similar nature within the South African context. Internationally, Martinovic and Zhang (2012) discovered that limited access and unmet expectations to use learning technologies in schools, poorly modelled and unjustified use of learning technologies both in schools and in the teaching programme, insufficient and inadequate learning experiences in the programme and a lack of confidence with which participants felt they could use the tools in schools were challenges experienced by the research participants inherent in their pre-service teaching programme at the University of Windsor. In addition, Zhou, Zang and Li's (2011) study at a Chinese university discovered that participants did not feel prepared to utilise their new skills following their inclusion in the programme, as well as identified the challenges of outdated software and disparate access to learning technologies which marred the course. Finally, Goktas, Yildirim and Yildirim (2009) utilised participant perspectives to delineate these challenges to categories of barriers to overcome, as observed in their Turkish study, that is extrinsic (including training, resources, technical support and time) and intrinsic barriers (teachers' and instructors' beliefs, visions for technology use and conceptualisations about teaching and learning).

TABLE 1: Authentic learning dimensions (Herrington, Reeves & Oliver 2006) and application with short course conceptualisation.

Authentic learning dimensions	Short course conceptualisation
Authentic contexts	Real-world examples used in all modules
Authentic activities	Activities related to school-based scenarios
Access to expert performances	Showcasing of experts using different approaches and tools
Multiple roles and perspectives	Critical perspectives presented throughout the course
Collaboration	Participants worked in smaller working groups on activities and assignments
Opportunities for reflection	Multiple activities such as blogs were used for participant reflection
Opportunities for articulation – authentic audience	Blogs were specifically used by participants as a medium to articulate opinions related to different approaches and tools
Coaching and scaffolding	All course activities were clearly scaffolded to accommodate all levels of digital literacy
Authentic assessment	Assessments reflected school-based activities and marksheets reflected practical considerations in a classroom setting

Source: Adapted from Herrington, J., Reeves, T. & Oliver, R., 2006, 'Authentic tasks online: A synergy among learner, task, and technology', *Distance Education* 27(2), 233–247

As a result of our approach discussed above, we conceptualised the digital literacy short course by focusing on the areas as mentioned in Table 2.

Methodology

Purpose

With the purpose to improve the pilot short course at a conceptual and operational level, participants' opinions on the perceived value of the course were investigated. Being situated within a qualitative paradigm, it is understood that individuals have an active role to play in the construction of social reality (Boeije 2010). According to Nagy Hesse-Biber and Leavy (2011:4), qualitative research seeks to discover 'the social meaning people attribute to their experiences, circumstances and situations …'. As such, researchers and participants are co-authors of the research, as it is through the eyes of the participants that researchers are able to make sense of phenomena (Hennink, Hutter & Bailey 2011). This study utilised a qualitative research so as to speak about the constructivist paradigm, fully harnessing the participants' perceptions of the value of the course.

Data collection

Three semi-structured focus group interviews consisting of a total of 24 participants were used for data collection. Such an approach provided the researchers with the opportunity to accommodate the maximum number of participants who participated in the short course. The selection of participants occurred by means of opportunity sampling. Qualitative research tends to employ small sample sizes so as to encapsulate such experiences, affording rich discussion amongst participants, which may not have been generated through single participant encounters (Stangor 2014; Stewart & Shamdasani 2014). Interview questions not only originated from questions we formulated to assist the authors in improving the course at an operational level, but also through themes identified in the literature. Interview questions focused on:

TABLE 2: Digital literacy short course module outline.

Module	Focus
Module 1: Going digital	Introduction to digital literacy and blended learning Digital footprints Internet safety Power of networking
Module 2: Presentations	Interactive presentations Visual presentations Audio presentations
Module 3: Information surfing	Negotiating academic and resource searchers Citing resources and condensing the links Collecting information, curating and collaborating
Module 4: Going Google	Gmail Google Calendar Google Hangout Google Drive Google Education and Apps
Module 5: Reflecting and application	Blended learning and Learning Management Systems The pedagogy of technology application in the classroom Working with limited resources

- the goals and outcomes of the course
- programme management
- content covered in the course
- the value of assignments
- the impact of such a course on pre-service teachers' professional development
- areas of improvement to be considered.

Data analysis

Audio-recorded interviews were analysed through transcript-based analysis rooted in constant comparison analysis. Onwuegbuzie et al. (2009) made the case that such a data analysis approach could be appropriate where multiple focus group interviews were conducted. The first stage is characterised by open coding followed by axial coding whereby codes are grouped into categories. The importance of maintaining the 'integrative narrative' integrity when handling the raw data is emphasised by Hennink (2014:90) so as not to lose sight of the constructivist element of this form of data gathering. In the final stage (selective coding), themes expressing each group are identified (Strauss & Corbin 1990). Emergent themes are identified but attention was also given to the 'degree of consensus and dissent' (Onwuegbuzie et al. 2009:5) in an attempt to contribute to descriptive and interpretive validity of the data analysis procedure. Such data analysis aims to remain fluid, affording themes to emerge as organically as possible without extensive direction from the researchers (Berg 2009; Braun & Clarke 2013)

Research rigour and trustworthiness

The quality of qualitative research can be determined in several ways, such as the level of sensitivity towards a particular context and phenomena, the level of transparency, rigour and consistency of the research process as well as the value level and impact of the chosen phenomenon under investigation (Yardley 2000). This involves a level of reflexivity on the part of the researchers into their own practices, as well as decisions that underpin the trustworthiness and transferability of the research.

The degree to which researchers can critically examine their position within and influence on the research speaks not only about the transparency of the research process, but also about the credibility and trustworthiness of the research results (Hays & Singh 2012). Such reflexivity is especially imperative in the current investigation because of all three researchers being involved in the initial conceptualisation, implementation and evaluation of the short course. In this specific case, an epistemological framework was employed whereby each researcher interrogated her own set of values and assumption by exploring the potential impact it could have on the research process (Willig 2013). In order for the researchers to ensure that the research respects trustworthiness, that is, undertakes to recognise the narratives of the research participants (Babbie & Mouton 2012), measures were taken to establish alignment with participants' unique perceptions and their portrayal by the researchers. Thorough record-keeping that documented

researcher reflections and decisions made as well as peer debriefing with researchers in similar fields enabled the researchers to fully examine intimations made, so as to continue to honour the intended narratives, provide confidence in the credibility of the findings and possibly to help direct future research (Mayan 2016). In addition, trustworthiness demands not only that careful steps are taken to ensure that the truth in participants' perceptions is honoured, but that transferability within the qualitative realm ensures that the research is replicable and has meaning for other researchers, whilst continuing to honour the research as specific to the context (Babbie & Mouton 2012; El Hussein, Jakubec & Osuji 2015). As such, this study employed a careful selection of the sample as well as meticulous recording of thick descriptions provided by the participants, with the aim to highlight the sociocultural context of both participants and their learning environment, and makes the case of the value and importance of developing the related digital, pedagogical and disciplinary attributes of pre-service teachers in South Africa.

Ethical considerations

Ethical clearance was obtained from Stellenbosch University. Authors followed the standard ethical guidelines by gaining informed consent from participants, protecting the confidentiality and anonymity of participants, gave the participants the right to withdraw at any stage of the research process and did not use deception in any form during the process.

Results and discussion

The focus group data suggest a number of themes (see Table 3) of value as highlighted by the participants during the interviews. This includes reference to assignments and knowledge creation. Of importance, however, was also that participants differed in the way they conceived the aim and outcomes of the short course.

Theme 1: Assignments

The participants referred to the specific value of the course assignments because of the real-life application value of it, equipping them for the 21st century classroom and in preparation of lifelong learning. Within this particular theme, participants did not distinguish between the tasks given to them and the final assignment, but rather viewed it as a collective in terms of formative and summative assessment.

TABLE 3: Similarities and differences.

Similarities	Differences
Theme 1: Tasks & Assignments • Application value of tasks/assignments • Preparation for 21st century learning • Appreciation for lifelong learning	**Theme 3: Purpose of short course** • Developing the 21st century teacher in preparation for the world of work • Enhancing current technological skills • Addressing the fear of technology use
Theme 2: Knowledge creation • Cumulative knowledge building • Collaborative knowledge building	

For the purpose of this article, reference to assignments will include both the tasks and final assignment.

Application value of assignments

It was clear that assignments were deemed important because of the application value in different real-world contexts. For instance, the course content and accompanying assignments were not merely perceived as theoretical, but the opportunity to reflect on what has been learnt and to apply it in both an academic and professional context was appreciated by participants:

> '… What I really liked about the assignment, I do believe the assessments need to be in this course but it challenged me to critically engage with technology and resources that are available and I think it is necessary because we are receiving so much theory each session … to go back, reflect on it and then just put it into an assignment that is more than [*the*] practical part of it …' (Focus group 2)

The real-life application value was not only to be able to relate theory to praxis, but also to build on a sensible resource that could potentially be used in the classroom:

> '… One of our assignments was to create a lesson plan and use technology in that lesson plan … I think that's also just kind of forcing us again to do it practically and then … once we were able to … this is actually what I can do in my classroom …' (Focus group 2)

> '… I am so proud of my blog. I just want to the schools and just tell them … so I think all the assignments, you can go off and incorporate them … that's quite nice and all your teaching resources as well … it just speaks for you …' (Focus group 2)

The use of the authentic learning pedagogical model (Herrington et al. 2010) was viewed as sensible – especially in terms of the different tasks and final assignment. A future approach could be to explore and evaluate such an approach in more depth and detail, with specific reference to authentic tasks and the assignment. As Herrington (2015) mentions, such tasks are conceptualised in order to develop transferable skills which relate to the notion of lifelong learning. This approach also speaks about what Maton, Carvalho and Dong (2016:72) called the 'embedding of theory within a practice' or 'praxis'. The case is made that there is a distinction between 'explicit' praxis where theory is heard and 'tacit praxis' where it is silent. This study relates to the value placed on theory in the conceptualisation and implementation of the course.

Preparation for 21st century learning

Participants referred to the course providing them with alternative teaching and learning methodologies and approaches. What was evident was that participants often encountered a more traditional mode within their respective courses or during teacher practice:

> '… I think everyone should do this course because before this course, I really, I studied Education but it was still like the traditional way of teaching and learning …' (Focus group 1)

It was suggested that the course provided participants with the opportunity to view teaching and learning in a different light:

> '… I really think this course helped me to have a different perspective on what teaching is because when you go into prac you see a lot of traditional methods …' (Focus group 3)

> '… And I think even like before, like the implementation of teaching of these skills is the fact that there should have been like a paradigm shift in from what we have experienced in schools. Is this where we should be with education and should we even incorporate technology and why do we include technology because I think if you don't have that understanding, if you don't understand the importance of why we're changing it and why we're using it, you're going to be much more reluctant to use it …' (Focus group 3)

Participants' comments allude to the rethinking of pedagogy necessitated by a new dynamic and intellectually challenging learning ecology that the use of technology created in the 21st century (Garrison 2011). Not only can learning approaches and teaching styles be changed substantially by available technologies, but new learning outcomes have become possible and indeed essential (McLaughlin et al. 2014).

Developing appreciation for lifelong learning

A sub-theme that was closely aligned was the notion of preparation of the world of work and the notion of lifelong learning. Participants highlighted the value of the short course of one whereby they realised that learning continues after the completion of the course but that one can also exert agency in developing new skills and acquiring new knowledge:

> '… It just inspired me on because I never stopped with what we learned. I wondered if I can do this because I was able to do that … so now, because of the course I continue to try new things …' (Focus group 3)

> '… Because I realised that I can actually initiate my own learning and I don't need to wait for someone else to do it for me … like this course is going to end next week but I can still carry on … there is education beyond me as a teacher …' (Focus group 2)

Barnett (2012) postulates that the so-called 'unknown future' and its implications very often drive curriculum design and also the enactment of pedagogy. In this course, it was therefore important to prepare participants for such scenarios where change is inevitable. In his reference towards an 'ontological turn', Barnett (2012) reflects on what preparing and learning for an unknown future entails. The case is made that we as individuals are preparing ourselves for an unknown future which differs from past unknown futures because of the so-called 'world order' (Barnett 2012:66) that places emphasis on the way by which one understands oneself within such a world and our own sense of identity within such a world. It therefore argues that participants (who will eventually become qualified teachers) should be prepared to make such an ontological shift and be prepared to engage in an unknown future by means of preparing themselves and positioning themselves in their respective contexts.

Theme 2: Knowledge creation

The way in which knowledge was created during this course calls for consideration and exploration. Participants referred to the process of learning and how new knowledge was acquired. What was highlighted was the fact that cumulative knowledge building in terms of learning technologies often creates discomfort and challenge. However, in terms of the value of a partner or peer, such a process was experienced of particular value.

Cumulative knowledge building

As in most educational spheres, it is expected to assimilate and accommodate new knowledge structures through effort and often discomfort. It was reported during this course that participants enjoyed a steep learning curve and perceived knowledge acquisition as often challenging:

> '… You learnt, you engaged, you developed, you were challenged …' (Focus group 3)

> '… And it's good for yourself because you consolidate … you learn, even though it's painful but learning and constructing knowledge is painful. It's when things don't connect and you have to make them connect and that's when you learn and that's good …' (Focus group 2)

What was also evident of this course was that participants came with past knowledge to the course, whether it was basic skills already developed or even failed attempts and a perceived notion of the potential reasons for difficulty experienced in the past. The course attempted to create a learning opportunity whereby new knowledge structures were developed and previously acquired knowledge was integrated. The purpose was to create a learning environment whereby participants developed the ability to transfer knowledge across different contexts and whereby participants re-evaluated their existing skills and knowledge (Maton 2014).

Collaborative knowledge building

The process of knowledge acquisition was, however, based on the prerequisite of a community of practice where participants and the facilitator engaged in collaborative activities and methods of exploration. The facilitator was not viewed as the 'sole expert' and participants were encouraged to engage and explore as partners in the learning process:

> '… [*I*]t is a collaborative effort between the teacher and the learners … so that the teacher can learn as much from the learners especially in the world of technology … [*in the course*]' (Focus group 1)

> '… And also which is very good of the course is when we had resources that she [*facilitator*] didn't know about, she just adds them quickly to the list and like we … I felt like we were part of the whole resources and everything …' (Focus group 3)

> '… Like the facilitator wouldn't say this is how you solve it … it's like well, I don't know, I haven't had this situation before … so let's look at it together …' (Focus group 1)

The value and importance of working together as a collective is further illustrated by one participant mentioning the way

in which learners could also contribute to the learning process by assisting each other and the teacher in the use of some of these tools:

> '… You get comfortable in technology and like your learners you can always learn from them … you don't have to be afraid … you don't have to know everything [*in a classroom*] …' (Focus group 2)

The process of collaboration and scaffolding, as underlined by the social constructivist approach, contributed to a sense of achievement and comfort. Despite fear and reluctance that are often associated with trying out new methods and tools, it was mentioned that such feelings could potentially be addressed by means of the support and collaboration of others focusing on the same task at hand:

> '… Because technology at times overwhelms you and freaks you out … and as soon as you have someone next to you, you immediately feel more confident …' (Focus group 1)

The collaborative knowledge building approach was highlighted as one of the valuable aspects of the course. It suggests an environment with close working relations, collaborative problem-solving, joint efforts to create resources and a willingness to explore new avenues of pedagogical engagement with technology. The authentic learning pedagogical model (Herrington et al. 2010) enhanced many of these practices, but poses interesting implications for praxis. Management and other key role-players should become increasingly aware of the ways by which teachers are potentially re-inventing themselves to become agents of change (Swanepoel 2008) in an ever-changing world of technology. An important factor remains to encourage discourse between colleagues and to develop an in-depth understanding of each teacher's role in the rethinking and potential transformation of teaching and learning practices in schools (Mukeredzi & Mandrona 2013). As experienced in this short course, the emphasis shifted from an individualistic focus towards a collaborative approach which was valued by participants. In schools, this implies the creation of working groups, formal or informal communities of practice or an understanding in guiding those who find the paradigm shift challenging (Burnett 2011).

Theme 3: Purpose of the short course

What was of interest is the different ways by which participants explained their reasons for attending the course and their perceptions regarding the purpose of the course. Of course, there are many potential reasons for such different views, such as the way by which the course was promoted (during lectures and online advertisements), the way in which participants communicated with each other as to why they considered attending the course and so forth. For the authors, the essential message is that role-players should be aware of the various individual needs and individual differences when conceptualising such courses or training opportunities. The three main sub-themes that emerged from the focus groups were preparing 21st century teachers for the world of work, at a more technical level the enhancement of current technological skills and also addressing the fear associated with technology use.

Developing the 21st century teacher in preparation for the world of work

Interestingly, within this sub-theme, participants differed in how they see the world of work and 21st century teaching which referred to the knowledge of digital literacy and the use of technology, the safe and ethical use of such tools and viewing technology as a tool or approach that contributes to professional development and lifelong learning:

> '… We spoke about what happens in the modern-day classroom and what is needed in the modern-day classroom … and based also on our practical experiences it became very clear from the start that what is needed is knowledge of digital literacy and how to use technology in your classroom …' (Focus group 3)

> '… I think in the beginning it was important what the goals were … if you want to be a 21st century teacher with all this technology but how to use it in a safe and secure way …' (Focus group 1)

> '… And just ways that we can use it to further our education and our understanding of what children need, what teachers need, what parents need …' (Focus group 3)

It is clear that technology use for teachers includes a number of diverse factors, such as improvement of administration, materials and delivery as well as a way of earning more recognition and prestige in a school (Cox, Preston & Cox 1999). However, pedagogical beliefs (Lei & Zhao 2008; Venkatesh et al. 2003; Wozney, Venkatesh & Abrami 2006) such as adopting a constructivist approach often contribute to teachers more often considering the integration of technology as opposed to those colleagues with more traditional beliefs (Ravitz, Becker & Wong 2000). Key role-players should pay attention to possible reasons as to why teachers embrace technology in order to effectively plan professional development, structure support and create opportunities to engage in sharing of good practice.

Enhancing current technological skills

Of no surprise does this sub-theme evolve where participants indicated that they chose to participate in the short course because of the need to upgrade or develop technological skills. What was of interest, however, was that none of the participants referred to the application of such skills within the specific learning contexts:

> '… And for myself, I'm not really a big techno type of person. So that's why I did the short course …' (Focus group 1)

> '… It's also maybe to give to us like a basic understanding of why that [*technology*] is important first of all …' (Focus group 1)

> '… Yes, to upskill myself with the technology and to learn more about new programmes and … yes and how things work in the 21st century classroom …' (Focus group 2)

Through the lens of the TPACK framework, pre-service teachers' perceptions on the value they have gained from the course primarily focused on technological knowledge and its integration with pedagogical knowledge.

Pedagogical content knowledge played a significant role in the critical rethinking of pedagogy when technology was included. Content knowledge, in turn, played a role in the integration of all three knowledge types in the planning of lessons that included the use of technology. Contextual influences on their knowledge building included the compilation of the course (aims and objectives, collaborative and cumulative aspects), as well as pre-service teachers' attitudes, prior experiences and available technological resources.

The development and effective integration of technological, content and pedagogical knowledge domains (Koehler & Mishra 2009) remains a challenge in preparing pre-service and in-service teachers for the use of learning technologies. Despite emphasis being placed on the development of technical skills, and understanding of the pressing need to develop such knowledge practices, emphasis should move beyond the technical and instructional design phase to a deeper-rooted process whereby participants are encouraged to critically engage with the true implications of the integration of technology into the curriculum. 'Recipe' approaches and frameworks serve as a valid starting point, but do not encourage a learning environment whereby colleagues collaboratively explore and analyse the potential and pitfalls such tools could bring to the learning environment.

Addressing the fear associated with technology use

In this sub-theme, participants remarked upon fears and discomfort that emerge when having to use to technology:

> '… It also helps you to become comfortable with technology because if you're afraid, then can you imagine the older generation being afraid of technology …' (Focus group 2)

> '… I'm freaked out when having to use technology, and I know we have to … there are so many things to learn and that I don't know of …' (Focus group 2)

Not surprisingly, the prospect of using technology in the classroom can be daunting to some teachers because of their lack of confidence in their own technological skills, which result in them feeling less inclined to experiment with technology in front of learners (Lašákova, Bajzíková & Dedze 2017). Another intrinsic factor potentially inhibiting the use of technology is the expectation of authorities (e.g. the principal) to integrate such approaches whilst teachers may resent being dictated to and consequently may refuse to implement such approaches (Strydom 2021). Another potential challenge contributing to the fear of using technology is the fact that although some teachers may have knowledge of the use of different technologies, they do not necessarily know how to integrate it into their preparation and delivery of instruction and therefore feel inadequate to use it sustainably (Russell et al. 2003). Also, the fear of technical problems ruining a well-planned lesson into which many hours of preparation have been spent confirms the notion that such approaches are too time-consuming to be practical (Medina 2018).

Conclusion

The conceptualisation and implementation of a short course to introduce new knowledge and skills or to attempt to develop or enhance existing skills and attributes associated with the integration of learning technologies into learning and teaching proves challenging, and requires a unique set of attributes and skills from the developers and facilitators alike. It remains important to critically consider an approach where 'standardised courses' are avoided so as to adopt a framework promoting a strong theoretical grounding, acknowledgement of individual differences and a sensitivity towards psycho-sociocultural factors associated with technology adoption and use.

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