

A Continuum of Teachers' e-Learning Practices

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Abstract: The introduction of technologies into the teaching and learning environment has implied changes to the way education plays out in an e-Environment. Previous research has highlighted the many barriers and challenges in integration technology into teaching and learning. Technology is said to be underutilised. However there are studies that have identified that teachers are using technology in their work. Little is known about the extent of this use of technology. Accordingly less is known about teachers' e-Learning practices. This paper seeks to highlight the patterns in teachers' e-Learning practices.

Using a blend of inductive and deductive techniques data was collected from a sample of teachers known to be using technology in their work. The study was framed by the: (i) Development in use and stages of teaching and learning with technologies (UNESCO) and (ii) Technological skills developmental levels (DoE). The data from the study has highlighted patterns in the use and practice of technology integration in school education. These patterns could be mapped to continuums of use and practice. It has been found that teachers used technology for a variety of purposes: personal, administration, teaching and learning at different frequencies and at varying levels of intensity. Teachers were found to use technology for e-Teaching and e-Learning progressively and in ways that was aligned to their comfort zones. The way teachers' used technology was found to be progressive from simple to innovative.

Keywords: e-Learning practice, continuum, use, e-Teaching, e-Learning, traditional, innovation

1. Introduction

Educational practitioners go through developmental changes in their approach and execution of their vocation naturally. The introduction of digital technologies in the teaching and learning environment has disrupted this developmental process. These new technologies suggests change, and this concept of change is supported by Laurillard and McAndrew (2003). They (2003, pp.82-83) state that the permeation of technologies in schools is turning teaching into a "conceptual challenge", which implies that teachers have to re-think their approach to teaching and learning "well beyond the traditional transmission model". Teachers practices are thus affected through these change processes.

The aim of this article is to provide insights from one aspect of a larger doctoral study that informs us of selected teachers' e-learning practice. The findings revealed that teachers' development and progress in using technology for educational purposes can be located on continuums of adoption, use and practice. In this article only the continuums for use and practice are presented.

2. Background

Researchers have echoed in different ways that e-Learning possesses the potential to change education globally. The South African National Department of Education (DoE) states that "ICTs have the potential to improve the quality of education and training" (DoE, 2004, pp.8). This notion was expanded on by Amin (2013, pp.6) who maintains that "ICTs, especially computers and internet technologies, enable new ways of teaching and learning". Kong et al. (2014, pp.71) further confirm the potential of ICTs in their statement, "The introduction of digital resources, digital ways of communication and digital platforms for learning and teaching brings about many opportunities to enhance the learning process in school education in the 21st century."

However all does not seem to be going well with the implementation of e-Learning at school level. The literature has shown that even if technology is available, training provided, and resources available, few educators are effectively integrating technology into curriculum (Mumtaz, 2000; Kahiigi et al. 2008; Wilson-Strydom et al. (2005). The DoE notes that one of the challenges in the implementation of its policy (White Paper 7) for e-Education in South Africa is the "integration of ICT into the learning and teaching process" (DoE, 2004, pp.8). Ford and Botha (2010, pp.1) further contend that the "practical implementation of e-Education has been a failure". A study by Bytheway et al. (2010) concluded that the effective use of technologies at schools is yet to be realised.

Much of the existing research into the use of technology focuses on singularities that evolve around pilots projects, training initiatives, technology testing, models or method testing, and barriers to e-Learning. E-Learning publications appear to highlight, in different permutations, drawbacks and barriers as opposed to advances: Bingimlas, 2009; Bytheway, 2010; Ford and Botha 2010; Cantrell and Visser, 2011; Ndlovu, 2012; Lim et al. 2013. There appears to be fewer studies that focus on patterns of use and concomitantly less on e-Learning practices. This was noted by Hadley and Sheingold (1993) who stated that research has not provided “insight into the individual teacher’s learning process, including both the cognitive understanding of technology and teaching”. Bhalla (2013) furthermore concluded that research “ignored systematic studies into ways of using technology... in teaching-learning process”.

Accordingly the under-utilisation and non-adoption of available technology and varying levels of uptake of e-Learning emerged as concerns. There is not sufficient knowledge of the patterns of teachers’ e-Learning practices.

3. E-Learning practice

e-Learning practice, in the context of this article, is taken as the integrative use of methods, digital resources, systems, technology (physical devices and ICT infrastructure) and services. Previous findings on the use of technologies have reported that teachers’ practices appear to be traditional with glimpses of advancing practices.

Sara Hennessy, Bjoern Haßler & Riikka Hofmann (2015, pp.545) amongst others have found that the use of technology was mainly for preparation of lessons, administration purposes and delivery of planned lessons. They state that teachers were “gradually coming to grips with novel technologies and developing an interactive teaching approach”. Hennessy et al. (2005, pp.185) note that “teachers were sensibly building on and extending existing practice, exploiting the new opportunities arising, yet not blindly jumping in”. However, what is found is temporal, as noted by Pedretti et al. (1999, pp.136): teachers “gradually replaced [old traditional practices] with practices that promoted students’ use of a range of multimedia technologies”.

4. Research Approach

The approach in the study was underpinned by the tradition of grounded theory using a selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry and, inductive and deductive techniques. According to Neuman (2002, pp.30), some techniques are more effective. Van der Merwe (1996, pp.279) maintains that “induction and deduction should not be regarded as mutually exclusive”. Johnson and Onwuegbuzie (2004) state that using a mixed method approach allows for complimentary qualitative and quantitative research.

The study comprised a purposeful sampling of teachers so as to include the peculiarities of individual cases (Huysamen, 1994, pp.168). This was to done to include participants that were most likely to provide reliable and rich data (Merriam, 2009, pp.77; Bless and Higson-Smith, 2006, pp.95). Teachers were selected from a cross section of public and private schools, in urban and rural locations and comprising primary and high schools (see table 1). The common criteria for selection included: teachers who had received ICT training, and that were known to be using technology in their classrooms. The limitation of the study was practicing teachers who were known to have received some ICT training.

The sample comprised seventy six survey questionnaire respondents and fifteen interviews participants. Motivation for the sample size was based on the understanding of data saturation. This is likely to occur with large samples in qualitative research where more data does not necessarily mean more information (Guest et al, 2006; Glaser and Strauss, 1967).

Table 1: Survey and Interview: Respondents distribution

Survey respondents - 76									
Gender		Province		School level		Geographical location		Grade levels	
Female	37	Kwa Zulu Natal	3	Primary	35	Urban	48	G 0	6
Male	39	Eastern Cape	4	High	28	Rural	28	G 1	12
		Western Cape	15	Combined*	4			G 2	14
		Limpopo	1	Special**	1			G 3	10
		Gauteng	3	Multi Grade***	1			G 4	14
		All candidates did not indicate province		Independent****	7			G 5	19
								G 6	16
								G 7	26
								G 8	17
								G 9	23
								G 10	36
								G 11	32
								G 12	26
Interview respondents – 15									
Female	6	Western Cape	13	Primary	4	Urban	9		
Male	9	Gauteng	1	High	8	Rural	6		
		Kwa Zulu Natal	1	Special** (primary)	1				
				Combined* (special**)	1				
				Independent****	1 (high)				

*: Combined – schools with both a primary and high components in a single school.

**: Special - schools where learners have special learning challenges and needs.

***: Multi grade – schools with more than one grade level in the same class (predominantly in rural context).

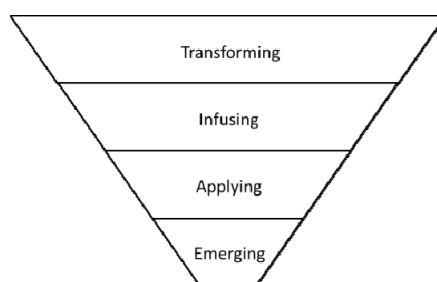
****: Independent - private non-government controlled or owned schools.

The study was framed by: (i) development in use and stages (UNESCO, 2002, pp.17) of teaching and learning with technologies (UNESCO, 2002, pp.15) and (ii) technological skills developmental levels (DoE, 2004; 2007). Data was collected through a survey questionnaire (see appendix A) and face-to-face interviews. Data was subjected to content analysis. According to Cohen et al, (2005, pp.82) fitness for purpose and legitimacy will govern the criteria used in deciding which forms of data analysis to undertake.

5. Development in use and stages of teaching and learning with technology:

The way technologies can be adopted and developed for use has been described as emerging, applying, infusing, and transformational on a four-stage continuum (UNESCO, 2002, pp.15-17). The stages of teaching and learning with and through ICT have been described as discovering, learning how, understanding how and when, and specialising in the use of ICT tools (UNESCO, 2002, pp.15-17). (See Figures 1.1 and 1.2 below.)

5.1 ICT development in schools


Figure 1.1: UNESCO ICT development in schools (UNESCO, 2002)

5.1.1 Emerging

In this first stage, teachers begin by exploring the possibilities of technology and its use is initially for administration. Some teachers begin to experiment with technology for teaching at a very elementary level.

5.1.2 Applying

As teachers discover the potential of technology, they start to use it for basic e-Teaching. The way it is used sustains traditional teacher-centred teaching methodologies.

5.1.3 *Infusing*

Teachers begin to explore how the use of technology can increase their productivity and way of work.

5.1.4 *Transforming*

At this stage the use of technology starts to become pervasive in teachers', administration and teaching. A change in practice begins to emerge.

The stages above set out what is seen as the adoption and sequential use of technology by individuals in schools and schools as whole units. Its significance to this study is that it informs the progressive use of technology that could be expected.

5.2 Stages of teaching and learning with technology

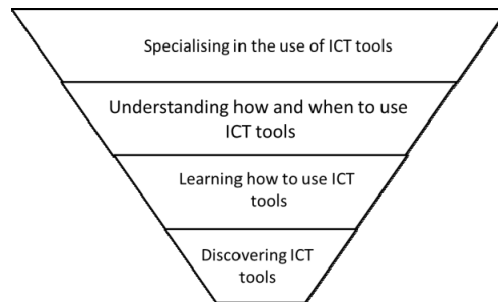


Figure 1.2: UNESCO stages of teaching and learning with technology (UNESCO, 2002)

5.2.1 *Discovering ICT tools*

Discovery is the key in this basic stage. Teachers are learning about technology, both its physical operation and its use for administration and teaching. Discovery of technology is characteristic of the emerging stage.

5.2.2 *Learning how to use ICT tools*

The applying stage above is linked to the learning of how to use technology for their administration or teaching. It is at this stage that teachers expand in their attempts to use technology.

5.2.3 *Understanding how and when to use ICT tools*

At this stage teachers become discerning users. They are able to identify opportunities where technology can be helpful for particular purposes. This suggests a competence to select appropriate technology for particular tasks. In doing this, teachers are found to be in the infusing and transforming stages of technology use and integration.

5.2.4 *Specialising in the use of ICT tools*

In the specialising stage, teachers find innovative uses for technology. This is often characterised when teachers use technology for uses outside of what it was intended for initially. This stage links with the transformational stage. The UNESCO (2002) information provides useful indicators for evaluating practice as well as planning for personal development.

5.3 Technological skills developmental levels:

The DoE has highlighted in two of its documents the crucial need for technological competencies among its teachers. They specify the following professional competency in ICT utilisation at levels of entry, adoption, adaptation, appropriation, and innovation (DoE, 2004, pp.25; DoE, 2007, pp.6). (See Figure 1.3)

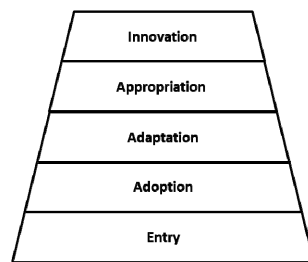


Figure 1.3: DoE ICT competency levels (DoE, 2007)

5.3.1 Entry

At the entry stage teachers should at least be able to develop technological literacies to be able to use technology such as, computers, laptops, data projectors. Additionally, the school should be able to assist learners with the operational use of technology.

5.3.2 Adoption

At this level teachers should be adopting technology into their professional lives. This should be for administration, teaching and learning.

5.3.3 Adaptation

As this level teachers should now be able to adapt the technology to suit more of the curriculum and learner needs. The curriculum and teaching and learning should thus become enriched with use at this level.

5.3.4 Appropriation

At this level there should be shifts from mere use of technology to authentic integration of technology. Teachers should be able to use technology, systems and services in holistic e-Teaching and e-Learning.

5.3.5 Innovation

Teachers at the innovative level should be able to develop and create dynamic learning opportunities and environments for e-Learning. Learning should be almost exclusively learner centred and technology should be used as the prime interactivity and collaboration tool.

Synthesis of the levels in the: development in use, stages of teaching and learning with technology, and technological skills developmental levels are depicted in Figure 1.4 below. The mapped corresponding relational levels and stages suggest three stage levels of complexity, that is, basic, integration and, specialisation and innovation. The figure shows an approximation that teachers will progress in how they learn about technologies and begin to use and integrate them. Concomitantly the UNESCO and DoE development levels highlight the levels of complexity at which the teacher may be operating.

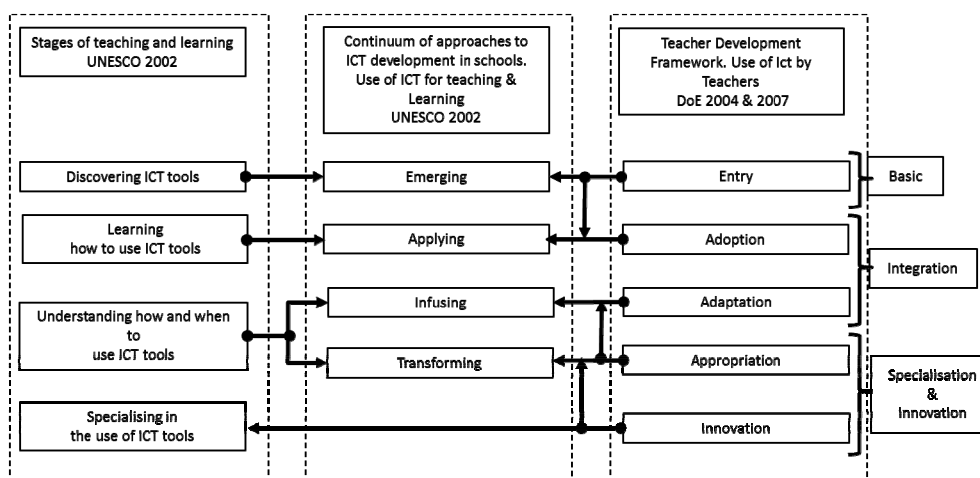


Figure 1.4: Mapped personal levels of technological skills development, use and integration (UNESCO, 2002; DoE 2004, 2007)

The basic stage relates to entry, emerging and discovering ICT tools levels. When teachers are starting out with ICTs they begin by finding out about these tools. This equates to an emergence of a way of work that is characterised by small steps and very basic use and application of technology for basic tasks.

At the integration stage the key levels of note are adoption and application. If adoption is not present, then it is unlikely that one would see any application or integration. As such adoption relates directly to application. Application has two aspects that work in tandem, that is: learning how to use the tools and, as shown in this study, how to adapt the use of the tools to suit the teachers desired way of work.

The specialisation and Innovation stage is indicative of deeper knowledge and skills regarding the use and integration of ICTs. Innovation relates directly to transformation as teachers would be using ICTs in diverse ways and for uncommon applications. These are indications of discerning teachers who by their informed choices are beginning to specialise in the use of ICTs.

Given the relational patterns evident in the mapping in figure 1.4, levels of use, integration and development should be viewed as non-sequential applied levels. For example a teacher may be operating at an advanced application level, but may be struggling at a mechanical level. Alternatively, a teacher who extends an innovation may still be seeking information about the innovation in the orientation level and may not yet have implemented the innovation.

6. Findings

6.1 What teachers use technology for

The data showed that teachers' use of technology permeated their personal and professional lives. The boundaries between personal and professional use of technology was found to be blurred. Technology was found to be used progressively for social, own studies, work related administration, for teaching (e-Teaching) and for learners learning (e-learning).

Teachers' responses to what they used technology for showed: teachers' personal study with technology influencing them to use technology for teaching; social networking services (SNS) in the personal space prompted use of SNS for learners. This appeared to show a progression among personal, administration, teaching and learning.

"Started with our cell phone...for admin of marks."

"Started typing out our own question papers, I started (to) practice teaching and computers."

The pattern of use is simply an indication of the emergent uptake pattern when teachers use technology.

Usage patterns were confirmed in both instruments. The survey instrument returned significant variances in the use of social networking services (SNS) by teachers for own learning and with learners learning. It was noted that for own learning, teachers used more cloud based collaborative spaces. Table (2) below shows the diminishing intensity in SNS where use for personal purposes was used progressively less for own learning and learners learning.

Table 2: SNS usage comparisons

SNS - personal use		SNS - own learning / studies		SNS – teaching / learning school	
Facebook:	64 (84.21 %)	Facebook:	25 (32.89 %)	Facebook:	17 (23.29 %)
WhatsApp:	65 (85.53 %)	WhatsApp:	26 (34.21 %)	WhatsApp:	14 (19.18 %)
Twitter:	35 (46.05 %)	Twitter:	18 (23.68 %)	Twitter:	8 (10.96 %)
		Google Docs:	43 (56.58 %)		
		DropBox:	39 (51.32 %)		

The findings of the use of technology confirm Kellenberger and Hendricks (2000) findings that teachers used 'computers' for more than teaching. They note:

Computer use by teachers was divided into three main components, namely, for teaching purposes (to impart knowledge, create variety, and to give confidence to teachers), administration purposes (in preparation of job-related materials and to ensure safe-keeping of data and information about students), and personal purposes (to engage teachers' free time in a beneficial and fruitful manner) (cited by Bhalla, 2013, pp.176).

6.2 Methodology of use of technology

The activities for learners were similar to traditional tasks. Learners had to present classwork using a computer or research something and present it. Furthermore many of the activities that learners engaged in were primarily representational as opposed to generative (Hokanson and Hooper, 2000, pp.543).

"to find an artist...need image research...find different images...do research on the artist and get a reference pictures and write up (on a computer)..."

"I use the projector and SMART Board to play educational videos, discuss power point presentations, display textbooks, and project our i-Pad screen."

These activities resonated at different intensities with Gagné (1985b) nine steps of instruction, the five teaching and learning events as proposed by Laurillard (2002) and Salmon's (2000) five stage model of e-Learning. The overall practice using technology appeared to follow a predominantly traditional path aligned with institutionalised methodologies.

"I use a variety of different technologies and methods to see how it works...I tend to try and follow that pattern".

The activities that were noted in the data include among others:

- teachers presenting and demonstrating lessons, creating assessments and providing digital resources
- teachers getting learners to find information using the World Wide Web,
- learners completing work using computers, doing assessments online,
- learners using social networking services (SNS) and, using a learning management system (LMS).

This was evident in the purposeful selection of digital resources, interwoven with interactional tasks and learning opportunities. The data additionally highlighted indications of project and problem based, and collaborative methodologies. These indicators allowed us to locate the use of technology at the basic, integration and, specialisation and innovation stages.

6.3 Pattern of teachers' use of technology

The general findings were that the actions of some teachers bore similarity to traditional teaching or e-Teaching. As a first level of use, technology was the tool to perpetuate traditional methodologies. Teachers would demonstrate, describe, explain and set tasks for learners. These activities can be mapped to entry, adoption and learning how to use ICTs (UNESCO, 2002) and entry and adoption of DoE (2004; 2007). This is indicated by the basic and integration stages referred to in figure 1.4.

The survey responses tended more towards teaching (demonstration) than learners engaging with technology for learning (see table 2). The data suggests that technology use was at emerging stages with some use at innovative levels. This pattern of use correlates with implementation as an incremental process (Pedretti et al. (1999, pp.136).

"I use a data projector and an interactive white board AND I give projects in which students must use ICT".

"We use blogs and wikis and occasionally Skype".

Table 3: Technology usage

I use the data projector to present our lessons:	I use the interactive white board (IWB) to present and demonstrate our lessons:	I get the learners to use the technology to complete their work (e.g. do a presentation, type a document, complete a worksheet):
23 (30.26 %)	9 (11.84 %)	17 (22.37 %)

All teachers typically blended traditional methodologies with technology integration aligned with the basic and integration stages referred to in figure 1.4. The progression evidenced in these stages was the progressive incorporation and experimenting with technology to extended traditional methodologies.

"We're now moving towards a combination of Power points, simulation and yes, I still use the chalkboard as well."

Teachers used simulations and applications (apps) for learners to interact directly with the digital resource. The teacher tells the learners what must be done; provides the limits of the learning opportunity; then guides the process and facilitates a debriefing of the activity by providing feedback and confirmation of learning.

"I use simulation software...we don't have microscopes...we don't have equipment for electricity experiments... we can do a circuit...through Phet simulation software."

Teachers evidenced understanding how and when to use technology. They recognised the relevance of using collaboration and communication to augment learning activities. This was evident in the way in which the experienced teachers adapted technology and integrated SNS. This finding suggested a progression towards specialisation and innovation.

"I've introduced our learners to blog site where learners are able to interact and exchange ideas...voice their opinions."

"I then introduced peer working for them to share more closely." [reference to using technology for collaboration]

The stage of specialisation and innovation referred to in figure 1.4 in the use of technology was evident in fewer of the teachers. Teachers who operate at these levels typically traversed the entire gamut from entry to innovative. This stage of use employing a LMS was an example of technical specialisation. It is uncommon to find teachers use a LMS with learners at school level. The approaches employed using the LMS were the flipped classroom and blended face-to-face/online engagements. Both instructivist and constructivist approaches were evidenced in the activities. These approaches are not mutually exclusive and no activity appeared to be devoid of instruction as seen in the examples below:

"Learners log onto a site to engage with content and to do assessments...I've sequenced the digital object in such a way."

"I make our own simulations like a podcast and upload to Moodle...learners watch on their own time."

"PPTs are uploaded to Moodle...students download it...Learners review text, animations, videos, PPTs, podcasts or screen casts before class. In class they...complete text and...digital mind maps on computers"

Teachers were inclined to lean towards the familiar as they navigated new ground with technology. Their use was aligned to their skills and comfort zones. This finding is supported by, Shuldman (2004, pp.323) who stated

that the “integration of computers...is characterised by...use of technology in such a way that it is compatible with the teacher’s established style of teaching”.

7. Discussion

Incremental use appears to emerge as a pattern across a range of contexts. The findings are congruent with other research that noted incremental and progressive use. Stoddart and Niederhauser (1993) pointed out that technology use could “fit into a spectrum of instructional approaches, varying from traditional to innovative” (quoted in Amin 2013, pp.6).

Dawes (2001) added an additional dimension that “change occurs” as teachers develop “professional expertise” “through stages” from “involved” to “integral users” ultimately” (cited in Hennesy et al., 2010, pp.10). These are similar to the findings of Sheingold & Hadley, 1990; Hennesy et al. 2005 and Wilson-Strydom et al. 2005.

The progressive and incremental nature of implementation is also noted by Thomas and Cronjé (2007) as characterised by a beginning and a culminating process. Furthermore, traditional use appears to be the starting point for launching into newer ways, possibly indicating a progression in use.

Teachers used technology in ways familiar to them. These were in alignment with their comfort zones, own expertise, access to technology and levels of compatibility with current practices. Their pedagogical approaches mirrored their beliefs about what they thought was relevant and appropriate for learning. Teachers’ e-Learning practice was highlighted as a progressive pattern of action and was found to be aligned with the UNESCO (2002) and DoE (2004; 2007) frameworks. The teachers were found to operate at different levels of use simultaneously.

Levels of use, integration and development should be viewed as non-sequential applied levels. The way teachers use technology showed two patterns. The first: suggestions of progression in complexity in use from basic to advance. The second: progression in depth of developmental levels. These are not points of attainment, rather indications of growth.

A teacher could be working at different points, but his/her practice may be at varying levels of complexity. For example, an approximation is a teacher working in specialisation and innovation, such as using tools like a LMS, but, could only be operating in the LMS at a very basic level, such as only uploading resources for learners to access. Alternatively, a teacher who extends an innovation may still be seeking information about the innovation in the orientation level and may not yet have implemented the innovation. This is depicted in the consolidation of teachers’ engagements in figure 1.5 below.

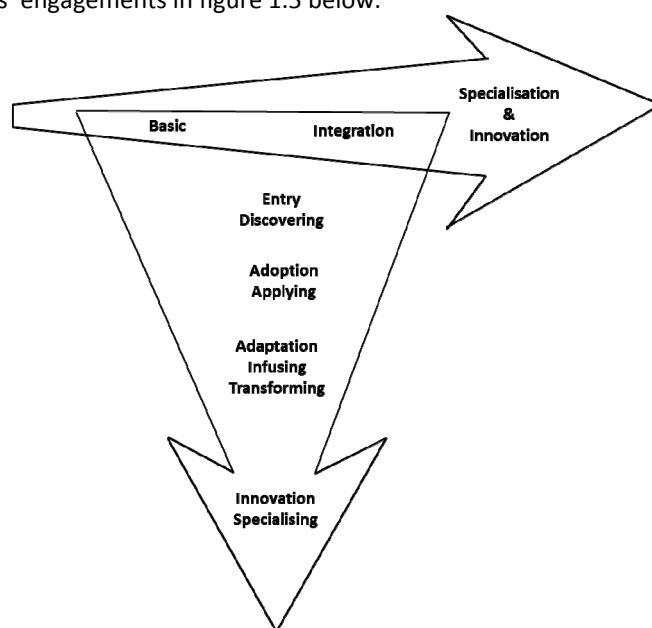


Figure 1.5: Consolidation of teacher engagement

8. Conclusions

The data revealed that teachers' e-learning practices comprise e-Teaching and e-Learning. There was a pattern of progressive application of methodologies from teaching to e-Teaching and from learning to e-Learning. It was found that what teachers used technologies for could be mapped onto a continuum of use (figure 1.6). It was further found that the way teachers used technologies through different approaches and methodologies could be positioned at different points of a continuum of practice (figure 1.7).

8.1 Continuum of Use

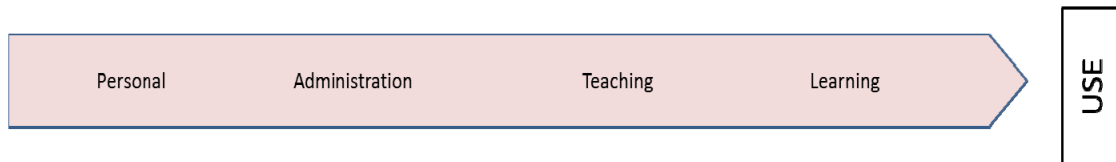


Figure 1.6: Continuum of Use

8.2 Continuum of Practice

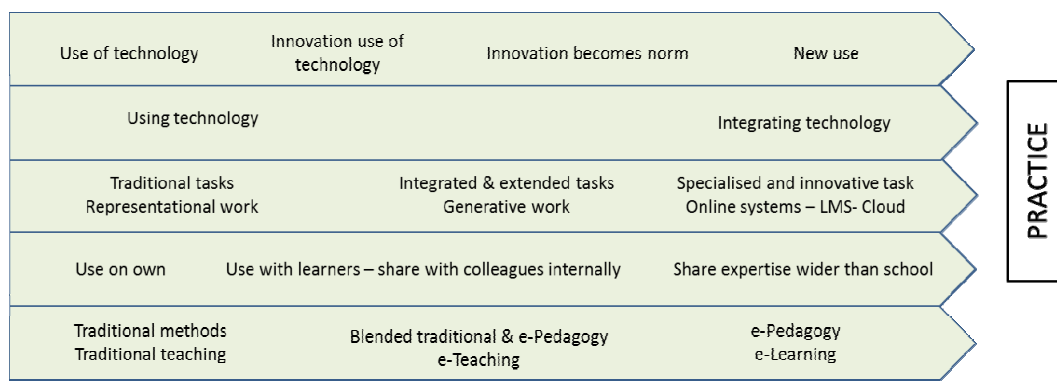


Figure 1.7: Continuum of Practice

Continuums provide indicators of ranges or scales. Whilst a range of taxonomies, levels and stages exist, they deal in most instances with singularities. The points are not fixed description of final destinations, but rather levels of operation or engagement at these points. The findings suggest that teachers are able to be active at different points on these continuums and may operate at different points simultaneously whilst moving freely within the range. It is further noted that teachers engage in the use and integration of technology as a continuum of their practice at varying intensities and frequencies.

Emanating from this study is that technology is pervasive in the lives of teachers with initial indicators of domestication. There is a comparable synergy with previous research which found that teachers used technology for more than just teaching and learning. The analysis of our data has revealed additional aspects related to use and we were thus able to extend personal use of computers only, to include the use of social networking services (SNS) and cloud services and systems.

The findings show that teachers use technology for personal use, administration, personal and work related communication and collaboration, for teaching, for own learning and for learners' learning, all along a continuum of: personal - administration - teaching - learning. There was no discernible evidence to suggest that teaching with technology exerted any backward influence on personal or administrative work. It is thus unlikely that the direction of the progressive stages in the continuum could be reversed. However teachers can be found to operate at different points of this continuum simultaneously. The use of social networking service (SNS) in this sample and at this point does not appear to validate notions of pervasive use. The findings in this study were that teachers used SNS progressively less along the continuum from personal to teaching to learning.

A natural link was found that bridged what teachers used technology for and the manner in which this was approached. It was thus possible to locate these actions on continuums for use and practice. The findings in this study further showed that teachers maintained some traditional ways of doing their work and were

progressively advancing their practice when it made sense to them. The progressive, incremental and transformative natures of teachers' actions were found to correlate positively with the UNESCO (2002) and DoE (2004; 2007) levels of use and development.

9. Recommendations

This study yielded continuums of use and practice. It did not test the continuums in other contexts and fields of education. Further research is needed to test the utility value of the continuums of use and practice in evaluative studies. Such research should furthermore explore teachers' specific activities.

References

- Amin, S.N. 2013. An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education: a literature review.
<http://www.nyu.edu/classes/keefe/waoe/amins.pdf>
Viewed November 2015.
- Bhalla, J. 2013. "Computer use by school teachers in teaching-learning process", *Journal of Education and Training Studies*, 1(2), pp. 174-185
- Bingimlas, K. A. 2009. "Barriers to the successful integration of ict in teaching and learning environments: A review of the literature". *Eurasia Journal of Mathematics, Science and Technology Education*, 5(3), pp. 235-245.
- Bless, C. & Higson-Smith, C. and Kagee, A., 2006. *Fundamentals of social research methods: An African perspective*. Juta and Company Ltd.
- Bytheway, A., Chigona, A., Chigona, W., Dumas, C., Fanni, F., Mooketsi, B., Rega, I. and Sadeck, O. 2010. "Integrating ICTs into the Classroom: Assisting Teachers in Disadvantaged Primary Schools". *Proceedings of the eSkills Summit 2010*, Cape Town.
- Cantrell S. & Visser, L. 2011. Factors influencing the integration of technology to facilitate transfer of learning processes in South African, Western Cape province schools. *Quarterly Review of Distance Education*, 12(4), pp. 275-285.
- Cohen, L., Manion, L., and Morrison, K. 2005. *Research Methods in Education*. 5th ed. Taylor and Francis e-Library. Routledge Falmer. London and New York.
- Dawes, L. 2001. What stops teachers using new technology? In Leask, M. (ed.). *Issues in teaching using ICT*. London: Routledge Falmer, pp. 61-79.
- Ford, M. & Botha, A. 2010. A pragmatic framework for integrating ICT into education in South Africa. In Cunningham, P. & Cunningham, M. (eds). *Proceedings of the 2010 IST-Africa Conference*, Durban, South Africa, 19–21 May, pp.1-10.
- Gagné, R. 1985b. Nine steps of instruction. http://www.nwlink.com/~donclark/hrd/learning/id/nine_step_id.html
Viewed June 2015.
- Glaser, B.G. & Strauss, A.L. 1967. *The discovery of grounded theory: strategies for qualitative research*. Chicago, IL: Aldine.
- Guest, G., Bunce, A. and Johnson, L. 2006. "How many interviews are enough? An experiment with data saturation and variability". *Field Methods*, 18(1), pp. 59-82.
- Hadley, M. and Sheingold, K. 1993. "Commonalities and distinctive patterns in teachers' integration of computers". *American Journal of Education*, 101, pp. 261-315.
- Hennessy, S., Ruthven, K. & Brindley, S. 2005. Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change. *Journal of Curriculum Studies*, 37(2), pp. 155-192.
- Hennessy, S., Haßler, B & Hofmann, R. 2015. Challenges and opportunities for teacher professional development in interactive use of technology in African schools, *Technology, Pedagogy and Education*, 24(5), pp. 1-28.
- Hokanson, B. and Hooper, S. 2000. "Computers as cognitive media: Examining the potential of computers in education". *Computers in Human Behavior*, 16(5), pp. 537-552.
- Huysamen, G.K. 1994. *Methodology for the social and behavioural sciences*. Halfway House: Southern.
- Johnson, R.B. and Onwuegbuzie, A.J. 2004. "A research paradigm whose time has come". *Educational Researcher*, 33(7), pp. 14-26.
- Kahiigi, E.K., Ekenberg, L., Hansson, H., Tusubira, F.F. & Danielson, M. 2008. Exploring the e-Learning state of art. *Electronic Journal e-Learning*, 6(2), pp. 77-88.
- Kellenberger, D.W., and Hendricks, S. 2000. "Predicting teachers' computer use for own needs, teaching and student learning". *Journal of Educational Computing Research*, 16(1), pp. 53-64.
- Kong, S.C., Chan, T.W., Griffin, P., Hoppe, U., Huang, R., Kinshuk., Looi, C.K., Milrad, M., Norris, C., Nussbaum, M., Sharples, M., So, W.M.W., Soloway, E. & Yu, S. 2014. E-learning in school education in the coming 10 years for developing 21st century skills: critical research issues and policy implications. *Journal of Educational Technology & Society*, 17(1), pp. 70-78.
- Laurillard, D. & McAndrew, P. 2002. Virtual teaching tools: bringing academics closer to the design of e-learning. In Banks, S. (ed.). *Networked Learning 2002 : A Research-Based Conference on E-Learning in Higher Education and Lifelong Learning: Proceedings of the Third International Conference on Networked Learning, Sheffield, England, 26–28 March 2001*. Sheffield: University of Sheffield, pp. 11-16.
- Laurillard, D. & McAndrew, P. 2003. Reusable educational software: a basis for generic learning activities. In Littlejohn, A. (ed.). *Reusing online resources: a sustainable approach to e-learning*. London: Kogan Page, pp. 81-93.

- Lim, C.P., Zhao, Y., Tondeur, J., Chai, C-S. and Tsai, C-C. 2013. "Bridging the gap: Technology trends and use of technology in schools". *Educational Technology and Society*, 16(2), pp. 59-68.
- Merriam, S.B. 2009. *Qualitative research: A guide to design and implementation*. USA: Jossey-Bass.
- Mumtaz, S. 2000. "Factors affecting teachers' use of information and communication technology: A review of the literature". *Journal of Information Technology for Teacher Education*, 9(3), pp. 319-342.
- Ndlovu, N.S. & Lawrence, D. 2012. The quality of ICT use in South African classrooms. Paper presented at Towards Carnegie III: Strategies to Overcome Poverty & Inequality, Cape Town, 3–7 September.
- Neuman, W.L. 2002. *Social research methods: qualitative and quantitative approaches*. Boston, MA: Allyn & Bacon.
- Pedretti, E., Smith-Mayer, J. and Woodrow, J. 1999. "Teaming technology enhanced instruction in the science classroom and teacher professional development". *Journal of Technology and Teacher Education*, 7, pp. 131-143.
- Salmon, G. 2000. *E-moderating: the key to teaching and learning online*. London: Kogan Page.
- Sheingold, K. & Hadley, M. 1990. *Accomplished teachers: integrating computers into classroom practice*. New York, NY: Center for Technology in Education, Bank Street College of Education.
- Shulman, M. 2004. Superintendent conceptions of institutional conditions that impact on teacher technology integration. *Journal of Research on Technology in Education*, 36(4), pp. 319-343.
- South Africa. Department of Education 2004. *White Paper 7 on e-Education: transforming learning and teaching through Information and Communication Technologies (ICTs)*. Pretoria: DoE.
- South Africa. Department of Education 2007. *Guidelines for teacher training and professional development in ICT*. Pretoria: DoE.
- Thomas, H.E. and Cronjé, J.C. 2007. "Computers in schools: Implementing for sustainability. Why the truth is rarely pure and never simple". *South African Journal of Higher Education*, 21(6), pp. 759-780.
- UNESCO. 2002. *Information and communication technology in education: a curriculum for schools and programme of teacher development*. Paris: UNESCO.
- Van der Merwe, H. 1996. The research process: problem statement and research design. In Garbers, J.G. (ed.). *Effective research in the human sciences: research management for researchers, supervisors and masters' and doctoral candidates*. Pretoria: Van Schaik, pp. 277-291.
- Wilson-Strydom, M., Thomson, J. & Hodgkinson-Williams, C. 2005. Understanding ICT integration in South African classrooms. *Perspectives in Education. Special Issue: Research on ICTs and Education in South Africa*, 23(4), pp. 71-86.

Appendix A

1. Please select Gender
2. Which province do you teach in?
3. What type of school do you teach in?
4. Which area do you teach in?
5. Please choose all the grades that you teach?
6. Which social network services (SNS) do you use for personal purposes?
BBM-WhatsApp- MIXIT- Facebook- Twitter-LinkedIn-None- Other
7. Which of these social networking services do you use for your own learning / studies?
Google Docs-Drop Box-Sky Drive-LinkedIn-Facebook-Twitter-BBM-WhatsApp-Mixit-None-Other
8. Do you use any social network site for professional development / networking with your peers?
9. Select all the responses that indicate why you choose to use social service for your personal learning?
I can get easy access to information-I can collaborate on my work with friends-I can get help whenever I need it-I can be in contact with peers and lecturers at all times-I do not use SNS for my personal learning-Other reasons
10. Select from the list all that you use in your own learning?
Technology (e.g. computer/laptop/tablet/smart-phone)-Digital resources-LMS (e.g. Moodle/Sakai/Web CT)-SNS (e.g. Face-book/LinkedIn)-Cloud Services-None
11. Select all the options that you believe are the benefits that you gain from using technology / digital resources / LMS for your own learning?
It makes learning easier-I have more easy access to resources-It keeps me on the cutting edge of the use of ICT in education-It puts me in power in the classroom-It puts me at a higher level than the learners-It helps me cope with modern technology savvy learners
12. Which of the following are aspects that motivate your use of ICTs for yourself and/or your learners?
It is aligned with the way the learners learn-It helps me teach better-I can make learning more exciting for the learners-It is the way that learning takes place currently
13. Who do you think benefits MOST from your use of ICTs for teaching/ learning?
Your Learners-You

14. What technologies (ICTs) do you use to teach with?
Data Projector-Documents-Viewer-Laptop / computer-Tablet-Smart-phone-Interactive White Board-None-Other
15. Select the most important aspect that reflects why you choose to use technologies for teaching.
The learning experience is enhanced-It allows anywhere/ anytime learning-It allows self- paced learning-Teaching is more exciting
16. What type/s of digital resources do you use for e-Learning (in the lessons with your learners)?
Video-Podcast-Simulations-Virtual worlds-Power Point / Presentations-Gaming-Animations-None-Other
17. Select the most important aspect that reflects why you choose to use digital resources for e-Learning.
The learning experience is enhanced-You get to see and do things that you cannot do in the traditional way-Teaching is more exciting
18. Which of the following social network services do you use for teaching/learning at school?
LinkedIn-Facebook-Twitter-BBM-WhatsApp-Mixit-None-Other
19. What Virtual Learning Environment (VLE) / Learning Management System (LMS) do you use for teaching/learning at school?
Moodle-Web CT-Sakai-Edmodo-None-Other
20. Indicate the most important factors only that motivate you to use ICT for teaching?
It is convenient-Can bring the world into the classroom-It is a fast means to access information-It makes my work easier-It allows simulation of real world experiences-It is aligned with the learners way of working-It is mandatory at my school that we use ICT for teaching-There are many resources available to enhance my teaching-I found that it works for me in my teaching-I found it works and the learners learn better
21. Which of the following reflects how you use technology (ICT) and digital resources for teaching and learning in your classroom?
I teach learners how to use the technology-I use the data projector to present my lessons-I use the interactive white board (IWB)to present and demonstrate my lessons-I get the learners to follow the instructions of the computer program-I get the learners to use the technology to complete their work (e.g. do a presentation, type a document, complete a worksheet)-I get the learners to use the camera or microphone to create their assignments
22. Which of these are typical of how you use social network services (SNS); a LMS-VLE systems or cloud services for teaching and learning in your classroom?
I respond to questions and request for help online-I send reminders of homework and tasks to be done-I set out questions and exercises-I use the drop-box or upload facility to get work sent to me-I engage in discussions in a forum with the learners-I get the learners to use the forum or blog to discuss their work-I set out lessons with information, assignments and assessment for the learners-I put out information for learners to access on their own
23. Which of these are typical of why you choose to use these social networking services (SNS); virtual environments and cloud services?
Helps manage teaching-Helps manage learning-It is useful if a learner is absent-The Learner can work on his/her own pace-A virtual system like a LMS is a useful all in one management system-It is more convenient to access documents and information from the cloud-Using the cloud means I don't have to use a LMS or any internal system-It is easy for me to get a message to the learners using a SNS-The SNS is useful for short quick messages-The SNS is useful for rapid responses-With the SNS I am connected to my class all the time-My school has made it compulsory to use one or all of these options for teaching and learning-There is pressure from the learners for me to use it at our school
24. What methodology (approach) do you use in your lessons when you integrate technology and digital resources?
Constructivist-Instructivist-Connectivist
25. Which one of the following best represents what motivates you to use e-Learning for your learners?
It is the way of the future-It is how learners learn-It is easy to use-It is a better way of learning-It makes my work easier
26. Do you think the learners learn better with or without ICTs?
27. How does access to technology affect your decisions to use it for teaching/learning?
I don't use it because I do not have access-No affect... I make a plan to get access-I use it only if I can get access.

28. How does technical support for technologies and systems affect your decisions to use technology for teaching/learning?
I don't use it because I do not get support if something goes wrong or does not work-No affect... I find a way to make it work-I use it if I know that there will be technical support.
29. How does the availability of digital resources affect your decisions to use it for teaching/learning?
I don't use it because I do not have any and cannot get access to these resources-No affect...I make a plan to get resources-I will only use it if I and get it from somewhere or someone.
30. How does support of management / peers / department affect your decisions to use ICTs for teaching/learning?
I will not do it because there is no support at school or from the department-No affect... I will make a plan to do it without any support-I will be willing to use it if I get the support that I need.
31. Please state what are the things that prevent you from using ICTs for e-Learning / teaching?
32. What do you think is more useful to help learning: having the latest technology, or, having good digital resources?
Having the latest technology-Having good digital resources
33. Do you think we should be using tablets or cell phones in classrooms?
Tablets...Yes-Tablets...NO-Cell phones...Yes-Cell phones... No
34. Do you think interactive digital resources (e.g. simulations, virtual gaming) are more useful than having an interactive white board?
Interactive digital resources are more useful-Interactive white board is more useful.
35. Please type any comments that you may have in the space provided.