

Full Paper

Authors

Aluko Ruth, Tony Mays & Hendri Kruger

Institutional affiliation: University of Pretoria

Contact e-mail address: ruth.aluko@up.ac.za

Telephone: +27 12 420 5604

Fax: +27 12 420 5863

Theme: Open, Online & Flexible Learning: The key to sustainable development

Sub-theme: Technology & Innovation

Title: Pushing the boundaries: Migrating online in a developing context

Abstract (Updated)

In this paper, the authors use the National Association for Distance Education's (NADEOSA) criteria for program development and Mishra and Koehler's Technological Pedagogical Content Knowledge (TPACK) framework, to share how a paper-based distance education model is in the process of being migrated into a web-dependent blended model that is responsive to the changing environment in a particular developing context. The change was necessitated partly by the University of Pretoria's decision to adopt a web-dependent "flipped classroom" model; partly by a desire to improve retention and success rates and partly by the new minimum requirements stipulated for teacher qualifications by South Africa's Department of Higher Education and Training. The new government policy encapsulates the notion of integrated and applied knowledge, which gives renewed emphasis not only to what is to be learned, but also to how it is to be learnt. Embedded in this is the ability to use technology. How did the University push boundaries without necessarily locking out disadvantaged students? What lessons learnt could advance the field of appropriate programme design in distance education? These are some of the questions which the authors attempt to answer.

Introduction

Though South Africa has only recently adopted a national policy on distance education, the history of this mode of delivery in the country, spans over a century (Department of Higher Education and Training – DHET, 2014). One of the fields that has benefited most consistently from this mode of provision, as it has in other African countries, is teacher education. A particular advantage of distance education (DE) is that it makes teacher preparation and professional development programmes accessible to people located in remote, rural areas that do not have convenient access to higher education institutions (United Nations Educational, Scientific and Cultural Organisation 2002). Distance provision allows the curriculum to be mediated through various forms of technology ranging from print to online rather than requiring learners necessarily to be in a classroom in direct contact with a teacher. From the start, media (text, graphics audio, video and mixed media) and technology (especially television and radio in developing contexts) played a more central role in DE than it did when studying at a traditional university and this mode of delivery cannot completely

exist without them (Peters, 2003). Distance education has come a long way since the days in which the only medium used was the print medium. It now includes the use of radio, television, computers and, increasingly, mobile technology evidenced in the literature generally, and in South African discourse in particular, of the term Open, Distance and e-Learning (ODEL). Degrees of openness relate to attempts made to identify and overcome barriers to access, to promote greater retention and success, and to increase student autonomy regarding what and how to learn. The distance dimension is concerned with how to mediate the curriculum in ways that do not necessarily require teachers and learners to be in the same place at the same time. More recently, e-learning has been defined as the delivery of a learning, training or education programme by electronic means. It involves the use of a computer or electronic device in some way to provide training, educational or learning material (Stockley, 2003). In this paper, the authors through the National Association for Distance Education's (NADEOSA) criteria for program development and Mishra and Koehler's Technological Pedagogical Content Knowledge (TPACK) framework, share how a paper-based DE model was re-designed into a web-dependent blended model seeking to draw on the most effective practices of different modes of provision. The change was necessitated partly by the University of Pretoria's decision to adopt a web-dependent "flipped classroom" model; partly by a desire to improve retention and success rates and partly by the new minimum requirements stipulated for teacher qualifications by the South Africa's Department of Higher Education and Training. The new government policy encapsulates the notion of integrated and applied knowledge, which gives renewed emphasis not only to **what** is to be learned, but also to **how** it is to be learnt. Embedded in this is the ability to use technology. How did the University push boundaries without necessarily locking out disadvantaged students? What lessons learnt could advance the field of appropriate programme design in distance education? What are the implications for staff and students of the migration? These are some of the questions which the authors attempt to answer.

Background of the study

The University of Pretoria is one of the premier research universities in South Africa, with approximately 50 000 contact students. Due to the bandwidth available to the University, it has been able to implement a comprehensive IT infrastructure. Training courses have been introduced to enable academics to optimise web-based learning opportunities and to further enrich the learning environment (Hendrikz & Aluko, 2011). The University uses *Blackboard* as a learning management system (LMS), which was specifically adapted to suit the needs of the University. This adapted learning management system is known as ClickUP (i.e. click University of Pretoria). In the first year, contact students do the AIM (Academic Information Management) modules, which include computer literacy (University of Pretoria, 2016a). The profile of the University compares to any good university in a developed context. However, when it started its distance education programs via the Unit for Distance Education in the Faculty of Education in 2002, the profile of its distance education students differed totally from the University's traditional campus-based students. The limited availability of computers and access to the internet, specifically in rural areas in South Africa, directed the University's decision to deliver distance education programmes predominantly in the form of paper-based materials, supported by contact and tutorial sessions. Distance education students enrolled at the University of Pretoria are therefore the opposite of the Millennials, Boomlets, or the Net Generation (Gawelek, Spataro & Komany, 2011). Their demographics show

that they are mostly (70%) above 40 years of age, and they are educators (95%) residing in the rural areas of the country with internet accessibility while growing from 1% (2005) to 29% (2014) remains relatively low and relatively expensive (Hülsmann, 2016). The changing connectivity profile of students can be linked to the country's technology profile change more broadly (SouthAfrica.info, 2015).

Over the years, the changing profile of students has enabled the University to constantly respond with the use of appropriate technology to support distance education students as required. The University's decision in its Vision 2025 is to adopt web-supported learning for all its programs including its distance education programs. In addition, the current minimum requirements for teacher education qualifications as approved by the country's Department of Higher Education and Training (DHET, 2015) demand that, among other fundamental competencies, teachers have the ability to use Information and Communication Technologies (ICTs) competently. It is believed, and more rightly so in the 21st century, that this lays the foundation for effective learning in higher education contexts. Invariably teacher education institutions in the country have no choice than to incorporate technologies into the delivery of their modules. The ubiquity of technology in the country has also made this possible even though the country still has its challenges on ensuring equitable access to it.

Towards a new BEd (Hons) DE program at UP

In South Africa, the BEd Hons is geared towards students who already have a BEd degree in education or a first degree capped by a PGCE. In terms of the new policy requirements, new BEd Hons programmes require a supervised research component which clearly places the BEd Hons in the academic, as opposed to the professional, learning pathway of a re-conceptualised higher education qualifications sub framework (CHE 2013). Contrary to the previous DE BEdHons program, which was offered in only one department of the Faculty of Education, all departments are now involved in the new programme due to multiple electives available to students. This is now known as BEdHons in Teacher Education and Professional (TEPD). More details about the development of the new program will be provided later.

Pushing boundaries at the University of Pretoria: The development of the new BEdHons program

In this section, the authors have developed a model to create a story line of how the University developed the new BEdHons. The model is a fusion of the National Association of Distance Education Organisations of South Africa (NADEOSA) quality criteria for program development and the technology, pedagogy, and content knowledge (TPACK) model developed by Mishra and Koehler (2006). Both, with their application to the new program, are described below.

National Association of Distance Education Organisations of South Africa (NADEOSA) quality criteria

The NADEOSA quality criteria document (Welch & Reed, 2005) was initially developed in the course of research undertaken for the Department of Education (DoE). The quality criteria have since been revised through a stakeholder process involving the wider distance education community. The criteria include policy and planning, learners, *programme development*, course design, course

materials, assessment, learner support, human resource strategy, management and administration, collaborative relationships, quality assurance, information dissemination and results. This paper focuses on programme development. According to NADEOSA, distance education providers should focus on the following when developing a program: program planning, program approval, program curriculum, admissions and learner support, accreditation, articulation and flexibility, and quality assurance. These criteria are nationally and internationally recognized as being essential (Commonwealth of Learning (COL). 2004; Council on Higher Education, 2004a & b).

The technology, pedagogy and content knowledge model (TPACK)

While traditional educational institutions were modelled on the notion of knowledge as a scarce commodity to be passed on from teacher to learner, the connected environment forces teachers to reconceptualise their role as knowledge curators and as facilitators of knowledge creation. This requires them to think more critically both about the WHAT and the HOW of teaching and learning. According to scholars (Neiss, 2005; Koçolu, 2009; Solis, 2009), though not new, the concept of pedagogical content knowledge (PCK) gained renewed emphasis with Lee Shulman (1986). Shulman (1986) defined the term PCK as teachers' interpretations and transformations of subject-matter knowledge in the context of facilitating student learning. According to the author, the key to distinguishing the knowledge base of teaching rested *at the intersection of content and pedagogy*. To this, Mishra and Koehler (2006) have added technology and described TPCK as the interweaving of technology, pedagogy, and content. According to Neiss (2005), TPCK is (1) an overarching of what it means to teach a particular subject integrating technology in the learning; (2) knowledge of instructional strategies and representation for teaching particular topics with technology; (3) knowledge of students' understanding, thinking, and learning with technology in a particular subject; (4) knowledge of curriculum and curriculum materials that integrate technology with learning in the subject area. Thus, Technological Pedagogical Content Knowledge (TPACK) has been proposed as a conceptual framework to describe the knowledge base teachers need for effective technology integration (Kurt, Akyel, Koçoğlu & Mishra, 2014).

The interrelatedness between NADEOSA's program development quality criteria and TPACK

As evident from above, most of the elements present in the NADEOSA's program development quality criteria could be said to be related to the TPACK model. At the point of program development, developers need to be mindful of all the elements, and should consider these in relation to the technology to be adopted for the program; how suitable this would be for both the content and context; how prepared both students and academics are; and how to teach using the adopted technology. The relationship between the elements and the TPACK model is depicted in Figure 1 below.

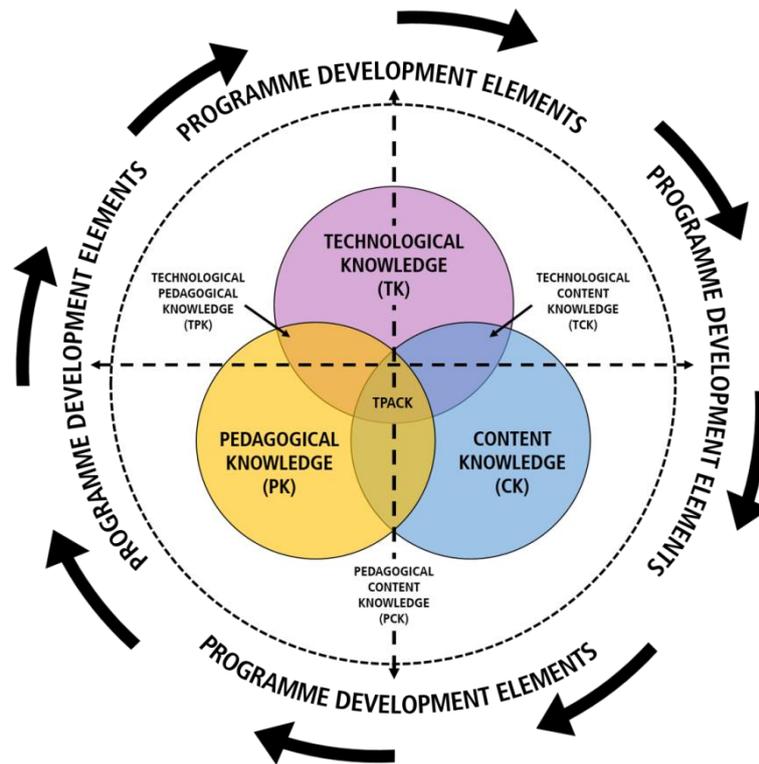


Figure 1: The interrelatedness between program development elements and TPACK model (Adapted from Mishra & Koehler (2016))

Application of both the NADEOSA quality criteria on program development and TPACK to the development process of the new program

Program planning

The planning of the new BEDHons program started with the needs assessment of the clientele (DE students). A needs assessment is a systematic approach to studying the state of knowledge, ability, interest, or attitude of a defined audience or group involving a particular subject (McCawley, 2009). In order to determine this, the Unit for Distance Education (UDE) conducted a study to determine the level of technology usage of DE students given their prevalent context. The mixed-methods approach, comprising a survey combined with focus group discussion during visits to some contact session venues, was applied. The survey has 24 questions divided into six sections: A) Biographical information; B) University of Pretoria’s website; C) E-mail; D) Mobile phone; E) Computer; and F) Internet connections. A total of 1 275 participated in the study. Regarding the visits, the aim of having focus groups in four regions where the majority of the students reside/work was to determine the level of support DE students would need to be able to access and use optimally the University’s portal system (clickUP).

The findings generally showed that students would need assistance with access to internet, devices (if they do not already have), logging into the University’s portal system (clickUP) and a computer literacy course. In addition, the study indicated that academics should develop modules with mobile and low internet access in mind.

This was followed by the development of a Gantt chart by the manager for the Unit indicating the timeline for the project, individual tasks, their durations and the sequencing of these tasks with the

expected completion date. The faculty also assigned a project manager to the project. The majority of the academics who would be involved in the new program were new to DE. Therefore, several meetings and workshops were held with all stakeholders. Also some academics from another university were invited to share their experience of online teaching. Key stakeholders also visited another university that shared similar experience. Academics who would be involved in the new DE program were also sponsored to two conferences: national and international in order to have first-hand experience of what DE involves. Though both academics involved in the DE and the contact modes were first brought together at the beginning of the planning, the group was later split into two. This was because of the different timelines when the program would be launched in both modes. The contact mode was launched in January 2016 while the DE mode would be launched in October 2016.

Lastly money was made available for staff members to obtain support, material developers for their modules or to pay contract staff to lecture as staff members developed the modules themselves. Funding was also made available for editing costs, and other necessary expenses.

Program philosophy

The new program philosophy as earlier indicated was developed in line with the current minimum requirement of teacher education in the country and the University's decision to move all its programs into a blended model. The new program has been restructured according to packages defining combinations of electives. The elective combination and the research project determine the specialisation and qualifier. The philosophical principle is a "flipped classroom" design. This approach is informed by the idea that students can learn basic information and even develop unique understandings both independently and in peer collaborative learning groups, while lecturers can then use contact time to guide and drive the development of higher cognitive (and deeper knowledge) achievements through problem-based discussion rather than lectures, as informed by Vygotsky's social constructivist theory (Vygotsky, 1978). In such an approach the package and module designers (1) set intended learning outcomes, (2) define the useful initial content/topics, (3) decide on assessments (formative and summative) that would ensure learning occurs, and has occurred, to the intended cognitive and knowledge levels. This is then encapsulated in a sequence of (4) activities, (5) that ensure that challenge and support (assignments and scaffolding) are established and their purposes clear, (6) activities and materials are well "chunked" and sequenced (scaffolding engagement through the Zone of Proximal Development). All of these must (7) align well with other modules, most closely those that are directly related within the identified clusters referred to as packages.

Program approval

The BEd(Hons) degree is not a new qualification but the nature of programmes that lead to that qualification has been redefined by the changing policy framework (DHET 2008, 2011; CHE 2013; DHET 2015). The degree has been registered as a single degree on the program qualification mix (PQM) by the country's Department of Higher Education and Training (DHET), the Council on Higher Education (CHE) and the South African Qualifications Authority (SAQA), and has been approved for teachers by the DHET.

As with the previous model, enrolment will be continuous and students encountering life challenges will be able to request a roll-over of their studies to a subsequent block at no additional cost.

Once students have completed the heavily structured part of each module, they will be provided with an orientation to OER and guidelines for an engagement that will help them to source, adapt and create their own resources and engage in inter- and intra-group discussions with a view to encouraging more creative and emergent learning.

Online tutors will provide light touch feedback throughout the process.

Program curriculum

The program curriculum is made of a mix of compulsory modules with electives, from which students could choose. The elective module provides the contextual specialisation for the professional interest and leads to the professional development focus and a research project. The elective combination and the research project determine the specialisation and qualifier. The blocks are thus balanced between principles of education and research and practice. Together these enhance students' knowledge and develop the skills and approaches towards the independent research ability which is a required outcome of an honours programme.

Technology, pedagogy and content knowledge

Pedagogy refers to the technical-know-how of teaching. Margerum-Leys and Marx (2002) emphasised that stakeholders acquire pedagogical knowledge through different means of interaction throughout their career and that their knowledge could be utilised irrespective of the context in which contents are delivered. This emphasises the importance of the application of general pedagogical strategies when teaching with technology.

However, scholars (Doering, Veletsianos, Scharber, & Miller, 2009; Messina & Tabone, 2012; Teräs & Herrington, 2014) have argued that knowing what to teach (content) and how to (pedagogy) are not enough, especially given the advent of technology. Thus Mishra and Koehler (2006) have stressed the need to integrate technology between and among the relationships among content and technology.

The unit's fundamental decision to move away from a paper-based delivery model towards web-supported delivery had immediate academic and administrative consequences. Academic staff with the assistance of the unit for distance education (UDE) had to investigate how the delivery of their modules will take place online. This was a considerable challenge as their learning material, presentations and delivery rationale was not designed for this. The new methodology follows an activity-based approach that places a lot of emphasis on peer collaborative and cooperative learning through online group discussions.

The use of the University's LMS was the logical option to support the above mentioned processes. The LMS has been tried and tested for many years in the contact mode and excellent support structures have been implemented. Consequently the academic staff, e-tutors, and students required training to be able to use the online systems at the University. The main aim of these sessions which employed the use of Blackboard is to demonstrate to the stakeholders how the use of the LMS could support manual (physical) actions. For instance, one of the trainings attended by academics was an *eLearning for Academics* course organized by the Department of Education Innovation of the University. The course was presented to illustrate the use of blended learning, which included both weeks of online participation and two full days of face-to-face interaction. The participants experienced

learning in an online environment as both a student and a facilitator. They later worked collaboratively to review one another's module offering valuable feedback.

Student administrative services

A very important aspect in DE that is often overlooked and underestimated is student administrative services. In the old programs, administrative processes were built around a paper-based system which required manual work. Therefore, many of the processes needed rethinking, especially considering how these processes could be dealt with electronically. The DE unit had the task to determine which of their administrative processes should be managed through the use of the LMS. The decision was to maintain those that have worked efficiently in the old programs, and that are still very relevant to the new program. An example is the call centre.

Admission and learner support

Admission into the new program has been tailored to match government's minimum requirements policy for teacher education qualifications (DHET, 2015). These among others include a bachelor's degree and a teacher's diploma/Postgraduate Certificate in Education (e.g. BA + HED); a four-year composite degree in Education (e.g. BEd, BAEd) (University of Pretoria, 2016b).

The former distance model, which involved the provision of print-based materials, face-to-face contact sessions and technology-mediated support (particularly extensive use of SMS and a student-staffed call centre) enjoyed retention and success rates that were higher than the norm and well above the national expectations and averages (DHET 2014, 2016). However, a major expense in the previous model, the provision of decentralised contact sessions, typically reached only 30% to 37% of students. The new model retains all of the dimensions of the previous successful model but seeks to use technology to plug some of the gaps and to reach ALL of the learners. Given the environmental constraints, students will be able to complete a lot of the work offline. However, they will need to go online for short periods to upload new assignments, download marked assignments and to participate in discussion fora. This means that student engagement can be tracked in ways which were not possible in the previous model and a progressive structured intervention strategy employed in the case of non-engagement or poor performance (SMS/email, call centre follow up, counselling on possible re-scheduling and roll-over to the following cycle).

In order to fully support students (based on the earlier needs assessment findings discussed above), prospective students must complete attendance of ICT training before final enrolment, which includes familiarising them with the Blackboard online-learning platform used by the University; they must have access to a computer as well as to the Internet and sign a declaration stating this. Students without access to a computer and/or the Internet have the possibility of receiving financial support, based on affordability. There will also be the option of a face-to-face decentralised orientation session at the start of a study block and a wrap-up face-to-face contact session before completion of summative assessment, which depending on the module might take the form of an examination, a report or a portfolio. Online tutors and call centre part-time staff are also being trained as at the time of writing this paper.

Quality assurance

Quality and quality management are organisational obligations that are vested in management's commitment towards an understanding of quality (Aluko, Fraser & Hendrikz 2008). Literature suggests that the singular reason for mixed reactions to distance education mainly relates to quality (Du Plessis and Van der Merwe 2005). The University of Pretoria sees quality as a priority. It is an iterative process and is considered to be part of a philosophy that pervades the University's managerial, teaching and administrative styles, irrespective of the mode of delivery (University of Pretoria 2009). The University already has a policy in place on its DE practices. However, this would not be useful unless it guides its practices. To enhance the quality of its programs, awareness is created among all stakeholders. For instance, prior to admission, prospective students are sensitized to their possible involvement in the research conducted by the University, and the importance of its findings to the improvement of DE programs they would be enrolled for. Staff members are also involved in quality assurance. For the new program, a research plan is in place to regularly monitor student technology profile, their online activities, and to provide necessary support. We believe this would positively influence their performance and throughput rates. Though still working at improving its DE practices, the University's DE throughput rates are unusual for DE programs.

Lessons learnt and conclusion

From the above, the authors have been able to learn the following lessons.

First, there is a close connection between distance teacher education program development and the TPACK model. Second, in the process of program development, one needs to pay adequate attention to the issues of planning, the program philosophy with regard to its alignment with the curriculum, accreditation, articulation and flexibility. Others are providing necessary support for both students and all necessary stakeholders; and ensuring the quality of the program. Also, related to these is the technology, pedagogy and the content knowledge (TPCK) of both academics and students. Due to the interrelatedness among the three forms of knowledge, Koehler, Mishra, Kereluik, Shin, & Graham (2013) emphasize that teachers need to have deep understandings of each in order to orchestrate and coordinate technology, pedagogy and content into teaching. For instance, though much is expected from lecturers, who mostly do not belong to the net generations, adequate training is not sometimes provided while opportunities for informed discussion and critical evaluation of the ever-changing world outside the university gates are scarce (Teräs & Herrington, 2014).

Bibliography

- Aluko, F.R., W.J. Fraser and J. Hendrikz. 2008. Some interfaces in conventional and distance education programmes in a postmodern context. *South African Journal of Higher Education* 22(3): 484–497.
- Aluko, F.R. 2014. From evaluation to reflection-on-action: Lessons learnt from the impact of a distance education program. *South African Journal of Higher Education*, 28(5), 1497-1512.
- Bates, A.W. 2005, *Technology, e-learning and distance education*, 2nd edn, Routledge, USA.
- Commonwealth of Learning (COL). 2004. *Planning and Implementing Open and Distance Learning Systems: A Handbook for Decision Makers*. Vancouver: COL. www.col.org
- Council on Higher Education (CHE). 2004. *Criteria for Institutional Audits*. Pretoria: CHE.

- .. 2004. *Criteria for Programme Accreditation*. Pretoria: CHE.
- .. 2013. Higher Education Qualifications Sub-framework of the National Qualifications Framework. *Government Gazette No. 36721, 02 August 2013*. Pretoria: Government Printer.
- Department of Higher Education and Training (DHET). 2011. *The minimum requirements for teacher education qualifications (MRTEQ)*. *Government Gazette*, 553(34467). Pretoria.
- .. 2013. *White Paper for Post-School Education and Training: Building an expanded, effective and integrated post-school system*. Pretoria: DHET.
- .. 2014. *Policy for the Provision of Distance Education in South African Universities in the Context of an Integrated Post-school System*. <http://www.gov.za/ss/documents/higher-education-act-policy-provision-distance-education-south-african-universities>
- .. 2015. Revised Policy on the Minimum Requirements for Teacher Education Qualifications. *Government Gazette No. 38387, 19 February 2015*. Pretoria: Government Printer.
- .. 2016. *2000 to 2008 First Time Entering Undergraduate Cohort Studies for Public Higher Education Institutions, 31 March 2016*. Pretoria: DHET.
- Doering, A., Veletsianos, G., Scharber, C. & Miller, C. 2009. Using the technological, pedagogical and content knowledge framework to design online learning environments and professional development. *Journal of Educational Computing Research*, Vol. 41(3) 319-346.
- Du Plessis, P. and W. Van der Merwe. 2005. Mergers, different modes of delivery and assuring quality for learners. http://www.fotim.ac.za/fotim_conferences/papers/duplessisandvdmerwe.doc .
- Gawelek, M.A., Spataro, M. & Komany, P. 2011. Mobile perspectives: On iPads why mobile? *EDUCAUSE Review Magazine*, 46(2), March/April. <http://er.educause.edu/articles/2011/4/mobile-perspectives-on-ipads-why-mobile>
- Hendrikz, J. & Aluko. R. 2011. ICT realities in developing contexts and their impact on social justice. 14th Cambridge International Conference on Open, Distance and E-learning, Cambridge, UK, 25–28 September.
- Hülsmann, T. 2016. *The Impact of ICT on the Costs and Economics of Distance Education: A review of the Literature*. Vancouver: Commonwealth of Learning.
- Koçolu, Z. 2009. Exploring the technological pedagogical content knowledge of pre-service teachers in language education. *Procedia Social and Behavioral Sciences*, 1: 2734–2737. World Conference on Educational Sciences 2009. www.sciencedirect.com
- Koehler, M. J., Mishra, P., Kereluik, K., Shin, T.S., & Graham, C. (2013). The Technological Pedagogical Content Knowledge Framework. In M. J. Spector, M. D. Merrill, J. Elen & M. J. Bishop (Eds.) *Handbook of research on educational communications and technology* (pp. 101-111). New York: Springer.
- Kurt, G. Akyel, A, Koçoğlu Z & Mishra, P. 2014. TPACK in practice: A qualitative study on technology integrated lesson planning and implementation of Turkish pre-service teachers of English. *English Language Teaching ELT Research Journal*, 3(3), 153-166. <http://dergipark.ulakbim.gov.tr/eltrj/article/view/1063000123>
- Margerum-Leys, J., & Marx, R. W. (2002). Teacher knowledge of educational technology: A case study of student/mentor teacher pairs. *Journal of Educational Computing Research*, 26(4), 427-462.

- McCawley, P. F. 2009. Methods for conducting an educational needs assessment. <https://www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0870.pdf>
- Messina, L. & Tabone, S. 2012. Integrating technology into instructional practices focusing on teacher knowledge. *Procedia - Social and Behavioral Sciences*, 46: 1015–1027. www.sciencedirect.com
- Mishra, P. & Koehler, M. J. 2006. Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Neiss, M. L. 2005. Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education*, 21(5), 509-523.
- Peters, O. 2003. Learning with new media in distance education. In *Handbook of distance education*, GM Moore & G, Anderson (eds.), Lawrence E Associates Publishers, London.
- Shulman, L. 1986. Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher*, Vol. 15, No. 2 (Feb., 1986), pp. 4-14. <http://www.jstor.org/uplib.idm.oclc.org/stable/pdf/1175860.pdf>
- Solis, A. 2009. Pedagogical content knowledge. http://www.idra.org/IDRA_Newsletter/August_2009_Actionable_Knowledge/Pedagogical_Content_Knowledge/
- SouthAfrica.info. 2015. *SA 5th in Africa for internet access*. Retrieved from <http://www.southafrica.info/about/media/broadband260913.htm#.VdGYCbKqkko>
- South African Qualifications Authority (SAQA). 2007. The Higher education Qualifications Framework. *Government Gazette No. 30353, 5 October 2007*. Pretoria: Government Printer.
- Stockley, D 2003, What is e-learning? www.derekstockley.com.au
- Teräs, A. & Herrington, J. 2014. Neither the Frying Pan nor the Fire: In Search of a Balanced Authentic e-Learning Design through an Educational Design Research Process in Online Courses. *International Review of Research in Open and Distance Learning*, Vol 15, No 2. <http://www.irrodl.org/index.php/irrodl/article/view/1705/2835>
- United Nations Educational, Scientific and Cultural Organisation. 2002. *Teacher education guidelines: Using open and distance learning – technology, curriculum, cost, evaluation*. Paris: UNESCO.
- University of Pretoria (UP). 2008–2016. *Research reports: Unit for Distance Education*. Pretoria: UP.
- . 2009. *Distance education policy*. Pretoria: University of Pretoria.
- . About UP. 2016a. <http://www.up.ac.za/about-up>
- . 2016b. *Distance Education program 2016: BEdHons in Teacher Education and professional development (TEPD)*. Pretoria: UP.
- Vygotsky, L. 1978. *Mind in Society*. London: Harvard University Press.
- Welch, T. & Reed, Y. (Eds.). 2005. *Designing and delivering distance education: quality criteria and case studies from South Africa*. Johannesburg: NADEOSA.