**Developing context-related recommendations for best practice in technology-enhanced learning, teaching and assessment**

**Introduction**

Researchers generally agree that the traditional lecturer-directed or lecture-based approach of instruction has limitations in reaching today’s learners (Shelly *et al*. 2004: 6.46). This necessitates the consideration of alternative approaches of instruction. It is for this reason that, over the last few years, there has been increasing interest in the use of technology-enhanced learning, teaching and assessment (TELTA) at both undergraduate and postgraduate levels (Ruiz *et al*. 2006). There is also evidence that TELTA provides a platform that is attractive to the learning, teaching and assessment (LTA) stakeholders while delivering high-quality personalised learning (Sandars 2003).

Broadbent (2002) comments that effective TELTA is created when there is a successful alignment of the approach to learning with the use of technology. The alignment of the approach therefore needs to be based on sound pedagogical approaches. In addition, it is critical to note that the success of TELTA largely depends on how the content is made available to the learners and how it is used to enhance their learning more than it depends on the production of content (Allen 2003). However, the biggest challenge within the South African (SA) context is that often educators are instructed to implement TELTA without adequate pedagogical guidance nor consideration of the local context and the related issues.

Al-Shorbaji *et al*. (2015: xvi) have shown that TELTA is no better and no worse than traditional learning with regard to knowledge and skill acquisition. Nonetheless, they highlight that students have reported ease of access, flexibility, portability, improved student-teacher contact and discussions, and increased discussions with peers as the major advantages with regard to how they experience TELTA.

Several authors have highlighted that TELTA can also have limitations in achieving the above advantages. For example, a systematic review by Childs *et al*. (2005) highlights poorly designed teaching packages, inadequate technology and lack of skills, a need for a component of face-to-face teaching, and the intensive nature of e-learning with lack of protected time as the major barriers to effective use of TELTA. Wright (2014) highlights five major barriers to the use of technology for teaching within the developing world and the \*Global South. These include electrical power limitations, internet connectivity and bandwidth issues, training and professional development of educators, respect and better pay for teachers (valuing of teachers), and the sustainability of implementations (Wright 2014).

The existence of the above barriers is outweighed by the fact that TELTA allows for the combination of hands-on, skills-based training as well as self-directed, knowledge-based learning (Al-Shorbaji *et al*. 2015: xiii). The latter accords well with what was once said by Confucius – ***“I hear, I forget. I see and I remember. I do and I understand.”*** (Shelly *et al*. 2004: 6.46). The use of TELTA creates a platform for learning by doing for leaners. In addition, Al-Shorbaji *et al*. (2015: xiii) highlight that TELTA may:

* Help reduce the costs associated with delivering educational content
* Facilitate the development and scalability of educational interventions
* Break down the geographical and temporal barriers that limit the access to and availability of education
* Improve access to relevant experts and novel curricula
* Allow for personalisation of e-learning based on learner behaviour
* Facilitate “immersive learning” through augmented reality and 3D learning environments, and ubiquitous learning through mobile learning and cloud learning environments.

**The South African Context**

The Department of Higher Education (DHET), in its *White Paper for Post-School*
*Education and Training,* places emphasis on social justice(DHET 2013). Within this publication there are two sections of note:

* **Section 7** deals with ‘Opening learning through diverse modes of provision’.
* **Section 7.4** deals with ‘Equitable access to appropriate technology’.

However, the realisation of both the diverse modes of provision and the equitable access have to be viewed within the existing constraints in the SA context. In the Universities South Africa (2015) publication, there is a significant indication of the issues within the SA context that are important to consider if the use of TELTA is to be successful. Among the issues highlighted by Universities South Africa (2015: 3) are the following:

* The need to improve digital literacies
* Elevation of research and devaluing of teaching which requires provision of incentives to academics as well as developing more sustained and in-depth professional development strategies. The Council for Higher Education (CHE) (2016: 167) adds that, while most universities have for a long time had awards for research, it is only recently that most universities are introducing awards for teaching and learning excellence.
* Lack of pedagogical guidelines which consequently leads to the use of technologies not yielding transformative learning outcomes, focusing on the technical aspects of these tools and remaining on a superficial level. In addition, several projects aligned to the use of technology in the teaching and learning space have placed more focus on how the technologies can improve teaching rather than focusing on the pedagogical principles on the use thereof (CHE 2016: 171).
* Need for sensitivity to context which should rather inspire creative and innovative teaching with technology. The issues related to context include aspects like the technology infrastructure, low broadband, limited access to technology, and students’ insufficient access to ICTs and basic computer literacy skills. These augur well with the issues that exist in the Global South, as indicated by Wright (2014) above.

In addition, the CHE, in its review of the South African higher education system 20-years post-democracy, highlights the staff development initiatives analysis over this period (CHE 2016: 166). The analysis highlights the following as being the areas on which the staff development projects have focused:

* Early focus was in the form of academic staff development as ‘technique’ where academics were invited to attend workshops to improve their teaching methods – grounded on theories that explained teaching and learning problems largely in terms of student deficit.
* There was then the advent of approaches that focused on staff engaging with postgraduate studies and this was partly parallel to a move to ‘undertake both staff and student development in more sophisticated ways that took the norms and values of the disciplines into account’.
* The next generation of staff academic development focused on the systemic view of institutions with a focus on issues relating to infrastructure use to support the teaching and learning project.

The above review of the CHE clearly demonstrates the lack of staff development within the SA context with regard to pedagogical issues and the use of technology. It is thus safe to say that the major considerations with regard to the successful use of TELTA are the context within which it is used, pedagogical issues and the technology-related issues. Most importantly, issues pertaining to staff development with regard to the pedagogical issues related to TELTA need a consolidated focus.

**Problem Statement**

Over the last few years, most higher education institutions in SA have implemented TELTA in part to align to the DHET White Paper recommendations while keeping up with the international trends in educational developments. Mobile devices have been given to learners but the guidance to educators has had a focus on the technical aspects of the technology being used, with lack of adequate pedagogical guidance and awareness of the barriers in the local context. In addition, staff development initiatives have not focused on dealing with the pedagogical issues related to TELTA. No best practice recommendations that focus on pedagogical guidance in the use of TELTA within the SA context were identified by the authors, and we consider that there is an urgent need for the development of suitable recommendations that can be used by educators within the SA context and may also be useful within the Global South.

**Project Aim**

The aim of this project was to develop context-related recommendations for best practice in TELTA in order to ensure effective design and delivery of the modules with the use of appropriate pedagogical approaches. For the purposes of this project, best practice is considered based on Arendale (2016) who defines *best practice* as the wide range of individual activities, policies and pragmatic approaches to achieve positive changes in student attitudes or academic behaviours.

The project may help to enhance transformative learning outcomes and thus positively impacting the use of TELTA. In addition, it may improve the sensitivity of educators with regard to the considerations to be made for the SA context while developing more sustained and in-depth professional development strategies with regard to TELTA use. The project also sought to enhance the scholarship of teaching and learning.

**Methodology**

Since this project had an aim of finding a specific solution to an identified problem, a systematic inquiry approach (applied research) was used. The choice of this methodological approach allowed the project to be problem-oriented and action-directed (Vijayalakshani & Sivapragasam 2009: 6). The methodology considered the time constraints since it was conducted as part of the Teaching Advancement at University (TAU) project which ran for a period of 12 months. Within the TAU project, it was located under the theme ***Strengthening curriculum and course design (including IT)*** under the stream ***Implementing quality online learning in Health Sciences Education****.*

The methodological approach followed that proposed by Khan *et al.* (2003), namely five steps to conducting a systematic review. The five steps proposed by Khan et al. are as follows:

* Step 1: Framing questions for a review
* Step 2: Identifying relevant work
* Step 3: Assessing the quality of studies
* Step 4: Summarizing the evidence
* Step 5: Interpreting the findings

The implementation of the above steps was an iterative parallel process that also employed the use of Google docs (see figure 1) to allow simultaneous contributions and inputs.



Figure 1. Summary of the parallel process employed in the methodology

**Part 1 –** dealt with the consideration of multiple options that could be used for incorporation into the development of the best practice guidelines. This phase entailed two primary activities:

* Literature survey to gather and integrate theories and principles for the development of the best practice guidelines. The literature survey also helped to operationalise the concepts within this phase (Vijayalakshani & Sivapragasam 2009: 6).
* The development of the guidelines was also informed by the following:
	+ The University of Johannesburg’s strategy for the use of technology devices and the LTA policy;
	+ Professional and industry dynamics, especially with regard to technology; and
	+ Current available technological platforms.

The outcome of the CF phase was therefore a draft of the guidelines based on the considerations of literature, foundational theories for TELTA and a visit to UCD.

**Part 2 –**  sought to carefully consider the outputs of part 1 back to the aim and proposal of the project while soliciting objective opinions from different experts. The experts consisted of the following:

* Dr Jonathan McNulty, Head of Educational Development, Diagnostic Imaging, School of Medicine, UCD, Ireland
* Professor John Sandars, Professor of Medical Education, Postgraduate Medical Institute (PGMI), Faculty of Health and Social Care, Edge Hill University
* A visit to the University College Dublin (UCD) (Ireland), School of Medicine, Diagnostic Imaging Section. This department was chosen as a case study to be incorporated in the development of the guidelines. It was also chosen because of the discipline offering and the fact that it had successfully migrated most of its modules to the e-learning platforms alongside traditional face-to-face teaching
* Since the project was conducted as part of the Teaching Advancement at University (TAU) project, which consisted of various education experts either as participants in the project or as mentors, valuable input was received from this group. The input was continuous during the project in the project meetings and through emails with the group members. Towards the conclusion of the project, the proposed guidelines were presented to the project team who afforded the proposed guidelines some critique.

The chosen methodology therefore sought to ensure an integrated approach that considered the best practice from an international perspective, simultaneously ensuring the relevance of such practices to the local context.

**Results and Discussion**

The review of the literature yielded several salient sources that contributed significantly to the development of the guidelines. These sources are a combination of pedagogical theories, models that are useful to guide in the use of TELTA and the recent publications advocating the use of TELTA. Amongst the critical readings that informed the design of the guidelines were the following:

* The ten principles for successful e-learning (Anderson & McCormick 2005)
* Learner agency principles as discussed by Gerstein (2013).
* The Substitution-Augmentation-Modification-Redefinition (SAMR) model (Victoria State Government 2015)
* Technological pedagogical content knowledge (TPACK) (Koehler & Mishra 2009; Mishra & Koehler 2006; Shulman 1986)
* Recent literature with regard to pedagogy for using technology (Attwell & Hughes 2010: 15)
* Moving beyond the hype: A contextualised view of learning with technology in higher education (Universities South Africa 2015)

The visit to UCD sanctioned the hands-on experience to link to the literature to develop the guidelines. A consideration of various sources and the UCD practice yielded a proposed model that served as a framework to guide educators in implementing the use of TELTA. The model is proposed with the following considerations:

* Suitability to SA context
* Easy to follow
* Does not require extensive educational background / training
* Implementable within any discipline

The model is shown in figure 2 below. This model can be used in a step-by-step custom in the design of LTA for a specific subject / module.

Figure 2. A proposed model for the implementation of TELTA

The model must be used in chronological order to implement the use of TELTA. Each step of the model leads to the next. It will thus be discussed below in that order, starting with the reason for the use of the technology.

1. **The reason for the use of technology – SAMR model**

The reason for the need to use technology is the critical first step in the process. In general, academics are very often encouraged to create an online presence without ever having studied online themselves or having even considered the pedagogical impact that technology can have on the students’ learning experience (O’Donnell & Sharp 2012). Dr Ruben Puentedura has developed a model that is used to describe technology integration through four levels with regard to the reasons for the use thereof (Victoria State Government 2015). The model is called the SAMR model which is an acronym for:

* **Substitution** – technology is used as a direct substitute for what you might do already, with no functional change.
* **Augmentation** – technology is a direct substitute, but there is functional improvement over what you have done without the technology.
* **Modification** – technology allows you to significantly redesign the task.
* **Redefinition** – technology allows you to do what has previously not been possible (Victoria State Government 2015).

Before the technology can be used for LTA, the educator therefore has to ask: What are the reasons for the use of technology? Is it to substitute, to augment, to modify, to redefine or a combination of these? Once these questions have been answered, then the process can unfold.

Coupled with these important questions is the notion that the educator needs to be cognisant of the learners’ prior learning and competencies. Universities South Africa (2015) advocates that the technologies available to the learners must be considered since the essence of learning with technology is about ways of appropriating technologies to achieve meaningful learning. In the absence of suitable technology on the learners’ side, meaningful learning will be hindered. In addition, learner agency has a significant role to play. For example, learners who have a high agency will find the use of technology for substitution more exciting and more relevant. On the other hand, learners with low agency may be frustrated by the use of technology as substitution. There is therefore a need to find a balance that will assist both groups of learners.

The response to the question of what the reasons for the use of technology are is also informed by the intent for the use of technology. According to Sandars (2014), technology can be used for different intents with regard to teaching and learning. These ‘intents’ can include the following:

* **Deliver content** - from PowerPoints / podcasts / videos / software packages
* **Direct resources** – e.g. websites / videos
* **Interact** – e.g. tasks, quizzes, discussions – collaboration (Forum / Web 2.0 – social media)
* **Collate / reflect / annotate** – e.g. online portfolio

When the reason for the use of technology is crystal clear, the next step is to ensure that the knowledge to be taught with the technology is identified.

1. **Identification of the knowledge to be taught with technology – TPACK framework**

Technological Pedagogical Content Knowledge (TPACK) is a framework that identifies the knowledge teachers need to teach effectively with technology (Koehler & Mishra 2009; Mishra & Koehler 2006; Shulman 1986). This is key to the successful use of technology for teaching. If the technology is used to teach the knowledge that is not necessarily suitable to be taught through technology, failure is imminent. At the heart of the TPACK framework is the complex interplay of three primary forms of knowledge:

* **Content knowledge (CK)** – is the teacher’s knowledge about the subject matter that is to be taught. The content to be covered in a skills subject is different from the content to be covered in pure theoretical subjects (e.g. physics). The former will possibly contain knowledge of established practices, deep knowledge, situational and procedural knowledge while the latter may contain more concepts, theories, knowledge of evidence as proof, and conceptual knowledge (De Jong & Ferguson-Hessler 1996: 111). Similarly, the subject content to be covered at the first year of a bachelor’s degree is different from that to be covered in the third or fourth year.
* **Pedagogical knowledge (PK)** – is the teacher’s deep knowledge about the processes and practices or methods of teaching and learning. These encompass, among other things, overall educational purposes, values and aims. This generic form of knowledge applies to understanding how students learn, general classroom management skills, lesson planning and student assessment (Koehler & Mishra 2009).
* **Technology knowledge (TK)** – is knowledge about certain ways of thinking, and working with technology, tools and resources (Koehler & Mishra 2009). TK includes the basic understanding of various technological platforms to be able to apply it efficiently while possessing the ability to identify when technology can assist or impede the achievement of the desired outcomes. It is also important to be able to adapt to changes in the information technology industry.

Figure 3 is a synopsis of the three types of knowledge as well as other types of knowledge that exist due to the interplay of these three main types of knowledge.



Fig 3. The TPACK model (<http://www.tpack.org/>) (Reproduced with permission of the publisher, © 2012 at tpack.org)

In the true sense, these forms of knowledge should not be seen in isolation. As shown in figure 3, the TPACK framework also emphasises the kinds of knowledge that lie at the intersection between these three primary forms of knowledge. These are:

* **Pedagogical content knowledge (PCK)** refers to the notion of the transformation of the subject matter for teaching. This transformation occurs as the lecturer interprets the subject matter, finds multiple ways to represent it, and adapts and tailors the instructional materials to alternative conceptions and students’ prior knowledge (Shulman 1986).
* **Technological content knowledge (TCK)** refers to an understanding of the manner in which technology and content that is taught influence and constrain each other. Lecturers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter can be changed by the application of particular technologies. They also need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology – or vice versa (Koehler & Mishra 2009).
* **Technological pedagogical knowledge (TPK).** According to Koehler and Mishra (2009), TPK refers to an understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies.
* **Technological pedagogical content knowledge (TPACK)** is the core of the teaching with technology which involves meaningful and deep skills of teaching with technology. According to Koehler and Mishra (2009), “TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones.”

In order to maximise the effectiveness of technology integration for pedagogy aligned to a particular subject matter, the educator needs to develop an understanding of and sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts (Mishra & Koehler 2006). Several factors dictate that no single combination of content, technology and pedagogy will apply for every teacher, every course, or every view of teaching. These factors include the following: the educator as an individual, study level, institutional-specific factors, demographics, culture, etc.

It is therefore important for the educator to possess, at the minimum, the three primary forms of knowledge, since the other forms of knowledge are formed as a combination of these primary forms of knowledge. Any educator should be an educator because he/she possesses the CK. The TK and PK can be easily developed through relevant courses and gaining experience. Once the educator has acquired the necessary knowledge, they can then consider the suitable pedagogical approach to use.

1. **Consideration of pedagogical theories**

Recently there has been an increasing interest in pedagogic theories and the related processes that informs the use of technology (Attwell & Hughes 2010: 15). This increasing interest may be related to the fact that in some instances, teaching with technology has failed to have the expected impact on learning processes. It is therefore prudent to have fine scrutiny of the pedagogical approaches. Attwell and Hughes (2010: 15) highlight that recent literature with regard to pedagogy for using technology advocates the move towards constructivist approaches.

As mentioned above, Confucius once said, ***“I hear, I forget. I see and I remember. I do and I understand”*** (Shelly *et al*. 2004: 6.46). It is therefore important that the pedagogic approaches used with TELTA are those aligned to enhancing the *‘doing’* by learners so that their *‘understanding’* may be enhanced. The favourable approaches are therefore those that are student-focused rather than those that are teacher-focused.

The core of constructivism is that learners actively construct their own knowledge and meaning from their experiences (Attwell & Hughes 2010:16; Educational Broadcasting Corporation (EBC) 2004; Learning-theories.com 2016; University of Sydney 2016). The same authors also argue that constructivism is not a pedagogy; rather a paradigm. Attwell and Hughes (2016) put forward eight principles that provide the essence of constructivist pedagogy which clearly highlights the student’s role in knowledge acquisition through puzzlement, experience, reflection and construction. These eight principles are:

1. Learning should take place in authentic and real-world environments.
2. Learning should involve social negotiation and mediation.
3. Content and skills should be made relevant to the learner.
4. Content and skills should be understood within the framework of the learner’s prior knowledge.
5. Learners should be assessed formatively, serving to inform future learning experiences.
6. Learners should be encouraged to become self-regulatory, self-mediated and self-aware.
7. Teachers serve primarily as guides and facilitators of learning; not instructors.
8. Teachers should provide for and encourage multiple perspectives and representations of content.

These principles form a good nexus with the ten principles for successful e-learning (see below) put forward by Anderson and McCormick (2005) as useful in ensuring that the design of the programmes is informed by the suitable pedagogical approaches. Constructivism has specific classroom approaches that are different from the traditional approaches (see Table 1). These approaches allow the learners the opportunity to construct their own knowledge and meaning in context, which aligns well with the use of TELTA.

Table 1. Traditional versus Constructivist Classroom (EBC 2004)

|  |  |
| --- | --- |
| **Traditional Classroom** | **Constructivist Classroom** |
| Curriculum begins with the parts of the whole. Emphasizes basic skills. | Curriculum emphasizes big concepts, beginning with the whole and expanding to include the parts. |
| Strict adherence to fixed curriculum is highly valued. | Pursuit of student questions and interests is valued. |
| Materials are primarily textbooks and workbooks. | Materials include primary sources of material and manipulative materials. |
| Learning is based on repetition. | Learning is interactive, building on what the student already knows. |
| Teachers disseminate information to students; students are recipients of knowledge. | Teachers have a dialogue with students, helping students construct their own knowledge. |
| Teacher’s role is directive, rooted in authority. | Teacher’s role is interactive, rooted in negotiation. |
| Assessment is through testing, correct answers. | Assessment includes student works, observations and points of view, as well as tests. Process is as important as product. |
| Knowledge is seen as inert. | Knowledge is seen as dynamic, ever changing with our experiences. |
| Students work primarily alone. | Students work primarily in groups. |

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The constructivist approach also supports the establishment of the community of practice. In the community of practice, members are involved in a set of relationships over time and most importantly these communities are developed around things that matter to the members of that community (Attwell & Hughes 2010: 18). Within a community of practice, learning involves participation. Technology can be used to enhance the self-expression and social networking that support the communities of practice.

The successful use of the pedagogical approach also needs to be based on sound principles. Anderson and McCormick (2005) suggest ten principles for successful e-learning that are useful in ensuring that the design of the programmes is effective. When these principles are combined with the right pedagogy, the chances for success are imminent. The principles include the following (Anderson & McCormick 2005):

* **Principle 1:** Match to the curriculum - The pedagogy should be matched with and aligned to the appropriate curriculum through clear objectives, the relevance of content covered, the appropriateness of student activities and the nature of the assessment.
* **Principle 2:** Inclusion - The pedagogy should support inclusive practices seen in terms of different types and ranges of achievement, physical disabilities that can be particularly supported by e-learning, different social and ethnic groups, and gender.
* **Principle 3:** Learner engagement - The pedagogy should engage and motivate learners. This engagement should be evident in an ethos of being both educational and motivating.
* **Principle 4:** Innovative approaches - It should be evident why learning technologies are being used, rather than a non-technological approach that achieves the same end as effectively. E-learning should be fit for purpose.
* **Principle 5:** Effective learning - This principle can be demonstrated in a variety of ways; for example, by using a range of different approaches in the learning platform that will allow the student to choose one that suits her or that can be personalised to her or by satisfying a number of the characteristics of good learning (learner agency; learner autonomy; enabling or encouraging collaboration).
* **Principle 6:** Formative assessment - The pedagogy should provide formative assessments.
* **Principle 7:** Summative assessment - The summative assessments must be valid and reliable, as well as comprehensible by teachers, learners and parents. It must also be able to deal with a range of achievement levels and be free from adverse emotional impact on the learner.
* **Principle 8:** Coherence, consistency and transparency - The pedagogy must be internally coherent and consistent in the way the objectives, content, student activity and assessment match one another. It must be open and accessible in its design.
* **Principle 9:** Ease of use - E-learning should be transparent in its ease of use.
* **Principle 10:** Cost-effectiveness - Technology solutions need to be justifiable and affordable and the costs sustainable.

The constructivist paradigm evidently promises to be the most suited to the use of technology for teaching, especially if the use thereof is based on sound principles. However, the key also lies in ensuring that suitable technological platforms are identified and used to support the pedagogical approach adopted.

1. **Identification of the suitable technology**

TELTA can be used to satisfy various needs to enhance the learning process. Jacobs, Vakalisa and Gawe (2011) advocate the use of TELTA for the following reasons:

* Enhancing the learning process
* Assisting in presenting
* Finding and using information
* Processing or working with information
* Assessing learning
* Collaborating
* Managing and reporting on the learning process

The choice of the suitable technology is influenced by desired result from the use of TELTA. In addition, the identification of the suitable technology lies in first ensuring that both the academics and the students have adequate digital literacy or are at least poised to improve it. The possession of digital literacy will ensure successful implementation of the use of technology. Universities South Africa (2015: 16) makes the following significant recommendations with regard to digital literacy:

* The focus needs to be on successful learning practices.
* Digital literacy needs to be thought of as more than computer literacy, as the concept encompasses a range of practices, including computer literacy, information literacy, media literacy, communication literacy, visual literacy and technology literacy.
* There is a need to move away from conceptualising digital literacy as computer literacy, as the issue is not about the device. Many students interact with the
internet via a cellphone very successfully, even before they have mastered a computer.
* Digital literacies need to be embedded into courses and subjects so that they can be learnt in the context of the discipline.

In line with the possession of the suitable digital literacy, institutions have a responsibility of creating an environment that will breed the use of technology. The institutional environment can be the first hindrance or succour for the use of technology.

Sandars (2014) advocates that the platform that is employed for teaching the use of technology can either be formal or informal. The most commonly used formal platforms are in the form of virtual learning environments. These may include platforms like Blackboard® (Blackboard Inc., Washington D.C., USA) / Moodle (Moodle Pty Ltd., Perth, Australia), a managed learning environment portal. Informal platforms are mainly the social media platforms that allow engagement of students at various levels. According to Cavazza (2016), social media can be used for publishing, sharing, messaging, discussing, collaborating and networking.

Understandably, one has to use a limited number of these platforms or social media tools in order to enhance the effectiveness thereof. As highlighted previously, it is important to have a clear indication of the use of any of the tools. The choice of the social media tool to be used can be easily decided upon, based on answering the following three basic questions highlighted by Cooper (2015):

* Who is your audience?
* How do you reach them?
* What are you goals?

Additionally, one has to consider the suitability of the environment in which these are to be used. For example, will the institutional network support the use of that particular tool if it is available in the country, since some of them are available in specific countries?

After the identification of the suitable technology, the last step will be to implement the lesson according to what has been decided based on steps 1 – 4.

**Conclusion**

The proposed model is designed to provide a cogent principled approach in the use of TELTA. It is meant to assist educators in simplifying their approach in decision-making with regard to the use of TELTA while considering the local context. The model could prove to be a very useful tool in simplifying the process of using TELTA while enhancing the use thereof. The use of TELTA can play a significant role if appropriate pedagogical approaches are used to inform the design thereof.

**References**

Allen, M.W. 2003. *Michael Allen’s Guide to E-learning*. Hoboken, NJ, John Wiley and Sons.

Al-Shorbaji, N., Atun, R., Car, J., Majeed, A., & Wheeler, E. *E-Learning For Undergraduate Health Professional Education: A Systematic Review Informing A Radical Transformation Of Health Workforce Development*. World Health Organization. ISBN 978 92 4 150826 1.

Anderson, J. & McCormick, R. 2005. Ten Pedagogic Principles for E-learning. Online: https://oeb-insights.com/wp-content/uploads/2011/09/10-Principles-for-Successful-E-learning.pdf Accessed 28 July 2017.

Arendale, D. 2016. What is a Best Education Practice? Online: <http://www.besteducationpractices.org/what-is-a-best-practice/> Accessed 30 November 2016.

Attwell, G & Hughes, J. 2010. Pedagogic Approaches to Using Technology for Learning - Literature Review. Online: <http://dera.ioe.ac.uk/2021/1/harnessing-technology-literature-review-january-111.pdf> Accessed 20 May 2016.

Broadbent, B. 2002. *ABC's of E-Learning: Reaping the Benefits and Avoiding the Pitfalls*. San Francisco, Jossey-Bass/Pfeiffer.

Cavazza, F. 2016. Social Media Landscape 2016. Online: <http://www.fredcavazza.net/2016/04/23/social-media-landscape-2016/> Accessed 19 May 2016.

Childs, S, Blenkinsopp, E, Hall, A, & Walton, G. 2005. Effective e-learning for health professionals and students barriers and their solutions. A systematic review of the literature findings from the HeXL project. *Health Info Libr J. Suppl* 2: 20-32*.*

Cooper, R. 2015. Choosing the Best Social Media Platforms. Online: <http://dusocialmediastrategy.com/2015/07/choosing-the-best-social-media-platforms/> Accessed 19 May 2016.

Council on Higher Education (CHE). 2016. *South African Higher Education
Reviewed Two Decades Of Democracy.* Pretoria: CHE. ISBN: 978-0-9946785-4-3.

De Jong, T & Ferguson-Hessler, M.G.M. 1996. Types and qualities of knowledge. *Educational Psychologist* 31(2): 105-113. DOI: 10.1207/s15326985ep3102\_2.

Educational Broadcasting Corporation. 2004. Concept to Classroom. Workshop: Constructivism as a Paradigm for Teaching and Learning. Online: <http://www.thirteen.org/edonline/concept2class/constructivism/index_sub1.html> Accessed 22 May 2016.

Gerstein, J. 2013. [User Generated Education](https://usergeneratededucation.wordpress.com/): Learner Agency, Technology, and Emotional Intelligence. Online: <https://usergeneratededucation.wordpress.com/2013/01/04/learner-agency-technology-and-emotional-intelligence/> Accessed 1 September 2015.

Jacobs, M., Vakalisa, N.C.G. & Gawe, N. 2011. *Teaching-Learning Dynamics*. 4th ed. Heinemann, Cape Town. ISBN: 978-0-7962-3369-1.

[Khan](https://www.ncbi.nlm.nih.gov/pubmed/?term=Khan%20KS%5BAuthor%5D&cauthor=true&cauthor_uid=12612111), KS, [Kunz](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kunz%20R%5BAuthor%5D&cauthor=true&cauthor_uid=12612111), R, [Kleijnen](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kleijnen%20J%5BAuthor%5D&cauthor=true&cauthor_uid=12612111), J & [Antes](https://www.ncbi.nlm.nih.gov/pubmed/?term=Antes%20G%5BAuthor%5D&cauthor=true&cauthor_uid=12612111), G. 2003. Five steps to conducting a systematic review. [*J R Soc Med*](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC539417/)*.* 96(3): 118-121. PMCID: PMC539417.

[Koehler, MJ & Mishra, P. 2009](http://scholar.google.com/scholar?cluster=12938928814658634016). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education* 9(1): 60-70.

Learning-theories.com. 2016. Constructivism. Online: <http://www.learning-theories.com/constructivism.html> Accessed 22 May 2016.

[Mishra, P. & Koehler, M.J. 2006](http://scholar.google.com/scholar?cluster=4833908126621332237). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record* 108(6): 1017-1054. DOI: 10.1111/j.1467-9620.2006.00684.x.

O’Donnell, E. & Sharp, M. 2012. *Students’ Views of E-Learning: The Impact of Technologies on Learning in Higher Education in Ireland.* DOI: 10.4018/978-1-61350-177-1.ch010.

Ruiz, JG, Mintzer, MJ & Leipzig, R.M. 2006. The impact of e-learning in medical education. *Acad Med* 81: 207-212.

Sandars, J. 2003. E-learning: The coming of age. *Educ Primary Care* 14: 1-5.

Sandars, J. 2014. SO2: What are my options? Overview of modalities - effective teaching and learning with technology. 2014 AMEE Conference. Unpublished handout.

Shelly, G.B., Cashman, T.J., Gunter, R.E. & Gunter, G.A. 2004 *Teacher Discovering Computers – Integrating Technology in the Classroom*. 3rd ed. Thompson Learning, United States of America. ISBN: 0-619020180-0.

[Shulman, L.S. 1986](http://scholar.google.com/scholar?cluster=2243319836282592745&hl=en&as_sdt=0,23). Those who understand: Knowledge growth in teaching. *Educational Researcher* 15(2): 4-14.

South Africa. Department of Higher Education and Training (DHET). 2013. *White Paper for Post-School Education and Training – Building an Expanded, Effective and Integrated Post-School System*. Pretoria: DHET.

Universities South Africa. 2015. *Moving beyond the hype: A contextualised view of learning with technology in higher education.* A publication of the Teaching and Learning Strategy Group of Universities South Africa (universitiessa). ISBN: 978-0-620-67501-7.

University of Sydney. 2016. Constructivism. Online: <http://sydney.edu.au/education_social_work/learning_teaching/ict/theory/constructivism.shtml> Accessed 22 May 2016.

Victoria State Government. 2015. Teaching with digital technologies. Online: <http://www.education.vic.gov.au/school/teachers/support/Pages/elearningcurriculum.aspx> Accessed 12 January 2016.

Vijayalakshani, G. & Sivapragasam, C. 2009. *Research Methods – Tips and Techniques*. MJP Publishers, Chennai. ISBN: 978-81-8094-046-0.

Wright, C.R. 2014. 5 key barriers to educational technology adoption in the developing world. Online: <http://edutechdebate.org/2014-ict4edu-trends/5-key-barriers-to-educational-technology-adoption-in-the-developing-world/> Accessed 20 August 2017.