MAKING MORE EFFECTIVE USE OF APPS: DESIGNING MEANINGFUL PROFESSIONAL LEARNING NETWORKS

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ABSTRACT – A 21st century teacher is expected to be competent in the use of information and communication technologies (ICTs), particularly Apps, which have proliferated in the digital world. Many Apps are relatively easy to use once the issue of connectivity has been addressed. In this paper we investigate the potential of Apps to support higher levels of learning as an integral part of authentic learning tasks. We report on a cohort of pre-service teachers (PSTs) who used Apps to develop their own professional learning networks (PLNs) as part of a guided learning activity. Student selection and use of Apps as evidenced in their PLNs forms the focus of this study. A concept map that links constructivist and behaviourist pedagogies to learning design and subsequent student activity was used as a framework to examine the variety of ways in which PSTs infused Apps (and their use) in the design of their PLN. The findings of the research have implications for the way in which participants recommend the use of a particular App, and the way in which they choose to include them in the design of their own PLN, and ultimately, their teaching.

INTRODUCTION AND CONTEXT

The use of smartphones, tablets and computers in education has rapidly advanced from being a "nice-to-have" to an essential part of the teaching and learning process. Smartphones (in particular) have become essential to many elements of our lives. Instant access to information and the ability to communicate with one another at any time and at any place have become an integral part of the modern students' life. In fact, the number of smartphone and tablet users has recently exceeded the number of desktop users at the University of Johannesburg (UJ) (cf., Gibbs, 2016). However, there are still a large number of students at UJ who rely heavily on the desktop computers provided as their only source of access to the online world. While off-campus internet access is a student responsibility, and may present a significant challenge for poorer students, connectivity on campus is extensive enough to cater for basic student ICT needs. Whatever the nature of their access, the use of online tools and services by students is reported to make interaction more engaging (Donaldson, Matthews, Walsh, Brugha, Manda-Taylor, Mwapasa & Byrne, 2017), and lead to greater motivation and potentially better performance (Ciampa, 2014) in ever-growing learning networks (Downes, 2010; Egg, Kapelari, & Dillon, 2017).

Learning with ICTs and implications for pedagogy have also been highlighted in the literature (Somekh, 2007; Beetham & Sharpe, 2013). It is no surprise, therefore, that most students expect the integration of learning technologies into their learning activities. In response, UJ lecturers are expected to include ICTs in the teaching and learning process, as evidenced by university key performance indicators (part of the performance management system for all teaching staff), requiring the use of ICTs in all modules. In response, the Faculty of Education at UJ mandates use of digital tools and services in all undergraduate coursework for pre-service teachers (PSTs).

A teacher in the 21st century is also expected to be competent in a range of technologies which have proliferated in today's digital world (McKnight, O'Malley, Ruzic, Horsley, Franey, & Bassett, 2016). This is congruent with preparing students to cope with the demands of the 21st century job market through development of digital and information literacies (Silva, 2009). The "ability to effectively and thoughtfully evaluate, navigate, and construct information using a range of digital technologies" (Kereluik, Mishra, Fahnoe & Terry, 2013, p.128) are key elements that facilitate a teacher's facility to function effectively in a digital world.

Many tools and services are supported by Apps that are readily available, often free, and relatively easy to use once the issue of connectivity has been addressed. There is evidence to suggest that UJ PSTs currently make significant use of a wide variety of Apps (Lautenbach & Batchelor, 2014). For example, students use a number of popular Apps like FaceBook and WhatsApp, to name only two of the most popular, to keep in touch with friends and other social groups, while others extend the use of Apps to personal banking, transport (Uber, Gautrain Buddy), maps and navigation, content curation (Pinterest) and other administrative tasks that are a mixture of personal and academic endeavours including popular Apps like Google Earth, SnapScan, MarkitShare (real estate), Kids Aid (first aid on the go), and Bookly (an e-reader app for Mxit) . Although Facebook is seen as the most popular of the social media Apps with over 86% usage in South Africa, student access to Facebook is blocked on all UJ campuses. This limits the potential of using the App as a possible tool in teaching and learning on campus, but it can still be used off-campus where connectivity is available. Whichever App is chosen for use in teaching and learning, there is much to be learned from how students select Apps and how they use them both in and outside of the classroom. In this paper we use the concept map in Figure 1 to link key literature on constructivist and behaviourist pedagogies, student activity and teacher learning designs (including Apps) to support higher levels of learning in an undergraduate course. Figure 1 was developed by the second author as part of a pre-service teaching Module in order to:
assist PSTs to better understand the relationships between theories of learning and how the use of ICTs can impact on student learning;
provide a means for PSTs to examine more fully the relationship between, 'what the teacher does', and 'what the student does in the classroom'; and
provide a framework for examining learning designs of PSTs, both at a personal level (as in this study) and in the classroom.

The selection and actual use of selected Apps and services by PSTs, is the main focus of this paper. A cohort of pre-service teachers (n=561) was tasked to work with a number of Apps to develop their own professional learning networks (PLNs) as part of their undergraduate coursework. Apps that supported communication and collaboration, group organization, content curation, content sharing, content creation, community building, social networking, and building a professional profile were introduced. Examples included Google Tools, About.me, LinkedIn, SlideShare, Teacher repositories (Microsoft Partners in learning, TES, Discovery Education, Merlot, TED Talks and KhanAcademy), curation tools (Diigo, Delicious, PearlTrees, Scoop.it, Pinterest), social media tools (Facebook and Twitter), and communication tools (WhatsApp, Messenger and Gmail). Cloud storage Apps included Google Drive and Dropbox. Not all possible Apps could be included in the brief introductions and students were invited to explore the wide range of alternatives available to them in their own time. The implications for practice of this task were to:

include the support for creation of PLNs for real-life educational situations; encourage PSTs to participate in designing their own learning;

form peer connections outside of the confines of traditional pre-service teacher learning; and find, organize, and process information from a variety of sources while providing evidence of

the responsible use of technology.

METHODOLOGY

A key driver of this study is the need to better to understand the specific UJ context, and how PSTs make meaningful use of Apps. Much of the literature refers to contexts with a longer history or involvement of the use of Apps in teacher education (than UJ). Many studies from more developed countries rely upon more complete infrastructure with greater accessibility to internet access, making the context of this study all the more important. A cohort of 561 pre-service teachers in their third year of undergraduate study were selected for the study. This group (by virtue of their experience and

knowledge) offered the potential to provide meaningful and valid contextual understandings of the uses of Apps as students navigated the transitional stage between formal teacher training and the world of work. Initially, participants were guided by the course facilitators but the task of building a PLN was based on the premise that the systematic use of self-selected Apps and services in a personal space would allow individual PSTs to forge new connections in a supportive environment before embarking on their journey as novice teachers. The requirements of the faculty of Education Research Ethics Committee were satisfied fully, and participants were duly informed before taking part in the study. As an additional ethics requirement, participants consented to analysis of their work when submitting their PLN Online.

In this research Figure 1 provides a framework that can be used to qualify how, and the implications about, personal pedagogies in the use of Apps to develop a PLN as part of a formal assessment task. A key element of Figure 1 is its potential to elucidate the pedagogies used by the PSTs in developing their PLNs and, potentially, to align these pedagogies with the affordances provided by specific Apps. In this study, Figure 1 was used to identify the underlying pedagogy or pedagogies that the PSTs may have either explicitly or implicitly used for developing their PLNs. While many Apps enable students to adopt a deep approach to learning, some implicitly (by design or use) only support a surface approach to learning.

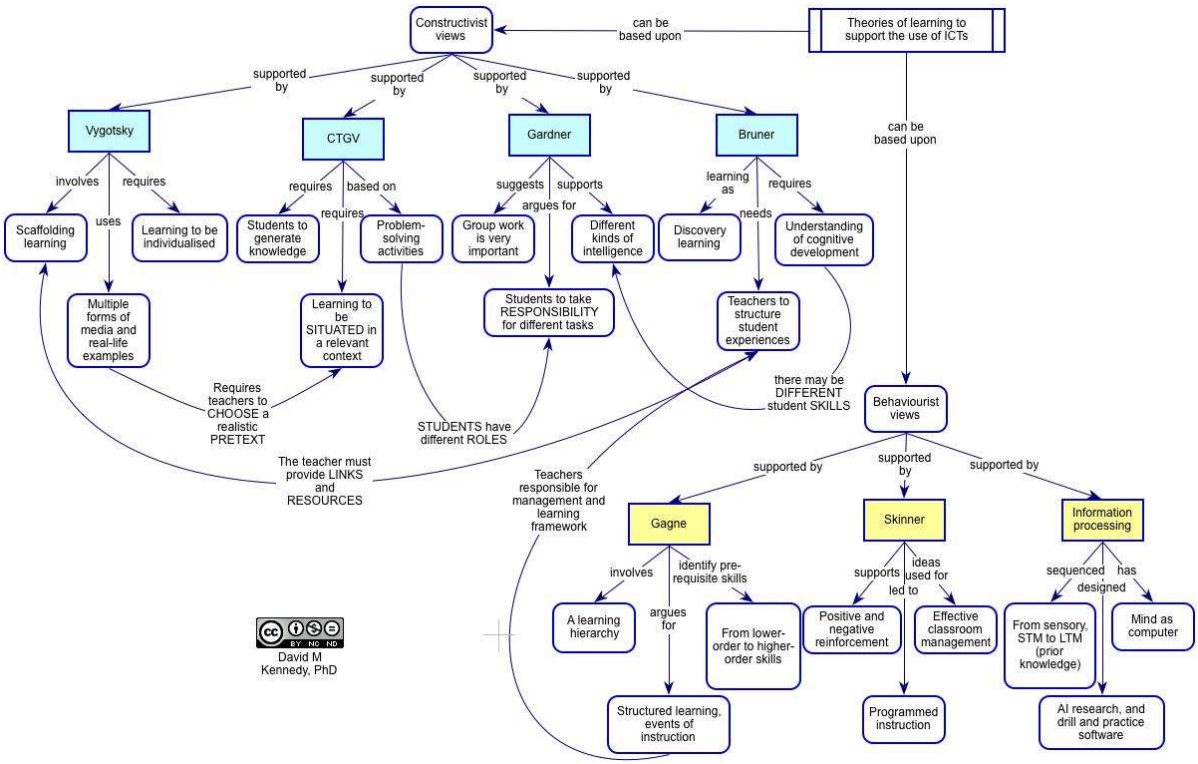

Figure 1: A pedagogical lens for understanding learning design related to PLNs

In the analysis, the Apps used in the construction of individual PLNs were noted and then critically viewed using the analytical lens as illustrated in Figure 1. The authors used the concept map to initially identify the implicit "paradigms" that emerged from the student work. Initial observations using the concept map allowed the researchers to distinguish between the Apps selected that exhibited either

a broad *behaviourist* or *constructivist* viewpoint (and occasionally, a combination of the two). Once a basic distinction was identified, the framework implicit in Figure 1 was used to illuminate the pedagogical reasoning that underpinned the use of Apps used for development of PLNs.

For examples that were judged as behaviourist in intent, we found that students who placed Apps in a hierarchy of sorts advocated several types and levels of learning more associated with the work of Gagne (1987), while other groups of students used some Apps in order to reinforce ideas, more aligned with the work of B.F. Skinner (e.g. using more than one type of App to do the same thing, but focused on reinforcement of basic concepts – as in a variety of curation tools where information is merely collected). Other participants relied on their chosen apps as simple tools to enhance their information processing (Roblyer, 2003), reinforcing what they knew. This third group of students tended to use a wide variety of tools but did not use many of them to their full potential. In other words, the use of the App in itself did not automatically lead to more complex uses of the App.

A number of PSTs adopted a more obviously constructivist approach in their PLN design in order to scaffold their learning (Vygotsky, 1978). An example involved the use of Apps for highlighting, annotating, and note creation (e.g. Evernote, Microsoft OneNote, Google Keep) that were intended to support more active roles by others in their PLNs. A number of PSTs used various Apps to support reflection and revision, which aligns more with the work of the Cognition and Technology Group at Vanderbilt (CTGV, 1990). In determining the impact on the development of PLNs, context and engagement were key factors. Simple resources like SlideShare provided a semantically rich, shared environment that allowed PSTs to develop, from novices to relatively able experts to view situations from multiple perspectives, shaping their perception and comprehension of the topics. In other words, SlideShare was used by some students to set up a context where they could communicate/discuss and generally try to understand various issues. Students' PLN designs often emphasized the importance of focusing on engagement in authentic tasks within the PLN (and of course their thinking – cognition), a mode of thought congruent with situated cognition. Other examples include PSTs sharing short and engaging videos on YouTube or other sources as an introduction to various components of their PLN.

The simple analysis process examined the links and various roles assigned to all chosen Apps, in each of the PLNs, mapping them to the concept map and shedding light on the variety of Apps used as well as the depth of use. In addition, the researchers looked at the various responsibilities that members of the various networks were required to adopt in order to be a meaningful part of each PLN. The researchers investigated PLN profiles to determine membership of various interest groups, who was "following", and who was "being followed". The analysis depended heavily on identifying a recognizable structure or pattern in the presentation of the Apps and their use. Frequently, many students fell short with regards to simple and logical layout and design with more than 120 students presenting their PLN in what was adjudged a haphazard layout with no logic or definable structure.

DISCUSSION

This pilot study to investigate the variety of ways in which PSTs engaged with Apps from a personal perspective (the PLN) found that this group of pre-service teachers lie somewhere on a continuum between being a student and a novice professional teacher. They have, in some cases (at a personal and social level), already forged online identities. The PLN activity was therefore (for most students) an opportunity to create the beginnings of a formal professional identity online.

After grading of the PLNs as part of the formal assessment task, the PLNs were subjected to further investigation using the framework implicit in Figure 1. There was considerable variety in the approach taken by individuals and most PSTs had a unique perspective on the potential of using PLNs in their future careers. This was evident in the diversity of ways in which the individual PLNs were conceived and presented in the student submissions. For example, most made use of a Microsoft PowerPoint backbone with links to evidence of engagement with the various tools (as demonstrated in class) while others used Microsoft Word, or in a few cases simple folder and file structures in Google Drive or

Dropbox. Very few made an actual distinction in their PLNs between the main types of Apps and services like communication tools, collaboration tools, content creation tools, content curation tools, etc. – even though this was stated as one of the requirements in the assignment. Most seemed to simply list the whole spectrum of tools used. The variety of Apps and services used in the PLNs seemed to be directed by the individual needs and aspirations of the students with most students simply reproducing a mixture of Apps and services as highlighted in the formal class setting. Very few new Apps (those not mentioned or explored during class settings) were incorporated into the PST resource pack as part of their PLNs. As disappointing as that may seem, we took solace in the fact that most students were already actively engaged with the basic technologies that formed the solid base of their PLNs. What was found, indicated that the majority did not take full advantage of the potential of each App. With a vast pool of potential Apps and services at their disposal online, they focused on the "known" (as mentioned in the methodology above) in appropriate ways to nurture, maintain and leverage their networks, albeit at the most basic level of potential for the App.

The majority of PLN submissions revealed that the establishment of a network that can further their own development in their future careers did not seem to be the primary student concern. The focus was on grades. That is, "demonstrating" the arsenal of tools that they used to construct their PLN, with an obvious 'more is better' approach. The PSTs used the tools they were familiar with or had been introduced to, to complete the assessment task without having fully investigated the potential of a real-life activity to improve their status and functioning as a practicing teacher. Despite this, a group of students (n=239) provided evidence of understanding the primary focus of the assessment task as it was intended, moving beyond the use of the Apps provided in class. These students' use of personally selected tools and services in the creation of their PLNs provides some insight into understanding the professional position of the innovative pre-service teacher and will be articulated in future work. This group strives towards becoming professional educators by cultivating a spirit of sharing and generosity, connecting themselves with the best teachers in the world through their PLNs. They demonstrated the ability to model good practice and are in the process of developing a distinct teacher identity they can grow and nurture in the future. This group of PSTs also see the task as an opportunity to extend what they do now into their future careers as educators.

While a cohort of the PST group (239 students who achieved a grade of above 70%) have reached a level of academic and personal maturity that enables them to feel safe, comfortable and confident, the majority of students (n=366) did not seem to go beyond the very basics of the potential of each App. 26 students failed the assignment (with less than a 50% grade) and 19 students did not do the assignment – which comes to an 8% attrition rate. Future modifications to the curriculum may therefore have to allow time to identify the potential of the chosen App through appropriate learning activities and greater depth of engagement with the Apps - In particular, the use of Figure 1 in class to provide a framework for the PSTs to develop better understanding of the underlying pedagogies of Apps and technologies on teacher activity and student engagement,

There is anecdotal evidence that the way in which the students use Apps for personal use in the building of their PLNs has implications for how they will subsequently design specific learning tasks for teaching. For example, regarding communication, only thirty seven students took advantage of the potential to harness the power of partnerships through communication with expert teachers by connecting with peers and other teachers from across the globe in their PLN. Other students may have used communication tools but did not extend their use to this level. It was evident from the analysis that interaction with content specialists did not yet feature as part of the PLN design, even though the basic use of various communication tools was advocated. It is clear that there are few connections between individuals in the existing PLNs. This is perhaps a point to focus on in future implementations where learning activities are designed to encourage PSTs to use communication tools more effectively in order to share resources, collaborate, strengthen pedagogies and practices. Such activities offer support for self-reflection and peer validation in the formation of meaningful communities of practice online.

FINDINGS

Initial findings in this pilot research into the personal networking and learning skills of PSTs indicates that there is much still to be done. Development of additional learning activities that scaffold PSTs understanding of the relationships between the tools and pedagogy, implicit or explicit, are required. There is considerable evidence in the UJ context supporting the position that learning is best ensured through direct teaching interventions and purposeful and authentic learning activities. There is a school of thought that learners cannot always learn on their own and benefit from challenging meaningful learning activities that extend them cognitively. For example, Kirshner, Sweller & Clark (2006, p75) stated "minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance of the student learning process".

The challenges of ensuring that PSTs have the required skills to develop their own professional networks with the potential to promote higher order cognitive skills remain. We maintain that PSTs need deep understanding of the complexities of the tools and services they have at their disposal. Engaging in an authentic task such as building a PLN is one component of the journey to develop the requisite skills and knowledge. However, it is clear that additional strategies will be needed to fully realise the potential of the tools available for personal growth and, in the future, ensuring student learning as the PSTs move from novice teachers to the classroom. Maintaining connections and staying up to date to extend connections within the broad educational community and beyond is essential and requires continual updating of the online profiles created. Individuals are central to this process as they make cognitive, social, and practical connections across networks enabled by learning technologies. By seeing the PLN as a teacher-driven, global or local support network that decreases isolation and promotes independence through both information aggregation and social media connectivity (Flanigan, 2012), pre-service teachers can use this space to get to grips with new tools and services that can form part of their ever-increasing arsenal of resources to add to their ever-growing PLN.

REFERENCES

Beetham, H., & Sharpe, R. (2013). Rethinking pedagogy for a digital age: Designing for 21st century learning. London: Routledge.

Ciampa, K. (2014). Learning in a mobile age: an investigation of student motivation. *Journal of Computer Assisted Learning*, *30*(1), 82-96.

Cognition and Technology Group at Vanderbilt. (1990). Anchored instruction and its relationship to situated cognition. *Educational Researcher*, 19(6), 2–10.

Donaldson, L., Matthews, A., Walsh, A., Brugha, R., Manda-Taylor, L., Mwapasa, V., & Byrne, E. (2017). Collaborative Tools to Enhance Engagement in a Blended Learning Master's Programme. *AISHE-J: The All Ireland Journal of Teaching and Learning in Higher Education*, 9(1).

Downes, S. (2010). Learning Networks and Connective Knowledge. In H. Hao Yang & S. C.-Y. Yuen (Eds.), *Collective Intelligence and E-Learning 2.0: Implications of Web-Based Communities and Networking*: IGI Global.

Egg, J., Kapelari, S., & Dillon, J. (2017). Visualising Social Network Structures in the Training of Professional Learning Communities of Educators in Informal and Formal Settings. In *Preparing Informal Science Educators* (pp. 269-288). Springer International Publishing.

Flanigan, R.L. (2012). Professional Learning Networks Taking Off. *Education Digest: Essential Readings Condensed for Quick Review,* 77(7), 42-45.

Gagne, R. (Ed.) (1987). *Instructional Technology Foundations*. NJ: Lawrence Erlbaum Associates.

Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. Basic books.

Gibbs, S. (2016). Mobile web browsing overtakes desktop for the first time. The Guardian. Retrieved 12 June 2017, from https://www.theguardian.com/technology/2016/nov/02/mobile-web-browsing-desktop-smartphones-tablets

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education*, 29(4), 127-140.

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of Research on Technology in Education*, 48(3), 194-211.
Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational psychologist*, 41(2), 75-86.
Lautenbach, G. & Batchelor, J. (2014). *Pre-service teachers' attitudes towards technology use in the creation of their personal learning networks.* In proceedings of ISTE International Conference on Mathematics, Science and Technology Education, Mopani Camp, Kruger National Park, October 2014. 407-412.
Roblyer, M. D. (2003). *Integrating educational technology into teaching* (3rd ed.). Columbus, Ohio: Merrill Prentice-Hall.
Silva, E. (2009). Measuring skills for 21st-century learning. *Phi Delta Kappan*, 90(9), 630-634.
Skinner, B. F. (1968). *Technology of teaching*. New York: Meredith Publishing Company.
Somekh, B. (2007). Pedagogy and learning with ICT: Researching the art of innovation. London and New York:
Routledge. Taylor and Francis Group.
Vygotsky, L. S. (1978). Mind in society. The development of higher psychological processes. Cambridge MA: Harvard University press.