

Using a Mobile Application to Increase Interaction amongst Students in an Open and Distance Learning Programme in Zimbabwe: A Cultural Historical Activity Learning Theory Perspective

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Abstract

The challenge of shortages of trained science teachers in Zimbabwe is amplified by the significant numbers of untrained science teachers currently deployed in schools as relief teachers. These relief teachers need access to professional training opportunities urgently without disrupting their teaching activities, hence the birth of Bindura University's Open Distance Learning programme. The authors designed a mobile application winksite.mobi/ntz/BUSEMOBI, which they intended to link with activity theory to mediate distance student teachers' learning. The subject of the activity system was the distant students who engaged with the mobile application and the primary object is higher cognitive thinking and their ability to use the mobile application to increase collaboration, interaction and engagement. In order to achieve the primary object of higher cognitive thinking and the ability to use the mobile application, the distance student teachers were supported by use of the elements of the authentic learning environments designed within the mobile application. A group of ten students and two lecturers piloted the mobile application to check its usability, effectiveness and affordances. The study showed that learners were motivated, gained additional technological skills, and these helped them to develop self-esteem and confidence. Mobile learning afforded self-expression and self-reflection as the distance students' documented experience, published thoughts on the mobile application.

Keywords: Mobile applications, learning theory, distance education, collaboration, interactions, cultural-historical activity theory

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1. Introduction

The history of educational communications and information technology includes numerous failed innovations and unfulfilled promises.

Using Information and Communication Technologies (ICTs) as cognitive tools could become yet another casualty in the struggle to improve teaching and learning unless it has strong foundation of a learning theory and contextual principles to support it. The research aimed at adopting mobile learning (m-learning) to cultural-historical activity theory (CHAT) which a social constructivist is learning theory. The objective and desired outcome is not on the technology used, but it must be centred on the pedagogical effectiveness. In this research, the mobile application was designed to be used in the context of BUSE distance student teachers' training.

Literature suggests the usefulness of technology for distant teaching and learning. On the other hand distance educational programmes that are running in some countries especially developing countries like Zimbabwe have serious challenges such as lack of resources and poor facilities (Mpofu et al., 2012). Distance learning student teachers have limited access to learning resources and they have very limited consultation hours with the lecturers or with other students due to prohibitive distances at their respective rural or remote work stations. Distance student teachers lack interaction and collaboration amongst students and also between students with their lecturers. A mobile application was designed and developed to address these disparities. The aim of this paper is to investigate the potential shift in pedagogical practices, or in the activity system of pedagogical practices facilitated by the introduction of a novel tool, using CHAT to develop an understanding of the how mobile learning (m-learning) mediate distance student teachers' learning.

CHAT emphasises that a tool has meaning if it is used meaningfully and appropriately and also knowing how to use it is a very crucial part of mediating tool (Hardman 2005). The BUSE mobile application is used as an evolutionary, accumulation and transmission tool of knowledge influencing the external behaviour and the distance student teachers' mental functioning shaping how the student teachers will interact with reality during the course activities or in classroom practice, (Keptelinin & Nardi, 2011). M-learning covers a wide range of standard technologies, thereby eliminating the danger of redundant devices, (Keegan, 2009).

2. Background of BUSE's VODL programme

BUSE is the sole university in Zimbabwe whose name carries the mandate of Science Education. Since 1996, the BUSE enjoyed a steady increase in the science student teacher enrolment up to 2003, (Mpofu et al., 2012).

Thereafter, the science student teacher enrolment went down drastically to unsustainable levels in 2009 due to the economic meltdown. This scenario threatened the University's fulfilment of its mandate. Upon recognising that the large numbers of trained science teachers the nation currently needs cannot be achieved through traditional conventional training, BUSE launched an institutionally born intervention pilot project named VODLin Mashonaland Central Province. This national programme was initially started in August 2010 at three centres namely Border Gezi training centre, Mushumbi and lastly St Phillips, covering five districts of Mashonaland Central Province (Mpofu et al., 2012). Since then to date it has expanded to two more provinces (Manicaland, Matebeleland North and South) with three more centres (Mutare Teachers' College, Mzingwane and Fatima).

The VODL programme's goal is to train postsecondary school students and Certificate/Diploma in Education holders to attain diplomas or degrees in Science Education. The students recruited in the VODL programme include practicing science teachers (relief and non-graduate) and non-practising school leavers with prerequisite qualifications who had no access to university education. Deterrents to university teacher education include high entry requirements and high cost of education in an era when Zimbabwe has undergone difficult economic times for more than a decade, (Mpofu et al., 2012). The project has been initiated at a time when every nation is in pursuit of Education for All (EFA), Thakrar, Zinn, & Wolfenden, (2009), making it quite significant. The VODL programme is guided by the assumptions of taking university education to the doorstep of the student at an affordable cost and factoring in the bridging aspect to students who meet the minimum entry requirements for our degree programmes but without ordinary level mathematics, (Mpofu et al., 2012).

2.1 Justification of the study

Interaction is a principal objective of any instructional process, (Hammer, 2013; Lambropoulos, Faulkner, & Culwin, 2012; Ng'ambi, Gachago, Ivala, & Bozalek, 2011; Luchoomun, Mcluckie, & Wesel, 2010).

It plays a fundamental role in a student's retention and perception of course and instructor effectiveness in learning. The physical separation of a distance learning programme contribute to students' feelings of isolation and disconnectedness, which can lead to reduced levels of motivation and engagement.

Present-day mobile mediated interactive technologies provide an opportunity for distance educators to familiarise themselves and employ these technologies to enhance learning. The study aimed to increase interactions amongst students in a distance learning programme.

2.2 Challenges that current VODL distance student teachers face

The resource-constricted conventional curriculum adapted to the VODL programme presents a number of study mode incompatibility problems (Mpofu et al., 2012). Traditional teaching approaches promote rote learning and develop cognitive overload and resistance in students. This is what the BUSE's VODL three week residential Face-to-face teaching is currently using due to the large number of students the programme is attracting. According to Rubanju (2008), use of traditional teaching strategies defeats the purpose of context-based learning. The current resource statuses of residential session centres are likely to depress the enrolled students and cause attrition as well as deter prospective students. Hence the BUSE mobile application learning intervention could rejuvenate this disheartening feeling. Research has shown that use of interventions that use tools that the students already own (Mlambo, 2012; Ng'ambi, 2013), makes learning more accessible and enjoyable to the VODL distance student teachers. The distance student teachers, just like any other distance students feel isolated. They have a feeling of not being part of the institution.

2.3 Cultural Historical Activity Theory (CHAT) as a Learning Theory

Modern CHAT originated from Soviet cultural-historical psychology which in turn was rooted in the 18th and 19th century classical German philosophy of Marx and Engels, in which the concept of activity was extensively elaborated by Vygotsky, 1978, and his colleague Leont'ev, 1981, (as cited in Engestrom, Meietinen, & Punamaki, 1999). CHAT originated within the cultural-historical tradition of Soviet psychology (Vygotsky, 1978; Leont'ev, 1981). An activity is undertaken by a human agent (subject) who is motivated toward the solution of a problem or purpose (object), and mediated by tools (artefacts) in collaboration with others (community).

The structure of the activity is constrained by cultural factors including conventions (rules) and social strata (division of labour) within the context (Ryder, Paragraph 2).

CHAT offers a set of conceptual tools that are applicable to various situations to understand the coupling of learning and activity.

It draws on Vygotskian theory of learning where higher mental functions appear twice in a social plane, that is first as actual relations between people (interpsychological) before being internalised on the psychological plane (intrapsychological), (Hardman, 2012). This dialogical interaction is posited as a crucial means of cognitive and pedagogical change, (Hardman, 2012). This argument formulated by Vygotsky in 1978 as the "general generic law" views learning as the acquisition of higher mental functioning (thinking, reasoning and problem solving) and human functioning being mediated by tools and signs. This perspective views that students learn with a variety of tools and within the communities that support their goal oriented activities. It must be noted that the actual use of a system is a long term process that cannot be adequately understood by just studying the initial steps of usage. In real life people take longer to develop their skills and this skill achieving dynamics have received too little emphasis in research, (Ngaleka & Uys, 2013; Yu, 2012).

This concept paper uses the second generation activity is essential to the analysis of the BUSE mobile application. The BUSE mobile application was designed with the objective of increasing collaboration interaction and engagement amongst distance students teachers and lecturers on course activities, thereby bringing affordances of joint problem solving and social support. Vygotsky as cited by (Hardman, 2008), elaborated the concept of mediation with a pedagogical idea of the Zone of Proximal Development (ZPD), This communicative attempt will transform effective communication by emphasising the mediational means that allow something genuinely new to be communicated, in this essay's context mediation to develop distance student teachers' higher cognitive functions through interaction, engagement and collaboration. The course tutor becomes a guide culturally more competent (more knowledgeable) in the learning activity, (Hardman, 2008). The central premise of mediation is that student can accomplish more with assistance than on their own (Hardman, 2008)

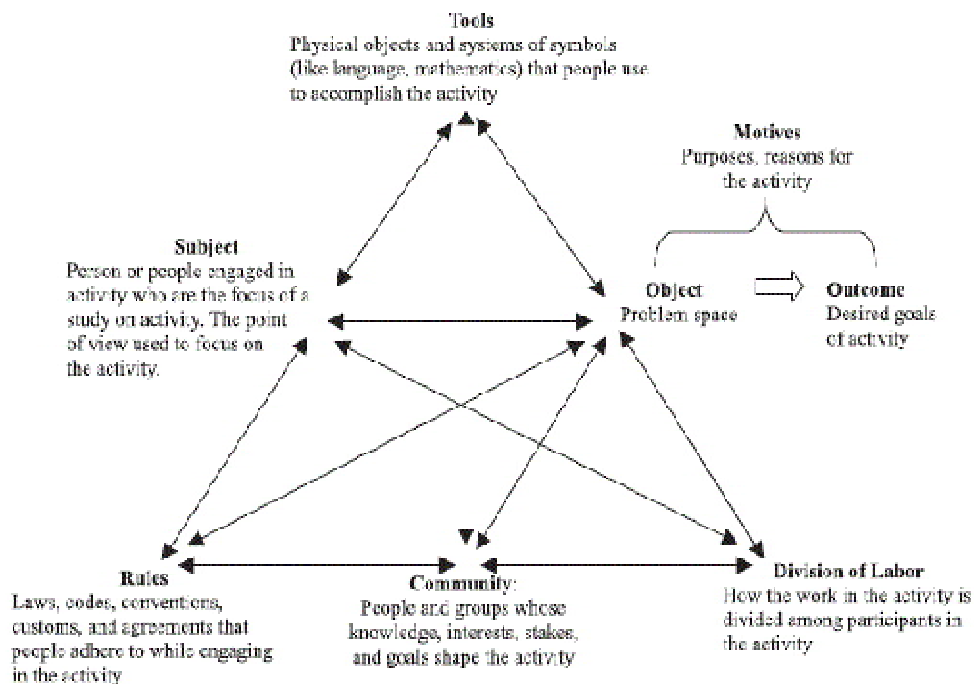


Figure 1 Adopted Cole & Engestrom Activity Theory (1993)

While Vygotsky's work adds a dimension to understanding learning, it does not flesh out the social context in an analytical manner. The work of Engestrom provides a useful heuristic tool for viewing human actions against the activity in which they are located. For Cole and Engestrom (1993), individuals exist in communities where there is division of labour with the continuous distribution of tasks, powers and responsibilities amongst the activity system. The relationship between the subject (distance student teacher) and the community (key stakeholders of the activity system) are mediated by the tool (BUSE mobile application) and rules which are norms and sanctions that specify and regulate the expected correct procedures and elements in the learning environment and how they fit into the various components and their relationships of the expanded version of mediational triangle.

2.4 BUSE Mobile Application Mediated learning Activity

BUSE mobile application, mobile device (PDAs, Smartphones, Mobile phones, IPADS, tablets), course outline, reflections, books, researched articles, artefacts etc

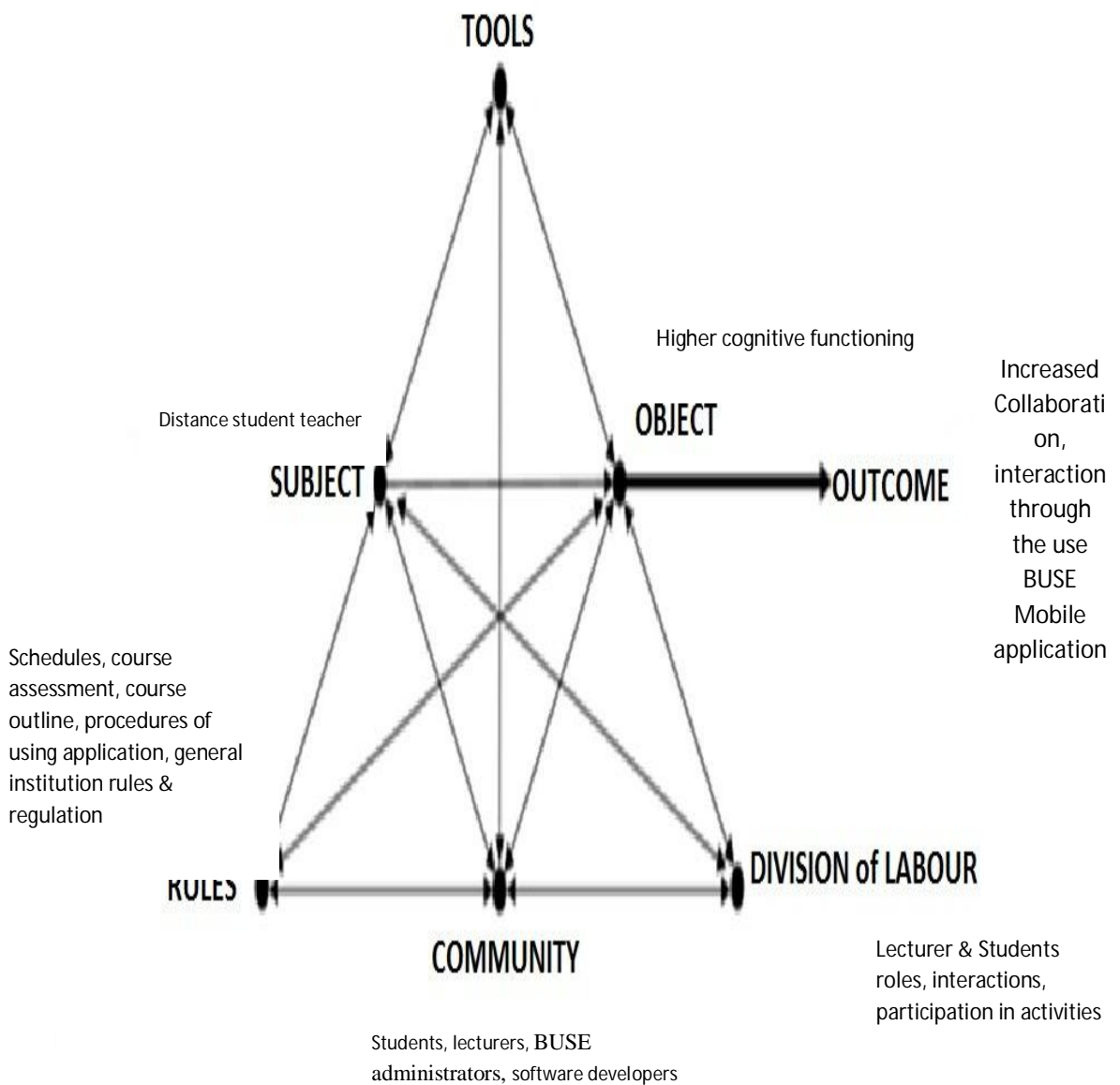


Figure 2: Engeström's Activity Theory translated to the BUSE Mobile Application System.

Figure 2 above shows the adopted Activity Theory, linked to the BUSE mobile application activity system. The subject is the distant student teacher and the primary object is higher cognitive thinking and the ability to use the mobile application to increase collaboration, interaction and engagement amongst distant student teachers. In order to achieve the primary object of higher order thinking and the ability to use the mobile application, the student is supported by use of the activities in the mobile application.

A pool of ICT and non ICT tools like the mobile application, course outlines, notes, recommended textbooks, researched journal articles and other artefacts mediate the interactions between the distant student teacher and the object. The distant student teacher belongs to a community of other students, lecturers, BUSE administrators, software developers, examiners, that shares and negotiates the object of engagement in collaboration, interaction and engagement in higher order thinking. Learners are not "taught" by one lecturer. They are educated by a learning community (of which they play a central part), and are educating others in the community as well, mediated by shared rules and procedures and the division of labour, (Lim & Chai, 2004).

The rules include schedules, course assessment, and course outline, more specific ones like the procedures of using mobile application, general institution rules and regulation that guides the use of the mobile application. The role of players in the activity system belongs to the division of labour. The student teacher takes the role of the user of the mobile application, collaborating, interacting and engaging with content and tasks. The lecturer takes the role of a guide or mediator, helping students by clarifying, explaining, highlighting key issues to help them understand the relationships amongst the variables in the activity system, (Lim & Chai, 2004).

This BUSE mobile activity system frees learners from power dynamics that see one central authority figure directing the course of learning. They become comfortable with the knowledge that in the world there is no correct "answer," but that there are many variations and possibilities and learning feedback comes from a variety of sources. BUSE mobile activity entails that learning is not just for the classroom but for the world outside classroom, of which the classroom is a part. Learners learn within their own personal environments they can understand better the implications of what they are learning and can construct ways to relate this knowledge in their lives. Thomas 2004 (as cited in Cobcroft, Towers, Smith and Bruns 2006).

2.5 M-learning devices as Cognitive Tools

(Ally, 2009; Anderson, 2004) describe m-learning as any form of learning through devices which are very small, autonomous, and small enough to accompany people anywhere. The use of mobile phones among students is very high in some developing countries where computer broadband access may be difficult, such as South Africa, students are increasingly using mobile phones to access learning materials on the Internet (Czerniewicz & Brown, 2013; Hodgkinson-Williams & Ng'ambi, 2009). Mobile devices are said to enable socially networked collaborative learning. The use of mobile phones is pedagogically grounded in teaching collaborative thinking, (Cheung, Mørch, Wong, Lee, Liu, & Lam, 2007). The mobile device has revolutionised how we communicate and affordance of enabling of learning anywhere and anytime learning. This connectedness provides a user with freedom to choose when to use the device to teach (Ng'ambi & Campbell, 2008). Carliner and Shank (2008) articulated on how learning theories can inform designs of e-learning looking at the constructivist learning theory and its respective instructional design. Students are learning through new mobile technology before educators have inquired to their attributes, in this way they are now playing a game of catch-up especially in developing nations (Ng'ambi & Campbell, 2012). The most critical importance of development of mobile application is that it should produce appropriate learning outcomes.

(Siemens & Tittenberger, 2009) research on the role of technology in transforming learning revealed that much of the change in education over the last several decades has been defined by discussion of content rather than the model and process of learning design and delivery in a technology infused world. Ultimately they suggest different types of technologies showing how they can be used in teaching and learning. Although the views of various social theorists differ, (Anderson, 2010; Rambe, 2009; Wali, 2008) agree that there is a general consensus that interaction, dialogue, and collaboration are essential for learning. Technology could provide a medium for conversing and collaborating within a learning environment. This calls for m-learning developers to think more on the pedagogy and content linkage, (Siemens & Tittenberger, 2009).

3. Methodology

The authors adopted a qualitative research approach was followed. An interpretative case study research design was implemented, (Yin, 2009).

The authors designed a mobile application as an intervention tool, to help increase interaction in a socialized environment amongst physically dispersed distance students. Students were encouraged to use the mobile application for the group task. 6 participants were purposively selected and a tutor was selected based on if one has access to an internet-enabled mobile phone. A tutor whose role was to facilitate the activities joined in the activities. The corresponding author was a non-participatory observer in all the activities on the mobile application.

4. Mobile application activities

The BUSE mobile Application's aim is to mediate learning by increasing collaboration and interaction among VODL students and their lecturers, hence the affordances of this tool to mediate learning through blogging, chatting, and use of discussion forums. BUSE mobile application has opened the horizon for distance student teachers by enabling them to collaborate through the discussion forums, blogs and chat room. This diminishes distance as a barrier to distance student teachers learning, by offering real-time learning, e.g. as students used the chat room to discuss and deliberate on topical course issues.

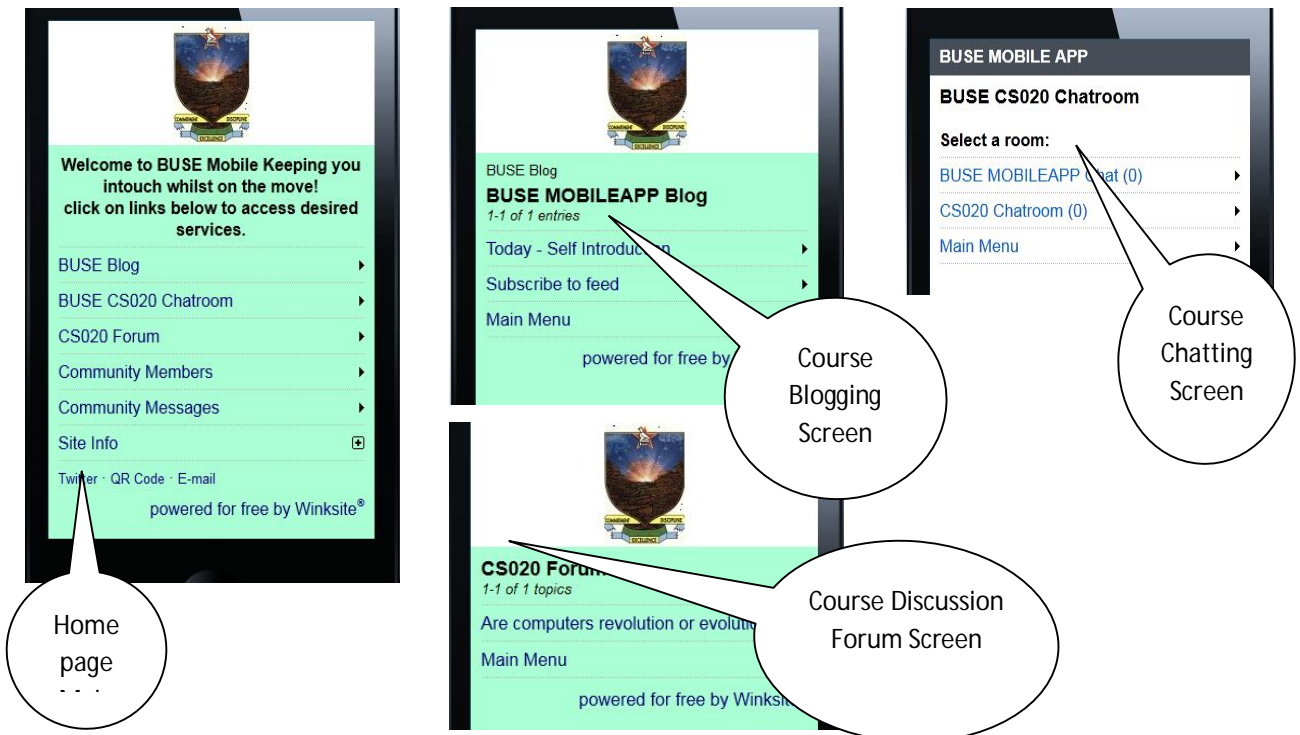


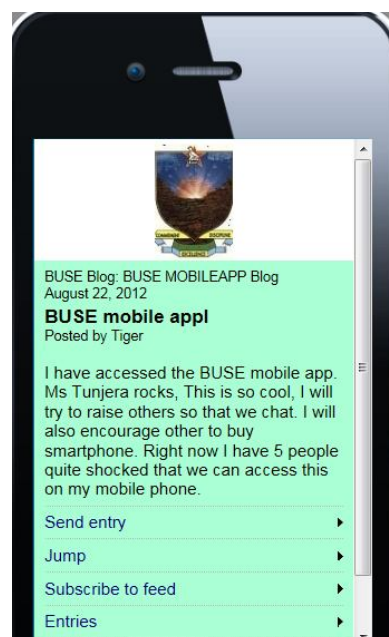
Figure 3: The BUSE mobile Application screen shots

(Markel, 2001) in her PhD thesis noted that participation in online discussion forums provide opportunities for responsibility and active learning through the expectation of regular students' participation in online discussions. This concurs well with CHAT as it advocates for a system that promotes active participation by students as they interact and engage with the tool, adhering to the rules and division of labour in the context of what each member's roles are and with a community contexts.

M-learning provides enhanced collaboration among learners, access to information, and a deeper contextualization of learning, (Koole, Mcquilkin, & Ally, 2010). The technological benefits are derived from the way in which learning is delivered, such as whether learners can access e-learning materials conveniently, and whether they can control the learning pace and style of interaction. Thus, from the m-learning perspective, the control of learning is based on learners' self-regularity or autonomy, (Liaw a, Huang, 2010). (Ng'ambi & Campbell, 2012) distinguished m-learning as a cognitive amplifier, thereby extending students' capabilities in collaborating, interacting and engagement in the course of their active system

4.1 Affordances of blogging to learning

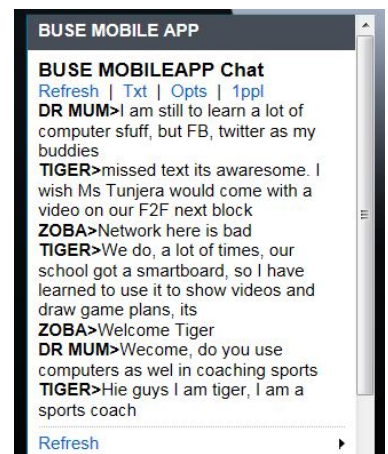
The BUSE blog will be used by distance student teachers to post their reflections on course activities. Blogs foster critical thinking, because learners need to reflect on the possible reactions of others to their postings, (Read & Douglas 2006). They have been used for self-reflection, collaboration, as a resource and peer feedback. Blogs promote critical reflection allowing students to be more analytic and evaluative presenting sound arguments. Blogs are easy to update entries and characterised by dated entries displayed in reverse chronological order, (Deng & Yuen, 2011). A series of archived Internet postings, some of which contain hypertext links to websites or other blogs, (Read & Douglas 2006). There is compelling empirical evidence of blogs as instruments for critical reflection, (Deng & Yuen, 2011). Blogs also foster collaboration with peers through commenting and share links to other resources.



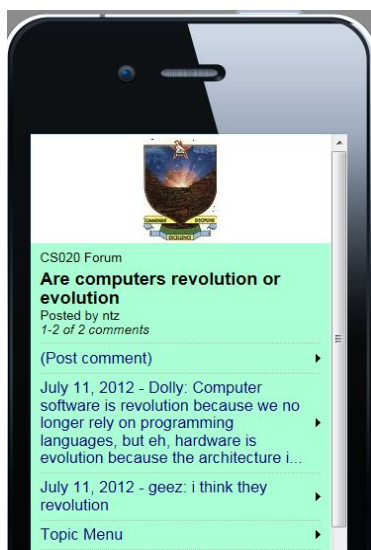
Distance students teachers will post their reflections on the course content in the Blog. This affords learner-content interactions, as well as, learner-learner interactions as the students share these reflections. If they have any issues to raise on the course content, assignments, etc. One can invite classmates through email or blog for help. It will accommodate every student even those who are shy to contribute in class, as well those who have language challenges.

4.2 Affordances of Chatting to learning

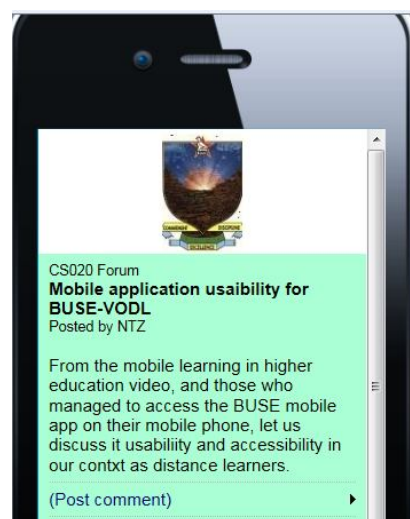
Chat Sessions keeps students interacting with peers as well as tutors, (learner-learner, learner-tutor). Students or lecturers can invite others to chat on challenges faced, to seek clarification, advice, etc. from classroom discussions or raised issues. The chat will offer real time communication and one can probe further if they need any further clarification or information. This will also help on team collaboration giving them real time, anytime and anywhere communication as illustrated on the CS020 screen shot. The chat archive enables the students to reflect on past discussions and can reflect on them, probing further or referring to them in future. The chats also give the distance student teacher an opportunity to meet virtually and get to know each other better, discussing course issues as shown on screenshot.



4.3 Affordances of Discussion forum to learning



A lecturer can set up, frame, moderate and facilitate discussions allowing students to discuss, collaborate, reflect, argue, analyse and share information by communicative conversation with other students, lecturer by making use of a discussion forum (Jaffer, Ng'ambi, & Czerniewicz, 2007). According to (Markel, 2001) "deepest learning is in the writing and "talking" about the content of the course within the community of learners.



It is a pedagogically sound practice, based on cognitive learning theories, to design and engage in discussion forums with students. A discussion forum topic was posted by the lecturer/tutor, students responded to the discussion by contributing their individual responses and what they have read on the topic and their experiences on the issue at hand in their own contexts. A timeline was given so that there are meaningful discussions. This promoted higher order skills as elaborated by Bloom's Taxonomy on the context of application, synthesizing, analysing, and evaluating. These skills can be noted as the students' response to the forum discussions, their comments or contributions to others postings. This BUSE mobile application activity system brought all students on an equal footing, as there was no threat of ridicule or intimidation from other students.

4.4 How cognitive tool BUSE MOBI application was linked with CHAT to mediate distance learning.

The wondrous development of technology during the industrial revolution brought about, for the first time in history, the possibility of distance education concept, (Keegan, 2009, p. 6).

The late 17th century technological tools inverted like the printing press, telecommunications, radio, transport, etc. that used some form of computing architecture. Distance education and training was born of the development in technologies associated with the industrial revolution. Today distance education can comprise all of the following; distance learning (d-learning), electronic learning (e-learning) which used electronic either wired connection or not directly connected (PCs, laptops, etc.) and m-learning(Keegan, 2009). In d-learning, learning had to be artificially achieved by the development of excellent distance learning materials usually printed for students studying at a distance, and the creation of excellent student support services (telephone, fax) for students in their homes, or factories, or some other place not normally geared to education and training.

The concept of m-learning as defined earlier, allows distance learner to interact using mobile devices that have wireless connectivity whilst on the move(Ng'ambi & Campbell, 2012). Distance education from its outset in the middle of the twentieth century, broke the structure of the learning group and treated its students as individuals, though activity theory goes further to advocates that learners' learning is guided by a number of key elements within an activity system that incorporates the activity system's community (stakeholders), rules, division of labour, mediating tools, etc. Hence educationists, researchers and software developers are now required to collaborate to come up with better technological mediating tools that forego the distance students' learning barriers.

The BUSE mobile application built an online community of lecturers, distance students teachers who shared and exchanged information through blogging, chatting and the discussion forum. This online community was governed by rules and players in the activity system played different roles according to their division of labour. Then after all the interaction and collaboration the outcome product became awell-educated and competitive, innovative student teacher. The phenomenal development of technologies in an early 1980s brought students the benefits of group-based distance education.

It was also noted that BUSE mobile application allowed a balance that covered a wide range of technologies and most models of phones were used as long as they had an internet browser enabled phone. Students learnt best when the learning materials were short (Keegan, 2009).

M-learning appeared to succeed within the contemporary constructivist and social constructivist paradigms because it encouraged both synchronous and asynchronous communication amongst distance student teachers, (Keegan, 2009). M-learning offered the opportunity to reach out to the distance student teachers wherever they are, anytime and do things that are useful and meaningful to their course requirements.

The role that communication and interaction played in the learning process was a critical success factor. It is within this context that m-learning contributed to the quality of education in developing countries(Brown, 2005). M-learning is said to offer opportunities for the optimising of interaction between lecturers and learners, among learners and this is realisable as the growth of wireless infrastructure in Africa in particular is enormous, Zimbabwe has been noted increase in mobile subscribers, even more rapid than in many first world countries(Kabweza, 2013).

5. Discussion

The researcher availed three offline videos from YouTube MMVREDY (2011), ACU (2011) and Roulatta(2009) that demonstrated on how distance student teachers could engage and interact in classroom activities through mobile learning. Before the pilot students started using the BUSE mobile application. The students showed eagerness to test the real mobile application, the researcher gave each participant 10MB data bundles that would enable the students to access the mobile applications from their mobile phones. Therefore, cost was not going to be an issue on failing to access the mobile application for learning. Students were grouped into three groups of four students in each. One group was to connect into the chat room, another on the blog and the other on the forum at their own scheduled meeting times.

The post-questionnaire was done to get distance student teachers' reactions to the BUSE mobile application pilot study. 25% of the students faced challenges of electricity and connectivity hindering them actual use of the mobile application. They appreciated its usability from the video, as well as from the screen shots of the BUSE mobile application.

The BUSE's VODL mobile application activity system was used as a pedagogical tool for learning(Hardman, 2008).

The students who managed to use the BUSE mobile application claimed that it enabled them to interact and collaborate within their groups, despite the distances between them. The mobile application allowed distance student teachers to learn when it was most convenient. Most said that they would be interacting early morning or late evening when the network was less congested and less disruption from work or family commitments. The distance student teachers asserted that the BUSE mobile application provided permanent contact with the course expectation, as well as, increased their motivation to learn. The pilot participants' responses also showed that the students got satisfaction in performing tasks that made the process of learning more exciting. They also recognised the educational potential of mobile phone for collaboration, interaction and engagement in the distant teacher training programme. One participant said, "The project is good because it is more flexible as it can be done anytime and anywhere." It also provided a focus on discursive, active, and collaborative learning aimed at keeping students engaged. Field (2005) endorses the complement of face-to-face environments enhanced by mobile applications. The blending of technology and conventional learning tools will help keep the students motivated and appreciating the resourceful learning environments provided.

5.1 Contradictions of BUSE mobile learning

Some contradictions found in the BUSE mobile application learning environment were as follows;

1. There is tension between community (society) and the object node (high cognitive functioning). Society would like to have problem-solving and thinking skills products, whilst students are generally interested in passing examinations.
2. There is also tension between the availability of technology, connectivity and the use of BUSE mobile learning environment, as most as they would have wanted to engage with the tool more frequently there were challenges of electricity, and connectivity.
3. The issue of power dynamics between the students and tutors, where students felt that lecturers are not doing their jobs of teaching (the traditional way of teaching).

6. Conclusion

This research demonstrated how the BUSE mobile application was built with Vygotskian activity learning and social learning theories contexts. The distance student teachers being the learners commented that BUSE mobile application afforded them to interact with content, experts, and other learners. The study has shown that learners can be motivated by using mobile devices to gain additional skills, and that these help to develop their self-esteem and confidence, (Hughes and Monteiro, 2005). Mobile learning as evidenced by the feedback affords self-expression and self-reflection as the distance student teachers document experience, publish thoughts, and express feelings, (Deng & Yuen, 2011). Blogging centres on its social values, that is, its potentiality to foster interaction and collaborative learning, this makes learning a social activity. (Uden, 2007) mentioned that although mobile technologies offer the potentials for learning, there is accessibility and usability challenges faced in the design of some devices especially mobile phones because of their small size, and battery life. The students also expressed concern on the small screens on most mobile phones. Some said they saved the content on their memory cards and accessed the information on their PCs for readability.

The AT was successfully used to analyse human-computer interaction as a pedagogical tool to increase computer-supported collaboration, interactions and engagement amongst students and tutors. The AT can also be used to better understand distributed learning. A successful mobile application depends on its context of designing; therefore, AT provided a philosophical & psychological framework for understanding collective human work activities as embedded within a social practice (e.g. distance education programme) and mediated by artefacts, such as mobile technologies.

Although activity theory offered benefits for designing mobile learning environments, it also had limitations. The key limitation of this approach was its key strength, in which the researchers involved in, must have a complete understanding of the activity system under observation. S/he also appreciated the dynamic interplay of all the units of the activity system, (Uden, 2007).

It is the authors' belief that the benefits outweigh the limitations. Using the activity system as its unit of analysis, avoided simple causal explanation of mobile learning design.

It helped describe an institutional setting as an ensemble of multiple, systematically interacting elements including social rules, mediating artefacts and division of labour,(Hardman, 2008). CHAT also explicitly perceived an activity as a dynamic phenomenon in which not only consensus and stability but also conflicts, breakdown and discontinuities play a crucial role. The process of context and the dynamic transformation of objects into artefacts was taken into account. This approach also took the perspectives of different actors of an activity system, and understanding and knowing how to utilise our everyday life worlds as learning spaces. The act of learning did not happen in a vacuum. It is at the intersection of prior knowledge, experience, perception, reality, comprehension, and flexibility; that is when learning occurs. 21st century learning environment and technology-rich society, it became increasingly important to learn how to learn. The essence of this essay was based on CHAT and m-learning in distance teacher education context. The researchers demonstrated its usability and affordances for constructivist learning philosophy balanced by the psychology of Vygotsky's Activity Theory.

7. Recommendations

1. For effective use of AT for designing context-aware mobile applications, (Uden, 2007) noted the importance of the research time to be long enough to understand the objects of activity, the changes of those objects over time and their relations to objects in other settings
2. BUSE could setup rural ICT satellite centres in district offices, where students could have access to other mobile learning facilities; thereby, reducing the distance students have to travel, in order to realise the BUSE-VODL's motto "bring education to your doorstep" (www.buse.ac.zw).
3. Further investigation is needed on m-learning tools that use audio and visual file content sharing that can be accessed by these distant student teachers who have challenges of connectivity.
4. Educators in all phases have to face up to the challenges posed by mobile learning and its integration in their professional practice. Lecturers need to go on staff development to help equip them with 21st teaching strategies.

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