# The use of mobile technologies in enhancing learning in South Africa and the challenges of increasing digital divide

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**Abstract:** Failure at school because children from the low socio-economic background have no access to information and communication technologies motivated this study. The realisation that even the poorest of the poor South Africans have access to mobile phones has prompted the Meraka Institute to consider mobile phones as a South African computer and attempts to leverage these mobile devices for educational purposes. Therefore, in order to develop mobile learning tools it is important to ascertain the level of access to these mobiles and how their usage by learners from the less affluent backgrounds. In this study two affluent private schools and one previously Blacks only university were identified and participated. From this university only first year students of Media Studies took part. From the high schools participants were sourced from grades 7 to 12. The study is grounded in the development research paradigm.

## Introduction

### The Context

Mobile technologies have become fundamental to society, transforming the ways in which we communicate with each other, and how information is disseminated and accessed. The history of a South African education indicates a system designed to create and perpetuate inequality. However, the year 2008 saw for the first time all grade 12 learners in public schools writing the same examinations set on the new curriculum known as the National Curriculum Statement. Although the government has made huge improvements in providing computers and Internet access to the public schools many blacks and poor students still lack computer access outside of regular school hours. Research indicates that almost 15 years of democratic dispensation where the agenda of the government has been to bring about a more equitable education system, which places more emphasis on the learner, by the introduction of an Outcomes Based Education (OBE) learners from the disadvantaged communities are still not doing well at school. The focus of education is now "firmly on the learner, their needs, interests and aspirations" (Fisher et al., 2006). However, in South African the majority of learners are still not getting good grades to allow them to enter tertiary institutions and even those who do get admitted still do not perform as well as their white or more affluent counterparts (Foko, 2006). These learners do not have the necessary skills to participate in tertiary education and lack many of the basic skills to compete successfully in certain sectors of society (Foko & Amory, 2005). After 12 years of primary and high school education, many enter tertiary institutions lacking visual, logical, numerical, reading and writing skills. Cultural norms and background including gender, race, socio-economics, access and curriculum are major factors involved in poor performance (Blunch, 2002 & Luckett, 1995). Even the recently carried out pilot study indicates that children start primary school education already lacking these skills (Smith, Foko and Deventer, 2008). There is a need to nurture these skills at an early age because children are born inquisitive, energetic, passionate motivated, creative, risk taking, and 'experiential' (Peel and Prinsloo, 2001). For children to be comfortable and willing to engage and explore there is a need to introduce into their environment from an early age positive science and ICT.

The research covered in this paper is part of an ongoing research motivated by the realisation that mobile phone is a strong tool available to most learners, poor and rich alike, in South Africa and could be leveraged and utilised in the classroom to support other ICT tools and learning in general. This could provide access to the Internet, Bluetooth and other mobile based technologies to the majority of South African learners whom otherwise do not have access to computers. Therefore, as part of Meraka Institute's mandate, we are involved in activities which could leverage the mobile phone for the benefit of the poor learners.

Therefore the research covered here attempts to ascertain the level of access by learners to mobile phone, the phone brands they use, how they use them, etc so that we can develop sound mobile platforms suitable for learning. This is part of the activities of the Meraka Institute to engage in research endeavours, including this study, to ascertain the value of mobile phones to education. Once these determinations have been completed the necessary platform for mobile education shall be developed in order to assist learning and teaching.

## Theories of Education

This study is founded upon the pillars of social constructivism, which is closely associated with many contemporary theories, most notably the developmental theories of Vygotsky, Bruner and Bandura's social cognitive theory (Kim, 2001). "The social constructivist version of Vygotsky developed a fully cultural psychology stressing the primary role of communication and social life in meaning formation and cognition" (Boudourides, 2003). According to Bruffee (1983) Vygotsky's main relevance to constructivism derives from his theories about language, thought, and their mediation by society. Some of the proponents of social constructivism have taken the criticism levelled against constructivism into their repertoire and elevated knowledge creation from the individual to a group of individuals (Taylor *et al.,* 1997). Social constructivism emphasizes that (1) the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding (Derry, 1999; McMahon, 1997); (2) learning is not a purely internal process, nor is it a passive shaping of behaviours. Vygotsky favoured a concept of learning as a social construct which is mediated by language via social discourse (McMahon, 1997). A key aspect for this theory is that knowledge is socially constructed and thus contested. The Social Constructivism Paradigm is based on certain assumptions, which include reality, knowledge and learning. Social constructivists believe that reality is constructed through human activity where members of a society together invent the properties of the world (Kukla, 2000). Thus, reality cannot be discovered as it does not exist prior to its social invention. Individuals create meaning through their interactions with each other and with the environment they live in. Learning is, therefore, a social process. It does not take place only internally, nor is it a passive development of behaviours that are shaped by external forces (McMahon, 1997). Social constructivist perspectives on teaching and learning emphasise the cognitive and social activity of learners in co-constructing their knowledge (Taylor *et al.,* 1997). Social constructivists see as crucial both the context in which learning occurs and the social contexts that learners bring to their learning environment (Kim, 2001).

## Mobile learning

The concept of mobile learning has had numerous meanings which could be reduced to two definitions: One school of thought understands mobile learning as learning using mobile technologies while the other says it is learning at any time from any where (Bollen et al. 2006). In the context of South Africa these two are extremely important because the mobile devices are in the hands of learners and have access to them at all times. Although mobile phones are not allowed in most public school in South African, these technologies are a familiar accessory of most teachers and students. "Cellular technology has a unique role to play in education in general and in Africa in particular" (Botha, 2008). These mobile technologies come with the advantages of performing many of the functions of desktop computers, while they are easy to use and could be accessed from every where (Houser et al, 2002). One problem with mobile phones is that majority of them were not designed with education in mind and consequently usability in this area is a challenge (Kukulska-Hulme, 2007). Furthermore, Kukulska-Hulme asserts, "Mobile learning is proving to be a fertile ground for innovation … The successful development of mobile learning is dependent on human factors in the use of new mobile and wireless technologies".

## Research Methods and tools

The study was guided by the development research paradigm. If theories stemming from traditional empirical research have any merit, "the persistence of significant problems in education and training suggest that this optimism is misplaced and that practitioners must be more directly engaged in the conduct of education research" (Reeves, 2000). It is because of this problem that other forms of research were proposed. The empirical research is generally founded on hypothesis based upon observations and or existing theory while the development research is based on analysis of practical problems by both researchers and practitioners (figure 2 below).

### Materials and Methods

In order to get a suitable sample of schools that formed a general cross section of schools and the types of cell phones the researcher had chose two high schools representing mainly affluent or advantaged learners and the once Blacks only university. The university was chosen because mobile phones are not allowed in most the public schools and the university draws most of its students from mainly the public schools. The first group (University Group) consisted of 74 first year Media Studies. Their average age was 22.1 years. The second group consisted of 399 high school students (High School Group) from two private schools and were more affluent than the University Group. The high school sample was drawn from grades 7 to 12.

### Research instrument

Respondents were asked to complete a questionnaire with the aim of trying to establish the percentages of learners with access to mobile phones and how they utilised them. The questionnaire method was chosen as the preferred data collection method. "The advantages of structured questionnaires are that they can usually be administered more quickly and are less subject to interviewer bias and coder error" (Whyte, 2000). Whyte went further to state that because of their cost effective nature structured questionnaires are used to gather large amounts of data.

# Evaluation

*Access to phones*
Of the 74 University Group who participated in the study 72 (97.3%) had access to mobile phones and 68 (91.89%) of them had their own phones. Only two learners did not have access any access to mobile phones. All 399 High School Group members indicated that they had access to their own phones.

*Types of phones learners carry*
The University Group uses mainly cheap phone with most of the m using entry level Nokias such as Nokia 1100, 1200, etc (Figure 1). The High School Group own the top ranges with some of them owning PDA such as iMate, HTC and even i-Phones and a third of them did not indicate their brands. Nokia phones at 47.22% are more common among the University Group than any other phone brand followed by Samsung with 23.61% and Motorola 20.83%. Most High School learners use Samsung with 33.83%, followed by Nokia and Sony Ericsson at 31.83% and 21.8% respectively and Motorola account for about 6.67%. None of the university learners had access to a Sony Ericsson.
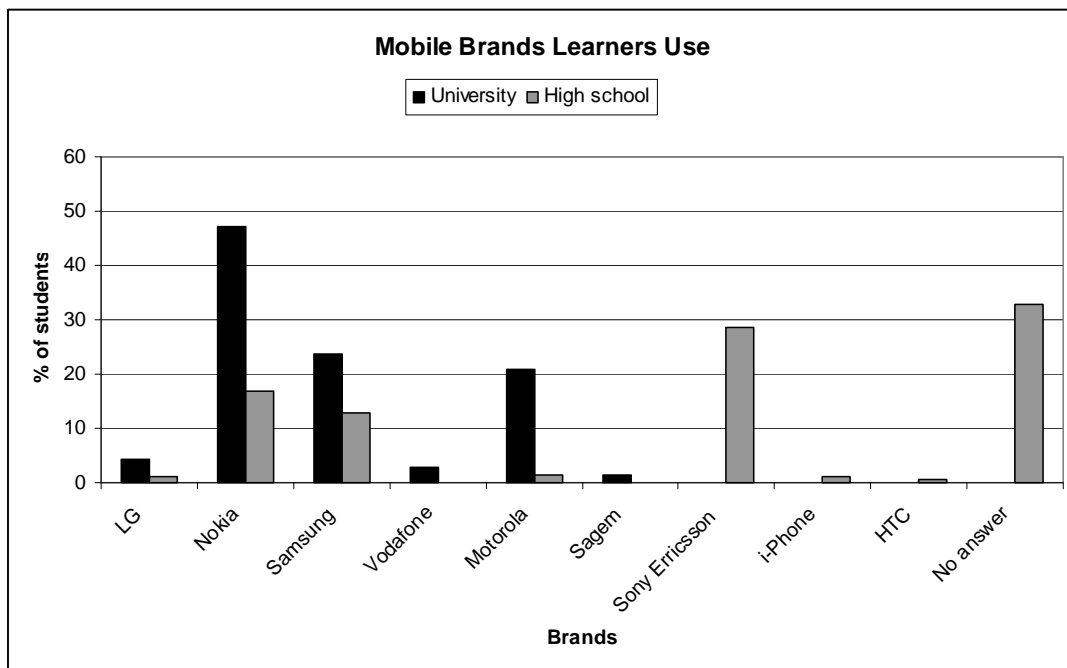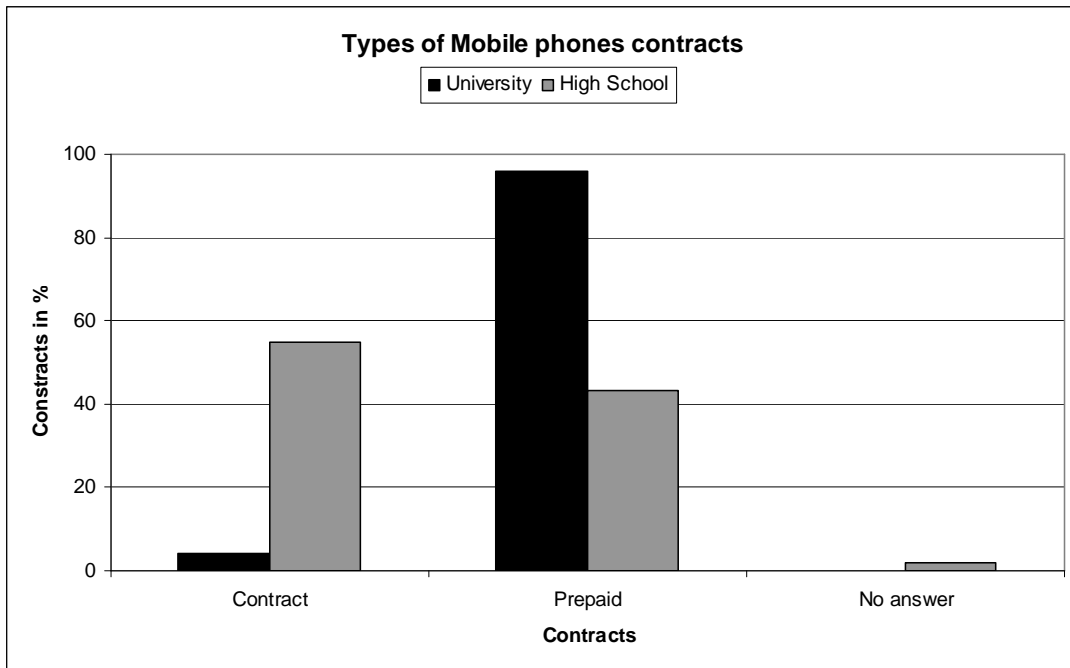


**Figure 1: Types of mobile phone learners use**

*Types of mobile contracts*
Only 3 (4.17%) University Group members had contract phones while 69 (95.83%) of them were on the pre-paid contract (Figure 2). Unlike with the University Group, the majority (54.89%) of High School Group were on contract payment methods while 43.11% pre-paid.

**Types of Mobile phones contracts**

■ University ▨ High School

Constracts in %

Contracts

**Figure 2: Types of mobile phone contracts learners use**

*Mobiles with cameras*

More than half (59.72%) of University Group had phones with camera features and 33.33% of them had no camera. Majority of phones with no cameras were Nokia with 26.39% of those carried by University Group having no cameras (Figure 3). These students carried the most basic Nokias e.g. Nokia 1100, 1200, 1600 etc. On the other hand almost all phones High School Group (95.99%) carried had cameras. Those few High School Group with mobile phones with no cameras owned business phones such as HTC.

**Mobiles with/out Cameras**

■ University ▨ High School

% of Mobiles with/out cameras

Availalability of Cameras
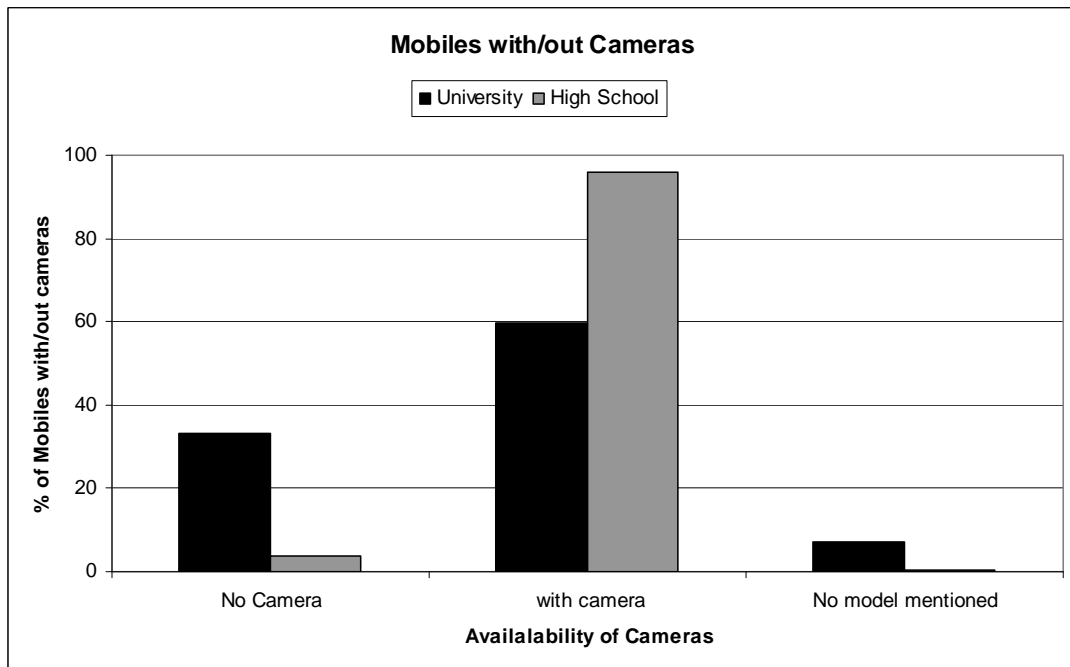
**Figure 3: Some of the feature mobile phones have or do not have**

*Other Activities learners Engage in*

Two thirds (66.67%) of university Group use the SMS feature of their phones compared to only a third (34.34%) of High School Group. Almost half (45.11%) of the High School Group seem to appreciate more an instant messaging called MXit than their less affluent counterpart at 18.05%. Very few learners 16.67% of University Group and 9.52% of High School Group use the mobile Internet.
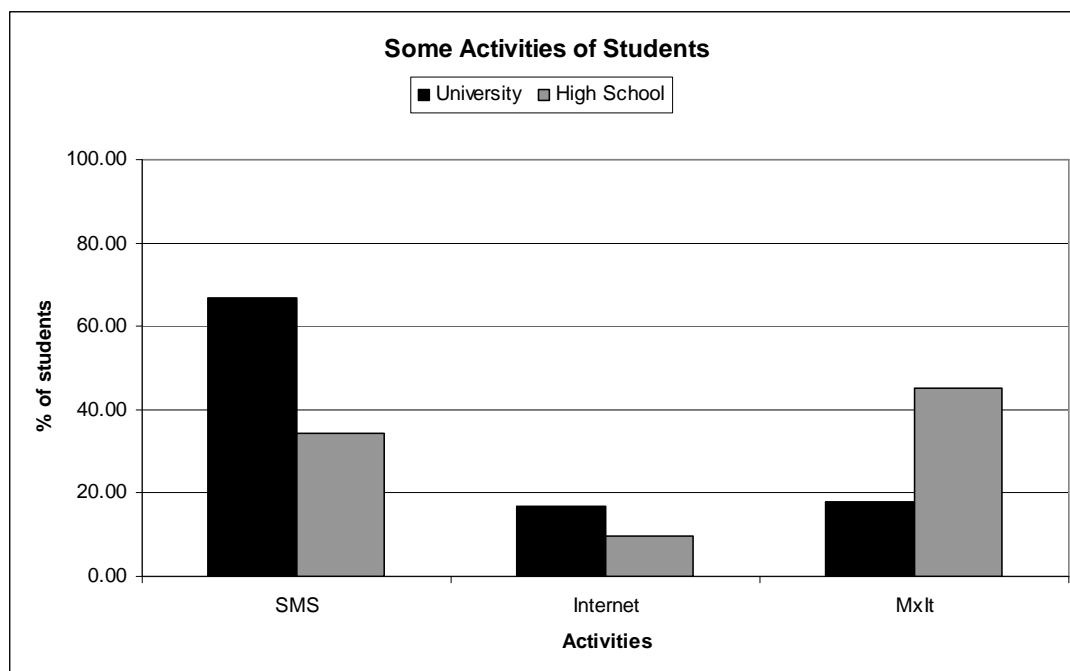
**Figure 4: Some of the activities learners engage in on their mobile devices**

## Analysis and discussion

The study indicates that at more than 97% of access to mobile phones by learners from the disadvantaged communities there is really no problem of access if the purpose is purely for communication, i.e. making and receiving calls or sending and receiving calls SMSs. However, the brands which are commonly held by the two groups indicate that there is now a new problem which needs to be tackled if the intention is to use these phones for educational purposes. If a phone cannot take a picture and videos or does not have the Internet facility this indicates that the tool is creating limitations to the provision of quality education. If the intention is to use a mobile device to assist with access to information but they do not have facilities such as the Internet or cameras then learning is curtailed. In the South Africa context it is crucial to be thorough when designing mobile education as this has the potential of enlarging the digital divide with the poor getting left behind instead of assisting them. The rich children are able to get phone contracts and are able to pay for these phones over a period of two years while the poor cannot do so as they cannot produce papers indicating that these credit facility once provided shall be duly serviced every month without fail. It seems that Nokia is a brand of choice for learners with no money as it provides a wide range of phones to choose from starting with those costing as little as a few hundred South African Rands (or tens of US dollars). The results also indicate that Sony Ericsson does not cater for this poor market segment but is popular with the rich children.

On the positive side one can look at the fact that learners do have access to these phones as a good start. Learners have indicated that they do like to play games on their mobiles and many (71%) are also willing to use these phones for educational purposes if the cost is not prohibitive.

Therefore, when designing and developing better educational platforms for mobile phone it is clear that learners like to send SMS more than they use instant messaging and the internet tools. The lack of internet or even Bluetooth facility on some phones provides other challenges such as access to information. This implies therefore that

## Conclusion

The high access to mobile devices by poor children signifies the new era for both communication and education. This mobile technology has the potential for providing new platforms for use in learning environment. It is because of this reason that we at Meraka are intending to develop new platforms for hosting information which learners could accessed with their mobile devices. Again, the results indicates that where initially learners could not play education games because of lack of access now the time is right for developing mobile educational games for the benefit of the poor children as they have ICT devices in their hands. Learners who are not able to access information on the Internet because of lack of availability to computers now can do so using their hand held computers. There is a need for new and innovative ways in education to leverage mobile phones for the good of the poor learners whose dream is to one day enter a university door but cannot do so currently because of their poor socio-economic status leading to poor performance. The availability of mobile phones in the classroom will slowly diminish the digital immigrants status of the poor as they are now becoming the resident of the cyberworld because of the availability of the mobile device.

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