

New ways of learning

Participatory action research and Kenyan runners' appropriation of smartphones to improve their daily lives and participation in m-learning

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Foreword

“I think ICT is boring,” said the CEO of Safaricom¹ in his role as key-note speaker at a mobile technology conference in Nairobi, January 2014. His statement was undoubtedly provocative, but his main point was that technology is only interesting when it works on a real level; a level at which technology changes lives and saves lives. I agree and this is one reason for undertaking this research. To this end, I was fortunate to be given the opportunity to implement mobile technology in a country that means a lot to me: Kenya. I spent considerable time in Kenya before conducting this research project and I am well acquainted with the country. Indeed, I visited Kenya for the first time in 1990, returning on many trips since then, and have been involved in several projects there.

In addition to my interest in Kenya, I have a strong interest in running. It started when I met a group of Kenyan runners some years ago. I was fascinated by their humble attitude and dedication to becoming top athletes. However, I was also depressed to see their living conditions in Nairobi. The runners came from poor backgrounds and had limited formal education. They ran to earn money. Nonetheless, they strived to excel in running. Not all of them succeeded and this has led me to consider on many occasions how best to support them or offer alternative opportunities to gain income.

In this research I was given a real opportunity to introduce smartphones to the Kenyan runners. For me it combined perfectly with my main research goal: to analyze learning processes using smartphones. However, at the beginning of the project, I had there many concerns. First of all, I did not know whether I would be accepted as a researcher in the runners’ community and thus be

¹ Kenya’s leading mobile network operator.

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able to participate in their activities. Furthermore, I did not know whether the runners would resist using the smartphones in their daily activities or whether they would impede the runners' performance. Certainly, the runners did have initial fears about the project. At our first meeting, one of the runners asked whether we would help them. I didn't understand the question and my reply was "how do you mean?" The runner told me that "we have only primary education and we don't know so much". Thus, this was a great opportunity to make a distinction between non-formal and informal learning. It has been a privilege to come closer to the Kenyan runners and to learn about their life conditions. The project has been fun and has motivated me, so it is with sad regret that it must now draw to a close. However, it is my sincere hope that it can continue in some way.

There are many people that I must thank for making this possible, not least my supervisors, Professor Per Andersson and Professor Elin Wihlborg. Per has guided me through the process in a calm, positive and methodical manner. Elin, who helped me to start my doctoral studies, removed several obstacles, financed trips and has been a constant motivational force throughout the process. I am grateful to you both. William Jobe, co-worker in the project, has always maintained a positive attitude in the field and responded promptly; for this, I show my appreciation for his excellent cooperation. I must also thank him for the massive task of proofreading.

I thank my brother Henrik Hansson for the initiative to focus on runners and smartphones. I also give thanks to DSV (Stockholm University) for the initial contribution that enabled the purchase of the smartphones. My appreciation goes to Isaac Macharia and William Morwabe for opening doors, to Hans and late Carina Freijd for their valuable support in the early stages, to Simon Krushal from Kibera for translations and assistance in the project, to Paul Ndavi for translation of the summary, to Iddi Bashir, an artist in Nairobi who contributed to the front cover, to Anders Egle and Patrick Moreau-Raquin for the images used, and to earlier opponents Mona Lundin and Ola Lindberg for their careful reading and advice. I thank my colleagues at the Department of Political Science for their continuous support. And not least I give thanks to

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my daughter Noemi for repeatedly asking about the dissertation party, which kept me motivated throughout the whole process. Finally, I am grateful to those who participated in the research project. I wish you good luck to pursue your dreams as a runner.

Linköping, April 2015

“So it is quite helpful. You cannot imagine life without these phones now.”
(Participant in the study)

1 Introduction

I am on my way in the morning hours through Kibera, East Africa’s largest slum. Situated on the outskirts of Nairobi, Kibera has a population of approximately half a million people. I am going to meet the Kenyan runners. All around me is the turmoil of the city, a lively social scene made up of people pulling carts piled with heavy loads of vegetables, matoke (cooking bananas) and water, groups of children in their school uniforms walking along the road, crowds of minibuses blasting out loud music from their speakers. Open markets flourish, offering groceries, household items, shoes, clothes, and toys. On every corner, shop vendors and small enterprises sell everything all you need for daily life. People look friendly and some of them greet me.

I leave the tarmac road, which leads through Kibera, and head in to the city center of Nairobi. I cross the railway line, which also leads through the slums on its way to Mombasa and Kampala. Once on the other side of the railway line, the environment and living conditions change. There are small dwellings that consist mostly of one bedroom, iron sheet roofs, walls made of mud, small open windows covered with curtains or cloth to keep out the dust. Along the dirt roads are lots of plastic bags and rubbish and, tiny chickens run in and out. When I am getting closer to Nairobi River, the dwellings are leaning...²

² Excerpt from my fieldnotes.

Introduction



Image 1. Kibera

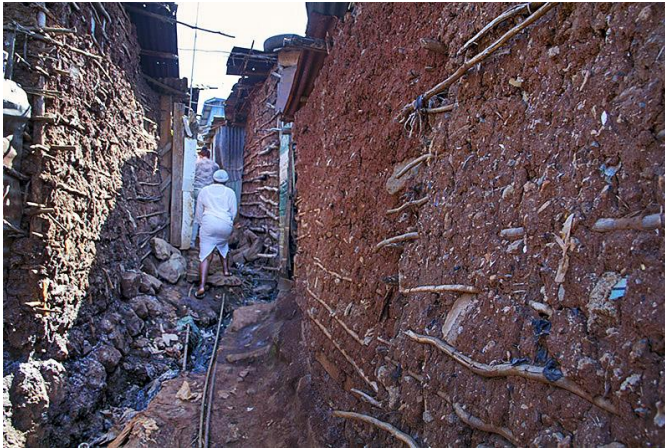


Image 2. Narrow alley and shelters in Kibera

It is obvious that living conditions are harsh in Kibera. Indeed, life here is more similar to rural communities than that normally associated with urban environments. Kibera has insufficient sanitation, and lacks running water, electricity, infrastructure, income, secondary schools and so on. Amidst its dense population criminality and unemployment rates are high. Kibera's impoverished people live relatively isolated lives at the outskirts of a vast urban center (Nairobi). Nonetheless, their isolation has been reduced by the growth of technologies such as mobile phones, TVs, and radios.

In principle, everybody has a mobile phone, from the young to the old, both men and women. Mostly, people have basic phones, although a few people use smartphones. When I made my observations in the slum, I noticed the frequent use of mobile phones and how busy people were with their phones. People were not just making calls to friends, or looking for work. They were also listening to music, playing games, and communicating and participating in different social networks.

In fact, Kenya is a country where mobile technology is “leapfrogging” landlines thanks to “the arrival of plentiful and cheap international bandwidth from competing submarine cables” (Jensen, 2012, p. 32). Thus, Kenya is considered to be a “mobile phone rich” country with a mobile penetration of 80% (Communications Commission of Kenya [CCK], 2015). There are 32.8 million mobile phone subscribers within a population of about 44 million. However, as Hellström (2010) has importantly stated, subscriber numbers can vary quite substantially, because it is possible to own multiple SIM cards. Thus, users may use different lines, depending on which lines have better network reception in a particular area.

1.1 Kenya and Kenyan runners

United Nations Development Program [UNDP] (2014) ranks Kenya as number 147 of 187 countries, one of a group of countries that have “low human development”. Statistics also show that life expectancy is 62 years and that individuals study for an average of 6.3 years in school (UNDP, 2014). There is a 51% drop-out rate in primary school, and the adult literacy rate is 87%. Kenya has an 8-4-4 education system (primary school-secondary school-university) and one can illustrate the educational level in the country with how many people attend the different school levels. Enrollment rates are nearly 10.2 million at the primary level, 2.1 million at the secondary level, and 325,000 at the university level (Kenya National Bureau of Statistics [KNBS], 2014).

Recent figures from the World Bank (2013) indicate that 46% of the population lives under the national poverty line, a rate that is higher than that found in the neighboring countries of Uganda,

Tanzania, and Rwanda. Thus, a large portion of the population in developing countries misses the opportunity to access education because of their socioeconomic situation.³

Nevertheless, sport can act as a mechanism for development and in this study the participants are Kenyan runners who live in Nairobi. In Kenya there are many people (both male and female) who like to earn a living from their talent in running. Many of them nourish the dream of becoming champions in their sport.⁴ The runners are hardworking and depend on their sport to generate income and assist their families. The runners are exceedingly proud to be sportsmen, and are ambitious enough to want to make their country proud of them. Some Kenyan runners succeed in the struggle to become top athletes and earn a lot of money; however, many do not. Despite coming from poor backgrounds and in general low educational levels the Kenyan runners are seen as role models in society. Youth are encouraged to be runners, when they notice that it is possible to achieve success.

Thus, this study has a significant value in terms of its impact on learning and living conditions. It can contribute to improvements in Kenyan runners' efforts to gain income, as well as increased general development, another important factor. In this case it was easy for me to gain access among the Kenyan runners due to my own interest in running and experiences from different projects in Kenya.

In Kenya, Nairobi is a hub for runners, as is Eldoret. Many potential runners are attracted by the competitions that are staged in these areas and therefore move from the countryside to improve

³ The term "developing countries" is used to denote low- and middle-income countries. However, it does not imply all countries are similar or that other countries have reached a final stage of development. Rather, the countries in this group are heterogeneous and face different development challenges (World Bank, 2014).

⁴ Complete statistics of how many runners there are in Kenya does not exist because the federation (Athletics Kenya) only registers top-athletes. Other runners belong to governmental organizations like the Armed Forces or Kenyan Police, private athletics clubs or have no affiliation. However, to illustrate East African dominance there were 135 male runners who performed sub 2.07:30 in a marathon between 1st of Jan. 2012 and June 30 2014, and all of these athletes represented either Kenya or Ethiopia.

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and develop their training. However, as Image 3 shows, not all parts of Nairobi are suited to running.⁵ In Kibera, it is dusty, dirty, smelly and littered, not to mention overpopulated, with busy roads and traffic congestion. The training environment is much better in Ngong, where world-class athletes are often seen.



Image 3. Running session in Kibera

I will briefly illustrate how the runners focus on becoming athletes by presenting extracts from my interviews with them in November 2011:⁶

For me I see as I am going ahead, when I have motivation in running and I know that I can be like Vivian Cheriyot⁷ and I know that we have discovered my talent I like to nurture it, to set a good example to the people of Kibera. No matter of what the outsider take that they are not good. But one day and one time I know that I'm going to challenge them. (Linda)

When I was young, I was sent to the shop and the shop was really far, and my parents send me to the shop and I came back very fast. The

⁵ The runner who appears in the image is not a participant in this study.

⁶ The runners' real names are changed to pseudonyms.

⁷ World champion in track and field 2009 and 2011 at 5,000 m and 10,000 m.

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parents were surprised: “oh you are back” so that is when I realized that I could run. (Joyce)

Even me I started to run when I was young. In primary level and from my family, my father was an athlete. He use to run, and he even use to win the races. He won sufurias and pangas.⁸ So he encourages me to just run, run. And he told me there is a time afterwards. So there is a time now when you can earn a living from athletics, from running. You can earn something. Because nowadays you can be competitive, so he used to encourage me. I was following the way he was telling me. I went even to national level that is in cross-country. Even track. In track I didn't reach national. I reached provincial. So that is when I started, I got motivation then I saw that is good to work hard. I can reach where the others are now. As you can see, for those who run, they have established well in athletics. Even the ways they are living are in fact higher. Because is just their sweat. It is not a matter of picking something from somewhere. So you have to struggle. They have really worked for it. Even us, we devote our time. We just concentrate on training. No other things that is not constructive. In fact, God will help us, and one time we will raise the flag of our nation. (Anthony)

This study shows the runners motivation to develop their training and learning through the implementation of new technology, but as most Kenyans the participants had knowledge of mobile phones, but not of smartphones. As a whole, the study is aimed at not only analyzing how learning develops with smartphones, but also how participatory action research (PAR) can improve the daily lives of poor people in Kenya. Thus, the study focuses on mobile learning and opportunity creation in real life.

Clearly, mobile phone adoption affects poor people; indeed, it is a powerful catalyst for change in people's lives. In the developed world, mobile technology is used extensively, especially for social networking via the Internet. In Kenya, there are several ingenious mobile systems; among them is m-pesa, a mobile system for payments and bank transfers that is well-known, and has had a wide impact on Kenyan society.⁹ Indeed, Kenya leads Africa in

⁸ Household equipment and gardening tool.

⁹ m-pesa or mobile-pesa is a mix of English and Kiswahili; the Kiswahili word “pesa” means “money” in English.

mobile payment technology, with 27 million subscribers making use of the mobile money transfer service (CCK, 2015).

To become familiar with technology, however, is more than learning to use a tool; it is one way to participate in a society. Even some of the poorest people in the world are engaged in ICT and are mobile-literate (Uden, 2007), mainly through the rapid growth in the ownership and use of mobile phones. Nowadays, smartphones are available in lower price ranges. In 2014, 65 to 70 % of all mobile phones sold worldwide were smartphones (Ericsson, 2014). Thus, it is likely that in a few years most Africans will have a smartphone and the spread of smartphones and access to the Internet may impact on their lives and reduce poverty.

1.2 Mobile learning

We may consider that mobile technology will change what, how, where and when people learn. Most likely, in terms of ICT tools, the future learning landscape will shift from receiving information and knowledge to constructing your own knowledge with a focus on what you as an individual want to achieve. The objectives, or aims, are therefore multiple and are based on the diversity of learners' intentions. Engeström (2009, p. 2) noted that “as educators, we tend to define top down the desirable patterns of mobility we want our mobile learners to engage in”. In informal learning, it is the learner who decides what he/she wants to achieve and how. The educational choices are more or less the decision of the learner, which leads to reforms and changes in educational practice.

Previously, education was classroom-based with a content determined by textbooks and the expectation of there being one correct answer. The problem with such traditional practices was to find ways to retain curiosity for learning and maintain inner motivation. It is the learners themselves who become familiar with the technology, and acquire the necessary skills for extending learning support. For those who remain outside the traditional educational system, access to appropriate learning resources through mobile technology and Internet access may be especially important (Unwin, 2012).

Learning is understood to be embedded in particular situated environments and practices, where learning is relevant and meaningful. In their study of learning in a craftsman setting, Lave and Wenger (1991) stated that learning primarily develops from less complex and less vital periphery tasks; in this way, newcomers and novices gradually become masters in a community of practice. Thus, people learn through a process of increased participation and social interaction in communities (Wenger, 1998).

According to Kukulska-Hulme (2010) and Looi et al. (2010), the availability of mobile technology gives learners the opportunity to switch between a classroom and an outside environment, whilst still having full access to digital information. This includes the possibility of using their device to communicate with teachers or other learners. Thus, it offers the chance to work with authentic experiences and tasks that are of personal significance, and respond to the “here-and-now” in real-life situations. This new type of learning takes place outside the traditional classroom environment and “it takes place without books, without teachers, and without classroom...” (Thomas & Brown, 2011, p. 18).

In short, it is set to change our conception of education. That said, however, it is more likely in the future that a hybrid of “traditional” teaching and this new type of education with access to unlimited information will become more commonplace. Thomas and Brown (2011) argued for a shift from a teacher-based approach to a participatory learner-based approach, where the learning environment is not necessarily the classroom. Instead, digital media is the source of knowledge through which people can gain a better understanding of the world and ask new questions to learn more.

Accordingly, learners do not just learn from one another, but also share experiences and knowledge with others. When the context for learning is seen as diverse, it is possible to promote an informal learning environment with thriving social interaction. In fact, “there will be occasions where learners are engaged in self-learning or discovery, and at other times they will interact with others, such as their peers, teachers or experts” (Looi et al., 2010, p. 159).

The use of situated learning and sociocultural activity along with mobile technology can, therefore, provide new opportunities

for interaction within social and informal learning environments. Using a mobile device creates new ways for the learner to acquire knowledge, which allows them to make decisions and solve authentic real-life problems wherever they are and at any time. In contrast with formal education, where learning is organized using a curriculum and syllabus by an educational institution, informal learning sometimes occurs accidentally and unintentionally in certain situations (Schugurensky, 2006). Thus, self-directed learning and mobile phones appear particularly important for engaging individuals in learning processes both in and with society. These increased insights and awareness of the surrounding world are mediated by ICT tools, which allow people to develop learning in a variety of situations and social context. In turn, they can support the creation of ideas, improve quality of life and create opportunities to get out of poverty.

We have to consider mobile learning and the use of mobile tools in everyday practices. It is thus necessary to focus on the daily interaction between people and mobile technology to improve learning. According to Uden (2007), however, collaborative learning can only occur if the technology has been designed to fit the requirements for use. In particular, we should consider how new technologies integrate with existing social practices, shaping and developing them so that they are adopted in everyday life (Merchant, 2012). Today, more and more people use smartphones to develop new skills and knowledge. It is not possible to avoid learning; indeed, the most common and important way to learn is through daily interaction and natural conversation. The question is however, what do they learn and what activities develop through the use of smartphones?

Obviously, it is important to maintain a closeness with the users in order to be able to interpret what is going on and to identify any collaboration between the researcher and the participants. Thus, PAR and fieldwork are particularly relevant. Previous studies of mobile learning research have primarily consisted of small-scale pilot projects, mostly in a school setting. Just a few of these studies were carried out in informal contexts and, according to Wright and Parchoma (2011, p. 254), “informal learning is notable in its absence, and a call for attention”. As Frohberg (2007, p. 6) stated,

“...there are astonishingly few projects dealing with informal learning”.

Various research methods and multiple sources of data collection can be used to generate knowledge of informal learning with smartphones and to make a real improvement in the living conditions of participants. It is noteworthy that most existing studies lack an ethnographic approach in authentic settings. The traditional ethnographic approach is challenged by the development of digital resources.

Thus, there is a need for a new approach if we are to gain insights into the everyday use of mobile phones and be able to analyze learners’ experiences and social interactions in informal settings when mobile technology is used. This approach requires a mixed-methods approach, including interviews, observations, fieldnotes, inquiries, mobile log files and longitudinal studies (Kukulska-Hulme, 2010; Looi et al., 2010).

1.3 Research aim

This thesis explores Kenyan runners’ appropriation of smartphones and analyzes the process of learning. The overall aim of the thesis is threefold:

- to introduce new opportunities for learning and the improvement of living conditions through the use of smartphones;
- to analyze the appropriation of smartphones in the daily life of Kenyan runners;
- to analyze how smartphones can be used to improve participation in m-learning.

1.4 Limitations

In this study, we focused on impoverished people in Kenya. We were, however, subject to limitations. The study was conducted in Nairobi, Kenya’s capital city. Two groups of Kenyan participants took part, both of which had running as a profession.

This thesis is focused on the study of m-learning using a multidisciplinary approach. First and foremost it is situated within

the domains of education and social science; however, it also involved multiple perspectives related to several other disciplines such as development studies, sports, and technology. There is a complexity associated with working in a multidisciplinary domain (Dodson, Sterling, & Bennett, 2013), which is necessary if we are to gain a broader and deeper understanding of the purpose of the study. However, a comprehensive approach can help to address problems in learning and knowledge. In turn, this can help to attack such complexity. Furthermore, communication across boundaries is fundamental to a sociocultural perspective.

In addition, the analysis of data excludes the validation of acquired skills and knowledge production. Thus, whilst this analysis found that skills and knowledge were developed in the process, an in-depth analysis of these was not performed as part of the study. Rather, the research interest was focused on an analysis of the Kenyan runners' appropriation of smartphones to improve their daily life and to participate in m-learning.

1.5 Outline

Four papers form the backbone of the thesis. Table 1 presents these publications.

Table 1: Publications

<p style="text-align: center;">PAPER A</p> <p style="text-align: center;">Frontrunners in ICTL: Kenyan runners' improvement in training, informal learning and economic opportunities using smartphones</p> <p style="text-align: center;">Per-Olof Hansson and William Jobe</p> <p style="text-align: center;"><i>International Journal of Education & Development using ICT.</i> (2014). 10(4), 4-20</p>
<p style="text-align: center;">PAPER B</p> <p style="text-align: center;">mRunning: New ways of running in Kenya</p> <p style="text-align: center;">Per-Olof Hansson</p> <p style="text-align: center;"><i>Accepted for publication in Journal of Sports Pedagogy and Physical Education.</i></p>

PAPER C

Daily Usage of Smartphones – *New Activities for Kenyan Elite Runners*

Per-Olof Hansson and William Jobe

Accepted for publication in Journal of Mobile Technologies, Knowledge, and Society.

PAPER D

Putting a MOOC for Human Rights in the hands of Kenyans

The Haki Zangu case for non-formal learning

William Jobe and Per-Olof Hansson

The Electronic Journal of Information Systems in Developing Countries. (2014). 65(3), 1-17.

These publications were compiled on completion of the project, when all data were accessible. Thus, a first analysis of all data from the empirical material was carried out and, from this analysis, emerged specific data which were highlighted in four different papers.

In addition, the thesis is presented in different sections, starting with a review of existing research studies and related work. The purpose of this review is to present studies that contributed to my exploration of mobile learning, particularly the way in which mobile phones can be combined with learning in different settings.

Section 3 presents the learning approach taken in this thesis, which consists of a sociocultural perspective, including the frameworks and central concepts relevant to the study. Section 4 presents the research questions raised by this thesis and the associated publications, and briefly describes the content of these papers. Section 5 thoroughly explains the research design of the study, and offers an exploration of the empirical context in Kenya and the methodological considerations.

Section 6 sums up the main findings from the four papers. Specific implications that emerged in the study are discussed in relation to theoretical concepts in section 7. Finally, section 8 includes a discussion of the findings and their significance for future research.

2 Related studies

Information and communication technology for development (ICT4D) and mobile technology for development (M4D) are growing fields of research and practice. Research in M4D explores the advantages and disadvantages of scaffolding or implementing mobile technology in developing countries. ICT can be regarded as one tool among others, which can be used to improve development and poverty reduction.

There are many positive examples of such research in the fields of education, health and democracy (Hellström, 2010). Many of these studies were conducted on a micro level. They include studies of microeconomic impacts on fishermen and farmers (i.e. *I-cow* in Kenya is an agricultural service for small-scale farmers, which allows them to receive farming tips and best practices via text messages and mobile phone applications, or via the Internet in order to improve their returns), small enterprises, including those that deal with emergencies (i.e. alert warnings like *Ushahidi* in Kenya, which uses mobile phones to report crime, abuse, and insecure areas), health care (i.e. text information about HIV/Aids), governance (i.e. delivering political information by text message or enhancing transparency in governance), and m-learning.

Such research is not without its challenges. For example, whilst Internet cafés are common in Kenya, the development of a computer center in the slums of Nairobi is a complex business, not only in terms of skills, but also because of the costs involved and a lack of resources (Wihlborg & Hansson, 2011). Thus, in this dissertation I have chosen to explore the use of smartphones as substitutes for desktops and Internet cafés. This dissertation also fills a research gap in that there are relatively few studies of how youths and adults use mobile devices outside of school.

Related studies

Furthermore, in the Kenyan context, access to modern technology such as desktop and laptop computers is limited and costly; however, mobile phones are commonplace in Kenyan society, even if smartphones are used on a limited scale. Thus, in this dissertation my main interest was m-learning and the use of smartphones outside of formal education.

This section highlights studies related to non-formal and informal learning with mobile phones. Thus, studies carried out in formal education environments such as classrooms and higher education have been excluded. Also excluded were studies that referred to the use of games, videos and so on in classroom settings. However, studies of learning outside the classroom or on the border between learning in and outside the classroom were included. I did not distinguish between research projects based on the age of the learners, however the main focus was on adults' or young adults' learning, and my main search for related work was in that field. This section presents the most significant existing studies, which can contribute to a better understanding of my own study.

Figure 1 shows the structure of this section and outlines existing research studies. It includes literature reviews related to aspects of mobile technology and learning in combination with current research approaches, as well as literature reviews of m-learning studies in developing countries. In addition, this section identifies bridging or hybrid studies in both formal and informal learning environments. Finally, specific studies from developing countries, including comparative studies and studies from non-formal or informal settings, are presented.

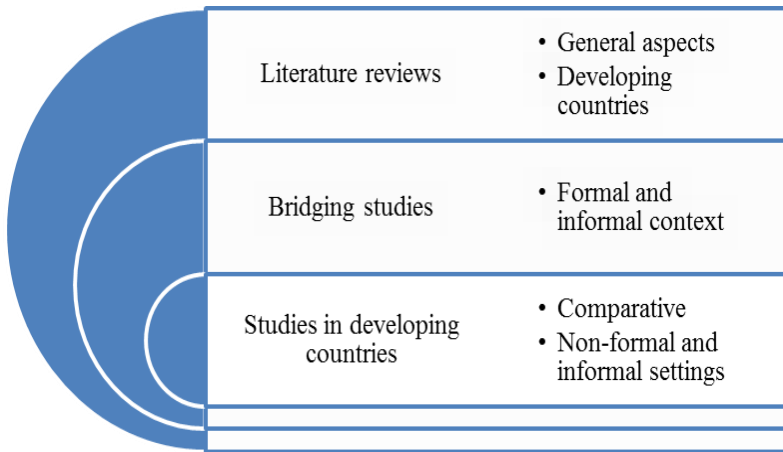


Figure 1. Structure and outline of M4D

Initially this section describes different characteristics of learning in combination with mobile technology. Mobile technology can be favorable for learning, but what constitutes formal, non-formal, informal and mobile learning?

2.1 Formal, non-formal, informal and mobile learning

Formal learning is intentional and institutionalized; both the process and the goals are explicitly prescribed by a syllabus and a curriculum. Formal education is characterized by boundaries such as classrooms and school buildings, and learning happens in fixed teaching periods regulated by scheduled timetables and semesters.

Non-formal learning takes place outside the formal, highly institutionalized system. Study is undertaken voluntarily, usually with the assistance of a teacher, as is the case in many adult education courses or workshops. This learning can, however, also take place without the presence of a teacher, as is the case in member-based study groups where responsibilities are carried out in rotation (Schugurensky, 2006).

Informal learning is carried out through everyday activities, which offer spontaneous inspiration, fun, and motivated content, allowing learners to deepen their understanding and knowledge. According to Livingstone (2006, p. 206), informal learning is

“...any activity involving the pursuit of understanding, knowledge, or skill that occurs without the presence of externally imposed curricular criteria”. It can take the form of self-directed learning without the presence of a teacher or facilitator, although a resource person can assist. This form of learning is sometimes unpredictable, because the participants do not know where it may lead.

This type of learning is both intentional and conscious; the learner is aware that he/she is learning something (Schugurensky, 2006). Clough, Jones, McAndrew, and Scanlon (2008) referred to work by Vavoula et al. (2005), which divided intentional, informal learning into two areas of control: control of the process or methods, and control of the goals of learning. However, as Clough et al. (2008) have argued, this viewpoint does not include the different choices made in the learning process, including whether and how various tools are used in learning, or how the learners collaborate and share resources.

Another form of informal learning is unintentional learning, which is incidental. This takes place when the learner has no intention of learning more from the experience, but afterwards he/she becomes aware that something has been learned. Daily activities often lead to unplanned, unconscious learning, and this is often referred to as tacit learning.

Finally, Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, and Vavoula (2009) have contributed by introducing the concepts “externally structured - internally structured” and “externally initiated - internally initiated”. Learning is either externally or personally structured, or initiated by the learner or an educational institution. Accordingly, both informal and non-formal learning offer an alternative to formal schooling and further education.

Learning and knowledge are considered to be situated to social practices. It is thus necessary to clarify the somewhat confusing concept of “setting”, which can either be a formal education setting or an informal learning setting. Formal learning can take place in an informal setting; for example, through field trips planned by teachers or students carrying out a task designed by teachers outside of the formal school environment and class hours. Informal

learning in a formal setting can include unintended learning in a classroom (Wong & Looi, 2011). Accordingly, significant learning can occur in informal settings such as in the workplace, with friends, through the media and so on. Informal learning and its pedagogical activities can occur in both non-formal and formal settings (Schugurensky, 2006).

This thesis focuses on learning through the use of smartphones. Thus, it is necessary to also define m-learning (mobile learning). Terms used in the research literature include wireless, connectivity, ubiquitous, seamless, augmenting and pervasive mobile learning. Cochrane and Bateman (2010, p. 3) have defined m-learning as “the use of wireless enabled, mobile digital devices...”. Thus, it is important to have an opportunity to quickly switch from one scenario to another, using the mobile phone as a mediator. Chan et al. (2006) introduced the term seamless learning, which implies that students learn wherever they are:

By enabling learners to learn whenever they are curious and seamlessly switch between different contexts (such as between formal and informal contexts and between individual and social learning) and by extending the social spaces in which learners interact with each other, these developments, supported by theories of social learning and knowledge-building, will influence the nature, the process and the outcomes of learning. (p. 23)

Whilst the notion of using mobile technologies in learning environments is interesting, it is not just about learning with mobile devices. It is as much a process of learning through conversations and explorations across multiple contexts that are open to all who wish to participate (Sharples, Taylor, & Vavoula, 2007). Quinn (2011) stated:

All the information we need to achieve our goals is what mLearning is about: the answers we need, the people we need to communicate with, the just-in-time assistance, the special information relevant to where and when we are, the capture of context to share, and more. (p. 18)

Hence, my interest in this research field also extends to how people create new contexts for learning through their interactions, and how they progress their learning across contexts (Vavoula & Sharples,

2009). Consequently, new wireless technologies offer a different way for users to connect with other learners in social interaction and the use of digital learning resources.

2.2 Existing literature reviews of m-learning

A wide range of research studies exist, which shows the complexity of mobile devices and their use in daily lives. In the field of M4D, researchers have presented comprehensive literature reviews (i.e. Dodson et al., 2013; Donner, 2008; Duncombe, 2011; Frohberg 2007; Frohberg, Göth, & Schwabe, 2009; Wright & Parchoma, 2011). A significant aspect of these studies is that they presented positive findings: poor people in marginalized areas are given a voice by using mobile phones, programs have been developed to encourage rural connectivity, and mobile phones are used to increase family contact when relationships take place at a distance.

Whilst these projects are destined for success, because they avoid the obvious failings, they may also lead to naive generalizations on how best to achieve their full potential. Thus, Traxler (2013) has argued for a comprehensive analysis of evidence in research projects of m-learning in Africa. Less optimistic studies also exist, which present the authors' doubts and concerns about text messages and their educational and political effects, or which show how expensive mobile phones can be an economic burden to their users. Likewise, Dodson et al. (2013) reviewed 40 research papers, concluding that ICT initiatives are ineffective.

Thus, research in this domain has led to unsatisfactory development results, caused by the use of top-down, technology-centric, and goal-diffuse approaches. Emergent technology optimism and uncritical relationships between technology and users also exist. In addition, the literature review of m-learning by Wright and Parchoma (2011) has shown that mostly small-scale project studies were involved in existing studies; these were carried out in either a school or university setting, with a high degree of experimentation and a strongly researcher-controlled process.

In educational practices, it is usually the case that the teacher decides what should be learned. With mobile technology, this

means that a top-down approach of what is considered desirable is adopted (Dodson et al., 2013; Engeström, 2009). Wright and Parchoma (2011, p. 255) pointed out that this led to a tendency "... to focus on learning in practice and the tools used, rather than seeking to set up and control the device, situations and practices...". Consequently, an informal learning and ethnographic approach was notably absent (Frohberg, 2007), which otherwise could have contributed to the observation of practices and learners' everyday use and choices. Engeström (2009) argued for more research into diverse practices in order to gain a greater insight into the lives of learners. In his work, he examined the highly motivated use of mobile technology exhibited by skateboarders, bird watchers, and relief workers. Frohberg (2007) also carried out an overview of existing projects, identifying only eight informal m-learning projects out of 122. Informal learning research used a sociocultural and learner-centered approach, while formalized projects adopted a behavioristic learning approach that better suited rapid response answers or results in quizzes, games and so on.

A few years later, a further study by Frohberg and his colleagues (Frohberg et al., 2009) screened 1,469 publications and analyzed 102 mobile learning projects. All projects were categorized in terms of context, tools, control, communication, subject and objective. The researchers noted that, despite the fact that mobile phones are communication devices, communication and collaboration actually played a small role in such projects.

According to Uden (2007), there is little understanding of how mobile technology supports collaborative learning. This is not less important from a learning perspective. Learning is not only an isolated and individual process, it is a social and interactive process that is affected by communication with others. By collaborating and discussing content with other learners, knowledge can be deepened and better understood. Thus, mobile technology plays a pivotal role in improving communication and collaboration channels.

Consequently, it is possible to draw the conclusion that there are surprisingly few studies related to informal learning. Furthermore, there is an awareness among researchers of the great potential to study processes in which learners choose their own

learning goals. Today, smartphones are an indispensable and ubiquitous tool in many people's lives, but this change has only recently taken place. The research publications are thus still lagging behind, and cannot be expected in large numbers in the short term. Most of the current research on mobile learning is carried out in developed countries. The use of mobile phones in developing countries does not necessarily follow the same trends as in developed countries. Thus, there remains a need for studies of the use of mobile phones by people in poverty in the developing world (Donner, 2008).

2.3 Studies that bridge formal and informal m-learning

It seems that m-learning tools have the capacity to bridge the formal and informal learning experiences. Looi et al. (2010) noticed that students spend more time in informal than formal learning settings and Froberg (2007, p. 10) claimed that, "learning in informal context is another omitted chance of mobile learning, to add value in education". Consequently, our knowledge of learning can be extended. It is important, therefore, to explore what, how and when people learn informally in order to benefit and challenge both practices.

However, Shih, Chuang, and Hwang (2010, p. 50) have proposed that structure be added. In order "to avoid students aimlessly wandering around, instructors need to carefully arrange the learning environment and design an interactive model, along with meaningful learning content provided in time". Unintentional, informal learning is therefore not highly valued in knowledge production. More specifically, Shih et al. (2010) have claimed that there is a lack of research into the use of mobile technology in the study of social sciences in schools. They carried out research in 33 elementary school pupils in Taiwan, examining how learning took place in a local temple using handheld devices (PDAs).

Shih et al. (2010) found that students with "low and middle achievement" made the most significant improvements by using mobile devices. These findings were supported by quantitative and

qualitative data. The device and designed application scaffold allowed learning to take place at the learners' own pace.

Another study which explored ways to bridge formal and informal learning by using mobile devices was conducted by So, Kim, and Looi (2008). Their research purpose was to investigate pupils in Singapore with regard to their capacity to recognize environmental problems using a pocket PC. The project used a teacher-centered approach whereby the pupils explored recycling problems outside the school setting. The mobile device was used as a scaffolding tool to enable the pupils to learn in different locations. Findings showed that the digital device assisted the learners. Furthermore, the researchers claimed that students' content knowledge also increased, and that even classroom-based learning deepened after participating in m-learning in an informal setting (So et al., 2008).

Likewise, Santos and Ali (2012) explored how 15 female undergraduate students in the United Arab Emirates used their mobile phones outside the classroom to support learning. The study took place during a 15-week university course using the students' own mobile phones. The methods used in the survey consisted of questionnaires, interviews, and student diaries. The study was limited, however, because not all students had access to the Internet. Furthermore, the study took place between 2009 and 2010, a time when there was limited availability of smartphones with functions such as GPS and video.

The study took place in a course setting; thus, perhaps unsurprisingly, the students found that mobile phones could add value to formal learning. The students used their mobile phones frequently at home, and less often when travelling or in public areas. Students mostly sent and received text messages and these messages were used mainly to contact classmates to discuss the content of their course and pass on information.

In 2012, Botha and Butgereit conducted a study on learning at home which involved a mathematics project for secondary school students in South Africa. The project created a platform with a mobile social network where university students voluntarily tutored secondary school students in order to scaffold the learning of mathematics. The more experienced adults assisted the learners on

how to carry out tasks they could not perform on their own. Botha and Butgereit (2012) distinguished between indirect scaffolding, where the learners collaborated with their peers, and direct scaffolding, where more experienced university students gave feedback, offered explanations and justified the learning. The volunteers were seen as substitute parents who encouraged the learners to work and pass examinations. The findings raised a question that is particularly relevant to this thesis: is a teacher or expert required to assist the novice learner, or is it possible to gain knowledge, skills and competence with technical resources alone?

Another study of mobile phone use both in and out of school was based on a South African mobile phone project called MobilEd (Ford & Leinonen, 2009). Research-based ideas were implemented to study young participants from poor backgrounds and their everyday use of low-cost mobile phones. Interaction between teachers and students took place through text messages, multimedia messages, and audio-wikipedia (text-to-speech technology). The participants learned quickly and the mobile phones supported the learning process, including spontaneous searches for information, and enabled collaboration. The mobile phone was therefore seen as an important tool in the educator's toolbox.

Furthermore, Crichton and Onguko (2013) presented a case study in Kenya, which put forward the idea of blended learning through the use of tablets. Blended learning combines face-to-face teaching and online experiences in order to improve students' learning. The study focused on new technology and was conducted in a remote area in Kenya. The study included 10 teachers in a secondary school. Findings from observations and interviews showed that the use of technology changed the content design. The changes introduced a participatory teaching approach to support learning experiences. The researchers highlighted the challenges of using the technology, such as its sensitivity and power consumption. A significant pedagogical challenge was the incorporation of local, contextually relevant content (Crichton & Onguko, 2013).

2.4 Informal m-learning studies

Existing research into informal learning and semiformal learning with mobile devices is illustrated by two case studies (Jones, Scanlon, & Clough, 2013). In one study, web-based support for learning was used, whilst in the other study the learners used their own mobile devices. Both cases illustrated different ways of supporting learning with mobile devices. The first case showed how to guide youths in secondary school through structured activities using a software toolkit. The mobile device supported the learners' inquiries even outside the school without the help of adults. The topic was "food sustainability" and students used personalized software as support, including photographs, and browsed the Web to deepen their knowledge.

The second case illustrated an activity driven by the learners' own choice. Adult learners used smartphones to search for Geocache.¹⁰ Portability played a major role (they went on long walks to search for "caches") and flexibility (access in different ways). The two cases showed the different influences that mobile phones had on learners. In both cases, learners showed similar improvements in learning, because of their motivation to use technology and make their own choices (Jones et al., 2013).

Likewise, Squire and Dikkers (2012) put forward findings for informal learning in their study of adolescents (from 8 to 16 years of age) and their use of borrowed smartphones. The researchers studied the use of smartphones both in and out of school over a period of three weeks. The methods used were observations, log files, and interviews with the youths and their parents; however, two of the 10 participants were the researchers' children.

The smartphones were mostly used for information seeking and entertainment. One significant finding of this study was that the youths downloaded, on average, 23 applications during the three-week study and more than half of them were related to entertainment. Moreover, most of the participants appreciated being connected to the Internet; they were quickly able to search

¹⁰ The participant's aim is to navigate by GPS, or other techniques, to hide or seek an object including a logbook called "caches". The word geocaching is a combination of geo (Earth) and cache (hidden location).

for information and instantly found it useful for solving real-life problems. Even social networking had a positive impact, helping the students to create casual friendships with others. The researchers noticed an indication of a change of learning practice to one that was more interest-driven. A similar conclusion can be drawn from the use of audiovisual mobile technology to support a museum guided visit (Vavoula & Sharples, 2009). Digital resources mediated learning and played a central role in supporting informal learning in museums (Kukulska-Hulme et al., 2009).

Furthermore, Clough, Jones, McAndrew, and Scanlon (2009, p. 109) pointed out that mobile phones support both intentional and unintentional informal learning. The reasons they gave were that “the portability, storage capacity, computing power, and convenience of mobile devices emerged as determining factors in learners’ decisions to use them to support informal learning activities”. In 2009, Clough et al. conducted a web-survey with mobile phone enthusiasts to identify informal learning experiences with smartphones and PDAs that were specifically used for collaborative learning. However, many of the participants, were unaware of any collaboration, which mainly took the form of sharing data. Furthermore, the findings showed that the users took notes, made recordings, or accessed the Internet and used their devices on the move.

According to Clough et al. (2009, p. 110), the learners “tailor their use of their mobile device to fulfill their learning goals”. This highlights the importance of the present study of informal learning, which found that people may be unaware that learning has occurred. Gaining access to information about their activities can also be a problem (Clough et al., 2009), indicating the importance of using multiple sources of data, such as log files.

2.5 Studies in developing countries

Only a few mobile technology projects have been implemented and evaluated in developing countries (Imtinan, Chang, & Issa, 2012). These projects were mostly pilots or trials, and took place in a variety of research fields such as medicine, computer science, business education, and game-based e-learning. They all showed

positive outcomes of flexibility, motivation, collaboration, support for learning and welfare gains (Duncombe, 2011; Imtinan et al., 2012). The outcome of these projects, however, was that people were marginalized because of a lack of access to the technology (Ryberg & Georgsen, 2010). This cannot be emphasized enough. Indeed, it is the case for many people in developing countries who are already socio-economically marginalized.

Comprehensive literature reviews by Donner (2008), which included over 200 studies from different disciplines, and by Duncombe (2011), which comprised a narrower set of studies (18 studies) conducted at different levels between 2000 and 2008, have shown the impact of mobile phone usage in developing countries. Donner (2008) gave a broad sweep of the impact of mobile phones in such areas as business, education and communities, and described how mobile phone use impacts people in different ways.

Nevertheless, many of the research studies have focused on describing mobile penetration within or across nations rather than on individual needs and behaviors. Case studies that use multi-methods exist and consist mainly of research studies from China and India. Duncombe's (2011) findings revealed purely quantitative approaches in economics and purely qualitative approaches in social impact studies. Duncombe (2011) has argued for a mixed approach, which would allow researchers to focus on the broader impacts of projects, rather than only on output or outcome. However, output is associated with the use of mobile phones, and outcome is the measurable differences in cost and benefits brought about by the intervention of mobile phones. Impact, on the other hand, relates to broader goals such as growth, income, and equity. Output and outcome are thus more straightforward compared to impact, which is more complex and has significant methodological challenges (Duncombe, 2011).

It is notable that research studies have tended to focus on specific units. Instead of seeking interdisciplinary understanding and multiple units of assessments, distinctive surveys come from within single disciplines. In the African context, such studies mostly relate to network and technical solutions, the telecom market and its providers (Donner, 2008).

Typically salient in research studies is the participants' unfamiliarity with mobile technology. Likewise, technical barriers were revealed in a survey of m-learning in Botswana that involved 19 trainee physicians (Chang et al., 2012). They were provided with smartphones and pre-loaded applications to support decision-making. However, downloading applications proved to be a challenge because of bandwidth limitations with mobile broadband. In this case, it was significant that technology limited the learning outcome, as well as its breadth and depth. Indeed, Imtinan et al. (2012) claimed there is a need for technical support and initial training when participants switch from traditional learning to m-learning. In addition, Unwin (2012) has emphasized the necessity of proper infrastructure:

However, with the rapid development of mobile broadband solutions, with the creation of even better handheld devices in the future, and with the realization that such technologies can indeed transform education, then learners will increasingly demand access to appropriate and sophisticated learning resources that they can access through their mobiles to use the Web in innovative ways, especially for those who remain outside traditional educational systems. (p. 130)

Other crucial issues were the cost of mobile devices and access to the Internet. For example, Auld, Snyder, and Henderson (2012) and Porter et al. (2012) demonstrated in their Australian and African studies the importance of shared phones and network facilities. Auld et al. (2012) investigated how indigenous people in Australia used mobile phones. The research purpose was to examine how mobile phones were adopted in a poorly resourced community, and how the participants used mobile phones for their own purposes. In the study, Auld et al. (2012) interviewed 95 participants, 56% of whom owned a mobile phone.

Findings showed that they shared the phone with their family and friends, and it was common to borrow a mobile phone. The mobile phones were mainly used for social activities such as music, video and pictures. Access to the Internet was both costly and difficult; such effects were not included in the study. The authors concluded that mobile phones were an appropriated tool and embedded in daily activities.

These findings emphasized the importance for teachers to connect with the activities of youths and learning at home. Likewise, in a study of teenagers in a slum area of India the researchers found that mobile phones and the Internet were used for music and searches for Bollywood teasers, rather than educational content (Rangaswamy & Cutrell, 2012). According to the researchers, however, the mobile phone can be seen as a tool that can potentially create interest for learning via entertainment and other curiosity-driven interests. In this thesis, I will test and analyze this assumption on a practical level.

Work by Porter et al. (2012) has similar aims to this thesis. In their study, the authors explored the relationship between young people's use of mobile phones and the impact this has on society. The study examined the mobile phone usage of youths (aged 9 to 18 years) between 2006 and 2009 in three African countries: Ghana, Malawi and South Africa. Some 3,000 people responded to a questionnaire. Significant differences were found between the three countries and between urban and rural environments. Whilst it was common for young people to have their own phone, it was not normally for their exclusive use; rather, they shared the phone with other family members. Nevertheless, mobile phones are seen as objects of desire for personal ownership. They are also regarded by youths as playing an important role in their daily routines. In this study, mobile phones were mostly used for socializing with family or friends, either by making calls or sending text messages.

Mobile device provided ways to be included in social networks and offered independence from parents, both in terms of their surveillance and constraints. However, mobile phones were also seen by Porter et al (2012) as a potential tool for empowerment, enabling access to resources such as financial support (digital banking system), social support, and employment opportunities.

Collaboration and social networking are vital aspects of m-learning and in a few studies the use of text messages was seen to support learning. One evaluation of an adult education program highlighted the importance of text messages, indicating that increased literacy skills and motivation could be achieved by using a simple mobile phone (Aker, Ksoll, & Lybbert, 2011). The researchers carried out a study of rural communities in which

several ABC-villages in Niger participated as part of a mobile phone adult education program. They used quantitative methods to test the educational outcome seven months after the project. The findings showed that mobile phones enabled students' learning outside the classroom. Consequently, they increased learning (particularly writing and mathematics) compared with their counterparts in other villages. Sending and receiving text messages is a low-cost technology that does not require specialized software, to make a significant impact on learning.

In addition, Balasubramanian, Thamizoli, Umar, and Kanwar (2010) gave a positive example of intentional informal learning with simple mobile phones when they studied 73 illiterate and semi-illiterate women in India and their use of mobile phones as a learning tool. The researchers used a questionnaire, focus group discussions, participatory observations, and interviews to explore learning.

The results showed that the women were assisted in their learning process through the use of mobile phones. The women carried their phones when they took their goats for grazing and received three to five voicemails or audio messages per day, which they shared with others. Some 82% of the women found learning in this way was more useful than face-to-face training. The reason was that the women learned as they moved, avoiding the need to waste valuable time attending classroom training. In this case, mobile phones supported learners to learn in their own time and at their own pace (Balasubramanian et al., 2010).

Furthermore, Kim (2009) illustrated informal learning in an action research study with indigenous children in Latin America. The children had no consistent access to formal education and were considered to be digitally marginalized people. Kim (2009) examined how the children learned with mobile phones. Children from 3 to 13 years of age used mobile phones to engage in literacy activities. The phones were preloaded with videos and exercises. The children had no reading materials or parents who could read, but with the mobile phones they were exposed to a learning environment. Hence, this study showed that mobile technology can be supportive and improve learning.

2.6 Summary

In summary, there is a rapidly expanding practice and research literature relating to the use of mobile phones in developing countries. However, most of the aforementioned studies originated before the smartphone expansion. With regard to findings from these studies, they clearly show the potential in using mobile technology to improve learning. Mobile phones were also found to be motivating and fun to use and learn; they were quickly adopted in daily routines. Whilst mobile phones were used to search for information or access educational content, they were mostly used for entertainment and communication, including social networking.

In these studies, this technology tool was seen to support social interactions and collaborative learning. It also acted as a mediator for curiosity-driven learning. Thus, the potential for mobile phones and learning development is high. Mobile technology is able to support existing practices and extend the capabilities of learning. In addition, mobile phones can be used anywhere and anytime; thus individuals can learn where and when they want and at their own pace. This opens up the possibility of using technology outside the classroom, away from educational settings. Thus, mobile phone technology presents an outstanding opportunity to empower people who are excluded from the formal educational system because of prohibitive school fees, a lack of time and so on. It can help to spur them on in their learning and knowledge production.

Existing studies have shown that mobile phones can enable people in developing countries not only to access information via the Internet, but also to stay informed and become active participants in society. Fulfilling these ambitions may, however, not be straightforward. Studies have shown an unfamiliarity with ICT tools. Consequently, they had less impact than could have been the case and led to a low improvement in digital competence. In addition, expensive mobile technology, costly Internet access, and a lack of broadband or wireless connections all create barriers. It is particularly difficult for the poor people in developing countries with whom this study is concerned.

With this in mind, there still remain many gaps in our knowledge. Together with those mentioned above, there is also an

Related studies

absence of in-depth studies. Use of multiple sources of data would also strengthen findings. Most of the studies referred to in this section used unilateral questionnaires or qualitative approaches such as inquiry, interviews, observations and so on. They also used a top-down and teacher-centered approach in which the success of the project relied on the pedagogical design. Challenges for future studies are thus to introduce bottom-up and learner-centered approaches in practice. Moreover, there is a demand for participatory methods that seek to understand the use of mobile technology on an individual level and in real life situations.

Furthermore, most studies relating to m-learning are set in a Western context and include mostly children and youths. There is a lack of research that takes a holistic and multidisciplinary approach, looking at real-life experiences and informal learning with mobile phones in developing countries. There is also a shortage of studies that examine the increasing usage of smartphones in daily lives, and the impact of the interconnections between technology, individuals, and social interactions.

3 Theoretical framework

ICT has a great impact on how we access information about the world, how we transfer that information, and how we acquire knowledge. However, in this thesis, the main focus in m-learning is on the learner; the provided ICT tool plays a relatively minor role. The tool itself does not create better learning processes and outcomes; however, there are aspects that are decisive for the quality of learning and knowledge production.

The constraints of new mediational means and any problems that arise must be recognized and discussed. Thus, it is necessary for learners to be able to receive digital information and demonstrate the ability to use new ICT tools. However, they must also understand what they are doing. Even more important, Bransford and Schwartz (1999) argued that the learner must be capable of “knowing with”. This capacity can be explained as the ability to interpret the surrounding world and judge situations based on previous experiences. This affects what learners notice in subsequent events in order for them to be able to make choices and take action when required.

It is nevertheless important in a modern society that learners first generate their own ideas about phenomena, and contrast their own thinking with that of others to enable critical thinking and create diverse viewpoints about issues. With the increased integration of advanced technology into people’s daily lives it is therefore important to analyze how users acquire and deepen their knowledge. In the case of smartphone-related m-learning, it is necessary to explore how people use them to learn, and how the learner uses their experiences and insights to participate in various contexts.

3.1 Sociocultural perspective

In 2010, Caballé, Xhafa and Barolli claimed that smartphones were not an appropriate tool to develop sociocultural learning; however, they were regarded as being good enough for evaluations of daily life experiences. In addition, Kukulka-Hulme et al. (2009) stated that the challenge in m-learning is to define the pedagogical theory that underlies the process. In m-learning, it is important to analyze the relationship between technology and learning. Many aspects of technology are already embedded in people's lives and within society as a whole. However, the interests of learners are also important; indeed, these interests drive the process and not the technology itself.

According to Laurillard (2008, p. 527): "Technology will probably not change what it takes to learn, therefore, but it may impact how the process of learning is facilitated". Thus, digital technologies represent mediating tools that can be used to connect formal and informal settings and establish structured support to formal, non-formal and informal learning. Consequently, the use of new technical tools by individuals means that the individuals themselves have to change, because of the acquisition of new knowledge and skills.

Rogoff (1995) emphasized the importance of inquiry in how people participate in sociocultural activity. In an inquiry-based approach, the learners' own devices act as mediating action tools (for example, smartphones, as in this study); they are used to support the routines of daily life. The learners are able to take control of their own learning and actively decide for themselves what to engage in, collaborate on, and share. This type of learning enables engagement, communication and active participation. It also develops creativity to generate ideas, understanding, and updated knowledge. The learners shape their own personal learning style, and assistance and scaffolding comes from peers, teachers, and the virtual community. As McLoughlin and Lee (2007, p. 668) stated, "It provides contextually appropriate toolsets by enabling individuals to adjust and choose options based on their needs and circumstances".

The sociocultural perspective argues that knowledge is constructed within a community through social interactions with peers and active participation. Thus, learning is a continuous social practice. It is a process that involves all aspects of an individual, with a focus on a change of attitudes, values, understandings, knowledge, and skills. It is thus not possible to separate a person from his/her context or the activity being performed (Gustavsson, 2002; Säljö, 2010a). Moreover, learning is a dynamic process, which involves active participation and social interaction within an activity (Wenger, 1998).

Participation is one essential aspect in the sociocultural perspective, and knowledge/skills can be acquired through participation in sociocultural activities. The way that learning takes place differs between societies, with people from different communities having a variety of experiences. Nevertheless, learning has many common features. In order to understand learning, however, one cannot define individuals and collectives only in terms of the surrounding world, technology and social circumstances (Säljö, 2013).

Thus, I adopted a sociocultural perspective in which it was necessary to investigate how individuals and collectives acquire and develop their knowledge, skills, and experiences. The backbone of this approach is the understanding that learning is a social process and that tools play a useful role in this process. Tools are used in everything we do; indeed, they are critical for how interaction takes place with others. Vygotsky labels interaction as “mediated action”; in other words, action involves mediational means and the people who employ these means (Wertsch, 1995). In social actions, when we act and interact with other people, tools mediate the outside world for us. In this thesis, technology-mediated learning is used, and the goal is to shape actions, not determine or cause those actions (Wertsch, Rio, & Alvarez, 1995).

Tools can be both physical and intellectual; for example, physical tools, or artifacts, can include a hammer or a book, or technology such as a smartphone. Access to mobile technology can facilitate communication and conversations, which supports the construction of knowledge production for learners. Thus, the use of technology and thinking are intertwined. Whilst a lot of work is

required to learn certain types of artifacts, others are less problematic to use (e.g., calculators). When learning to use tools, we bring into play our accumulated experience and knowledge of our society. Thus, they represent collective knowledge over time and are rooted in social relations.

Intellectual tools are thus linguistic and mental, as is also the case for experience and knowledge. By using language as a tool, knowledge is communicated. This is crucial for building up knowledge and skills. Accordingly, a written system can be different from one culture to another and, thus, can be considered as a cultural tool.

3.2 Social context and appropriation

The way in which learners acquire and master skills and knowledge is fundamental; this is referred to as appropriation. It may be intentional or unintentional. Knowledge can thus be regarded as situated, where understanding emerges through social practices (Sutherland, Lindström, & Lahn, 2009). Säljö (2013) argued that those who find it difficult to learn in a particular situation (e.g., English in school) may learn more easily in a different environment (e.g., using a computer at home). Thus, learning and knowledge become entirely contextualized and bound to their situation. As Brown and Duguid (1996) claimed:

Even when individual instruction is extensive, if the social context is missing, confusion and disillusion are likely. By contrast, even though instruction is minimal, quite complex practices can be learned effectively and easily where the social context is evident and supportive. (p. 51)

A cornerstone in the sociocultural approach is that our thoughts and actions in social contexts are situated. The mobile device acts as an artifact and mediates a user's actions, although these actions are not isolated in a social context (Uden, 2007). Accordingly, what is possible in a certain environment or activity is difficult to transfer to other environments. Hence, we live in a sociocultural reality with access to various resources and tools. Within this reality, we learn to act based on what our context allows and encourages.

Learners develop skills and knowledge when they engage in the processes of social communication and interaction, by sharing, and by using appropriate tools or artifacts that are embedded with information, functions, and routines. Participants are thus not isolated from social, cultural, and historical environments (Rogoff, 1995; Sainsbury & Walker, 2011; Wertsch, 1998). Indeed, there is an interdependence between the social and personal processes. As Wells (1999) argued, this relationship can be seen in changes that occur when more and less expert participants collaborate in a joint activity:

These changes involve a triple transformation: first, of the object or situation to which the activity is directed; second, of the ability to participate, and thus of the knowledgeable skills of those involved; and third, of the cultural artifacts and practices that are drawn upon to mediate the activity. (p. 140)

Vygotsky discussed the relationship between the learner and the social context in terms of the zone of proximal development (ZPD). Vygotsky (1978, p. 86) explained ZPD by stating “it is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers”. This requires the lowest threshold where instruction begins to be determined. The upper threshold must also be considered; here, the most important instruction must focus on the aim and the future, not the past (Vygotsky, 1986).

Thus, learning and development are linked together. Consequently, central to Vygotsky’s concept of ZPD is the ability of learners to learn and to collaborate on social practices in an environment with others. In this model, learners benefit and thus learn from meeting with someone who knows more. The capable person bridges the gap between what learners already know and what they need to know by scaffolding the activity (Säljö, 2010a; Säljö, 2010b). In the beginning, a great deal of support needs to be provided by someone more knowledgeable, although this support can later be reduced. According to Uden (2007, p. 87), “it is through the interaction with other learners and the teacher,

mediated by mobile technologies, that the ZPD emerges”. Consequently, communication is essential in a social setting, even though scaffolding knowledge is eventually appropriated and mastered by the individual (Sutherland et al., 2009; Säljö, 2010b).

Appropriation is when a person becomes acquainted with and learns to use cultural devices and understands how these devices mediate the world (Säljö, 2010a). In other words, the person who masters a technique can then guide the novice. During the learning process the novice borrows competence or “steals” knowledge of what he/she finds most appropriate (Brown & Duguid, 1996) from those who are more experienced. Gradually, a greater degree of autonomy develops to deal with an assignment. Generally, the learner begins as a participant and develops into an active and known contributor, who may even attain the level of an expert. Their participation changes from what Lave and Wenger (1991) have referred to as “legitimate peripheral participation”, where they simply observe or act in a secondary role, to one in which they gradually increase their responsibility and are able to manage the activity themselves. Accordingly, as argued by Vygotsky, the focus is not only on the product of development; the process itself is essential for development.

3.3 Sociocultural analysis

Mobile learning takes place in formal, non-formal and informal settings, and the largest proportion of adult learning appears in everyday informal learning (Frohberg, 2007). It is constructed by switching and engaging between contexts, social networks, topics, and “in between time”. According to Vavoula and Sharples (2009), there is a complexity in measuring informal learning:

By contrast with formal education, mobile, informal learning can be both personal and elusive. The learning may be personally initiated and structured, such that it is not possible to determine in advance where the learning may occur, nor how it progresses or what outcomes it produces. (p. 56)

We can, however, search for evidence of learning and observe how learners initiate and show responsibility for their own learning, as

well as acquire skills and concepts, collaborate and share ideas with others. Information and evidence can be collected from different sources of data and by using multiple methods. It is important, however, to be clear about which indicators to assess, from where to start and where one is headed in the learning process.

Rogoff (1995) argued that a sociocultural analysis of development on different planes is necessary in order to consider the relationship between the individual and social context. In Rogoff's analysis the assumption is that particular relationships occur on three different planes and that all three aspects must be considered for an analysis to be completed. The analysis consists of community, interpersonal and personal processes and makes use of the concepts of apprenticeship, guided participation and participatory appropriation.

Firstly, the concept of apprenticeship relates to the community level, where individuals cooperate with others in culturally organized activities. The purpose of this activity is that newcomers in the community form a group of people drawn together by a common interest to learn skills through participation with more competent people (Wenger, 2006). Apprenticeship refers not only to the relationship between an expert and a novice in which apprentices become more responsible, but also among peers who serve as a resource and challenge while exploring an activity (Rogoff, 1995).

Secondly, guided participation provides a perspective for the analysis of the events in everyday life in which individuals engage, and interact and collaborate with others. Sociocultural processes consist of a variety of forms of communication such as face-to-face interaction, side-by-side participation, tacit/explicit, or hands-on involvement in a guided collective activity. Guidance is directed by cultural and social values via collaboration, and can be direct or indirect structuring. People observe and participate; thus, communication and coordination with others are the key aspects in sociocultural processes. People's involvement in activities is motivated by purposes and deliberate actions; thus, understanding these purposes is of importance in the analysis.

Thirdly, the personal level of sociocultural activity relates to the analysis of participatory appropriation. It can be seen as the

way in which individuals change through their involvement in an activity and in their preparations for subsequent involvement in other activities. Thus, the personal process takes place through engagement and participation in an activity or situation. The participant learns from this and then acts differently in upcoming events. Consequently, such sociocultural activity involves active participation by the learners in which they collaborate and share in order to develop and change. Through participation in culturally organized activities, in which tools are important, the learner is involved in appropriation by personal participation.

The individual's development and ongoing development thus depends on personal active participation in events and transforms the individual's understanding to become more prepared in subsequent activities. Rogoff (1995, p. 157) argued that "in the participatory appropriation perspective, personal, interpersonal, and cultural processes all constitute each other as they transform sociocultural activity".

Nevertheless, criticism of the sociocultural perspective exists. According to Sainsbury and Walker (2011) there are major shortcomings. The sociocultural approach is reluctant to acknowledge the role of the active individual in processing ideas, and denies the possibility of transferring knowledge between different situations. It also rejects mental models for constructing learning and knowledge. Finally, the sociocultural approach can be difficult to manage because it is widely divergent.

3.4 Frameworks and concepts

From a theoretical perspective it is possible to conclude that human action is a tool-mediated sociocultural activity. ICT tools have a place and can be embedded in existing practices to impact social interactions and learning. It is thus significant to analyze how learning can shape and transform through the use of emergent technologies (Sutherland et al., 2009). This aspect resembles frameworks within the sociocultural perspective such as Koole's (2009) FRAME model (The Framework of Rational Analysis of Mobile Education), Rogoff's (1995) sociocultural analysis and

Theoretical framework

Silverstone, Hirsch, and Morley's (1992) Domestication of Technology Framework.

Figure 2 presents the frameworks and relevant concepts that are used in the present study. The framework put forward by Silverstone et al. (1992) is process-driven (shown in the center of Figure 2). Meanwhile, Koole's (2009) FRAME model relates to the interdependence of aspects (shown on the left-hand side of Figure 2) and Rogoff's (1995) analysis puts forward the relationships that exist between different planes (shown on the right-hand side of Figure 2).

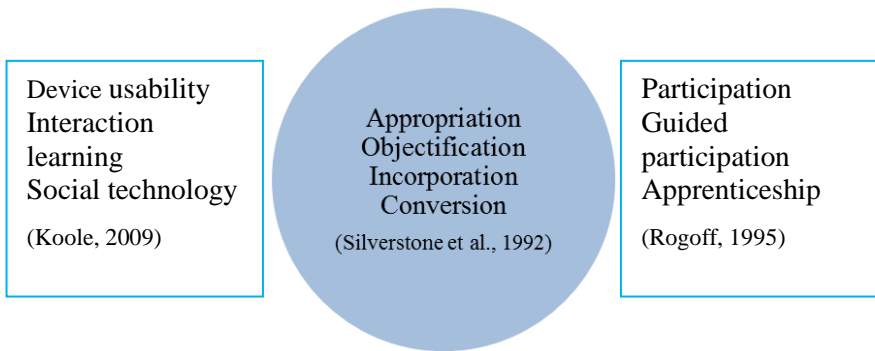


Figure 2. Frameworks and central concepts

Nonetheless, a common feature for all the frameworks is the importance of a relationship between mental processes and sociocultural setting in order to develop learning and knowledge production. Moreover, the approaches have in common such concepts as appropriation, participation, collaboration and social interaction in relation to technology.

In this thesis the smartphone mediates action, interaction and collaboration between people. Frameworks by Koole (2009), Rogoff (1995) and Silverstone et al. (1992) support a better analysis of the complexity of m-learning, including the convergence of learning, and social, and technological aspects. The

mobile device thus plays an equal role in combination with social and personal aspects of learning.

In fact, most people in developed countries, and increasingly in developing countries, have continuous access to the Web with portable mobile devices. Once again this fact affirms the importance of studying the role of technology in learning. It is not only important in terms of what and how much should be learned, but also in the way we interact with the knowledge of others and in situations that vary depending on cultural circumstances (Säljö, 2000).

Consideration must also be given to the particular cultural setting in which events and actions take place (Wertsch, 1998). According to Schoen (2011), knowledge of the local, situated context is of supreme importance in the sociocultural approach. This study therefore discusses how concepts and frameworks challenged the data gathered in the empirical setting of Kenya.

There is still a need to analyze how pedagogical perspectives transform and shape the real-life use of technology and vice versa. It is particularly important to understand the approach in order to test ideas in practice and determine the potential of a mediating tool for learning. A tool such as a smartphone encourages interaction and activity. This promotes the notion of learning as an active participation in the social process driven by interest and discovery, rather than the memorizing of facts and knowledge. The smartphone gives learners a chance to act and interact, thus initiating the learning process for themselves. It can then lead to the opportunity to incorporate sociocultural activities in formal, non-formal or informal settings.

The m-learning environment has the capacity to offer flexible learning with a personal tool. Thus, m-learning can be tailored to the learners' individual needs, encouraging them to update knowledge and further develop the skills and knowledge relevant for life. To meet the demands of m-learning, however, new pedagogical approaches may be needed. The impact of mediated action with the introduction of new technological tools demands more empirical studies that use a sociocultural approach to investigate authentic m-learning (Sainsbury & Walker, 2011).

4 Research questions

Existing studies and the desire to use a theoretical approach, were the motivation to analyze how smartphones support learning efforts in non-formal and informal settings. People spend a considerable amount of time learning informally (Livingstone, 2006), and smartphones may stimulate varied and innovative uses according to the learners' needs. Other important aspects include increasingly widespread smartphone use, and increased opportunities for poorly educated and impoverished people to make a difference to their lives.

Hence, the main aim of this study was to analyze the appropriation of smartphones to improve Kenyan runners' training, learning and daily life. At its core were the introduction of new ways of learning by using smartphones, and improved participation in and with society.

The present study is aimed at a purpose-driven intervention and implementation of smartphones for young, adult Kenyan runners for use in their daily lives. It analyzes how participation in learning is developed by the use of a digital resource. The research questions posed in this thesis are:

- a) *How does the appropriation of a smartphone by Kenyan runners affect training, social interaction and participation in m-learning?*
- b) *What are the implications of smartphone appropriation for Kenyan runners?*
- c) *How can smartphones act as mediational tools to improve daily lives and participation in m-learning?*

4.1 Structure of the papers

The cornerstones of this thesis are four papers, and Table 2 presents an overview of the entry points of each of them. The theoretical approach adopts a sociocultural perspective, which permeates all four papers to different extents. Different frameworks were used in the papers to challenge and analyze the empirical data. In addition, Table 2 shows types of data, units of analysis and the analysis approach used in the papers.

The papers did not derive from each other, so findings from paper A were not further developed in paper B, then paper C and so on. Rather, the data and preliminary analysis were discussed with the participants during the project, and the papers were written upon completion. However, the papers were interrelated in terms of the large amount of data collected, and the different units of analysis and frameworks of analysis used.

Table 2: Entry points of the papers

Details	Paper A	Paper B	Paper C	Paper D
Sources of data	Interviews Observations Fieldnotes Web inquiries Mobile log files	Interviews Observations Fieldnotes Mobile log files	Mobile log files	Activity reports and evaluations
Units of analysis	Individual Group Social interactions	Group Social interactions	Individual Group Social interactions	Technology Group Social interactions
Analysis	FRAME model	Domestication of Technology Framework	FRAME model	Content analysis

Research questions

To clarify, paper A took a broad approach by investigating the use of smartphone by Kenyan runners. The aim of the paper was to analyze training, m-learning and entrepreneurship by using such sources of data as individual interviews, group interviews, observations, fieldnotes, web inquiries and, to a limited extent, mobile log files. Units of analysis were the individual, group and social interactions. To challenge the empirical data from a sociocultural perspective, I used the framework of m-learning put forward by Koole (2009) the FRAME model (The Framework of Rational Analysis of Mobile Education) to analyze the interconnection between mobile devices, the learners and social aspects. The main research question in paper A was: *How can an inexpensive smartphone and simple native/web applications affect Kenyan runners' training, informal learning, and economic opportunities?*

This thesis as a whole, and the four papers included in the study, largely drew on the disciplines of education and social science; however, paper B also highlighted sports and development. The aim was to interconnect technology, learning, running and social interactions. Thus, mixed methods were used to carry out an in-depth investigation of smartphones in combination with running: these included individual interviews, group interviews, observations, fieldnotes and, to a limited extent, mobile log files. The objective was to analyze how smartphones were incorporated in existing practices and in everyday routines. A particular focus was on the use of smartphones by Kenyan runners during training and in social interactions.

The units of analysis were the group and social interactions. The analysis approach used was based on the framework put forward by Silverstone et al. (1992) called the Domestication of Technology Framework, which studies the way in which participants learn in and about their social world, and how they improve with practice. Thus, the research question posed in paper B was: *What impact do smartphones have on social and professional practice for a group of Kenyan runners?*

A deeper investigation of the Kenyan runners' daily usage of the smartphones was discussed in the third paper (C). This paper focused on how the participants utilized the smartphone, its

Research questions

applications and the Web to improve their learning, training, living conditions, and social interactions. Data collection consisted of mobile log files. The units of analysis was the intersection of learners, technology and activity over time. Koole's (2009) FRAME model of m-learning was applied to analyze appropriation and social interactions in this specific example. The research question was: *What new activities do the smartphones create in the participants' daily lives?*

The Kenyan runners showed an interest in learning, particularly in the area of human rights. The participants' rights are abused as poor citizens in the local society but also as runners abused by foreign managers. A Massive Open Online Course (MOOC) about human rights was thus designed. Unlike the other papers, which used PAR, this paper adopted a design-based research approach. Paper D explored the use of open and free (to any Kenyan participant) non-formal learning. Incentives such as digital badges and certificates were used to increase participation.

The paper evaluated the pedagogical challenges of learning human rights content via a MOOC. Consequently, a sociocultural approach was performed in practice. The sources of data were derived from evaluations and activity reports made during the course, and from content analysis. The main unit of analysis was technology, but group learning and social interactions were also used. The research question was: *How can non-formal educational experiences of human rights learning improve by the use of mobile technology?*

5 Research design and empirical context

This empirical study should be regarded as one of developmental intervention, because the researchers were initiators of the project and participated as observers. The purpose of the research was to implement an ICT tool, make the participants well-informed in their use of the smartphone, and follow the participants' appropriation and involvement in m-learning. Such a project may take the form of a case study (McTaggart, 1997) or an exploratory case study (Yin, 2009). Its aim is to come close to the users in order to describe, explore, and analyze daily activities in a real life context. This study analyzes how poor people in Kenya, who have running as an occupation, appropriate smartphones and develop their interest to learn with an ICT tool.

5.1 The settings

This research study was conducted from November 2011 to November 2012. It carried on for an additional six months in order to include follow-ups. The participants were located in two different settings in Nairobi: Kibera and Ngong. Hence, the case takes place in two locations to investigate the Kenyan runners' daily activities. The study can therefore be regarded as a multiple case (Stake, 2006). According to Stake (2006) a multiple case study can consist of a set of participants in different settings. Moreover, a multicase study recognizes that diversity binds the cases together, and provides opportunities to learn about complexity.

The locations were west of Nairobi city center; Image 4 shows a map of Nairobi West (2014) including Kibera (within the dashed lines) and Ngong.

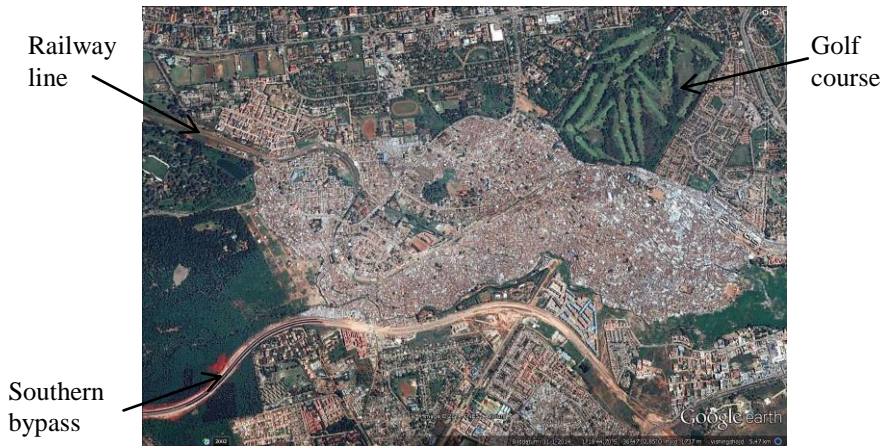


Image 5. Overview of Kibera

A zoomed-in satellite image (image 6) shows the crowded conditions in which the people of Kibera live. Although living conditions are severe, the participants in the study found Kibera to be more attractive than most other areas in Nairobi. The runners often stated “but Kibera is somehow good”. When we discussed the environment in Kibera and daily life there, the runners found that it was low class and that the costs of living were also low. However, participants from Ngong claimed that Kibera is a poor settlement and they are better off in Ngong.



Image 6. Kibera from above

5.2 Fieldnotes from Kibera and Ngong

To give some insight into the local environment and the empirical setting of Kibera the following was extracted from my fieldnotes from the first meeting with the participants in Kibera:

Early morning in Kibera. I am on my way to meet the runners and walking from Ngong road through Jamhuri Estate in to Kibera. Crossing the railway line, I notice all the children are in different colored school uniforms - the type is the same but you can notice the difference between schools by the color of the child's sweater. The children are carrying their school books and some of them even a lunch box. But the children have time to notice my appearance and call out "mzungu - how are you".¹¹ I reply "fine" and it goes on like that during my walk to the meeting point. Some of the children are curious and come to greet me and shake hands. Of course it's very nice to see so many children are happy on their way to school and there are many children coming from the shelters, some of the houses built only of mud with a simple sheet iron roof.

Smoke from charcoal stoves comes from most of the shelters, in the narrow alleys there is lots of garbage on the ground and dishwater flows along the muddy paths. But not least all the men and women seem to be on the way to something. However, my attention goes to the proud posture of the people and the flawless clothes they wear. I meet a number of men in suits, shirts and ties, and women in pure white dresses and hair styles that seem to come direct from the salon. Many of the youth and adults are busy with their mobile phones; talking, sending/receiving text messages and when I later talk to the runners all of them express the importance with Facebook.

¹¹ In Kiswahili a Westerner is called mzungu; the exact meaning is "the one who walks in circles"



Image 7. School children in Kibera



Image 8. School children in Ngong

Clearly, mobile phones are ubiquitous and an essential tool for most Kenyans of all ages. Marketing for the sale of new phones is everywhere, including in the slums. The interest for mobile technology is high, and demand for Internet access is growing. Image 9 shows an advertising board for the Internet in Kibera.



Image 9. Advertising board in Kibera



Image 10. Muddy streets in Kibera in rainy season

As previously mentioned, mobile phones are widely used in Kenya and the digital banking system known as m-pesa has an impact on residents' payments and bank transfers. Image 10 shows a street in Kibera with a typical m-pesa stall; this is a common sight.

Mobile phones can be charged nearly everywhere and Image 11 shows a mobile charger in a shopping mall in Nairobi.



Image 11. Mobile phone charger

Image 12 is an example of mobile charging in the streets and a customer paying for the service.



Image 12. Mobile phone charging station

To illustrate the runners' interest in participating in the research of smartphones, the following excerpt is taken from the fieldnotes of my first meeting with the group of participants from Ngong:

Will¹² and I walk through the center of Ngong town, which is a small but sprawling suburb with more than 100,000 inhabitants. The town center is also a hub for buses to and from Nairobi, and lots of buses are crowded in a small, dusty area behind the petrol station. The conductors from different buses call out to get our attention but we continue our walk to the conference hall at Bounty hotel, which is our meeting point for the day. We pass the market with stands of fruit, clothes, shoes and massai women selling necklaces and bracelets. The traffic is congested and Piki-Pikis' (moped taxi) zigzag between cars and buses.

Outside the conference hall we notice people who must be runners; some of them are dressed in track suits and all of them are very slim and fit. But we also notice that they are many. We count to 30, 40... oh no, there are more than 50 of them. Far too many and we didn't expect more than 20 runners. Will and I get worried, perhaps we are starting an intervention study which creates conflicts, because not all of them can participate in our research. But pretty soon we realize that we don't have to worry. The runners are all curious to hear more about the smartphone project and some of them are there to learn even if they are not directly involved in the project, and others are there if someone drops out.

Fieldnotes are essential because they are a commentary of what events are seen or heard in the field (Beach, 2005). Firstly, fieldnotes can be reflective writing; in other words, what was noticed and recognized as being important as it occurred. These notes are interpretive. They are facts only seen by me; thus, they are subjective. Secondly, I collected statements from informants, both in a formal setting (e.g., when we had workshops) or in an informal setting (e.g., when making small talk on the bus). In the study, a lot of information was garnered from casual conversations. Thirdly, objective facts were collected, such as the number of

¹² William Jobe, a PhD colleague and co-author of three of the research papers.

people, size, and so on. Fourthly, fieldnotes can expose the inner experiences and values of the researcher. Thus, my notes showed more personal assumptions and opinions regarding a participant's position in a particular setting or an event (Beach, 2005).

Thus, fieldnotes contain my observations, quotes from participants' own experiences, concerns, insights and interpretations. Emerson, Fretz, and Shaw (1995, p. 13) pointed out that, "...field notes offer subtle and complex understandings of these others' lives, routines and meanings". Additional fieldnotes were made every evening, after I had carefully read what I had written during the day from observations of formal and informal meetings. Additions were then made to the notes and an interim analysis was carried out. The aim was to have in-depth and comprehensive fieldnotes. An ethnographic term for this is "thick description" (from Geertz in Emerson et al., 1995, p. 6; Larsson, 2009, p. 33; Patton, 2002, p. 437/503; Rock, 2001, p. 30), which describes fieldnotes that are detailed, context-sensitive and locally informed.

It is important for the overall picture to have access to participants' life situations, social environment and backgrounds in order to analyze the context through direct observations, conversations and meetings. Rock (2001) stated:

The impressions and feelings of the observer become part of the data to be used in attempting to understand a setting and the people who inhabit it. The observer takes in information and forms impressions that go beyond what can be fully recorded in even the most detailed field notes. (p. 264)

However, there are two sides to a coin when carrying out participatory research in a foreign environment. I am both an outsider and an insider because of my knowledge of the culture and people of Kenya. This is thanks to my many years of experience in the country. In addition, the area of research itself is a collaboration that could lead to an insider perspective. Walsh (2004, p. 226) argued that the researcher can be a "member" or a "stranger". A "member" lives within the culture, while the "stranger" does not have access to the inner circle or inner world; however, he/she can become a "member" through participation. The advantage of the

“stranger” is that he/she can relate more objectively, or rather, can be distanced from the group being studied. I am familiar with the environment, but distance is maintained by moving back and forth between Kenya and Sweden. I also moved between theoretical perspectives and the empirical data, observations and analysis. Thus, the research can be considered as having taken place both *in* the community and *with* the people.

Cohen, Manion, and Morrison (2011) described situations in which females may feel more comfortable being interviewed by a female. As an outsider, I benefited in a similar way. Hammersley and Atkinson (1995) explained that male researchers may encounter difficulty when accessing the world of women if the culture has a strong division between the sexes. Accordingly, it is important to work with trust, and perform the interview as a conversation, allowing topics to emerge gradually.

Furthermore, when interviewing local people, being an outsider can be considered both an advantage and a disadvantage. I do not understand the local setting, which is a disadvantage. However, as a result of this, I have the advantage of not taking things for granted. According to Rock (2001), participant observation has an external perspective. By being an outsider, one can really ask naive questions about what is going on in order to gather information.

In my case, my questions were naive, because, as an outsider in Kenyan society, I did not know what was going on. The context itself was familiar, but the particular setting was not. I know Kenya well, but the daily lives of runners and the way that they learned were new to me. Thus, I asked naive questions in order to get a grip on peoples’ actions and reality. Such naive questions may not have been seen as naive by the participants. However, they might have done if I’d lived permanently in the community under study. Patton (2002, p. 179) argued that “these problem-solving and learning-oriented processes often use qualitative inquiry and case study approaches to help a group of people reflect on ways of improving what they are doing or understand it in new ways”.

However, whilst fieldnotes are a major source of data in qualitative research, they do have their limitations. It can be difficult to observe external events, to have time to take notes and ask questions. The researcher is also at risk of becoming too

involved (Rock, 2001). Nonetheless, Patton (2002, p. 21) stated that, "to understand fully the complexities of many situations, direct participation in and observation of the phenomenon of interest may be the best research method".

5.3 Participatory action research (PAR)

The PAR approach was used in this thesis; not only does it give a purpose to research and development, but it also enables local knowledge. The main research principles of PAR are to achieve good communication, cooperation, collaboration and trust (Lennie & Tacchi, 2013). These criteria are essential for improving and encouraging continuous learning, for creating new ideas, and for developing thinking and responsiveness to different attitudes and values.

A PAR approach is a powerful instrument and can contribute to significant differences in practice. Kindon, Pain, and Kesby (2007, p. 39) have claimed that it brings with it the "...possibilities of 'doing some good' *through* research...". Such social research, where the researcher intervenes, creates impact and seeks for change. Hammersley and Atkinson (1995, p. 15) stated that, "...ethnographic research should be concerned not simply with understanding the world but applying its findings to bring about change". Social change can be seen from many different perspectives; it is considered to be non-linear, diverse, emergent, contextual and complex. Often, it consists of unpredictable processes; thus, it is hard to capture and measure.

Moreover, development interventions may have contradictory effects on different people or groups, especially vulnerable, marginalized people. An understanding of the local culture, as well as the context and relationships between participants and the context, is however important in terms of the impact of social change (Lennie & Tacchi, 2013).

The deliberate and bottom-up approach of PAR means that there is a possibility to find depth and width as well as detail in order to understand situations, ongoing practices, actions and reflections of participants' daily lives (McTaggart, 1997). Research is not passive or neutral; rather, it is active, creative, subjective, and

interpretive (Rock, 2001). Participant observation requires field work, which involves personal meetings and direct contact to create understanding about the participants' reality. This allows the researcher to prioritize nearness in order to identify the choices and actions made in daily activities. Even if the observing researcher is present, there is an ambition to distance him/herself in order to make an analysis. Objectivity is thus not compatible; indeed, it may even be impossible.

Interaction, communication and collaboration are the cornerstones of a sociocultural approach, as well as of PAR. Such approaches involve collaboration with the participants (Argyris & Schön, 1989; McTaggart, 1997), who can be considered as “co-researchers” thanks to their involvement in the process. The process is orchestrated by the researchers, but designed by the participants, and aims for action implications (Whyte, 1991). Rock (2001, p. 28) stated of the informants that, “in acting, they will learn about the world and so reformulate their ideas; and that reformulation, in its turn, may induce them to return to the world with new questions which can lead to yet newer ideas...”.

For the action part of PAR a smartphone can act as a powerful and flexible resource for different activities and diverse visual content. In this case, increased learning can lead to the improvement of daily lives and greater income for the Kenyan runners. The process of research collaboration was not controlled or managed by the researcher, but by the participants. The co-researchers were not only sources of data, they also affected the research design and data collection, and to some extent the analysis. Participants were not only aware that they were under study, but also that they were involved in managing the process, were acting deliberately and responding to opportunities.

According to Argyris and Schön (1989), PAR aims to create an environment in which the participants contribute and achieve valid information, make free and informed choices, and create a commitment to their inquiries. Thus, it was an open-ended design process for which the researcher and participants were jointly responsible.

In the PAR approach used in this study, the participants mutually affected the process, which then created a deeper study.

The participants' strong interest for learning new skills influenced this process. As a collaborative approach, PAR aims to increase our understanding of what occurs in practice for participants and implement change for the individuals. Additionally, PAR fits with a sociocultural approach, because it is a way of explaining a particular social world. It does so by working with people who construct, explain and improve their life conditions through collaboration and communication with other participants (Kindon et al., 2007).

Collaboration through participation means that the researcher must build confidence, trust and friendship in order to be allowed into the social context; otherwise, not everyone will open up. There is a clear gap between the participants and a middle-aged, male researcher from Sweden who cannot fully speak the Kiswahili language. On this latter point, English is a common language for Kenyans. Having been in Kenya for several periods over the past 15 years, however, I have been able to build up a personal network. Hopefully, although I did not know the participants personally, this nonetheless allowed them to build up trust in me. After a while, many of the runners began sending me e-mails or chatted via Facebook; for me, this was indeed a sign of trust. Communication took the form of greetings or information about their training and previous competitions. What was clear was their eagerness to improve the project. Below is an example of an e-mail conversation with Dennis, which took place about halfway through the project:

Hello Mzungu, Kenya has become boring or??? You are away for too long now. We miss the sharing in many areas. We would now be finishing an online course and graduate. Anyway it's just a reminder you had some commitments. So far so good to many of us. Thanks.

Another example of trust and collaboration between the researchers and participants can be exemplified by an excerpt from the fieldnotes:

I stop by the runners' camp outside Ngong. Several runners are there and are preparing for their training session. I ask them about the status of their smartphone. Moses tells me the smartphone got wet during the rainy season and is not working properly. He has

problems with some applications. I give him the receipt and tell him to go to the store and ask them about the warranty. Joyce's smartphones has also been wet, due to the fact that she dropped the phone in a bucket of water. But happily she tells me it has been solved because she dried all the parts in the sun, and the phone is now working again. Caroline approaches me and her GPS doesn't work. We agreed to consult my colleague William.

A training group of runners can consist of more than 60 individuals, including key persons or gatekeepers who are essential for access to interview time, information, opportunities, and so on (Walsh, 2004). Depending on the sensitivity of the projects, these gatekeepers can influence the direction of research. Not only can they paint themselves, and others in a favorable light, they can even prevent information or contacts that is unfavorable to them from surfacing in interviews.

Gatekeepers have expectations of the researcher, and my ambition was that they saw me as a committed and skillful person; someone who takes an interest in their ideas and wants to support their learning and improve living conditions. I came to understand that the key persons (two people in each setting: Kibera and Ngong) were exceptionally trusted by the runners. Therefore, my relations with these key people brought good value to the project, which was important for the upcoming interviews.

Hammersley and Atkinson (1995) claimed that participants often have more concern for the person carrying out the research than the research itself. I was aware of this, so during our first meeting with the runners, I knew it was important to make a good impression. For example, I paid particular attention to how I dressed at our first workshop; I wore a finisher t-shirt from a marathon and running shoes. I also carefully planned what to say initially, so as to connect with their primary interest, namely running.

In this study, the researchers acted as facilitators and provided the participants with advice and guidance, which involved and engaged them in increased challenges as the tasks became gradually more complex. Ideas for change therefore developed through deliberation and reflection. What was interesting was not

the ideal type of field research, and the timescale depends on the purpose of the study and research questions.

The approach used in ethnography aims to identify and describe what happens in different settings and daily activities. A common feature of ethnography is fieldwork, a method that raises several issues, including time span, setting, target group, and documentation. Time is sensitive and, of course, it is important to spend significant time in the field to gather valid data. Most important, however, are the activities carried out by researchers whilst they are in the field.

Several methods can be adopted, ranging from “fly-on-the-wall” style observation, to engaging in the lives and concerns of those being studied (Emerson et al., 1995). As far as I was concerned, it was necessary to follow the project over time and provide continuous, formative feedback to the runners. The study used an open-ended approach, starting with general research questions. This method required a fair degree of open mindedness and flexibility.

After a few months in the project the research questions were narrowed down based on new insights that emerged from the fieldwork process. These new ideas came up during my discussions with the participants and my evaluations. Some of the ideas were implemented in reality as a course on human rights and as slum runs. Thus, this study took on a spiral research design, which started on a small-scale and developed through a continuous learning process (Cohen et al., 2011; McTaggart, 1997).

This process was, however, not straightforward. Indeed, one of the first questions posed by the runners at the initial workshop was whether they could still be included in the study if they did not excel in their running during the research period. In addition, as the researcher, my concern was to maintain the balance between intervention and the participants’ activities. The intention during the whole project was that the runners could utilize the smartphones as they wished, and the researcher’s role was to collaborate and support the initiative. We also noticed a higher frequency of activity during our fieldwork in Kenya. Whilst it was initially thought that the participants would not use the smartphones or not learn much, these fears were certainly not

realized, as can be seen by the high levels of activity and the large amount of log data recorded.

Accordingly, my role as a participating observer changed over time. In the beginning, I was an initiator, orchestrating several workshops and ideas for actions (e.g., learning opportunities and suggestions for income-generating activities). The longer the project continued, however, I took a step back in order to observe the participants, and their behavior and actions. I returned regularly to the participants and took responsibility for the workshops, but their own influence over the content was strengthened over time. Thus, the research focus shifted over time, based on what was happening in the field. According to Walsh (2004, p. 230), "one of the strengths of ethnography is its open-ended nature".

5.4 The study and its participants

The project was conducted in collaboration with another PhD student, William Jobe from the Department of Computer and Systems Sciences at Stockholm University. My field was within learning and education, while William's was in technology and its development. Thus, we complemented each other and worked together throughout the project. Our collaboration took the form of joint involvement in planning, implementation, discussions, and evaluation. We also co-authored three research papers. In both the project and the fieldwork, William had responsibility for technical issues associated with the device and educational platform. My responsibility was for the interviews, observations, fieldnotes, workshop content, and educational content in the non-formal course.

The research project itself ran for one year (November 2011 to November 2012). For the six months that followed, evaluations took place (to May 2013). In field-based research the length of the study is critical; too short a time would ignore any effects of the process (Cohen et al., 2011). In fieldwork, data is usually collected over a longer period of time. As previously mentioned, I chose to follow the project on site over different time periods, rather than remain permanently in the field. During the project year I visited Kenya on five occasions.

Familiarity and trustworthiness are both key to studying human context with the aim of expanding the knowledge of others. The more experience a researcher has with the participants' actual setting, the better. Thus, it was important to keep returning to the field. In so doing, it demonstrated interest and concern (Beach, 2005). Faith and trust are built for the long-term by someone who knows and cares about what is going on, and is known, rather than by someone who turns up occasionally. By returning to the field and the participants, I was able to convey my seriousness and interest in understanding their daily activities. By returning, I was able not only to observe, but also to deliberate on the research and search for a way forward. From such deliberations came several interventions, such as the educational course on Human Rights and the slum runs. The latter led to a mobile website, from which tourists can now book slum runs.¹³

The study began by conveying the purpose of the project in advance by e-mail to the key persons; namely, the running coaches in each setting. I had already met them through various projects in Nairobi. Indeed, the coaches selected the participants for this study. The selection was based on consistency in training, as well as the runners' strong interest in participating in the project. A further selection was made by a lottery organized by the coaches.

The participants consisted of Kenyan runners from the slums of Kibera and from Ngong. In total there were 30 runners (21 men and 9 women) aged between 19 and 34 years. I knew three or four of the runners personally before the project started. The runners in the two settings were considered to be semi-elite (in terms of racing, their results are just below those of elite runners), elite at the national level, or world class elite (competing in international races). The vast majority of the participants concentrated on marathon running, because of the amount of money that can be won in such competitions. They mostly trained between two and three times per day to fulfill their goals. The runners were hardworking and disciplined in their ambitions to become world class runners. Running is one way that Kenyans can rise out of poverty and assist their families. All of the runners came from poor

¹³ www.slumrun.com created by my research colleague William Jobe.

backgrounds and had no or little income; there were a few exceptions, including those who succeeded in the international arena.

Several of the runners had only completed primary school education. Most of the runners had attended secondary school for a few of the stipulated four years; however, they had left early, without completing, because of high school fees or to pursue their interests in running.¹⁴ Some of the runners moved to Kibera/Ngong primarily for training opportunities (high altitude and varied topography), but especially to train with other talented runners. It is also possible to train within a group of more well-known runners, who have been successful in the international arena. Training in a group is an important element for Kenyan runners. It spurs them to train and compete against each other, and creates high-intensity training sessions.

All the runners in the study already had a simple mobile phone, but were not accustomed to smartphones. The participants had limited computer skills, ranging from being able to send emails to carrying out simple searches on the Internet. It was thus important for us to keep the technology as simple as possible. The reasons for this were:

- i. *Pedagogical*: we wanted the technology to enable the project rather than dictate its aims and shape. Also, at the start, we only had existing applications for Android phones,
- ii. *Practical*: smartphones that are too advanced can become a serious barrier to engaging with a mobile learning activity and;
- iii. *Security*: a simple smartphone minimizes the attraction value for others and reduces the risk of theft.

All 30 Kenyan runners were provided with a simple Android smartphone (Huawei Ideos). These cost US \$80 and were available in Kenya.¹⁵ Free Internet access up to 1.5 GB traffic/month was

¹⁴ See information of the participants in Appendix A.

¹⁵ During the course of our study, rapid smartphone expansion took place, leading to lower prices. By the end of the project, smartphones in Kenyan shops only cost US \$65.

available for one year. Image 13 shows the actual smartphone used in the research project.



Image 13. The smartphone used in the study

The participants chose how and when to use their smartphone. They were encouraged to use it according to their own interests and to use those functions that supported their training. The smartphone had many functions, including a built-in camera for recording video and audio, and GPS-tracking, which automatically provided the location of the phone. The phone itself could be used during training secured in an arm pouch.

Every phone that was provided to the participant could be tracked, and all data traffic was registered by a program named Phonebeagle. This registration meant that the number of text messages sent and calls made, the GPS location and web pages were all stored. Also recorded were the websites visited by the user. This created important information that could add nuances to the subjective images that emerged in the formal interviews.

The participants were well informed of the tracking, and it was thoroughly discussed both within the groups and with the researchers. Permission from each runner was given in a written, informed consent letter.¹⁶ Naturally, it created an ethical discussion of the research design, and was continuously discussed when we had workshops, conversations, and interviews. We reminded the

¹⁶ Appendix B.

participants of the tracking because, when they got to know you as a person, they tended to forget. They responded with “we have nothing to hide”.

Images 14 show the runners using the smartphones and interacting during workshops.



Image 14. Participants collaborate and interact during a workshop

5.5 Data collection

We orchestrated a learning process and drove this process forward by organising a total of 15 days of workshops within the project period. These workshops were held in Nairobi and attended by the runners. Table 3 shows an overview of the data collection, which was carried out through workshops, group and individual interviews, observations and fieldnotes, web inquiries, and mobile logging. There was thus a comprehensive and structured approach to the analysis of the runners’ daily usage of smartphones.

Table 3: Sources of data

Method	Participants	Details
Workshop	30	Held on four different occasions (15 days in total) Included technical issues, discussions and proposed learning applications/web sites Documented by fieldnotes
Group interview	1 st 25 2 nd 21 3 rd 16	Held on three different occasions; initially, after one year and then six months after the project ended Includes evaluations at 2 nd and 3 rd interviews Randomly selected groups (4-6 in each group) Lasted 50-60/70 minutes All interviews recorded and transcribed
Individual interview	27	Held on one occasion (in the middle of the project) Lasted 45-60 minutes All interviews recorded and transcribed
Web inquiry	19	Online inquiry with short answers
Observation	30	Formal observations Informal observations and conversations Documented by fieldnotes
Mobile log	29	3 smartphones for 1-3 months 6 smartphones for 4-7 months 20 smartphones for 8-12 months ¹⁷ Compiled by a tracking program

¹⁷ The tracking program didn't work on one smartphone and therefore the phone was not logged at all.

We recorded the first two formal sessions (workshops) with the assistance of a Kenyan documentary filmmaker, who was also helpful as an interpreter (Kiswahili to English). These workshops can be seen as educational training meetings in which the researchers and the participants met to discuss technology, and learning.

I conducted semi-structured, in-depth interviews, both with individuals and with groups, in order to understand the participants' daily lives and actions (Bryman, 2008; Yin, 2009). I was guided in these interviews by a list of themes, issues, and questions. The questions did not follow the same order for every interview, because I felt it was more important to have a conversation than to simply check off questions as they appeared on a list. Nonetheless, the same questions were asked in every interview. Indeed, for subsequent interviews the questions were changed based on the previous interview.

The group interviews were conducted at the start of the project, whilst individual interviews took place in the middle and group interviews at the end. In some of the interviews I used an interpreter, because the respondent did not feel comfortable with conversing in English. The male interpreter lives in Kibera where he works with volunteer projects and is previously known by most of the runners.

The interviews were all conducted in surroundings that were familiar to the participants, either at their usual meeting places (e.g., an office, or assembly hall), or in some cases at a nearby coffee shop. Some of the interviews were disturbed by the sound of loud music or heavy rain on the sheet iron roof, which made it difficult to hear the interviewee. The noise was also detrimental to the sound quality of my recording.

First, group interviews were performed (November 2011) with five randomly selected runners in each group. I chose group interviews so as to involve collective activities, which are an important aspect of the PAR approach (Cohen et al., 2011). In total, 25 runners out of 30 attended these interviews, and each group interview lasted between 50 and 60 minutes. The interviews, which were conducted on the day that the runners received their smartphones, established current practice. They also offered an

opportunity to discuss the runners' experiences of mobile phones and computers, as well as their personal background (e.g., family, education, etc.), any sporting goals, the runners' expectations of the project, and societal issues.

At first, the Kenyan runners were shy, and therefore not easy to interview; for example, one of the participants stated, "because being shy, you don't want to show that you don't know". According to Hammersley and Atkinson (1995), however, group interviews can complement individual interviews. By involving several people, the interview situation can seem less strange to the interviewees, thus encouraging them to express themselves.

The individual interviews (April 2012) each lasted between 45 and 60 minutes and included 27 runners.¹⁸ Each interview started with small talk and general questions about training and running, allowing me to show the participants that I know something about their lives. I then focused on the learner's experience of using their smartphone. The conversation continued with discussions about the usage trends from the mobile logging. Transparency, and access to and control of research findings are all central to PAR. Thus, by sharing with participants the data gathered from tracking mobile phones and from some of the events staged, I was able to increase the transparency of the project. It was possible to show not only the purpose of the log, but also the fact that we were not hiding data.

The aim of the interviews, therefore, was to capture narrative descriptions of what the runners did with their smartphones, as well as their behaviors, experiences, skills, knowledge, and what they would like to develop in the future. Thus, the runners were able to reflect on issues that extend beyond the tool and technology itself, to focus on challenges and further explore how smartphones can be used to affect real life.

For many of the participants it was the first time they were interviewed for research. Indeed, I sensed that the last interviews were better than the first ones because I also learned to adjust to the participants. In the beginning they may have had expectations of

¹⁸ Three of the runners were out of the country and not reachable, despite attempting to contact them using Skype. Reasons for this could be either lack of Skyping skills, or lack of time.

the interviews; they may, perhaps, have been expecting to be tested because they were meeting an educated foreigner (Hammersley & Atkinson, 1995). The runners were more relaxed when they were asked open-ended questions that focused more on “how” they used the smartphone and less on “why” (Yin, 2009). A friendly atmosphere also helped to put them at their ease.¹⁹ Nonetheless, they were probably more serious when interviewed by a researcher, which discouraged them from talking freely.

Notably, Kenyans, tend to answer denial questions in an affirmative way, something which is in contrast with my culture.²⁰ Initially, it was confusing; however, I realized I had to re-state the questions in another way in order to understand the conversation correctly. I also asked some leading questions. As Livingstone (2006) pointed out, there is a tendency in empirical research to focus on informal learning because, until they are interviewed, most people have not yet had a chance to reflect on their unintentional learning. Kvale and Brinkmann (2009, p. 172) argued that, “...the qualitative research interview is particularly well suited for employing leading questions to repeatedly check the reliability of the interviewees’ answers, as well as to verify the interviewers’ interpretations”.

The final interview session (November 2012) was considered a group interview, even though it comprised one group with only two participants. The other group interviews were randomly organized, with between 4 and 6 runners in each group. A total of 21 participants were interviewed for between 50 and 70 minutes each. I started each interview with an exercise aimed at creating an impact evaluation. Each participant was given a bunch of post-it notes and assigned five minutes to complete a task, which was to create word associations with “smartphones”. The participants wrote one word on each post-it note. They then ranked the three most important words or concepts. The interviews began with a discussion based on the runners’ notes, because I felt it was easier

¹⁹ All interviews included chai, which is tea with a lot of milk and sugar, and chapati, a sort of Indian flatbread.

²⁰ For instance, in Kenya, a follow-up question such as “*you haven’t been training today?*” could be answered with a yes if he/she has not been training; in my cultural setting, however, the same person would have said no.

to deliberate issues in this way. All the runners contributed highly. In this session we did not have an external translator; thus, if someone wanted to express his or her opinion in Kiswahili, the other runners in the group translated. The reason for not having a translator was to have a more open and free discussion.

Some months after the formal end of the project, I once again evaluated the research. At this time, the project was no longer assisted with Internet data bundles for the Kenyan runners. I conducted group interviews to discuss the current situation and compare it with previous experiences. In total, 16 runners were interviewed in this final post-project session (May 2013),²¹ which was a lower number than expected. Even though I spent some considerable time in Kenya, it was sometimes difficult to arrange the interviews. An extract from my fieldnotes illustrates my dilemma:

I arrive at the venue half an hour before the stipulated time which is 11 am. I order chai and chapati for today's interview participants. Time goes by and after I made some phone calls runners turn up around 1 pm. They are tired after today's training and some of them call me to rearrange for another day. I get a bit stressed because I am in Nairobi for limited days and would like to conclude my interviews, but there is not much to do other than accept the fact. However, those runners who came contributed in a good way and we had a fruitful discussion.

I did not successfully interview all the runners in every session because they were either racing abroad or were absent because they were visiting relatives up-country. All runners, however, were at least interviewed at some stage during the project. In total, 27 individual interviews were conducted and 30 participants made 62 attendances at group interviews.²²

All interviews were recorded on a digital Dictaphone and transcribed verbatim. Although I felt that undertaking the

²¹ One of the smartphones was stolen towards the end of the project and the participant had to leave the project, thus the participant couldn't attend the post-project interview. But the smartphone was logged for 12 months.

²² See the participants' attendance information in Appendix A.

transcriptions myself was important, because it would allow me to become familiar with the data, it was a time-consuming process. Thus, a Kenyan typist transcribed 10 of the 27 individual interviews. This person was not familiar with the runners, allowing the runners to maintain their anonymity. The typist could also listen to the interpreter's translation during the interview. To ensure accuracy, I also listened to the recording and followed the script, adding how things were said and tone of voice. In some cases, I used my fieldnotes to add details about body language or if I had not understood the questions fully. The remaining interviews, I transcribed myself.

In my writing (including the participant information given in Appendix A), the runners' real names were changed to pseudonyms to maintain anonymity. However, the names of places were not changed. Kibera and Ngong are highly populated areas with many runners, so it was not necessary to change the names of the locations. Rather, it can be important to know where the study was conducted when discussing bias.

The empirical material also consisted of a web inquiry, which required short answers. This was distributed halfway through the project. The inquiry was anonymously completed by 19 runners.²³ Moreover, data was collected from formal and informal observations. Hence, even the informal sessions produced important data. I tried to be open to all possible information during my time in the field. Thus, I paid attention to discussions with the participants on the bus, during training, in the runners' camp, and so on. Patton (2002, p. 286) noted that, "one can't anticipate all the things that might emerge during unplanned program time, so the observer watches, listens, and looks for opportunities to deepen observations, recording what people do [...] and in particular, what people say to each other".

There was great potential for data collection outside the formal setting. Thus, it was important that I also listened to the participants before and after regular meetings. Usually, I was with the

²³ Questions such as: *Describe how you currently use your phone on a typical day? If you search the Web what do you search for? If you search the Web, can you provide an example of something you have learned?*

participants in their home environment (Kibera and Ngong) throughout the day, including during workshops and in interviews. We also had informal conversations whilst travelling on the local bus, over lunch or when I visited their homes. Many of the runners wanted to show how they lived and introduce me to their families.

5.6 Field work

Length of fieldwork study is an issue that has been much debated by researchers. In this study, my interest was in studying the way in which people actively use smartphones in their daily lives. In particular, I wanted to identify conditions, perspectives, and ideas within the context of the participants' setting, and any events that took place there. Years can be spent undertaking fieldwork. What is most important is to spend that time wisely by considering the kind of data needed and how that data can be acquired. For my part, I chose to return to the field at regular intervals. In between my visits, I communicated with the participants via email or Facebook (chat).

During my stay in Nairobi I chose not to stay with the participants, mainly because I thought it would disrupt their training. Most of them stay with their families, whilst some of them stay in a camp. A camp commonly comprises two or three rooms that house between 12 and 20 runners. At the camp they train, eat, and sleep day in and day out. The runners who stay in camp choose to stay there either to maintain their focus on running, or because their relatives live up-country and have no other place to stay near the training ground. Alternatively, they may simply wish to leave the slum and all its distractions.

Thus, whilst I was invited to stay with them, I chose instead to stay in a nearby guesthouse. This made it possible for me to write up my fieldnotes at the end of each day in to plan upcoming events. It was also a matter of security, because staying overnight in the slum would have put my safety at risk, along with that of my host family. On some occasions, I did stay overnight in the running camp. Likewise, I did make several home visits during my trips to Kenya. On the whole, however, I could not see any added value to

my research in staying with the runners or their families during the period of study.

During an overnight stay in the camp, I made direct observations. Below is an extract from my fieldnotes that illustrates these observations:

I travel by matatu (minibus) from Nairobi city center with Anthony. Now, his family is back in Kibera again, but his daughter is not feeling well. Anthony has hurt his foot and cannot run. No wonder you twist your ankle on these roads. There are potholes everywhere. We stop in Ngong and buy blankets, mattresses, dishes and toothbrushes (some of them only use a stick for brushing to save some money) for the camp. We walk around among the small shops, dhukas, and it is dusty, dry and hot, and a lot of people are passing by. We discuss his training and use of the smartphone, and he claims that his training has improved with the smartphone.

Anthony orders a Piki-Piki (moped taxi), and he leaves himself once with the stuff, then the second time we go all three of us. It is very bumpy to ride three on a moped on these bad roads. We go up to the camp and there are 8 runners (of the 12) inside. We change and go out for a run. The runners with smartphones either carry it in their hand or with an armband, and sets the application Runkeeper with loudspeakers to call out the pace and distance.

This was an example of how the runners appropriated and mastered smartphones and their applications in their professional development. The use of such mobile devices supported their running and extended their learning. It did so by allowing them to analyze data about running. The runners were also able to search on the Web for running-related information, including training programs, rehabilitation and nutrition advice, and information on upcoming competitions. As such, their combination of running and mobile phone use can be recognized as m-running. From a sociocultural perspective, the learning process and outcome were shaped by the interdependence between the learner and the context (Sainsbury & Walker, 2011). My fieldnotes from the visit at the runner's camp continue with:

It gets steep immediately, from 1 925 m above sea level to 2 010 m, and it is difficult to breathe because I'm not used to the high altitude. But the pace is slow so I manage to keep up. We are passing locations called South Africa and Zambia, several masai women with firewood on their backs (looks really heavy) and masai children waving and shouting "how are you". We run down (circular orbit) and meet secondary school students in school uniforms on their way home. It goes faster downhill (from 5:30 min/km to 4:45 pace) and I am breathing heavily. The runners don't say much because they don't want to spend energy talking. The only sound we hear is from our shoes touching the red soil. The roads are dusty, but extremely beautiful when we run on the plateau. Beautiful landscape with acacia trees and Ngong hills is visible in front of us (the peak is 2 460 m above sea level). We are running for 65 minutes and it is easy running for Kenyans but I notice that they are at least sweaty.

Coach has heated water and I get a plastic bucket of warm water for my shower. The runners relax and there is not much to do at the camp. Some of them spend some time with their smartphones: search on the Internet, viewing images in the phone and transferring them to one another via Bluetooth, and most of them listen to music on the phone.

The camp is sparsely decorated. Potato sacks for the windows, a plastic sheet for the little shower, only a light bulb in the ceiling, a small TV and 12 people in 3 rooms. They sleep two and two in each bed. Beds are wide and they think it is better to sleep a little crowded because then more people have the chance to stay at the camp (free accommodation and food). They are organized in cooking teams and two of the runners start with the fire. It is charcoal on a jiko (open fire). It gets dark and takes a long time for the water to boil. Three hours after our running session we finally eat something. They serve an enormous load of ugali with sukumawiki (maize porridge with fried vegetables). The runners eat incredibly fast and have eaten everything in no time. It is more difficult for me. We look at their pictures from their smartphone camera on my computer and everyone wants to add theirs and show the others. Most are self-portraits, but Samuel takes really good pictures from everyday life. He clearly has a talent.

Coach starts to talk about the rules and safety. He is particularly upset that the girls do not announce where they are going when they leave the camp in between training sessions. The week before they have created their own rules for the camp and coach dislikes that they are not following them. They contacted me by email concerning the rules and I just recommended they create their own rules. But the girls have been given a warning because they have not followed the rules.

They offer me a bed, but I refuse. I take my mattress and lie on the floor in the kitchen. It is warm from the heat of two jikos, and outside it starts to get chilly. I don't bother with mosquito nets and fall asleep. Anthony knocks gently on the door at 6 am and tells me it is time for the morning run. It is chilly but shorts are good enough for the run (I'm used to Swedish weather). However the Kenyan runners wear hats, long sleeves, jackets, etc. I think both of us are thinking you are a bit crazy to dress like that. They set their smartphones and start to run at low pace. No one speaks and it is uphill. In the end the pace gets faster and we cover 12 km in one hour. I shower in the plastic bucket again, and wait for chai (tea with milk and a lot of sugar) to boil on the jiko. We drink the sweet tea with two plain sandwiches. I say good-bye to the runners and catch the matatu back to Nairobi.

This narration not only shows the basic living conditions at a running camp but, as mentioned previously, is also an indication of appropriation, and how the smartphone was incorporated by the runners. The runners mastered, used and interacted with the technology. They searched the Internet, read news, collaborated, shared data and images, and gave feedback to each other on applications, playlists, and so on. In order to handle problems or challenges the individuals were often assisted by their peers. They were actively involved in using different strategies developed in the process, or borrowed from others to find alternative approaches to making use of the available digital resources.

The main purpose of the runners was to be supported in their running and to improve their training; however, other goals emerged during the process, such as staying updated on current events, to have access to social media, and to improve computer

literacy. The runners thus changed from having what Lave and Wenger (1991) described as peripheral participation (by observing) to being responsible for managing activities themselves. Borrowing Rogoff's (1995) concept of guided participation also illustrates the activity and interpersonal process.

In order to increase the runners' participation in developing their learning and to analyze their work as runners, I also attended several of their training sessions and competitions. Sometimes, I was there as a participant, whilst at other times I was a spectator. Either way, I was able to gather additional observational evidence.

Image 15 shows an interval session that took place on an open field outside Nairobi. It is an example of participant observation (the author can be seen in the background). Several of the runners used their smartphones during the training session, either carrying it in their hand or attached to the arm.



Image 15. m-running

In particular, I undertook two- and three-day excursions with a large group of runners to participate in two competitions held in the Rift Valley. A sequence from my fieldnotes illustrates my participation in one sociocultural activity, the Masai Mara Marathon:

I am invited by the gatekeeper in our project to follow him and the runners to a race in Masai Mara. Pleased by the invitation I accept

and together with 14 runners from the target group we travel through the Rift Valley. I am amazed by the beautiful view when we reach the escarpment, but the runners are more hardened and have full focus on their smartphones. Instantly during our four hour ride they use the phone. The runners browse, discuss and share pictures and videos. It is mostly from their own training and competitions they have attended. The runners watched Youtube and the most popular was the world record race in Berlin a few weeks ago.

To stay overnight at the runner's camp and to participate in their event was evidence of the trust and confidence I gained by collaborating and working together to improve their living conditions. The stay also created valuable insights about the runners' lives, something that was useful for me as a researcher, helping me to understand 'the other' and their social world.

Fieldwork is about empathy (Rock, 2001), which means taking the other's point of view, exploring their everyday life, feelings, experiences, and so on. Empathic ability includes having a cognitive understanding of 'the other'. However, it is also emotionally affected by being able to express an understanding for their situation and showing consideration. In other words, it is not possible to be empathically neutral when encountering another person. When undertaking participant research, sensitivity is required and the researcher must be tactful and careful to calibrate situations.

In the present case, however, it was necessary to take another dimension into account; that I would come into contact with vulnerable and poor people in Kenya. These people, who have little or no income at all, did not leave me unaffected. When the researcher's actions are deeply embedded in the daily activities of other people (or organizations), it is important to work with personal respect and confidentiality (Cohen et al., 2011). This includes toleration, both during fieldwork and data analysis (Hammersley, 2005). Thus, I have tried to be open-minded to other people, and not to be judgmental or prejudiced. However, during the gathering of data I sometimes encountered attitudes and expressions with which I disagreed. They were over minor matters, so I did not do anything about them. I was aware of them, however,

and my body language may well have shown my reaction. For example, after one interview, the interpreter made a remark. In his opinion, I remained too silent and showed little interest when one respondent discussed the importance of religious matters in his daily life.

5.7 Analysis and units of analysis

The method used to analyze qualitative data has been criticized for a lack of transparency (Bryman, 2008). In addition, Yin (2009) has claimed that the strategies used in the analysis of data collection would need to meet certain criteria to be judged successful and significant. One guideline for analysis is to review related case study research (e.g., m-learning), and other approaches (e.g., sociocultural perspective). This gives a framework that can challenge both the motivation and the case, although the data has to be tested for its validity and reliability. As Denzin (2002) noted, it is a matter of identifying how a phenomenon or event is organized, and whether it gives meaning to the persons studied. According to Denzin (2002), an analysis process includes:

- i. bracketing when the researcher holds the phenomenon up for serious inspection
- ii. constructing the phenomenon: at which point the researcher classifies
- iii. structure and reassembles the phenomenon back into a coherent whole, and finally
- iv. contextualizing the phenomenon by giving the structures meaning in the social world in which it occurs.

In this thesis, both quantitative and qualitative data were used in the analysis. The quantitative data includes mobile log data from the participants' activities carried out over the course of one year. They were summarized into clusters of information and frequencies. My PhD colleague William Jobe and I reviewed the qualitative data several times. The data were then categorized. Initially, I used a cross-case analysis (Patton, 2002), where I grouped together into

common topics the answers given by all respondents, as well as observations and fieldnotes. From there, I searched for patterns and different perspectives on the same issues, working from an overview of the whole data material, to specific parts and back. I searched for coherency, connections, similarities and deviations, and examined the evidence and contradictions in the research design, together with any findings. Alvesson and Sköldbberg (2008) used the concept of abduction, which is the process that not only develops empirical enforcement, but also adjusts and shapes the theory. There is thus an interplay between empirical data and theory; Alvesson and Kärreman (2011) called them partners for critical dialogue.

This systematic search for meaning from data forms the core of qualitative content analysis (Schreier, 2014). Through successive and systematic searches of the categories, the empirical material shows a reduction in data that focuses on the overall research questions. Naturally, there is a loss of information; however, there are also benefits in the way that different relevant data from the empirical material can be compared with and related to each other (Schreier, 2014). Key features for qualitative content analysis are a reduction of data, systemization and flexibility. The latter refers to a combination of concept-driven and data-driven categories. In this thesis, the concept-driven categories are derived from a sociocultural perspective: Koole's FRAME model (2009), and frameworks by Rogoff (1995) and Silverstone et al. (1992). Examples of data-driven categories are usage, social interaction, and m-learning.

Moreover, from a sociocultural perspective, mediated action is of importance (Wertsch, 1998). The runners used smartphones in their individual activities and in interactive social collaboration. To analyze the use of a mediational device, consideration was given to the material and the symbolic artifact. Thus, it was considered how the runners used their smartphone (e.g., taking photographs) and how they searched on the Web or used applications. Ideas emerged from the interplay between the smartphone, discussions (e.g., workshops, and interviews) and participation in social relations, which are symbolic artefacts that shape usage and actions. These activities offered the Kenyan runners the opportunities for learning

and life improvement. The activities were embedded in daily routines and evoked by the context of which the runners were members.

To describe the analysis approach in more detail was not a straightforward or smooth path; rather, it was a flexible process that consisted of several different aspects. Figure 3 shows the chronological order of the analytical process:

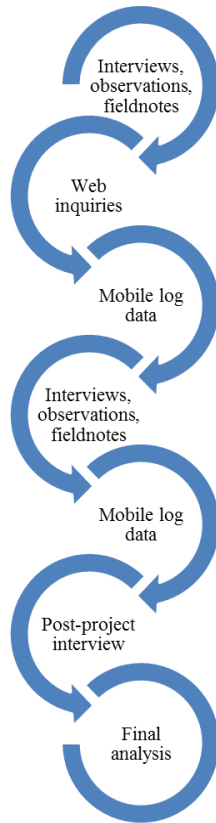


Figure 3. Data collection and analysis process

My analysis began with an open-minded and unprejudiced assumption of the whole process. Both researchers and participants put forward vague ideas about how the project should be implemented, and what kind of actions should be included. The first group interviews were compared and issues were categorized.

I wrote several memos in the transcribed material because they gave insight that could be used in the analysis, as well as in subsequent workshops and interviews. The structuring and comparison of the empirical material, such as interviews, observations and fieldnotes, was carried out, along with the calibration of the main research problem. The process continued with an attempt to identify core consistencies and meanings from data-driven categories (Patton, 2002; Schreier, 2014).

The web inquiries were compared and issues categorized, and related to previous interviews. There was a continued focus on theories of mobile and informal learning; indeed, I tried different approaches and interventions in Kenya. My travels back and forth between Sweden and Kenya allowed me the time to rethink my concept and explore its weaknesses and problems. The mobile log data were briefly checked and frequency was noted. The data were included in the previous material (which became a platform for further interview questions).

Individual interviews were compared and themes were categorized and subcategorized. Relationships with observations, fieldnotes and mobile log data were included in the categorization. Reflective memos emerged from the transcribed material. In particular, the empirical material inspired a reflective question: what conclusions do I draw from all this data? Here was a challenge; to not see things as natural or rational as they may occur, and to problematize those things taken for granted (Alvesson & Kärreman, 2011). It led to new ways of seeing the fieldwork and inspired change in the research practice (e.g., the implementation of an educational platform about human rights).

Group interviews were compared with previous material and issues categorized. The concepts and theoretical perspectives that now emerged as interesting were related to sociocultural learning, including Koole's model (2009), Rogoff's (1995) sociocultural analysis and Silverstone's et al. (1992) framework.

The mobile log was thoroughly checked, and the analysis process involved separating the mobile log data and successively summarizing it into categories. All the application usages and web pages were then manually analyzed to find patterns and verify the categories (Jobe, 2014). The findings served for further data

exploration and the search for patterns and co-occurrences (Schreier, 2014). Over time, fieldnotes and observations were matched to the aforementioned data for a more in-depth approach. As Emerson et al. (1995) noted, the analytical reading of fieldnotes requires a different approach; they must be read as if written by a stranger. In addition, Schreier (2014) argued that meaning in a context, relevant context and aspects should all be described in the material. Accordingly, illustrative examples from the fieldnotes were selected. Finally, the post-project group interviews were organized and compared with the aforementioned data. A search for additional value and categories, as well as rival explanations and contrasting reasons, was also carried out.

5.8 Ethics

The aim of the research was to be relevant and impact on people's lives. Nevertheless, when discussing ethics a starting point must be: do poor Kenyan runners really need to use smartphones? This is a fundamental issue in an economically poor setting. Most likely, the Kenya runners who participated in the study only have small incomes and are in need of other supplies. However, ICT tools transform lives and create an impact. In particular, smartphones can improve learning and everyday life. Thus, the objective of this research was to create knowledge of new technology and acquire skills accordingly. Such skills and knowledge may be necessary and useful in the future. However, new tools do not entail the introduction of new skills to use them; the introduction of new limitations must also be considered (Wertsch, 1998).

Involving people in research is sensitive, perhaps even more so when we are tracking their mobile phone to gather data. This was an ethical dilemma because it represented a borderline invasion of their privacy and dignity. We were actually researching vulnerable people; those who are unable to protect their own rights (Cohen et al., 2011). By giving poor people a free smartphone, it was like giving them a birthday present. Were we exploiting poor people to obtain data for our research? Nonetheless, it was possible for the participants to reject the smartphone if they did not agree with the informed consent. The form notified them that participation in the

project was voluntary, that data was confidential and that they could withdraw from the project at any time. But would a poor Kenyan runner really reject a smartphone if given to him/her? In theory, the answer is yes, but in practice most likely not, something that is particularly troublesome and must be considered. However, the participants were only obliged to use the smartphones as much or as little as they wanted according to their own willingness and interest. Being part of the project also allowed the participants to keep the smartphone after the project had ended.

Transparency and awareness was thus of the utmost importance in this study. It was essential to maintain transparency with regard to the mobile log, and its findings. The participants also needed to have full access to information during the process. At the initial meeting there was a long and thorough discussion with participants about the tracking. I also came back to the issue during each interview (two group interviews and one individual interview during the mobile log period) to make sure it was well known. I considered this to be important because the participants tended to forget about the tracking and needed to be reminded about confidentiality. During the interviews it was possible to report on progress. The tracking was made transparent by showing them data from the database.

Hawthorne's effect, also known as bias, states that participants are initially motivated because of the novelty factor (Franke & Kaul, 1978). In this thesis, a consequence of bias could be that the Kenyan runners learned because new technology was introduced; thus, together, curiosity and satisfaction created learning. It is not necessarily a long-lasting effect; instead, the intervention of new technology affects the learning phenomenon. Thus, to reduce this effect it was advantageous to use a long-term study.

Another problem was that the participants were motivated because they thought that inclusion in the project could lead to future benefits, i.e. they may continue to be part of other research projects or find potential financial support. Once again, however, the research project continued for a considerable length of time, which allowed me to follow up on truthfulness by asking the same types of questions. It is reasonable, however, to reflect on a question posed by Benton and Craib (2001, p. 75): "can we

understand action at all if it takes place in the context of another culture?”.

A further aspect of bias was the degree to which “I” affected the outcome. Fieldwork includes personal involvement and the role of the researcher exposes not only the researcher, but also the participants and empowerment. My research involvement included training together with the Kenyan runners and I probably wanted the participants to succeed in their struggle to improve training and learning. As Cohen et al. (2011, p. 345) put it “...participatory action research both requires and builds commitment”. On the other hand many of the participants demanded more assistance and support during the project. The researchers then assisted when requested.

My involvement both as a researcher and as a practitioner, meant that reflexivity was most important. Hammersley and Atkinson (1995) stated that the researcher is part of the social world under study. The researcher participates in this social world and reflects on the products of participation. What is required is to stand back and critically reflect so as to create an awareness of the research process, as well as any actions, feelings, attitudes, and so on. With regard to reflexivity, it is no less important to avoid bias, or at least create an awareness of bias.

5.9 Reliability, validity and generalization

For the most part of this study we were considered as two researchers who carried out fieldwork, though from different angles and with different perspectives. This can be seen as an advantage for the study as a whole, because it created an opportunity to discuss what we had both observed. In turn, this improved the internal reliability of the study. If the study is reliable, then it is also repeatable, something that is not easy to achieve in qualitative research, particularly in PAR. To increase reliability, Yin (2009, p. 122-123) argued for a “chain of evidence”, which would allow another researcher to be able to track every step in a case study, from research questions to data, setting and conclusions.

In this thesis, to reveal evidence it was a matter of describing the context, settings, activities and circumstances, and providing a

proper link and transparency between research questions and the multiple sources of data. Most important was to repeatedly penetrate data, revise categories according to new facts and observations, see beyond what was said and not said, and deliberate findings with the participants to extract new or other findings. Finally, in terms of the chain of evidence, it was necessary to link the aforementioned aspects with the clarification of concepts and the sociocultural perspective.

With PAR, it is necessary to make subjective judgements of collected data, and to construct validity significant concepts that are defined and related to other similar studies. From previous studies I learned about the methods used and bias in order to find relevant evidence from my own data and produce a chain of evidence. Validity can also be related to generalization. Thus, an important question is: has this study any meaning beyond the context of Kenyan runners and their use of smartphones? Qualitative methods and case studies are often regarded as having limited generalizability (Cohen et al., 2011). Thus, a great deal depends on the logic of the argument being presented, which is based on the researcher's familiarity with the data and its theories.

Yin (2009) also made the point that case studies should be seen as analytical generalizations. In this sense, case studies can be helpful in terms of theory-building. Furthermore, findings of case studies can be tested in other cases rather than with other populations. As Kvale and Brinkmann (2009) argued, a case study can also be used as a guide for what may occur in another setting. Thus, the interpretation of a particular case may be based on an overall pattern. According to Larsson (2009), however, either there is no need for generalization or there are some possible opportunities for generalization. An example of the first suggestion is an ideographic study that aims to contribute with a unique piece to other studies. Larsson's (2009, p. 29) remark is "it is therefore perfectly legitimate to investigate the emergence of educational system in a specific country, without any aim of generalizing the interpretation."

It should be noted, however, that, as was the case in this thesis, many factors can heavily influence a study, including the researcher's role, selection of participants and settings, and

intervention. Thus, it may be difficult to transfer findings from one context to a similar context. In this thesis, however, it was the process which was in focus. Consequently, it would be possible to recognize patterns. This study may assist other studies in describing, comparing and interpreting their research process or phenomena (Argyris & Schön, 1989; Larsson, 2009).

Generalization may also be of relevance in terms of usage (Bryman, 2008). If the information and results from a study are relevant, useful and applicable to others, then the knowledge derived and its generalization are thus determined by the user. As Alvesson and Kärreman (2011) concluded, empirical material and case studies challenge established assumptions and perspectives. This thesis can thus be considered as a study that fills a gap. Furthermore, it can provide insights that are not made available by controlled studies and can have value in practice, when knowledge derived from the process can solve problems for the participants involved (Kindon et al., 2007). Thus, it can impact on real life situations as Larsson (2005) states as the pragmatic criteria in qualitative research.

6 Summary of the papers

The aim of this research was to study how the appropriation of smartphones can improve daily lives and participation in m-learning for Kenyan runners. The study took a PAR approach with a multidisciplinary dimension, which included such disciplines as education, social science, technology, and sports. Each of these was affected by the research design chosen and the approach taken. Each of the papers followed a multidisciplinary approach and gave a different perspective on smartphone usage.

6.1 Paper A

Paper A took a holistic approach; an overview of general findings of the study was given, together with a major issue associated with informal m-learning.²⁴ The data source included interviews, web inquiries, mobile tracking data, participant observations, and fieldnotes. The aim of the research was to investigate the effect of smartphone usage on training, informal learning, and economic opportunities for Kenyan runners. The analysis was carried out using Koole's (2009) FRAME model (The Framework of Rational Analysis of Mobile Education).

Findings showed an improvement in the Kenyan runners' training and performance at competitions when using the smartphone and various running applications. The runners had better access to data from their training and could view it afterwards in order to analyze their performance and make any necessary adjustments. Thus, the runners were better prepared for competitions using the newly acquired data from the smartphone

²⁴ Frontrunners in ICTL: Kenyan runners' improvement in training, informal learning and economic opportunities using smartphones

instead of their previous “we just run” approach. The smartphones assisted them in planning for competitions, because they were able to search for and study the course profile and the performance of competitors. In addition, the smartphone gave the runners the ability to find and contact managers so that they could compete internationally. The smartphone thus made a major impact on their lives and enabled various skills.

The participants had limited formal education. Nonetheless, they all soon had e-mail and Facebook accounts, downloaded different apps for training, took and shared pictures, and listened to music. The learners embraced the technology, and were highly motivated to improve their learning to develop a greater awareness of their society, and their surrounding world. The participants adopted an active, self-motivated learning process; they learned by discovery and interest, and had an action-oriented understanding. The device reduced boredom. The participants were able to access the Web to search for news and stay updated on current events, something that was important to them. A diverse number of web sites and applications were used, but the most frequently visited websites were Yahoo, Google, and Facebook. In addition, the participants downloaded the Bible, so that they could read whenever they had time. Moreover, the runners improved their skills in English, computer skills, and location awareness by using GPS.

Thus, the smartphone was embedded in daily routines and replaced the use of an Internet café. When the learners required support, they were guided either by peers or sought feedback from the smartphone application. The participants also assisted each other with technical and language problems, and shared advice on new applications. The Kenyan runners were able to connect with family and friends, as well as the Internet around the clock. The participants updated their statuses, and increased their communication with others. By using the smartphone, some of the runners found options for income-generating activities. For example, the smartphone’s camera was used for business purposes by the Kenyan runners, who organized an urban tourism scaffold using the ICT tool. The smartphone was thus a significant and appropriate tool for training, learning, collaboration and income-

generating activities. Likewise, the device itself had a significant impact on usability.

To conclude, a common statement made by the runners was that “it helps us a lot”; hence, a smartphone that gave access to the Internet empowered impoverished people. One concern in the study, however, was the aspect of uncritical thinking regarding to Internet content. Other major challenges included power consumption, lack of electricity, and the availability and cost of Internet access.

6.2 Paper B

Paper B put forward a specific example of the Kenyan runners’ usage of smartphone for running.²⁵ The aim of this research was to study the everyday use of the smartphones, and how this impacted on social and professional practice. Silverstone’s et al. (1992) Domestication of Technology Framework challenged the empirical data, which consisted of interviews, participant observations, fieldnotes, and mobile log files.

Findings showed an intensive use of the smartphones and their applications. Thus, they can be seen as a substantial resource for the runners’ professional development. The smartphone had a significant impact on the Kenyan runners’ daily practices and the study showed an example of m-running. The runners utilized the smartphones along with various apps, such as Runkeeper or Mytracks, nearly every day. The runners, who regard running as their work, were armed with better information about their own training, as well as training programs, competition calendar, competition venues, courses profiles, and so on.

Thus, self-esteem and self-reliance improved by being able to receive digital feedback from the smartphone applications. This made it possible for them to analyze their running performance, making any necessary adjustments along the way. Consequently, most of the runners in the study performed better in competitions, which increased opportunities to participate in future competitions. If the competition was an international race, the runners also

²⁵ mRunning: New Ways of Running in Kenya

searched for general information about the culture and city in which the race was to take place.

The participants accessed the Internet wherever they were and whenever they wished to increase their knowledge. This was mainly in terms of sports information, although they also sought news updates and entertainment. Hence, technology-mediated learning improved their professional development as runners, and thus strengthened the objectification, incorporation and conversion processes.

Moreover, the runners frequently used social media, such as Facebook, to communicate with peers in the running community. The higher number of opportunities for personal networking were used in several ways. The runners contacted competition organizers abroad, and checked and cross-checked information for reliability, initially concerning sports management and agreements. Another use was to fill in forms and apply for visas via the Internet, which decreased the time spent in queues, and minimized the risk of falling into the hands of corrupt officials.

The significant usage of smartphones demonstrated a flexible way to learn, created insights and developed existing practices. This took place not only in their field of running. Their society expanded, too. Geographically, their network became larger, and these changes offered more opportunities. As one runner said with satisfaction in an interview, “I can go faster than before and I do understand more”. The smartphones were thus a substantial mediating resource and became a supportive tool for the runners, who could improve their daily lives and rise out of poverty.

However, there were challenges, including a lack of access to electricity, and an unreliable power supply. Accordingly, the participants were occasionally unable to charge their smartphones. A concluding remark was that the cost of smartphones and the cost of Internet access was a future concern for poor people in developing countries.

6.3 Paper C

To deepen the understanding of the sort of activities that developed from smartphone usage, paper C analyzed the runners' activities over the course of one year.²⁶ The analysis applied Koole's (2009) FRAME model, especially the interaction of technology, learning and social interactions. The analysis also used mobile tracking data to illustrate the influence of technology on daily life.

Findings showed that the runners utilized their smartphones and the Internet frequently; indeed, 180,000 different visits to websites were made. Most popular was web searching (24%), entertainment (19%), news (14%), sports (12%), and social networking and communication (11%). Activity was high throughout the whole project period, with some peaks. Fluctuations in accessing news and social media were most likely related to large news events that took place during the year. Another reason for fluctuations was that when the participants received new Internet time (data bundles at the beginning of each month), they were more likely to increase their access to entertainment websites and web searching.

Some 346,832 applications were used, mainly including the phone, launcher and contacts. There was also significant use of communication, camera, and native applications, and applications for running. The frequency of application usage corresponded with web usage. The smartphone was integrated in daily activities and brought participants into contact with new activities.

Five main themes emerged from our findings with regard to Kenyan runners' smartphone usage: 1) learning for curiosity, 2) learning for professional development, 3) learning about technology, 4) learning about the society, including understanding their own culture and those of others, and 5) social networking, collaboration and entertainment. Learning was thus a personal process and the runners demonstrated an active and diverse way to learn through the use of web searching (Google and Yahoo), Wikipedia and suitable smartphone applications. Sport was of interest to the Kenyan runners. Indeed, their web usage emerged from that particular personal interest. Consequently, the runners

²⁶ Daily Usage of Smartphones - New Activities for Kenyan Elite Runners

used the smartphones to search the web for training programs, health aids, diet advice, competitions, managers, and so on.

With regard to the runners' own development within their work, they created something interesting for themselves from the available digital resources. For example, learning about the technology was an ongoing activity. The participants also shared data, searched for new applications, and frequently used the maps, calculator, clock, calendar, notepad and Google Play store applications.

Moreover, the participants, who came from poor backgrounds and had limited education, showed a great deal of interest in searching for information, reading digital novels and watching the news, thereby increasing their interest in society and culture. Finally, the runners' interest in entertainment was high. Music, games, adult sites, videos, TV, and YouTube dominated. In this sense, access to the Web was therefore of utmost importance. Social media, such as Facebook, was the main means of communication. During the study, the participants also started to use Twitter, email and Skype, thus expanding their social networks.

One can conclude, therefore, that the smartphone, coupled with Internet access, acted as an important tool for improving learning, awareness, widening social networks, and increasing collaborative opportunities.

6.4 Paper D

In this study, the Kenyan runners expressed an interest in learning about human rights. Paper D provides a practical example of mobile learning.²⁷ A non-formal Massive Open Online Course (MOOC) on human rights was created (called Haki Zangu, the Kiswahili translation of My Rights). The approach to improving and evaluating learning was design-based research; thus, it differed from the other three papers in that it did not use PAR.

The aim of this research was to explore non-formal educational experiences of human rights, and make improvements through the use of mobile technology. The course was open and free to any

²⁷ Putting a MOOC for Human Rights in the hands of Kenyans – the Haki Zangu case for non-formal learning

Kenyan with access to a smartphone or other form of Internet-connected device (e.g., tablet, PC). The course was offered through a mobile Moodle webpage and the participants learned about human rights and democracy. Text-based content was accessible in English, and Kiswahili, whilst an audio version was available in English. Furthermore, the course offered an open digital badge, which can be seen as a form of digital diploma. This gave the online learners proof of their having studied the course. Sources of data in paper D were evaluations of the course and activity reports in a content analysis.

After six months, some 160 Kenyans (including the Kenyan runners in the present study) had enrolled and 10 participants had completed the course. However, the value of the Haki Zangu project should not only be seen in terms of the completion rate. Enrollment and participation are just as valuable and significant as completion. Even though only 6% completed the course, the majority of the 160 participants actively expressed their opinions and showed critical knowledge about human rights in the different sections of the course. A MOOC is not just a product; it is also a process that can bring education to poor people who cannot afford to join more costly education systems.

Findings from the evaluations (completed by 19 participants) showed that 70% of the respondents were under the age of 30, 20% were women, and 75% had a college or university education. Thus, the respondents were primarily young, college-educated men. The findings also showed that 75% used a desktop computer to complete the course, with the remainder using a smartphone (15%) or tablet (5%). The respondents stated that, on average, they spent a little over 30 hours working on the course.

Furthermore, the availability of digital badges and certificates increased interest for participation, and both were perceived as equivalent. The participants highlighted that it was most stimulating to discuss and share experiences with other participants in forums. They also learned from the experiences of others, and from the pedagogical challenges and ethical dilemmas.

The participants showed extensive enthusiasm and engagement for human rights issues, and expressed a desire to learn more and further spread knowledge about human rights. Of the respondents,

Summary of the papers

100% stated that the course would be useful in their daily life, and that they would like the opportunity to study other courses in the same format. Suggested subjects included computer studies, health issues, environmental issues, and gender equality. The MOOC format was a viable platform to provide a free, non-formal course, but the key challenge for the future was the cost of Internet access.

7 Implications

Obviously, context played a significant role in the analysis of the findings in this study. Indeed, actions cannot be isolated from the environment in which they take place (Uden, 2007). This study is also of limited scale. Nonetheless, it did take place over a considerable length of time (one and half years). Furthermore, the discussion of implications and real life improvements are major concerns in a PAR approach. Implications were identified from the Kenyan runners' usage of smartphones and its mediating impact. The analysis of data was based on multiple sources, calibrated with a sociocultural perspective and reference to existing research literature.

This section intends to discuss the first two research questions posed by the study, namely:

- a) *How does the appropriation of a smartphone by Kenyan runners affect training, social interaction and participation in m-learning?*
- b) *What are the implications of smartphone appropriation for Kenyan runners?*

7.1 Central concepts

Returning to frameworks and the central concepts of a sociocultural perspective (presented in section 3), Figure 4 shows the key concepts and the relationship to m-learning in the present study.

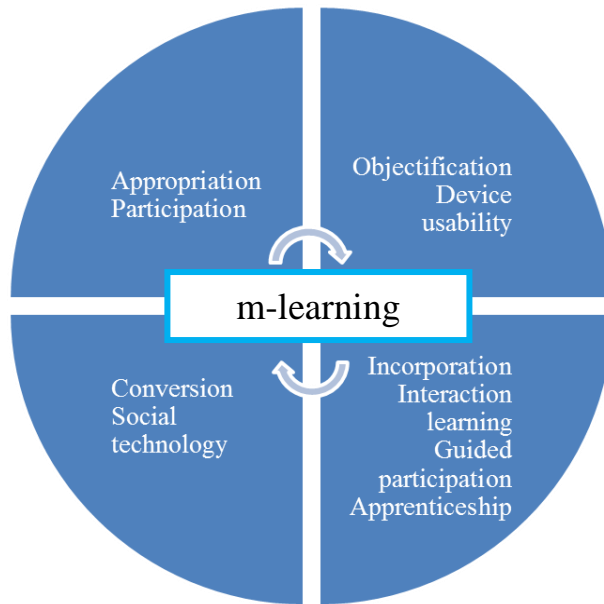


Figure 4. The key concepts

At the heart of the model is m-learning, which was the main purpose of integrating mobile technology in this study. Central to the process of m-learning was the relationship between the concepts that appear in Figure 4. In short, the figure can be explained as follows:

- i. The *appropriation* of the mediational tool refers to the implementation and usage of smartphones by Kenyan runners. In this case, it was a combination of active *participation* and interactive learning by mastering skills.
- i. *Objectification* symbolized status and usage followed by *device usability*. In this case, utility referred to a useful, significant smartphone.
- ii. The smartphone was *incorporated* in daily routines, thus creating *interaction learning*. The appropriation and mastery of the smartphones was sometimes assisted by peers in *guided participation*; using communication and collaboration, peers

acted as experts in the situation. Participation in sociocultural activities and peers acted as resources; *apprenticeship*. However, sometimes the participants were assisted by digital feedback.

- iii. The runners' use of *social technology* within the group as well as with others expanded. Their interactions occurred in real time through the use of social media, sharing data, and so on. *Conversion* refers to relationships and membership in the outside world.

The concepts and their relationships are further discussed in the following sections.

7.1.1 Appropriation and participation

The Kenyan community already had a great deal of collective experience of mobile phones, but smartphones were a novelty, particularly amongst the Kenyan runners. Furthermore, it is possible for individuals to routinely master a tool without necessarily having to appropriate it (Wertsch, 1998). The participants in this study, however, did not just acquire the tool; they used it actively and in a variety of ways. The study highlighted the Kenyan runners' appropriation of an ICT tool in their everyday routines. It also focused on the knowledge gained in using the digital resource for participation in learning in a consistent and confident manner. Thus, a Wertschian (1998, p. 174) perspective could be described as appropriation in a "contextually appropriate way".

The barriers to learning the smartphone and its functions were low. In a short time, all the participants were connected to the Internet, were using social networks, writing e-mails, downloading applications and exploring the Web according to their own interests. Obviously, there were differences between the participants in terms of the skills they brought to the appropriated technology. That aside, all the runners did manage to master and appropriate the technology, and utilized the smartphones to increase their competences to some extent.

The appropriation of mobile technology created a learning environment for the participants. Through sociocultural activities and interactions the Kenyan runners were encouraged to participate. Thus, technology transformed learning and development at both an

individual and collective level. Participation adjusted their ways of being, doing, talking and interacting in the personal and social process of learning (Wenger, 1998). The appropriation of a mediational tool thus transformed and shaped their actions. However, although the introduction of new mediational means (in this case a smartphone), shaped the runners' actions, it did not act alone. It was also necessary for the individual using the smartphone to adapt to new skills and knowledge (Wertsch, 1995).

7.1.2 Objectification and device usability

One single device (in this case, the smartphone), regularly used for a range of purposes can act as a “learning hub”; in other words, it offers learning resources that can support a range of different activities without having to use separate tools for each activity (Wong & Looi, 2011). In this study, the smartphone could be used anytime and anywhere thanks to its small size and light weight. In fact, it was found to be the perfect tool for training, reading novels, searching information, calculating, and taking notes (cf. Clough et al., 2008). For example, the smartphone users no longer used paper and pen; instead they used memo applications on the smartphone and cloud computing services such as Dropbox. Notably, Internet cafés were replaced by smartphones, which were seen to be both more cost-effective and time-saving.

For the runners, the smartphone offered an open door to the global world with all its information. Consequently, they acquired skills in different areas, such as English, computing, sports and rehabilitation or news updates from the world around them. The smartphone created status change and engaging with the device made the participants feel more self-confident. This engagement grew when the participants used the smartphone not only in the “in-between-time”, but also in their profession as top athletes through the frequent use of suitable applications.

The Kenyan runners often claimed that “the smartphone keeps us busy” when they may otherwise have become involved in less useful activities. Accordingly, the smartphone played an active role in, and significant contribution to, their awareness and empowerment. One participant (Brian) claimed that “I’m very bright up to nowadays because using smartphones.”

7.1.3 Incorporation, interaction learning, guided participation and apprenticeship

Through participation and guided participation, the Kenyan runners developed new ways of using digital resources. In my observations, I tracked changes in how the runners took greater responsibility over the process and learned to manage more complex tasks. From the beginning of the research project, when they novices in using the smartphone, the participants learned to manage the device as a group. Further on in the project, the users shared information both intellectually (e.g., offering advice about applications) and socially (e.g., sharing photos and text via Bluetooth or Dropbox). Thus, as part of the learning process, they participated with and involved other individuals in sociocultural activities. The smartphone expanded individuals' freedom in their everyday lives and, by incorporating its use into daily routines, it released time for other activities (Silverstone et al., 1992).

Learning to use a tool is not only determined by the tool itself. It is also determined by the participants and peers. People use smartphones differently and, in this study, differing usage reflected cultural differences. Knowledge content and development were determined by the demands of the real world and the particular context in which the learners interacted (Schugurensky, 2006). Hence, it was possible to see the development of a form of apprenticeship, similar to craft apprenticeship (Lave & Wenger, 1991), whereby senior runners participated with less experienced runners in culturally organized activities with a view to becoming involved with their development. Brown and Duguid (1996) described this as cognitive apprenticeship, which in some ways is similar to craft apprenticeship, because learning and knowledge production develop during authentic practices. This is consistent with the sociocultural analysis made by Rogoff (1995, p. 160): “their participatory appropriation was an ongoing feature of their guided participation in the apprenticeship system through which we can view personal, interpersonal and cultural processes of this activity”.

The Kenyan runners frequently claimed the importance of peers and guided participation. One runner expressed this in an interview: “whenever I have troubles with the phone I have always a close friend for assistance”. According to another runner: “there are some that have

learned more. Even there were other things that were not in my phone, even Runkeeper, so I asked others. So they helped".²⁸ Thus, there was guided participation through social collaboration and guidance through direct structuring. The runners used the ICT tool to encourage interaction with others through interpersonal processes.

Furthermore, the personal process developed through active participation and interaction in the learning situation. Interaction, communication and collaboration are central to sociocultural activities. In this study, I observed how the Kenyan runners participated as such. In particular, how their participation changed during the learning process as they figured out how to acquire new skills and manage situations, either by themselves or in collaboration with others to reach their own goals (i.e. information updating, better awareness, improved learning, etc.), or shared goals (i.e. become a better runner).

7.1.4 Conversion and social technology

In Kenya, the main source for news and information is the radio. Nonetheless, word of mouth also plays a major role in terms of information gathering (Bowen, 2010). For the Kenyan runners, however, the main source of updated information became the Internet. Keeping up to date is especially important for people who live in Kenya's slum, where security is inadequate, and it is necessary to stay alert in case there are emergencies and violent outbreaks. By using the smartphone to access continuous news update by Facebook, chat and Twitter, the participants had the advantage of knowing the breaking news anytime and anywhere.

Moreover, the participants became more confident by building up information and awareness via Internet searches, reading articles, and networking with others on social media. Thus, the runners became active participants, rather than passive receivers; in general, they felt more updated and knowledgeable than others in the community. The appropriation of the smartphone thus defined and distinguished them from others, and linked them to each other (Silverstone et al., 1992).

Participants created relationships with other participants by use of the smartphones. Hence, the technology transformed social relationships by fostering dependence on the device. The smartphones

²⁸ Runkeeper was the most popular application used in training.

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were the source of conversation within the runners' community and created status. One runner (Maurice) argued:

Discussions, you go with this phone, for instance what happens the last minutes you get an update. You don't have to go to the house to watch news, so you find there that update is just there. Some of these things we even discuss. Before some of us didn't have the money to go to the Cyber, and whatever information we extract from the Internet we didn't have before. You find that other person is well informed.

Thus, access to smartphones and the Internet made the participants proud of themselves, not only because of using a "mzungu phone", but also because they felt that the majority of the runners are poorly educated. By appropriating the tool, they felt knowledgeable and up to date, which gained status for them in the community. This was an example of conversion.

7.2 Implications for m-learning

This section will investigate the core of the model: m-learning. In this study, smartphones gave the participants a tool, which improved learning. Nevertheless, curiosity and interest played a significant part in the learning process. All participants made extensive use of the smartphone and the following could be extracted from the log data (tracked smartphones): 182 unique applications were installed with over 346,000 different occasions of use. 1,814 unique websites were accessed with over 180,000 visits logged. Hence, the Kenyan runners deepened their learning, and consumed and explored knowledge driven by personal interest.

The runners were kept continuously up to date, mainly with sports information, including athletics, but also with news. They also accessed casual entertainment, watching movies, and sharing photos and playlists. If the participants wanted to find out more about something they were interested in, they got immediate feedback by searching on Google and Yahoo. Interest-learning trained the participants to ask accurate and sophisticated learning questions when they wanted to find appropriate answers. It also taught them to dig deeper. The participants acquired knowledge and skills they considered most useful and important for life. It contributed to situated learning,

because the participants could work on authentic and real life problems. The smartphone was thus an available tool in problem-solving situations.

The participants stated they were used to limited access to books; at best these were old books. Now, however, they were provided with unlimited access to information and resources. This demonstrated that learning could be active, flexible and diverse. Vast information resources could be combined so that learning was spontaneous, and fun. The participants had freedom to define tasks, make unplanned and personally motivated use of their smartphones, and could utilize learning in their domain of interest.²⁹

Many of the participants had limited school backgrounds, whilst some of them relied mostly on Kiswahili in conversations. With the use of smartphones, however, they were more or less forced to improve their English in order to understand and keep up with the others in the group. Thus, the use of spelling, grammar check and translation improved their English vocabulary, and introduced new words to the Kiswahili language. Furthermore, some of the participants with a language interest used this tool to learn new languages such as Spanish, French or Swedish, and started to communicate in social media using their newly acquired skills.

The term digital literacy refers to the way in which learners engage with information, messages and symbols that are mediated by digital resources so as to become computer literate (Säljö, 2012). At the beginning of the project, most of the participants had little or no experience and knowledge of computers. Several of the participants learned by trial and error in cyber cafés and had basic skills in sending and receiving mails or browsing the Web. No one had any experience of smartphones or touch screens. Within a few days with their smartphone, however, their computer skills improved. Such activities as reading, writing, browsing, watching YouTube, sending/receiving mails, capturing images, recording videos, and navigating with GPS were integrated into their daily activities. Consequently, they became familiar with unknown places. The users also improved their

²⁹ As researchers such as Aker et al. (2011); Balasubramanian et al. (2010); Chan et al. (2006); Chang et al. (2012); Clough et al. (2009); Ford and Leinonen (2009); Imtinan et al. (2012); Jones et al. (2013); Kim (2009); Squire and Dikkers (2012) have emphasized.

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awareness of location and places, topography and physical geography and used graphical tools when they were able to navigate with maps. These skills were new to them. In the early days of the project, many of them stated that “we are used to getting lost or being late because of not finding the way”.

The participants embraced the ICT tool, not only improving their skills in reading and writing, but also in business. With the smartphones, it was possible to facilitate creativity and innovative use, as was seen in this study when the smartphone’s camera was used to capture and sell images. Other income-generating activities included using the Internet as a booking system for so-called slum runs with tourists. Some runners even rented their smartphone to other runners so that they could gain access to running applications and so on. The runners also used their smartphones to search for competitions on the Internet. Such competitions were considered as business opportunities.

Mobile devices are widely used in Kenya, but mainly in an informal learning environment. In this study, smartphones improved access to education and bridged the gap between informal and formal education (secondary school), which is expensive because of costly school fees. Achievement of a digital badge and a digital certificate from the online course created status and formal access to job opportunities and educational progress. Hence, online courses can be seen to open the way for more educated and knowledgeable citizens.

Thus, m-learning is a flexible way to learn. It gives opportunities for people to move in and out of educational programs when they lack the time for conventional training. Nevertheless, to deepen learning the non-formal learning format must be favorable. In this study, the virtual setting spurred on learning, with collaboration taking place over authentic tasks and real life problems. The Kenyan participants found these particularly challenging because of their lack of experience and school education. With regard to the online human rights course (Haki Zangu), it met the needs and interests of the participants. They found it both stimulating and motivating. The course also gave them the opportunity to interact with others, and gave them a degree of flexibility. Indeed, the same content was made available in both written form and an audio format so that those undertaking the course could benefit from different learning styles. The learners were able to

study at their own pace, when and where they wanted; in turn, this supported learning and knowledge production.

7.3 Implications of a participatory action research approach

Of particular note was the impact of the PAR approach. This was a context-dependent study; in other words, what occurs in this study is not necessarily found in other studies or contexts. Nonetheless, the study did provide deep and rich insights into the implementation of an ICT tool in a poor community. The research method involved close involvement with the participants and encouraged the participants' input. Thus, it can be classed as situated learning within an authentic context. The research stimulated change, allowing the participants to communicate through various channels. In other words, the smartphone supported m-learning, and created an environment in which the runners could participate in social relations.

As discussed in previous sections, however, the challenges posed by logging the participants' smartphones, the risk of the Hawthorne effect and the researchers' approach to the project all influenced the outcome. The research influence thus ranges from giving smartphones to impoverished participants in Kenya to documenting and describing events and situations in the field. A further challenge was not only to maintain a certain distance between myself and the runners, but also to combine engagement and analysis (Alvesson & Sköldbberg, 2008).

As explained in section 4 the research process was complex and Figure 5 shows the development and phases during the project period.

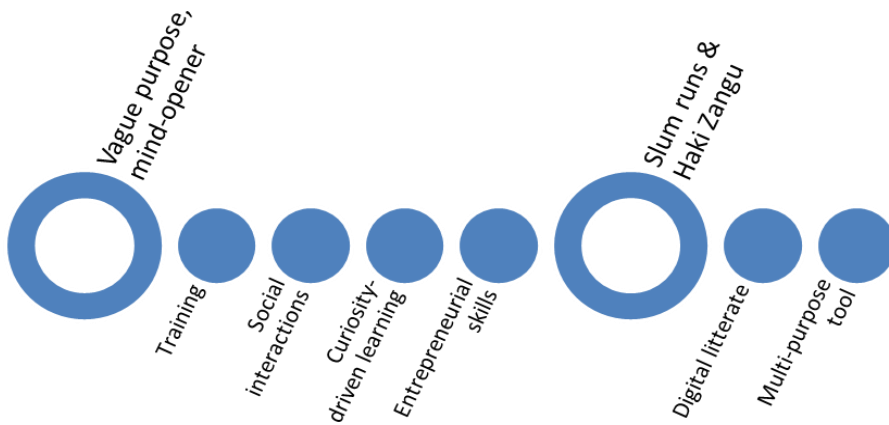


Figure 5. How PAR process emerged and developed during the project

The research project began with the initial aim of implementing smartphones and, in some respects, my intentions were to open the minds of the Kenyan runners. They had immediate use of the tool in their daily practices and curiosity expanded both their social interactions and m-learning. The ease of use and appropriateness of the technology for the runners developed several skills. Among other things, the participants developed entrepreneurial skills from learning the tool, which opened doors for them.

As a consequence of the learning interest demonstrated, the research approach entered another phase. In fact, the demands from the participants in terms of activities and real life improvement created both educational and income-generating activities. Slum runs with tourists in Kibera and the MOOC on human rights were two practical examples of PAR. Ideas were raised and discussed in our workshops, by both researchers and participants. The final technological platforms were created by the researchers. The educational site engaged participants in the m-learning process and expanded learning through the use of different mobile devices for all Kenyans, the vast majority of whom cannot afford to pay school fees. With mobile devices as the

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mediums for the course, learners were provided with new opportunities to expand their knowledge and engage in lifelong learning.

The participants' development of digital literacy emerged through the use of a mediational tool. The Kenyan runners used one multipurpose tool. Whilst the tool was initially inspiring, motivation was still required to appropriate and master the tool. Such motivation was based on interest and a desire to learn. Indeed, this study highlights the importance of the participants' own interest. As such, it is therefore worth discussing whether or not the participants in this study were especially motivated. The Kenyan participants were all runners and were used to setting goals. They have an inner drive and, as can be seen in the findings, their interest for learning is derived from their own practice. Thus, their interest began in the field of sports and was broadened when they were exposed to the possibilities offered by the appropriation of the smartphone. A requirement for m-learning is, therefore, that people have a strong inner drive.

8 Discussion

To some degree, the focus of the four publications that make up this study was the technological tool: the smartphone. The picture is, however, more complex and dynamic. Thus, it was necessary to go beyond the ICT tool itself to recognize the role played by the participants and their interactions in sociocultural activities. The study in Kenya explored how m-learning emerged in practice and carried out an in-depth analysis from a variety of interdisciplinary perspectives.

The PAR approach seeks to produce knowledge and action that is useful for the participants. This approach, and accordingly this study, has a concern for impoverished people. The challenge faced was to enable significant impact for poor people whilst analyzing the complexity of smartphone usage in real life situations. By using a mixed methods approach, it was possible to take a holistic perspective, which provided rich data about the Kenyan runners' smartphone usage.

For the Kenyan participants, the project involved a shift from using basic mobile phones to using smartphones with Internet access. This PAR provided the motivation for learning, knowledge production, social collaboration and action by introducing smartphones to Kenyan runners and analyzing how these smartphones were used.

However, let us now recall the third research question posed by this study:

- c) *How can smartphones act as mediational tools to improve daily lives and participation in m-learning?*

8.1 Analysis of m-learning

Congruent with previous studies, the findings of this study indicated that significant learning improvement can take place among individuals who have no other educational initiatives. The findings

from the study also showed that learning experiences were both individual and collective. The study identified that the use of smartphones increased motivation and created interest for people who are normally disengaged or considered remote. Thus, from a learner's perspective, the analysis of m-learning showed that smartphones have the potential to improve inclusion and increase participation in society. From the empirical data presented in the research papers, four main themes emerged relating to the Kenyan runners' use of smartphones:

- i. engagement,
- ii. attitudes and awareness,
- iii. participation in m-learning and development of entrepreneurial skills, and
- iv. social interactions.

Firstly, the research project allowed the learners to be autonomous; in fact, the use of smartphones produced a high level of engagement. The participants showed interest and a desire to learn how to use the smartphone, its applications, and to access the Internet. The smartphone brought about a more efficient use of time; undoubtedly, the participants filled that time with what they found most interesting. They saw their time as useful for meeting their personal needs and interests. The participants were successful in finding ways of using the smartphone to improve learning. Thus, the introduction of technology-mediated learning resulted in the participants becoming active and action-oriented (Koole, 2009). The Kenyan runners were able to switch between different contexts, such as non-formal and informal, and between individual and social learning interactions (Chan et al., 2006).

The frequent use of smartphones was not only for entertainment, a finding that is supported by many existing studies. Data revealed that smartphones was used in diverse ways, including the creation of new ways of learning. Key to the development of learning was that the learners accessed contextually relevant content that was of importance to them.

Secondly, the users gained an increased awareness of world views, and their society and surroundings. This awareness of both the world, and the tool continually changed as a result of their interaction (Brown & Duguid, 1996). Furthermore, the Kenyan runners were exposed to

other cultural values and attitudes. Before competitions in other countries the runners prepared by searching the Web about the specific country, learning about cultural differences, such as food, clothing, and religion.

Moreover, in a hierarchical society it is common to rely and depend on the authorities. It should be noted that, at the beginning of the project, the participants expressed low confidence in politicians. Their smartphones gave them access to information that was not filtered by the authorities, however, which gave them an insight into ideas and thoughts from other areas of society. Certainly, the community and peers play an important role in creating opinions. By checking and cross-checking information via the Internet and social networks it was possible to verify and falsify statements at a higher degree. The participants felt more aware of their rights, and had a better sense of what was reliable information. Thus, they could maneuver more easily within their society without being dependent on the arbitrary decisions of authorities.

The participants were kept up to date about politics and news, and discussed such matters more frequently. Thus, they were more engaged and knowledgeable about what was happening in Kenya and elsewhere in the world. By participating in the online human rights course, the participants felt they had gained awareness and knowledge of an important topic. Human rights knowledge is important for all people, but especially for poor people who most often suffer the violation of their rights. It was particularly significant for the participants, because the Kenyan president at that time was facing charges at the International Criminal Court (ICC) in The Hague. However, this could be seen as a reason for the low completion rate of the online course. In fact, to focus on human rights in the Kenyan society at that time was a sensitive political issue. The learners may have feared that, if they completed the course, they would be monitored by the government.

Thirdly, the runners developed their own practice by frequent use of the smartphone application for running and by searching the Web to improve their knowledge of the field of athletics. Thus, using the smartphone increased participation in learning and, at the same time, the Kenyan runners acquired new skills and knowledge. These skills developed entrepreneurship among the runners and developed income-generating activities. For example, the runners used the smartphone's

camera to capture images and then sell them. They also used the Internet as a booking system to arrange urban tourism (slum runs). In addition, being able to continuously access the Internet empowered the young Kenyan adults to carry out tasks that would ordinarily have needed assistance (e.g., searching the Web for information), a broker (e.g., to acquire information for investment purposes) or time (e.g., queueing in the bank). The smartphone was used to fill in forms, apply for jobs, education courses, and visas on the Internet, which decreased the time spent queueing and, thus, minimized the risk of coming into contact with corrupt officials.

Accordingly, the smartphone created an environment for learning. By using the smartphone, the runners engaged in learning through inquiry. Their learning was connected with real world goals, situations, emergent problems and dilemmas. With their smartphone, the runners were able to meet these goals and solve problems. As such, the smartphone acted as a “facilitator”, improving access to information, knowledge and education. In turn, this mitigated the stress of having to excel in running. Hence, access to education reduced the pressure of having to succeed in their current profession. It offered an alternative to the current life situation and the limited incomes they had at that time. Thus, the smartphones created hope for future change and opportunity. However, this utopia relies heavily on competence to use the technology as a learning tool. In the present study, the participants developed digital literacy, but critical attitude of the Internet needs to be further explored.

Fourthly, the participants were involved in sociocultural activities, such as increased collaboration, peer assistance, social interactions, and shared data and experiences. The runners used their smartphones to access social media to the extent that their personal network grew during the project. The smartphone opened up possibilities by allowing them to access social networks as part of their everyday lives. Thus, continuous access to Facebook and chat forums improved the Kenyan runners’ involvement in their community. They carried the smartphone with them all day and every day, and, with access to the Internet, they had constant and increased contact with their colleagues in the “runners’ community”.

Hence, the impact of introducing smartphones can be measured in terms of collective interactions and continuous access to the Internet

(although there were challenges for m-learning, see section 8.3). This enabled the participants to contact their friends, share experiences and access information conducive for learning. Interactions with peers were frequent during the online human rights course. In fact, it was perceived as important to be able to discuss topics and content with fellow participants with different experiences. The interdependence between individuals and contexts appeared in the runners' behavior. Participation by individuals affected the involvement of others, including the extent of social interactions between the participants who were involved in discussions and collaborative networks.

8.2 Improvement of daily lives

Life conditions in Kibera and Ngong are undoubtedly harsh with many challenges for poor people. One of these challenges is access to health care. Treatments and drugs are expensive, however the participants in this study used their smartphone to access health care information and counselling on the Internet. In serious health cases, the participants obviously consulted their doctor or pharmacist. Thus, one can conclude that free access to information by browsing the Web may have a great impact on poor people.

Thus, the findings in this study indicated that smartphones make a difference. The tool had a significant impact on running performance, communication, interactions and learning. The use of smartphones can be considered to have acted as a catalyst for empowerment through increased communication and social collaboration between peers and friends whilst interacting with technology.

Additionally, the implementation of smartphones created a status change for the participants, who learned to master digital skills, receive information updates, and become more worldly. The participants were proud to be able to manage their smartphones and acquire knowledge. The findings showed how the Kenyan runners participated in social processes and how the smartphone contributed to opportunities for real life improvement. The Kenyan runners described changes which may have an affect in the long term, and impact on poverty reduction. This indicates that the use of appropriate tools can inspire learning and empower people.

The empowerment and growing awareness of the participants came from being more informed and knowledgeable than before. Accordingly, along with technology-mediated access to updated information, online communication and social interactions with peers, the participants' status in the society and knowledge both increased. In line with this were the findings from the MOOC on human rights, which was shown to be an emerging learning practice. The participants accessed a free, non-formal course and improved their learning, shared experience with other Kenyans. As a result, they felt empowered to take action in their society. Thus, being able to communicate with other participants on the course helped them to improve not only in terms of knowledge production about human rights. The course gave also gave a voice to people who are normally left out of formal education. Thanks to the course, it became possible for them to express experiences from real life and discuss issues that were of concern to them.

The findings indicate the importance of creating access to education for women. Mobile technology can play an emancipatory role for women, by helping them to participate in educational and social activities. Thus, m-learning can support the achievement of United Nations Millennium Development Goals by enhancing literacy, inclusiveness and equitable access to learning. Some of the reasons for this include no-cost (except the cost of Internet access), open access to m-learning, and the provision of quality education. Most importantly for girls, who have a higher drop-out rate from school than boys in Kenya, mobile technology can improve their lives through education.

Clearly, the convergence of technology, learners and social interaction has improved the daily lives of the Kenyan runners who participated in this study. Most importantly, the study has highlighted that learning as a social process has emerged from personal motivation. Thus, the appropriation of smartphones made learning meaningful and engaging.

8.3 Challenges for m-learning

Nevertheless, one should not overestimate the impact of mobile technology. Many research studies into mobile technology (i.e. ICT4D/M4D) are overly optimistic of the future for mobile phone

development and its impact in different fields (e.g., education, health, democracy, safety, and the reduction of corruption). Besides, it is important that we not only digest mobile technology and change with it, but also investigate the kind of support that is needed (i.e. for m-learners). As Vygotsky stated with regard to the notion of ZPD, m-learning may require support, from a teacher, from peers, or the technology itself.

Through the use of smartphones, the participants in this study had access to such features as the Internet, media, and communication. They were thus able to access information and keep up with the rapidly changing world. The participants embraced the technology, bonding rapidly with their smartphones. As learners, the mobile technology showed the participants how to use multiple ways to interact with the content and with others. The tool enabled learners to inquire, explore and create new understandings. However, it was difficult to develop critical reflections to the information on the Web. Thus, the most difficult part for the learners was to be capable of “knowing with” (Bransford & Schwartz, 1999). Thus, it is important to help users to develop a critical appreciation of the use of smartphones in everyday life.

Accordingly, the Internet poses a great challenge, not only in terms of fragmented understanding and lack of critical thinking, but also because of the cost of connectivity and of Internet access. The Kenyan runners in this study claimed that access to the Internet was particularly important. The runners were given access to free Internet during the project period. Consequently, they flocked to the Internet, where previously they had not. After the project, however, although the participants continued to use their smartphone and access the Web, the frequency with which they did so depended on their disposable income. In fact, the participants significantly reduced their usage of the Web. Thus, both the cost of smartphones and the cost of Internet access, which are high in comparison with average income levels, must be affordable in the future.

This raises the question of how mobile technology, including Internet access, can reach impoverished people. Certainly, there is a need to create equal access to digital resources and wireless connectivity. Nevertheless, as shown in this study, the impact can be of great value, even for the poorest people. Undoubtedly, the mobile

phone market in coming years will provide more affordable smartphones that require less power consumption; however, many limitations remain. A lack of electricity or an unreliable power supply can act as significant constraints, especially for people in marginalized areas (i.e. those living in slums), where power breakdown happens too often and access to generators is limited. In fact, frequent use of the Internet requires a high level of power consumption, which means that smartphones need to be charged repeatedly. Consequently, the participants were occasionally unable to charge their smartphones.

To conclude, when implementing m-learning projects, several challenges may be encountered: pedagogical, technical, social and research-related. One pedagogical challenge is to introduce and incorporate mobile technology in formal education at a time when many schools forbid mobile phones and mobile devices. Reasons may be fear of pupils' use of games or social media during lessons. Thus, a change in mind-set is required if learning potential is to be achieved. Another pedagogical challenge is to move from traditional ways of learning to learner-centered approaches in order to create active participation and effective learning. Mobile technology can support that change, extending learning between formal and informal settings, as well as beyond the classroom.

The technical challenge relates to the economics of mobile phone use; namely, the cost of the mobile devices themselves, and the cost of accessing the Internet. Most common in the mobile learning literature is the postulate that "you can learn whatever, whenever and wherever with your mobile device" (e.g., Frohberg, 2007; Ford & Leinonen, 2009; Looi et al., 2010; Wright & Parchoma, 2011). Mobile technology has a great deal of potential to support learning because of its flexibility; however, in this study, the participants with smartphones were not able to access the Internet wherever and whenever. For example, there were occasions when travelling by bus into town when the network failed, and access was limited in certain areas of their neighborhood. However, if it is possible to have lights and TVs in most houses, even in the interior of Kenya, then one can anticipate that the Internet will also become more widely available within the next few years.

The social challenge is the acceptance of mobile technology in society and peoples' familiarity with mobile phones. First and

foremost, the gender aspect must be considered. It is crucial to include all people in society in the use of mobile technology to increase their life opportunities. This leads us to the final challenge: research. There is a need for more research into individuals' real life problems and how mobile technology use in daily activities can impact on living conditions and poverty reduction.

8.4 Final words and future research

Digital technologies are mediating tools. Thus, whilst we can most likely never use ICT tools exclusively in education, we can use them to expand learning beyond the classroom. In this study, a visible effect was the participants' appropriation of technology embedded in their social world. Thus, technology mediated and impacted on sociocultural learning activities at both an individual and group level. Nevertheless, the findings of this study indicate that learners' attitudes, motivation, experience and participation were significant for the success of m-learning.

Future learning projects may choose to study relationships between technology, learning and setting, because in developing countries there are abundant distractions in the environment at any given time. For example, household duties and income-generating activities all call for attention. Consequently, the content for learning must be more innovative than that used in conventional settings in developed countries (Kim, 2009). Such innovation may be further investigated to consider learners' usage of mobile technology in different cultural settings and for different social groups. Thus, we can explore how ICT influences people's living conditions and how it can support real life situations.

Not least, it is necessary to offer equitable access to education for those who are excluded by economic or social reasons. In the future, even in developing countries, smartphones will most likely offer an inexpensive way to access educational training and support learning. A suggestion that has arisen from the present study is to create a Kenyan Cloud School and encourage young people to participate in free, non-formal, online courses in several school subjects. The Kenyan Cloud School is the working name for a comprehensive educational effort that consists of the entire core curriculum studied at the secondary

level in Kenya. Enrollment rates in secondary schools are fairly high in Kenya, but these figures can be misleading. More appropriate is to examine the graduation rates, which are extremely low in Kenya compared with enrollment rates. A significant proportion of students drop out of secondary school, the main factor likely being high school fees.

Hence, by undertaking online courses with ubiquitous devices, including Internet access, learners can fill the gap between the demands of study and formal practices. Accordingly, it is necessary to further explore the challenges of Internet access along with the possibilities and hindrances they pose for m-learning. It may be appropriate here to explore the potential of a micro-credit system on non-formal educational platforms such as MOOCs, as well as hubs or digital villages that offer Internet services. Moreover, the personal device-versus-borrowed device debate (tablets and laptops are more common in projects or schools than smartphones) may be further explored to create a learner-centered approach in practice.

The potential of m-learning is particularly interesting to consider in relation to addressing the needs of youths and to identify innovative ways to address youth development. Hence, it would be of interest to investigate other groups in society with regard to the appropriation of mobile technology to improve learning and create an impact on living conditions. In particular, young adults face high unemployment rates, and a lack of access to higher education, both barriers for integration into the economic and social life of society.

The present PAR has highlighted that smartphones inspired the runners to develop their own practice. The smartphones have supported their ambition to develop their running as a strategy for moving out of poverty. The Kenyan runners pursue the dream “from zero to hero”, which means that if they improve their running performance, they will be able to live on it and feed their family. Moreover, the smartphone challenged the Kenyan runners, not least to seize opportunities other than running. Thus, access to advanced technology and the Internet improved their quality of life, allowing them to communicate and socially interact, to conduct business and banking, to access just-in-time information and news, and to access learning material.

Discussion

Accordingly, there is a need for more studies that use different approaches to explore how ICT tools can support sports and creative ideas, improve quality of life and create opportunities to rise out of poverty. Additionally, there is an urgent need for studies on how learners can develop knowledge production with mobile technology. Further studies could also more thoroughly survey the efficiency of m-learning. Nevertheless, one can conclude that mobile technology can improve daily lives and develop new ways for participation in m-learning.

Summary

In Kenya, mobile technology is ubiquitous; mobile phones are an essential tool in the daily lives of most residents, from rich to poor. The mobile phone penetration rate is 80% (CCK, 2015), which is high for a low income country. Mobile technology can be one tool, among others, to improve real life situations for impoverished people and create opportunities for participation in m-learning. This is not least important for people who miss the opportunity to access education because of their socioeconomic situation.

Mobile phones can support the learning process, but may also change how the learner acquires information, knowledge, and skills. Thus, the technology creates opportunities for a learner-centered approach whereby the learner decides what, how, where and when to learn. Likewise, informal learning is often associated with curiosity, motivation, engagement, and an interest in understanding or solving a problem, as well as a desire to learn at anytime and anywhere. Hence, this fits well with mobile technology and interaction learning using ICT tools.

This research study was conducted between November 2011 and November 2012 and for a further six months after the end of the project for follow-ups. The participants in this research study were Kenyan runners from poor backgrounds. They had limited formal education, and were struggling for a better life by using their talent in sport. 30 Kenyan runners aged between 19 and 34 years participated in the study. They were each provided with a simple smartphone and Internet data bundles for a period of one year. The participants were located in two different settings in Nairobi: Kibera and Ngong.

This thesis analyzed Kenyan runners' appropriation of smartphones in daily life. Hence, the aim of the research was to analyze how smartphones created new opportunities for learning, how

Summary

smartphones were used as a mediational tool to improve living conditions and participation in m-learning. The main research questions of the thesis were:

- a) *How does the appropriation of a smartphone by Kenyan runners affect training, social interaction and participation in m-learning?*
- b) *What are the implications of smartphone appropriation for Kenyan runners?*
- c) *How can smartphones act as mediational tools to improve daily lives and participation in m-learning?*

The study used participatory action research (PAR), which aims to create an impact in real life. The approach takes a social research perspective, whereby the researcher intervenes and collaborates with the participants. Thus, the PAR approach and the participants mutually affected the process in order to implement real life improvement. Multiple methods of data collection were used, including interviews, observations, fieldnotes, web inquiries, and mobile log files.

The findings were presented in four papers, and showed the extent of usage of the smartphones. The smartphones had a significant impact on the Kenyan runners' daily lives. Hence, they were quickly appropriated and mastered by the users. Not least, access to the Internet was considered to be of importance. The runners made 180,000 different visits to websites, and 346,000 applications were used. Web searches were mostly made using Google or Yahoo (24%), entertainment (19%), news (14%), sports (12%), and social networking and communication (11%). The main applications used were the phone, launcher and contacts. However, significant use was also made of the following features: communication, camera, native applications and applications for running.

For the runners, their sport is a job of work. By using the smartphones, they were able to arm themselves with better information, which included information about their own training as well as training programs, competition calendars, competition venues, course profiles, and so on. Thus, self-esteem and self-reliance improved by receiving digital feedback from the smartphone applications, and by analyzing that feedback, and making the necessary

adjustments. Consequently, most of the runners in the study performed better in competitions, which increased opportunities to participate in future races.

The appropriation of smartphones created a learning environment for the Kenyan runners. The participants were engaged in an active, self-motivated learning process; learning by discovery and interest. Runners were engaged in inquiry learning improved by creativity. Moreover, the runners showed a great deal of interest in searching for information, watching the news, and improving their skills in English, computer skills and location awareness by using GPS. By using the smartphone, some of the runners found opportunities for income-generating activities. For example, they used the smartphone's camera to organize an urban tourism scaffold.

The ICT tool connected learning with real world purposes; the runners acted on situations, emergent problems and dilemmas, and solved them with the use of smartphones. The smartphone acted as a "facilitator", improving access to information, knowledge and education. In turn, this mitigated the stress of having to excel in running. Thus, by using the appropriate tools, the runners were inspired to learn. Thus, ICT tools can empower people who are normally left out of formal education.

The Kenyan runners in the study expressed an interest in learning about human rights. Consequently, a practical example of m-learning was created through a non-formal Massive Open Online Course (MOOC) about human rights (called Haki Zangu, the Kiswahili word for My Rights). The course was open and free to any Kenyan with access to a smartphone or other form of Internet-connected device. Thus, learners in rural areas could also participate in the course and learn in their own local context. The course offered a digital badge, which can be considered a form of digital diploma, as proof of studying the course. After six months, 160 Kenyans had enrolled and 10 participants had completed the course. Evaluations highlighted that it was most stimulating to discuss and share experiences with other participants in forums and learn from such pedagogical challenges as ethical dilemmas. Haki Zangu showed that, utilized in this way, a MOOC can level the playing field and provide a contextualized doorway to a quality education for free, regardless of economic or social status. Hence, a MOOC course is not just a product, but also an

Summary

important process. By participating in the course, learners can access education and awareness training, and thus have an opportunity to integrate themselves into society.

In conclusion, one single device, the smartphone, supported a range of different activities. The smartphone was incorporated in daily life, and was used at anytime, anywhere. Thanks to its small size and its light weight, it was found to be an ideal tool. A common statement from the runners was that “it helps us a lot”; hence, a smartphone with an Internet connection had an impact on real life situations.

Sociocultural analysis indicated that when the participants required support they were guided either by their peers or by feedback from the smartphone application. Through participation and guided participation the Kenyan runners developed new ways to use digital resources. The runners depended on their personal passion for running and a variety of activities. Hence, learning to use a tool is not only determined by the tool itself, but by the context and its members. Through sociocultural activities and interactions the Kenyan runners were encouraged to participate, which supported learning and social collaboration. Continuous access to Facebook and chat forums improved the Kenyan runners’ involvement in social interactions. Thus, from the findings on the Kenyan runners’ use of smartphones, four main themes emerged:

- i. engagement,
- ii. attitudes and awareness,
- iii. participation in m-learning and development of entrepreneurial skills, and
- iv. social interactions.

However, major challenges for m-learning in the study were found, including power consumption, a lack of electricity, a lack of availability and high cost of Internet access. A critical attitude to the Internet was also found to be lacking. The findings highlight that the Kenyan runners made substantial use of digital resources for training, expanding social interactions, developing entrepreneurial skills, increasing awareness in and with the rest of society, and improving participation in m-learning. Thus, the findings indicate that mobile technology can improve real life situations and develop new ways for participation in m-learning.

Summary in Kiswahili

Katika nchi ya Kenya teknolojia ya simu na simu ya rununu imekua ya muhimu kwa wakaazi wengi, tajiri na hata masikini. Simu ya rununu imepenya kwa kiwango cha aslimia 80% (CCK 2015), ambayo ni ya juu kwenye nchi yenye mapato ya chini. Teknolojia ya simu inaweza kuwa chombo kimoja kati ya nyingine, kuboresha maisha kwa watu na kuhuluku nafasi kwa ushiriki wa masomo ya mkono. Hii angalau si sababu dhabiti kwa watu kukosa nafasi ya kuweza kusoma kwa sababu za kijamii.

Simu za rununu zinaweza kuwa za msaada katika mchakato wa kujifunza, lakini zinaweza pindua namna mwanafunzi anapata habari maarifa na ujuzi, kwa hivyo teknolojia huluku ina nafasi mbalimbali ambapo mwanafunzi huchagua nini, vipi, namna, wapi na lini atasoma. Vivyo hivyo masomo rasmi kwa mara nyingi huhusishwa na udadisi, motisha ushiriki na riba ya kuelewa na kutatua shinda kwa kuweza kusoma wakati wowote na mahari popote. Hii uambatana na teknolojia ya rununu na kuweza kuingilina na vifaa vya (ICT) katika masomo.

Utafiti ulifanywa kutoka November 2011 mpaka November 2012 na mwaka moja na nusu mwingine baaada ya hapo nikafuatilia waliohusika. Walioshiriki kwa utafiti wangu walikuwa wanariadha wa Kenya kutoka familia maskini na wamesoma masomo kidogo, wale wanao ngangana kuishi maisha mazuri kwa kutumia talanta yao ya michezo. Wanariadha thelathini (30) walio na umri kati ya kumi na tisa na thalathini na nne (19-34) walikuwa washiriki na vifaa vya simu zinazotumia mtandao kwa muda wa mwaka mmoja. Washiriki wametoka sehemu tofauti Nairobi: Kibera na Ngong.

Utafiti ulichambua wanariadha wa Kenya wanatumia simu za mtandao kwa maisha yao ya kila siku. Sababu ya utafiti huu ni kuchambua vile simu za mtandao zina huluka nafasi mpya za masomo.

Jinsi simu za mtandao zimechangia kama kifaa kinachoshiriki kwa masomo ya mkono na jinsi zinavyo boresha hali ya maisha. Maswali muhimu kwa utafiti huu zilikuwa:

- a) *Jinsi wanariadha wakenya wanatumia simu zao za mtandao na kama zina athiri mafunzo, maingiliano za kijamii na ushiriki katika masomo ya mkono?*
- b) *Nini maana ya simu za mtandao kwa utumizi ya wanariadha wa Kenya?*
- c) *Jinsi simu za mtandao zinaweza kuwa kifaa cha upatanishi kwa maisha ya kila siku na kuwa masoma ya mkono?*

Mbinu ya (PAR) iisudi kuhuluku athari kwa maisha halisi. Mbinu ni utafiti wa kijamii, ambapo mtafiti uingililia kati na kushirikiana na washiriki. Mbinu ya (PAR) na washiriki wa pande zote mbili walio athirika kwa mchakato na kutekeleza uboreshaji wa maisha halisi. Mkusanyiko wa mawaidha ulikua kwa njia nyingi kama; mahojiano, uchunguzi, ziara, uchunguzi wa mtandao na njia ya simu.

Utafiti uliwasilishwa kwa makurasa manne na yalionyesha utumiaji wa simu za mtandao. Simu za mtandao zina athari muhimu kwa maisha ya wanariadha wa Kenya. Simu za mtandao kwa haraka zilikubaliwa na kutumika na wenyewe na angalau kupatikana kwa mtandao kukakua muhimu. 180,000 ziara mbalimbali zilifanyika kwa mtandao na 346,000 maombi zilitumika na wanariadha wa Kenya zilizo na maarufu kwa mtandao ni Google/Yahoo (24%), burudani (19%), habari (14%), michezo (12%) na mawasiliano (11%). Kuhusu maombi hasa simu na kuwasiliana lakini cha muhimu kabisa ni mawasiliano, kamera, maombi ya Asili na maombi ya kukimbia.

Wakiambiaji ambao kazi yao ni kukimbia, walikua wamejiami vilivyo na walikua na habari nzuri kama habari kuhusu mafunzo zao, program zao, kalenda zao, ukumbi za mbio nkt. Hivyo kujiheshimu na kujitegemea kwa kupokea teknolojia ya komputa kutoka simu za mtandao. Wanariadha walio husika kwa utafiti walifanya vizuri na itaongezea nafasi za washiriki kwa maisha ya mbio ya baadaye.

Utumiaji wa simu za mtandao umejenga mazingira ya masoma kwa wanariadha. Washiriki walikua wamechangamka, wana motisha ya masomo, masomo ya ugaduzi na riba ya hali ya juu kwa kutafuta habari, kutazama habari kuboresha lugha yao ya kingereza, ujuzi wa

kompyuta na ufahamu wa eneo kwa kutumia GPS. Kwa utumizi wa simu ya mtandao wanariadha wamepata jisi ya kupata mapato kwa mfano, kamera zimetumika kwa biashara na wanariadha kupanga utalii wa mjini kwa kutumia vifaa vya ICT.

Shirika la kushikamana masomo halisi duniani lina sudi kaimu ya hali ya juu, shida zinazoibuka na utata, jinsi za kutatua kwa kutumia simu za mtandao. Simu za mtandao zinatumiwa kwa “mwezesaji” na kuboresha upatikanaji wa habari, maarifa na masomo, pia hupunguza dhiki kwa kutoshinda mbio. Utumiaji wa vifaa sahihi zinaongeza masomo na kuwezesha watu wa kawaida ambao, hawakusoma masomo rasmi.

Wanariadha wa Kenya kwa utafiti huu wameonyesha riba kwa masomo kuhusu haki zao. Mfano mzuri wa masomo ya mkono ili huluku mashirika yasiyo rasmi (MOOC) kuhusu Haki Zangu. Somo ilo litakua wazi na bure kwa mkenya yeyote anayetumia simu ya mtandao. Hii ni kumaanisha wanafunzi walio vijijini wataweza kushiriki kwa utafiti na kuweza kusoma. Masomo hayo yatatoa beji za kiteknologia ambazo zitaonekana kama diploma na itakua ushaidi wa masomo. Baada ya miezi sita (6) wakenya mia moja sitini (160) walijiunga na washiriki kumi (10) walimaliza masomo yao. Tathmini imeonyesha ilikua inachochea kwa mjadala na kushiriki uzoefu na washirika kwa jukwaaa na kusoma kutoka kwa mfundishaji na change moto za kimaadili na utata.

Baada ya Haki Zangu ziliweza kuonyesha (MOOC) kwa ubunifu huo unaweza linganisha kiwanja na kwa mapana kupanua milango kwa ubora wa masomo ya bure licha ya kiuchumi ya kijamii, kwa hivyo somo la (MOOC) si bidhaa pekee lakini ni njia muhimu. Ni muhimu kwa washiriki kujiunga na somo ili waweze kupata masomo na kufahamu mafunzo. Hii ni njia ya kuunganisha jamii.

Kifaa cha simu ya mtandao kimechangia shughuli tofauti kwa maisha ya kila siku, inaweza tumika wakati wowote na pahali popote. Sababu ya udogo na wepesi wake imefanya iwe kifaa cha maana. Taarifa ya kawaida kutoka kwa wanariadha ni “inasaidia kabisa” kwa hivyo simu ya mtandao na yenye intaneti ina maana kwa maisha halisi.

Utamaduni wa jamii imechambua dalili ya washiriki walioitaji msaa waliielekezwa na rika ama majibu kutoka kwa mtandao wa intaneti. Ushiriki wa simu ya matandao kwa wanariadha imeibua njia mpya ya kutumia raslimali za teknolojia. Wanariadha wanategemea

motisha yao ya kukimbia kwa shughuli tofauti na pia kusoma kutumia kifaa na mazingira ya watu wengine. Shughuli za utamaduni wa kijamii, wanariadha wamepeva motisha ya kujisaidia kimasoma na kushirikiana na jamii. Uendeleaji wa kutumia Facebook na kuzungumza imeinua mawasiliano na mwingilioano ya wanariadha. Mandhari manne kuu yaliyobuka kuhusiana na matumizi ya wana riadha ni:

- i. ushiriki,
- ii. tabia na ufahamui,
- iii. ushiriki wa simu ya mkono na maendeleoya ujuzi ya mwekezaji,
- iv. mwingiliano ya jamii.

Hata hivyo changamoto za masomo ya mkono ni ambapo unatumia umeme, ukosefu wa umeme, upatikanaji na gharama ya mtandao wa intaneti kama vile umuhimu wa matokeo ya Intaneti.

Kwa utafiti huu inaonyesha kwamba wanariadha wanatumia teknolojia kwa mazoezi na kupanua maingiliano na jamii, ujuzi wa maendeleo ya wekezaji, ongezeko la ufahamu kwa jamii na kuboresha ushiriki kwa masomo ya mkono, kwa hivyo utafiti unaonyesha simu ya teknolojia inaboresha maisha halisi na kuendeleza njia mpya za ushiriki masomo ya mkono.

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Papers

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Appendix A

Participant	Gender	Age	Education	Individual interview	Group interviews	Log period	Most frequent Web search	Most used applications
Thomas	M	21	Form 1	1	3	Nov. 2011-Nov. 2012	Yahoo Facebook	Phone Contacts Music
Lewis	M	27	Form 4	1	2	Feb. 2012-Nov. 2012	None	Phone Contacts Radio
Jackson	M	27	Form 4	1	3	Nov. 2011-Feb. 2012	Google Twitter	Phone Contacts Google search
Adrian	M	26	Form 2	1	2	Nov. 2011-Oct. 2012	Google Gmail Facebook	Phone Contacts Settings
Joseph	M	23	Form 4	1	1	Nov. 2011-June 2012	Facebook Google Political blog	Phone Contacts Facebook
Pauline	F	21	Form 4	-	1	Nov. 2011-May 2012	Google News Facebook	Phone Contacts Settings
Janet	F	25	Form 1	1	3	Nov. 2011-Jan. 2012	Facebook Entertainment Utility	Phone Contacts Settings
Eric	M	31	University	1	1	Nov. 2011-Nov. 2012	Yahoo Google Facebook	Web browser Phone Contacts
Brian	M	26	Form 3	1	3	Nov. 2011-Nov. 2012	IAAF Wikipedia Facebook	Phone Contacts Settings
Richard	M	34	Form 4	1	-	Nov. 2011-Nov. 2012	News Google	Phone Settings Contacts
Dennis	M	22	Form 4	1	2	Nov. 2011-May 2012	Yahoo Twitter Entertainment	Phone Contacts Settings
Patricia	F	19	Primary	1	3	Nov. 2011-Nov. 2012	Google LinkedIn Facebook	Contacts Phone Music
Benjamin	M	26	Form 4	1	1	None	None	None
Jasper	M	27	Primary	1	1	Nov. 2011-Nov. 2012	Facebook Google Entertainment	Phone Contacts Settings
Francis	M	25	Form 4	-	1	Nov. 2011 only	Facebook Google Yahoo	Contacts Phone Settings
Pamela	F	21	Form 2	1	1	Nov. 2011-March 2012	Yahoo Safaricom Facebook	Contacts Phone Web browser
Maurice	M	22	Form 4	1	1	Nov. 2011-June 2012	Google Yahoo Youtube	Phone Contacts Web browser
Moses	M	26	Primary	1	3	Nov. 2011-Nov. 2012	Google Entertainment	Phone Contacts Settings
Fredrick	M	23	Form 4	1	2	Nov. 2011-March 2012	Entertainment Facebook Google	Contacts Phone Settings

Participant	Gender	Age	Education	Individual interview	Group interviews	Log period	Most frequent Web search	Most used applications
Mary	F	27	Primary	-	1	Nov. 2011-May 2012	Google Yahoo Facebook	Contacts Phone Web browser
Samuel	M	29	Primary	1	3	Feb. 2012-Nov. 2012	Google Facebook Youtube	Phone Contacts Settings
Mike	M	27	Form 4	1	3	Nov. 2011-Oct. 2012	Yahoo News Religion	Phone Contacts Settings
Nicholas	M	29	Primary	1	3	Nov. 2011-Jan. 2012	Google Safaricom Yahoo	Contacts Phone Web browser
Wilson	M	21	Form 3	1	3	Nov. 2011-Nov. 2012	Entertainment Google IAAF	Contacts Phone Web browser
Leonard	M	28	Form 4	1	3	Nov. 2011-Oct. 2012	Entertainment Facebook Google	Phone Contacts Settings
Anthony	M	23	Form 4	1	2	Nov. 2011-Nov. 2012	Yahoo Facebook Google	Contacts Phone Settings
Linda	F	21	Form 3	1	1	Nov. 2011-Nov. 2012	Facebook Entertainment Google	Phone Contacts Settings
Joyce	F	34	Primary	1	3	Nov. 2011-Oct. 2012	Google Facebook Safaricom	Contacts Phone MyTracks
Caroline	F	21	Primary	1	3	Nov. 2011-Nov. 2012	Facebook Google Entertainment	Contacts Phone Settings
Susan	F	20	Form 4	1	3	Nov. 2011-Nov. 2012	Facebook Google Entertainment	Contacts Phone Settings
				27	62			

Appendix B



Kenya Running Project

Prepared by: Per-Olof Hansson and William Jobe

Date: 2011-11-01





Informed Consent Form for the Kenyan Running Project

Per-Olof Hansson and William Jobe
Linköpings University and Stockholm University
Kenyan Running Project

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

We are two researchers, Per-Olof Hansson (Linköpings University) and William Jobe (Stockholm University), who intend to perform research with Kenyan runners using smartphones. We wish to invite you to be a part of this research project and these documents contain all the information about the project. If you do not understand any portion of this document please feel free to ask us for an explanation. If you have questions now or later do not hesitate to ask us. There is no pressure to consent now and you can take your time thinking about it.

Participant Selection

You have been chosen for this study because you are a good runner and because you can be expected to use the smartphone apps and have use of both the smartphone apps and the smartphone itself.

Voluntary Participation

Your participation in this study is entirely voluntary. You may choose to participate or not. Choosing not to participate will have no negative consequences.

Purpose of the research

All of you are currently runners. The goal of this research project is to explore how the use of smartphone apps (small computer programs that run on the phone) and smartphones in general can create opportunities to earn money as well as learn more about technology and other things. Another goal is to explore how well different types of smartphone apps perform.

Type of Research Intervention

This research will involve you using a smartphone and specific smartphone apps. Furthermore, you will actively participate in the research project and that includes attendance at every workshop and seminar hosted by the project leader. There will be a maximum of 12 sessions. Interviews and questionnaires will be used at some of these sessions. There will even be sessions where interviews are videotaped and video and audio capture, in general, will be used frequently during the course of the research project.

Procedures

A. This research program will require you to use a smartphone while running. You will use a variety of different apps. The particular smartphone to be used in this study is a Huawei Ideos smartphone. The serial number of the smartphone you will be using is _____ and the telephone number to your smartphone is _____.

B. This research project will use interviews and questionnaires throughout the study. We will ask you questions about your opinion of the smartphone and smartphone applications. We will even ask you why you used certain programs and why you did not use others? Furthermore, **everything** you do with the smartphone will be recorded for research purposes. We will install a program on the smartphone that



records, for example, the number of SMS and voice calls made, the use of different apps, the location of the smartphone, etc. Finally, we will gather and study all information about your runs.

Duration

This research project will start on the 14th of November 2011 and be finished no later than July 2013.

Risks

The risks with this study for the individual involve the potential to run too often and the risk that personal data stored on the smartphone might unintentionally be exposed to third parties. Because you will receive payment for running it might be tempting to run more often per day than is healthy. Therefore it is not allowed to run in quantities that exceed your normal training. Furthermore, we as researchers take all the security cautions we can to ensure that no personal information is exposed and of course we promise that no personal data will be shared to external parties in any way. Another risk is damage to the equipment, in other words damage to the smartphone. You are personally responsible for the care of the smartphone given to you. Furthermore, if the smartphone is lost, stolen, damaged, etc. then you are personally responsible to pay for a replacement. This research project will not replace the smartphone.

Benefits

The benefits of this study are that you will hopefully be able to earn some money while running. Furthermore, you will hopefully learn a great deal about technology, the use of technology, as well as learn about your surrounding area and history because of this research.

Confidentiality

The raw research data will only be available to those in the research group. This data will in no way be shared or made public. In published works (for example, research articles) the data of individual users will be made anonymous in all cases when used.

Sharing the Results

The data collected in this research project will be shared in research conferences, workshops, and publications. Upon request, your individual data will be made available to you.

Reimbursements

There are no reimbursements associated with this research project. However, once the research project is concluded, you may keep the smartphone that you have used. The only requirement is that you remain in the project the entire time until the research project ends.

Right to Refuse or Withdraw

As previously stated, you can withdraw from this research at any time. The only requirement for withdrawal from the project is that you inform the research leaders a month in advance either orally or in written form. All equipment that you received shall then be returned.

Who to Contact

Group leaders: Isaac Macharia (Ngong group) or William Morwabe (Kibera group).

Part II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Print Name of Participant _____

Signature of Participant _____

Date _____ **(Day/month/year)**



If illiterate

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness _____

Thumb print of participant

Signature of witness _____

Date _____
Day/month/year

A large, empty rectangular box intended for the thumb print of the participant.

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____
Day/month/year

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