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A DIGITAL PLATFORM FOR SOCIAL INNOVATION THROUGH DIGITAL STORYTELLING

by

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A dissertation submitted in fulfilment of
the requirements for the degree of

MSc (Computer Science)

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Abstract

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Abstract

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Technology plays a big role in our lives. However, many do not have access to technology and the knowledge it provides, giving rise to the so-called digital divide. The purpose of this study is to explore and understand the impact of digital storytelling for social innovation, considering the digital landscape of South Africa. For example, it is important to consider what types of technologies have worked and are still working to capture stories. Furthermore, to consider what skills the end-users would require to use the system and what devices would be best suited for them—PC, laptop, tablet, or smartphone—and what software would be required to capture their stories. Finally, access to Wi-Fi or the Internet would need to be economically viable. Despite the vast research that has been done on digital storytelling, not much has been done in terms of its impact on social innovation and how a digital platform should be designed to enrich social innovation and creativity. This study employs a design science research methodology to address the problem of creating an artefact (platform) that will inform social innovation through digital storytelling. The methods that have been used included: collaborative participatory design, interviews and participant observation. The findings from this study show that creating a digital platform for the sharing of

digital stories is a meaningful approach for increasing research skills, creativity and critical thinking. Furthermore, such a platform not only enables social innovators and entrepreneurs to share their stories and, in this way, enable collaboration, but could also be used by educational institutions to promote community engagement.

Keywords

ACM CLASSIFIED

• **Human-centered computing~Social networking sites** • *Human-centered computing~ Social content sharing* • *Human-centered computing~Collaborative and social computing devices* • *Software and its engineering~ Requirements analysis* • Applied computing~ Interactive learning environments • Human-centered computing~Scenario-based design • Information systems~Blogs

OTHER KEYWORDS

digital storytelling, digital platform, informal learning, social innovation, social change

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DECLARATION

I, *Ntombesisa Mateyisi,* declare that *A digital platform for social innovation through digital storytelling* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Full name:*Ntombesisa Mateyisi* Date: *03 March 2021*

Signed..... .....

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GLOSSARY

Critical Social Theory: refers to the study of differences between people as related to their socially determined status, such as socio-economics and also confronts the social problems of the present age (Kellner, 1990).

CIECT: Centre for Innovative Educational and Communication Technologies

Digital Divide: this is an economic and social inequality with regards to access and can be described as the split between those who have ready access to computers and the Internet, and those who do not (Van Dijk, 2017).

Digital platform: According to Stephane Castellani a platform is a "plug-and-play business model that allows multiple participants to connect to it, both producers and consumers. Here they can interact with each other and create an exchange value" (Castellani, 2016).

Digital Storytelling: is the practice of combining narrative with digital content, including images, sound, and video, to create a short story, typically with a strong emotional component (Robin, 2016).

DSR: Design Science Research

Epistemology: is concerned with the nature and forms of knowledge; how knowledge can be created, acquired and communicated, in other words, what it means to know (Scotland, 2012).

HEI: Higher Education Institution

ICT: Information and Communication Technologies

Informal Learning: is a form of learning an individual can participate in through knowledge creation or in an unsupervised environment quite different from the traditional view of teacher-centred learning (Cross, 2011).

Interactive Learning Environment: are platforms that provide an educational approach that incorporate social networking and urban computing into course design and delivery.

Justinmind: is a drag and drop prototyping tool for web and mobile app prototypes and high-fidelity website wireframes.

Participatory Design (PD): is the method of the design and development of technological systems and the involvement of people in the co-design of tools, products, environments, businesses, and social institutions (Robertson & Simonsen, 2012).

Proof of concept: a set of assumptions about reality that inform the questions we ask and the kinds of answers we arrive at as a result (Crossman, 2017).

Prototype: a set of assumptions about reality that inform the questions we ask and the kinds of answers we arrive at as a result (Crossman, 2017).

Systematic Document Analysis (SDA): Analysis is a systematic procedure for reviewing or evaluating documents—both printed and electronic, it is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around an assessment topic (Bowen, 2009).

Social Networking Sites (SNS): are platforms that provide a new method of communicating, sharing information and where users form relationships with other users in the same site (Lin & Lu, 2011).

Social Impact: is a substantial and positive change that addresses a pressing social challenge and affirms the humanity of all people (Maheshwari, 2016).

Social Innovation: is the practice of emerging and organizing effective solutions to challenging and often methodical social and environmental issues (Tracey & Stott, 2017).

USA: United States of America

Chapter 1

STATEMENT AND ANALYSIS OF THE PROBLEM

SKETCHING THE BACKGROUND

All cultures and languages have storytelling traditions which have been in existence since time immemorial. Approximately a hundred thousand years ago, many humanoid species lived on earth. Only homo sapiens survived. Why is this so? According to Harari, it is because homo sapiens experienced a cognitive revolution. It is this "*cognitive revolution*"—based on our ability to share stories and build upon information—which truly distinguishes us as human beings (Harari, 2011). Through digital stories, shared knowledge and wisdom is conveyed to the wider community and helps the community to navigate and understand the world around them better. Currently, there is great interest in the use of digital storytelling in many areas such as marketing, health, psychology, etc. (Robin, 2016).

Digital storytelling in marketing is powerful; selling a product or advertising a product in the form of a story is compelling. Human brains are wired to understand and retain stories, humans are driven by positive emotions, personal feelings, and experiences, and hence the likelihood of digital stories in the 21st century is capable of "*magic*" in the marketing industry (Event Psychologist, 2016). Since storytelling through video is something anyone with a smartphone can create, this concept—when applied in marketing—increases brand loyalty and trust, and it is likely to reach a wider community (Mancuso & Stuth, 2014). For social innovation marketing is not *per se*, necessary, however exposure to the media through digital storytelling may give rise to greater awareness by the public of the specific social innovation and also the possibility of raising more funds.

In the health industry, the concept of digital storytelling is used in different ways such as treatment and compliance barriers education, disease awareness and patient experience awareness. For example, the digital story "*Path to understanding cancer"* has assisted Community Health Workers to make people understand the impact of cancer using a digital story. According to Cueva, digital storytelling has given Community Health Workers the power of media; it has increased their cancer knowledge, allowed the facilitation of patients through conversations and promoted cancer awareness and wellness (Cueva M. , et al., 2013).

With the ubiquitous access to smartphones and its plethora of functionalities, there is a belief that everyone has access to technology and thus information. However, this is not the case, especially in developing countries, where access to a smartphone, technology, is still a problem. According to the World Economic Forum, the world is on the brink of the fourth industrial revolution.

> "*Information and communication technologies (ICTs) are the backbone of this revolution. The future of countries, businesses, and individuals will depend more than ever on whether they embrace digital technologies. And many of those who stand to gain the most are not yet connected.*"

Cell phone ownership in South Africa in 2014, according to Pew Research, was 89% which was equivalent to the United States percentage of cell phone ownership in that year. Most South Africans owned feature phones, while smartphones (those that can access the Internet and applications) were less widely used—only 34% of South Africans had smartphones (Poushter & Oates, 2015).

Ownership of cell phones has increased considerably worldwide since 2014. In 2017, 94% of adults in the United States of America (USA) had a cell phone of which only 17% were feature phones (Poushter, Bishop, & Chwe, 2018). In South Africa (SA), although 91% owned a cell phone only 51% were smartphones, in spite of the fact that smartphones sales in 2017 exceeded the sales of feature phones by more than a third (My Broadband, 2016) (see Figure 1).

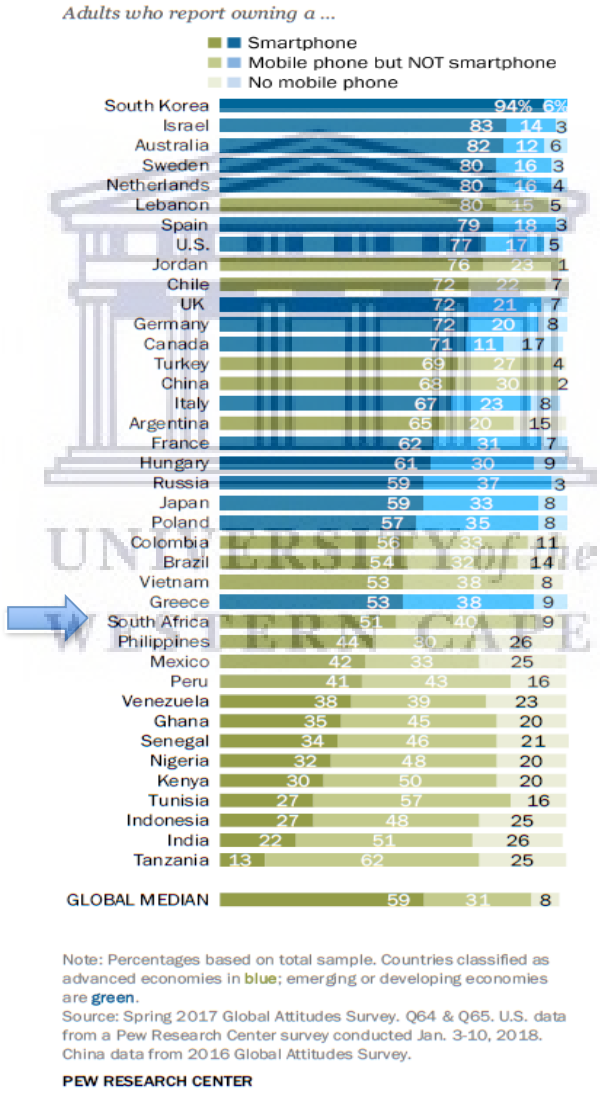


Figure 1: Cell phone ownership

In South Africa, the most common usage of mobile phones is for sending text messages followed by taking videos and pictures. Activities requiring Internet access were used much less in 2015, since the affordability of Internet services is a significant challenge in SA (Western Cape Digital Readiness Assessment: Summary Report, 2015). In the USA, Americans are progressively connected to the world of digital information[1] (see Figure 2).

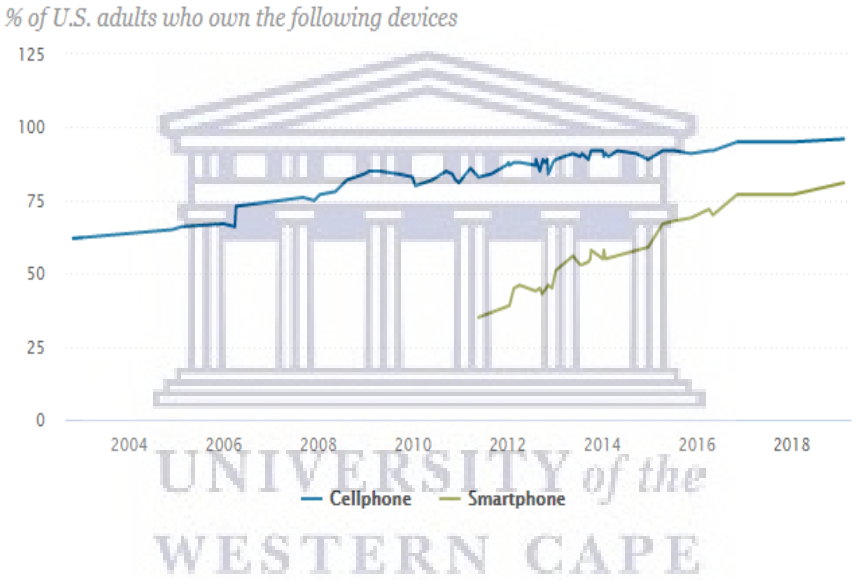


Figure 2: Cell phone penetration in the US in 2016 (Pew Research Centre, 2017)

As can be seen in Figure 3 South Africa falls behind the other BRICS ([1]Brazil, Russia, India, China, and South Africa) countries as far as the cost of connectivity is concerned. Singapore's costs and connectivity are far superior to South Africa's. Singapore is a leader in the digital space in terms of its connectivity speed. South

[1] http://www.pewinternet.org/fact-sheet/mobile/

Africa's connectivity costs are very high, China has a similar speed to South Africa but there is a huge difference in cost.

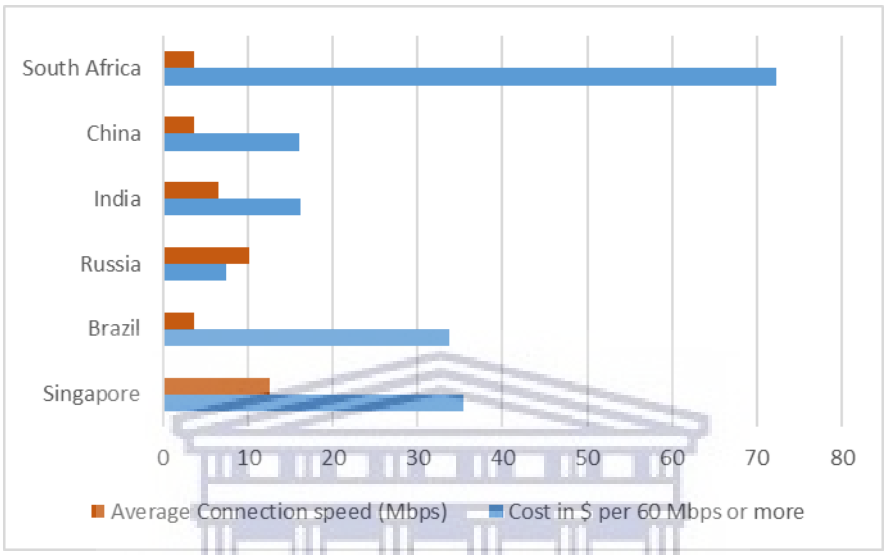


Figure 3: Affordability of data in SA compared to the BRICS countries[2]

These statistics extracted from the Western Cape Digital Readiness Assessment Report show the challenge South Africa is facing. High connectivity costs and low connectivity speeds are two of the major challenges that contribute to the rise of the so-called digital divide which will also have a direct impact on the ability of South Africans to create digital stories.

[2] Numbeo. (2018). *Prices by Country of Internet (60 Mbps or More, Unlimited Data, Cable/ADSL).* Retrieved 09 18, 2018, from Numbeo: https://www.numbeo.com/cost-of-living/prices_by_country.jsp?displayCurrency=USD&itemId=33 and

Akamai Technologies. State-of-the-internet, https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q1-2017-state-of-the-internet-connectivity-report.pdf, last accessed 2019/03/14

RESEARCH PROBLEM

The aim of this research project is to explore and understand the impact of digital storytelling for social innovation in South Africa. Therefore, the main research problem that drives this investigation is:

How should a digital platform for digital storytelling be designed to enhance social innovation and information sharing?

This can be translated into the following sub-questions:

- What would the impact of digital storytelling for social innovation be within the constraints of the digital landscape of South Africa?
- How can a framework for a platform for digital storytelling be developed, to promote informal learning and the sharing of socially innovative stories?

The aim of this research project is two-fold:

- To explore and understand the impact of digital storytelling for social innovation, within the constraints of the digital landscape of South Africa
- To develop a framework for a platform for digital storytelling to promote informal learning and the sharing of socially innovative stories

RESEARCH FRAMEWORK

This study employs design science research (as research methodology) to address the problem of creating an artefact (platform) that will inform social innovation through digital storytelling (Kuechler & Vaishnavi, 2004). Design science as a paradigm deals with the construction of artefacts (March & Smith, 1995). In order to enrich the consistency and validity of the research, multiple methods of data collection and analysis have been used. The methods include collaborative participatory design (Simonsen & Robertson, 2013), interviews and participant observation.

Ethics statement

The ethical considerations for this research are based on Lund's Research principals (Lund Research Limited, 2012) namely:

- Minimizing the risk of harm
- Obtaining informed consent
- Protecting anonymity and confidentiality
- Avoiding deceptive practices and
- Providing the right to withdraw

This research proposal, the approach, interview questions, and a completed ethics form was submitted to the University of the Western Cape Research Committee for its approval. Approval was given to do the research (HS17/9/25) (see Appendix A, page 91)

The results show the importance of using digital tools and of applying the concept of digital storytelling for teaching and for social innovative organizations since the publicity of the organisations' innovation in the media, creates opportunities in terms of greater awareness and possible funding.

DISSERTATION OUTLINE

The outline of the dissertation is as follows:

Chapter 1 gives an outline of the dissertation, the aims of the research and its contribution to the knowledge area. It also states the research methodology this study employs.

Chapter 2 is a review of the current literature and research in the field of digital storytelling. The literature review is carried out in order to analyse the topic, key concepts and to understand the viewpoints of researchers in the field.

Chapter 3 gives a full picture of the research methodology that is used in this research project; it also considers the associated research methods and design tools

that are required. This chapter explains in more detail the design and implementation of the design science research methodology to investigate the relevant research questions.

Chapter 4 gives the results revealed by the analysis of the data collected.

Chapter 5 discusses the findings in terms of the research questions posed and gives some recommendations for future research.

Chapter 2

LITERATURE REVIEW

INTRODUCTION

In this chapter, previously reported studies are presented, and key concepts defined. Also, this chapter provides detailed information concerning the following concepts; human-centred computing; social networking sites, social content sharing, blogs, scenario-based design, digital storytelling, digital platform, collaborative and social computing devices, interactive learning environments, informal learning, social innovation, social change.

THE FOURTH INDUSTRIAL REVOLUTION

Developing economies must implement policies that equip people with the required skills in order for them to grow and be able to operate and develop new technologies since basic reading and writing skills will not be enough; the fourth industrial revolution is like a bullet train coming and it is up to policymakers to prepare and enable the masses to either get on board or risk being casualties in its path (Younus, 2017). The changes that come with the Fourth Industrial Revolution, will change not only what we do, but also who we are. These changes will affect our perception of our identity and all the issues associated with it. Issues that will impact our identity include our sense of privacy, our notion of ownership, our consumption patterns, time dedicated to work and relaxation, and how we grow our careers and nurture our skills (Schwab, 2016).

As Schwab says:

"We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold,

but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society." (Schwab, 2016, p. 1)

RELATED WORK

Throughout the history of human, storytelling has been used as a tool for the transference and sharing of knowledge. Currently, digital storytelling is used in many industries for different purposes such as community engagement, educational and so on (Singh & Sonnenburg, 2012).

The use of digital storytelling to communicate with communities and as an innovative method for marketing (Pera & Viglia, 2016). This storytelling concept can also be used to capture peoples lived experiences such as dealing with mental health (De Vecchi, Kenny, Dickson-Swift, & Kidd, 2016). A study about learning community members' perspective about digital storytelling, shows that the integration of technology in educating and informing communities about health related issues brings a different sense of awareness; the members reported digital stories as an acceptable, emotionally engaging way to increase their cancer awareness (Cueva M. , Kuhnley, Revels, Schoenberg, & Dignan, 2015).

Stoltenkamp *et al.*, conducted a research in George, Western Cape. This study explored (data was gather from 16 participants), via digital stories, the authentic needs of vulnerable community sectors. Digital stories proved to be an excellent tool for community need identification while at the same time building digital skills among community members. The authors concluded that the use of digital stories in identifying community needs is recommended in future research focusing on community development or social innovation (Stoltenkamp, Siebrits, Kies, & Braaf, 2015).

Digital storytelling contributed significantly to social change movements by using the available technological tools. According to Khebbaz, the use of digital storytelling to deal with societal problems and finding solutions using the available tools empowers individuals (Khebbaz, 2016).

Community social impact developments have evolved over time. Littlewood stated what the Macassar Pottery, a social enterprise focuses on. According to Littlewood, the Pottery works with young people by providing them with pottery skills training, business opportunities, advice and support (Littlewood & Holt, 2013). The Pottery's aim is to empower youth in the community and helping to live more sustainable lives.

HUMAN-CENTRED COMPUTING

Computing technologies are increasingly affecting and transforming almost every aspect of our daily lives, this can be seen through the essential role computing plays in supporting human activities. As is pointed out by Schwab:

"Ordering a cab, booking a flight, buying a product, making a payment, listening to music, watching a film, or playing a game—any of these can now be done remotely." (Schwab, 2016)

Human-Centred Computing is a developing field that aims to bridge the existing gaps between the different disciplines involved with the design and implementation of computing systems that support human's activities (Sebe, 2010).

SOCIAL NETWORKING SITES

The rise of social networking sites (SNS) is inevitable and the content that a site produces determines its growth and stability. A Pew Research Centre report produced in 2011 shows that a platform and its content that is shared has an impact on the growth of new members that use the platform (Hampton, Goulet, Rainie, & Purcell, 2011).

Ellison defines social networking sites as web-based services that allow individuals to construct a public or semi-public profile, articulate a list of other users with whom they share a connection, view and navigate their list of connections and are designed to help people communicate and share information, photographs, etc. within group (Ellison, 2007).

According to Lin and Lu (2011), social networking sites provide a new method of communicating, employing computers as collaborative tools to accelerate group formation and escalate group scope and influence (Lin & Lu, 2011). Social networking sites have an innovative operation which has successfully drawn the attention of industry and academia; the most interesting thing that has happened is that these sites have also boosted user growth. Lin and Lu state that SNS is currently the world's fastest developing and improving personal networking tool used by many.

It is likely that the rapid rise of social networking sites also has a great impact on those who do not engage in SNS, since they happen to miss out on more than just communication. The wide influence of the digital revolution causes educators and advocates of new digital literacies to be confident that social networking inspires the development of transferable technical and social skills of value in both formal and informal learning (Livingstone & Brake, 2010).

SOCIAL CONTENT SHARING

Storytelling has been used as a tool for the transmission and sharing of knowledge and values throughout the history of human and social development. Storytelling is important whatever its form of content, and one of the characteristics of stories is that they get shared. Social media content sharing empowers individuals to create, share and seek content, as well as to communicate and collaborate with each other (Lee & Ma, 2012).

Blogs

Technology is empowering ordinary people in all sorts of ways (Reynolds, 2007). A blog is an Internet-based, networked community centred on a theme or idea, product, industry or any other subject (Droge, Stanko, & Pollitte, 2010). The chief function of blogs is community creation: since the created platform is used for information sharing, entertainment, and self-expression. Blogs can be used as a form of informal learning or sharing of educational content.

According to Granberg (2010), the use of blogs has increased over the last decade, their potential to be used for educational purposes has also increased. To bring to the fore the bloggers' thoughts, a variety of media such as text, pictures and videos are used. These can help in encouraging individual reflection and critical thinking in support of the learning process (Granberg, 2010).

SCENARIO-BASED DESIGN

The scenario-based design supports user-centred design processes that are aimed at developing products and services. This sort of design supports designers and design teams in their creative and reflective activities by providing a clear means to explore future use. Most importantly, scenarios can serve as a common language that everyone can understand, irrespective of their backgrounds (Van der Bijl-Brouwer & Van der Voort, 2013).

DIGITAL STORYTELLING

Digital storytelling is a way of sharing knowledge, information and of communicating any educational content to the wider community, using technological tools. Digital Storytelling is the modern expression of the ancient art of storytelling; it is the practice of combining narrative with digital content, including images, sound, and video (Malita & Martin, 2010).

Benmayor's (2008) states that digital storytelling is "a *short multimedia story that combines voice, image, and music*" (Benmayor, 2008, p. 202).
According to Kajder, Bull & Albaugh (2005), a group of still images, combined with a narrated soundtrack, constitutes a digital story if together they relate a story (Bull & Kajder, 2004).

This research project will use the following definition by Malita and Martin stating: digital storytelling is "*the practice of combining narrative with digital content, images, audio, and video to create a digital story"* (Malita & Martin, 2010, p. 3061).

The "story circle"

The story circle is one of the methods that uses the age-old practice of storytelling to bring people together. People sit in a circle and share their stories. This method helps individuals share their personal stories within a group. Lambert believes that the connections made between people in the *story circle* helps to focus and inspire everyone throughout the process (Lambert J. , 2010).

The *Seven Steps of the Story Circle* (Lambert J. , 2013):

- Owning your insights
- Owning your emotions
- Finding the moment
- Seeing your story
- Hearing your story
- Assembling your story
- Sharing your story

DIGITAL PLATFORM

A "platform" in the IT field often refers to the basic hardware (computer) and software (operating system) on which software applications can be run. However,

in this dissertation when reference is made to a platform it will be a platform as described by De Reuver.

According to De Reuver, digital platforms support new ways of interacting within communities through mediated co-creation. The emergence and development of digital platforms have changed how people interact, share information and experiences. Digital platforms are transforming almost every industry today (De Reuver, Sorensen, & Basole, 2016).

A digital platform is a software system such as Facebook, Twitter, or Instagram. It can also be defined as:

- A technology-enabled model.
- which allows the interaction of groups and offers value to communities
- it has open connectivity in terms of the use of APIs
- it is able to scale without performance degradation.
- it is easy to use, facilitates training

Digital platforms can support grassroots collaboration for sustainability and improve the social network of engaged communities (Baek, Manzini, & Rizzo, 2010).

COLLABORATIVE AND SOCIAL COMPUTING DEVICES

Electronic device users are increasingly able to collaborate on an ever-growing number of types of documents and projects online, depending on the content of collaboration (U.S Patent No. 8,566,301, 2013). The use of mobile computing devices provides opportunities to collaborate, discuss content with users and create new meaning and understanding; these devices include technologies that are transportable, such as cell phones and smartphones (Gikas & Grant, 2013).

INTERACTIVE LEARNING ENVIRONMENTS

An interactive learning environment is a system built in software and sometimes with specialized hardware, designed to support teaching and learning in education. The interaction in the system can be between the learner and the system, the teacher and the system or between teachers and learners with each other using the system (Psotka, 2012). This kind of system allows a variety of learning; it can be academic, informal, or work-related.

Informal learning

This form of learning is described as learning that rests in the hands of a learner and happens through observation, asking for help, conversing with others and listening to stories (Cross, 2011). Personal learning environments are a good platform that promote informal learning, as each individual has the choice of what to share, learn and who to share it with. People tend to use Web 2.0 technologies for personal purposes, whereas they do not take advantage of using them for informal learning (Dabbagh & Kitsantas, 2012).

SOCIAL INNOVATION

Social innovation refers to new ideas that meet the social needs of a community. It is the process of developing and deploying effective solutions to challenging social and environmental issues in support of social progress. Ezio Manzini states that social innovation can be understood as "*a new idea that works by meeting social goals.*" (Manzini, 2014, p. 57).

Social change

According to Dr. Maheshwari "*Social change is the change in society, and society is a web of social relationships.*" (Maheshwari, 2016) Social change also refers to the transformation of culture, behaviour, social institutions, and social structure over

time. As society becomes more modern, changes in technology, economy, inequality and gender roles are seen (Maheshwari, 2016).

SUMMARY OF THE LITERATURE REVIEW

The use and implementation of storytelling in the digital age is still developing. Even though the required technology is available, the challenge[s] of access and infrastructure persist. While the use of technology has been considered essential to all areas and industries, digital storytelling has not been fully utilized. This chapter reviewed the literature that is aligned with this research project.

The following chapter will discuss the research methodology employed to develop a framework for digital storytelling.

Chapter 3

RESEARCH APPROACH AND METHODOLOGY

INTRODUCTION

In the previous chapter, the literature review was discussed using the key concepts as a guide to what other researchers have done. This chapter deals with the research approach used to investigate the research question and explains the research methodology this project has adopted.

RESEARCH APPROACH

Crotty (Crotty, 1998, pp. 2-3), takes the view that any researcher during the research phases of a project should be able to answer four simple questions. He then defines these questions as the basic elements of any research process:

1. **What methods do we propose to use?** What are the techniques or procedures used to gather and analyse data?
2. **What methodology governs our choice of methods?** The strategy, the plan of action or design lying behind the choice and use of methods.
3. **What is our theoretical perspective?** The philosophical stance informing the methodology and providing context for the process and grounding its logic and criteria.
4. **What epistemology informs our perspective?** What is the theory of knowledge embedded in the theoretical perspective and thereby in the methodology?

The four questions give depth and breadth to the connected decisions that are essential in the design of any piece of research.

THE FOUR ELEMENTS

According to Crotty, a structured but broad approach is necessary to allow researchers to make sense of the vast amount of research approaches that are available. The four elements (see Figure 4) are reliant on each other, epistemology, theoretical perspective, methodology and methods, any decision made in one element affects decisions made in the others; they all inform each other (Crotty, 1998).

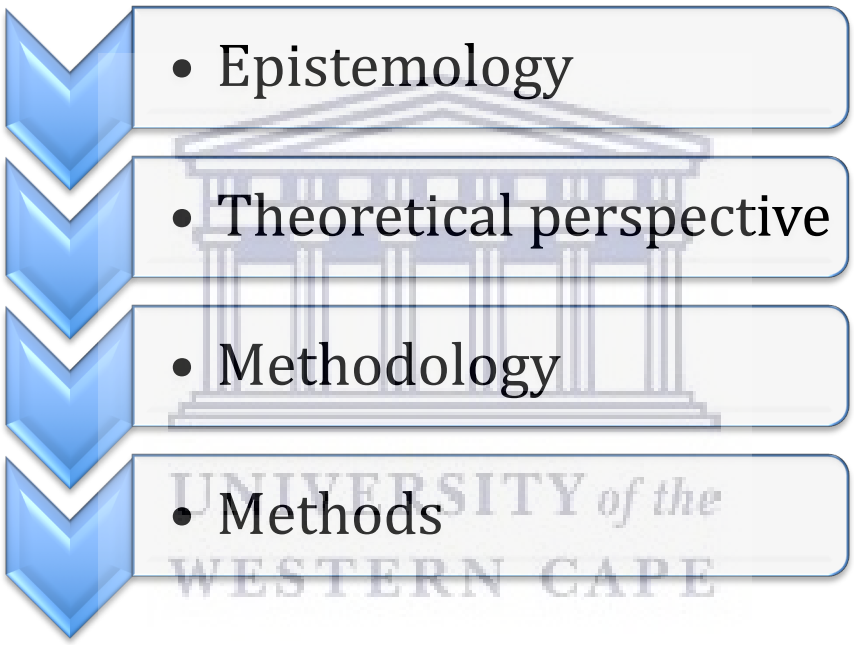


Figure 4: Four elements of research according to Crotty (Crotty, 1998, p. 4)

These four elements help a researcher to follow a structured approach. Initially, the researcher needs to identify, explain, and justify the epistemological stance that has been adopted. Secondly, the researcher needs to explain his or her theoretical perspective that is the philosophical stance that lies behind a chosen methodology. The research methodology is the choice the researcher needs to make to execute the research. The methodology describes a strategy or plan of action. Finally, the

research methods describe the concrete techniques or procedures the researcher plans to use, to gather and analyse data.

For this research, the four elements, as described by Crotty, are chosen as follows: For the epistemological stance, constructivism is chosen, as the theoretical perspective, critical theory is implemented, the methodology chosen is design science research, and several methods are used within the DSR methodology. These methods are: systematic literature review, interviews and observations, participatory design, and expert review (see Figure 5).

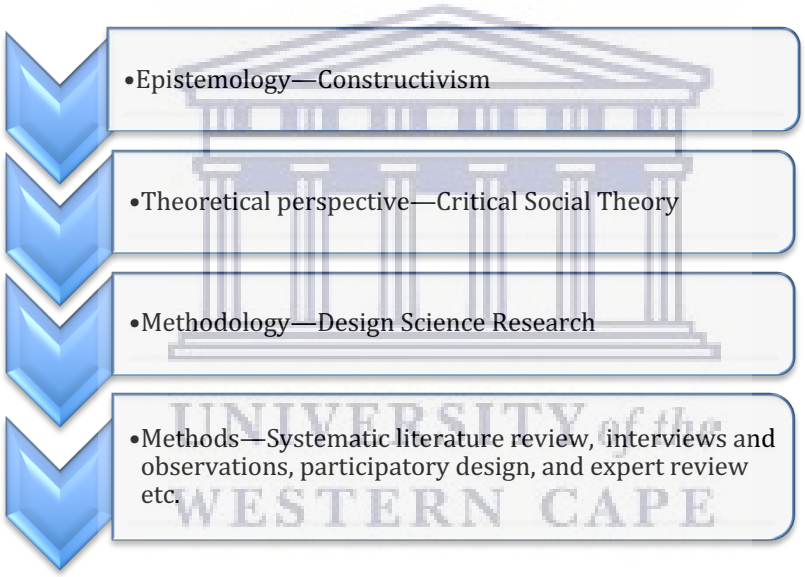


Figure 5: The elements used in this research.

EPISTEMOLOGY

Epistemology deals with the sources and nature of knowledge. In simple words, epistemology focuses on what is known to be true. According to Crotty, epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both acceptable and legitimate (Crotty, 1998).

Epistemology is usually joined alongside ontology. Ontology is defined as the study of claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other (Mack, 2010). This simply means ontology is the study of what we mean when we say something exists.

Therefore, in this research project, Crotty's definition of epistemology is utilized, defined as *the theory of knowledge embedded in the theoretical perspective and thereby in the methodology* (Crotty, 1998, p. 8).

According to Crotty, there is a range of epistemologies: objectivism, constructivism, and subjectivism. Objectivist epistemology holds that meaning, and therefore meaningful reality exists as part of the operation of any consciousness. Therefore, knowledge exists whether we are aware of it or not. In this objectivist view of *what it means to know*, understandings and values are considered to be objectified in the people we are studying and, if we go about it in the right way, we can discover the objective truth (Crotty, 1998).

Constructivism as epistemology maintains that there is no objective truth waiting for us to discover. It assumes that truth, or meaning, comes into existence in and out of our engagement with the realities in our world. Basically, in this understanding of knowledge, it is clear that different people may construct meaning in different ways even in relation to the same occurrence (Crotty, 1998).

The last epistemology is subjectivism; it is based on real-world phenomena. The world does not exist independently of our knowledge (Grix, 2004). Crotty states that in subjectivism, meaning does not come out of the interplay between subject and object but is imposed on the object by the subject (Crotty, 1998). Simply put, the object as such makes no contribution to the generation of meaning.

For this research, constructivism is used as the epistemological stance.

THEORETICAL PERSPECTIVE

Crossman defines theoretical perspective as *a set of assumptions about reality that inform the questions we ask and the kinds of answers we arrive at as a result* (Crossman, 2017). In research a theoretical perspective is essential, it serves to coordinate a researcher's thoughts and ideas and make them clear to others. Two different theoretical perspectives namely positivism and interpretivism, these stances have been among the most influential.

Positivism

Positivism has been considered as basing knowledge solely on observable facts and rejects speculation about ultimate origins (Ahmed, 2008). Crotty points out that the result of the research will tend to be presented as objective facts to establish the truth. In addition, Crotty mentions that one thing is certain: positivism is linked to empirical science as closely as ever (Crotty, 1998). Gray points out that positivism argues that:

- *Reality consists of what is available to the senses – that what can be seen, smelt, touched, etc.*
- *The inquiry should be based upon scientific observation (as opposed to philosophical speculation).*
- *The natural and human sciences share common logical and methodological principles, dealing with facts and not with values (Gray, 2013, p. 21)*

Interpretivism

The interpretivism paradigm, also referred to as anti-positivist paradigm, is a discipline where an individual's gained knowledge of the world is socially constructed rather than objectively determined (Carson, Gilmore, Perry, & Gronhaug, 2001). Therefore, interpretivists believe that knowledge is not 'objective' and 'value-free', but it is communicated to people through ideas, discourse, and experiences. In general, the point of interpretivist research is to gain

an in-depth insight into the lives of respondents, and this is done through a qualitative research method. According to Crotty interpretivists try to understand by looking at individual cases to trace the development of phenomena (typically qualitative) (Crotty, 1998). Furthermore, the objective of interpretivism research is to perceive the intended and interpret the meaning in human behaviour, and to understand motives, meanings and other subjective experiences (Neuman, 2000).

Critical Social Theory– Habermas

In line with the above assumptions (Habermas, Erkenntnis und interesse, 1971) Habermas identifies three types of "*knowledge interests*" which he believes drive all human inquiry. The three knowledge interests are: technical, practical and emancipatory (see Table 1).

According to Grundy, these interests establish the three types of science by which knowledge is brought into existence and organized in our society (Grundy , 1987). Habermas states that "*orientation toward technical control, toward mutual understanding of life, and toward emancipation from seemingly 'natural' constraint establishes the specific viewpoints from which we can understand reality as such in any way whatsoever*" (Habermas, Erkenntnis und interesse, 1971, p. 311).

Grundy presents a very good clarification of these three human interests. She sums up each of the interests as follows. "Put briefly, the technical interest is *a fundamental interest in controlling the environment through rule-following action based upon empirically grounded laws*" (Grundy , 1987, p. 12). Discussing the practical interest, she says, "This interest could be defined in the following way: *the practical interest is fundamental in understanding the environment through interaction based upon a consensual interpretation of meaning*" (Grundy , 1987, p. 14). And, finally, "The emancipatory cognitive interest could be defined as follows: *a fundamental interest in emancipation and empowerment to*

engage in autonomous action arising out of authentic, critical insight into the social construction of human society" (Grundy , 1987, p. 19).

This research project uses Critical Social Theory as defined by Habermas as its theoretical perspective.

Table 1: Three types of knowledge interest

KNOWLEDGE INTEREST	OBJECT OF INTEREST	ORIENTATION	KNOWLEDGE PRODUCTS
Technical	Natural World	Prediction	Scientific Knowledge Technology
Practical	Social Structures Social Relations Tradition	Mutual Understanding	Social Consciousness Humanity
Emancipatory	Technology Social Relations	Social Criticism	Norms for Justice Freedom

METHODOLOGY

A methodology is a number of steps that need to be taken to do the research. It is also defined as *"the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of the methods to the desired outcomes*" (Crotty M. , 2003, p. 10). According to Kothari, a research methodology is a way to methodically solve the research problem, he then adds: *"It may be understood as a science of studying how research is done scientifically."* (Kothari, 2004, p. 8).

Design Science Research

Design Science Research (DSR) is a methodology which uses design as a research method or technique (Vaishnavi & Kuechler, 2015). Therefore, DSR is focused on bringing into existence knowledge that supports problem-solving. An inherent part of the DSR approach is the concern with developing artefacts that serve human purposes (Dresch, Lacerda, & Antunes Jr, 2014). Thus, it can be used as a form of

knowledge production for accomplishing different purposes such as helping organizations to solve real problems.

A DSR Process Model shown in Figure 6 can be interpreted as a collaboration of both the knowledge using process and the knowledge building process.

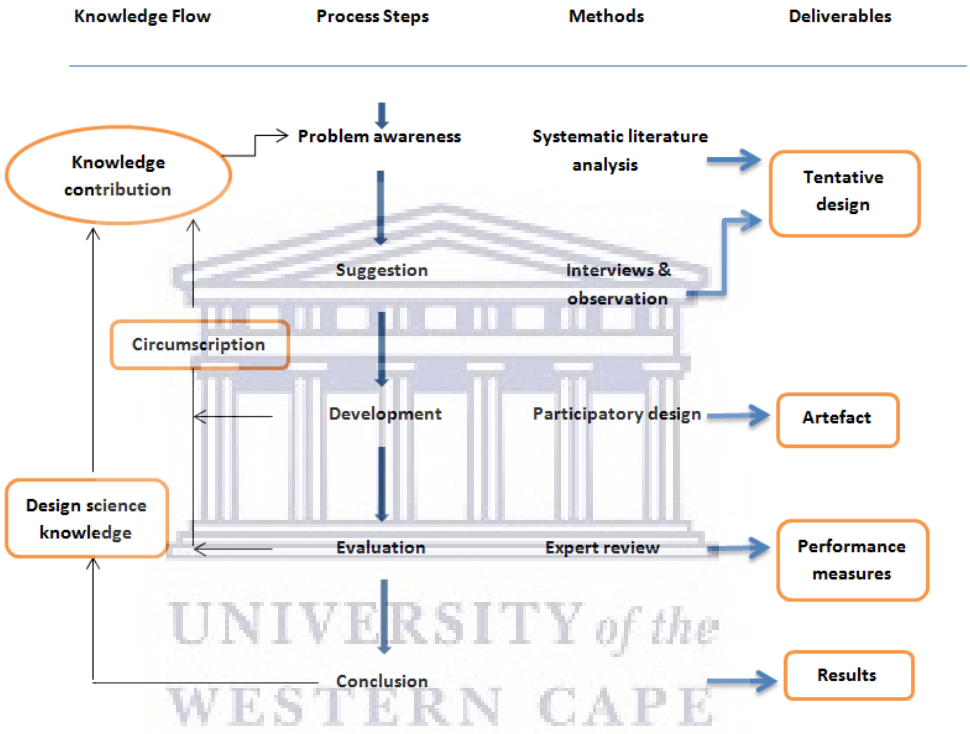


Figure 6: Design Science Research adapted from Vaishnavi & Kuechler (2015)

According to Vaishnavi and Kuechler (see Figure 6) there are five basic steps to the design science research (DSR) process:

- **Problem Awareness**: define the problem which you are interested in, the output of this step is a proposal, formal or informal, for a new research effort.
- **Suggestion**: after completion of the proposal some suggestion for likely solution in the form of an **artefact**.
- **Development**: preliminary design is further developed and implemented.
- **Evaluation**: this step is evaluating the artefact.
- **Conclusion**: this phase is the final phase of the specific research effort.

The design process is cyclical and may, after testing and evaluating the artefact, return to the "Awareness of Problem".

Design Science Research as suggested by Vaishnavi & Kuechler will be used for this research effort.

METHODS

Methods are a specific process for completing data collection during research. Data collection and analysis is done using different kinds of research methods and research techniques. According to Kothari all those methods or techniques that are used for conduction of research are referred to as research methods (Kothari, 2004).

The methods: systematic document analysis (systematic literature review); interviews and observation, contributed in the DSR methodology to the tentative design (see Figure 7).

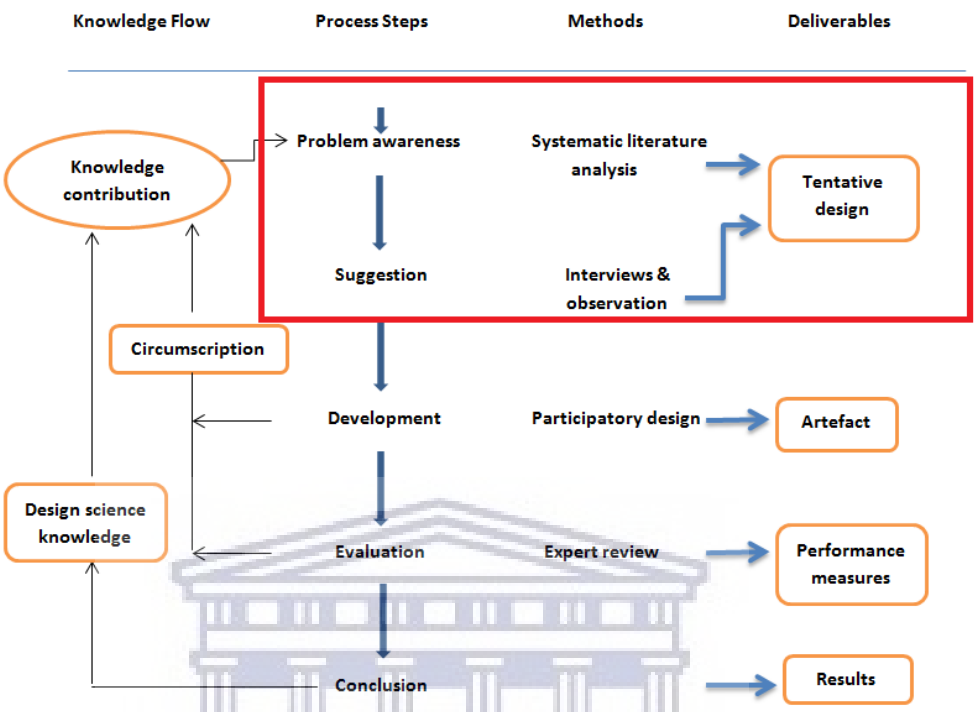


Figure 7: Methods that are used to develop a tentative design

Systematic document analysis

Systematic document analysis (SDA) is defined by Bowen as *"a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around an assessment topic"* (Bowen, 2009). The SDA technique can be used for reviewing and evaluating electronic documents—sources like Google Scholar, Research Gate, and CiteSeerX can be used to collect the documents by using specific keywords or concepts (see Figure 8).

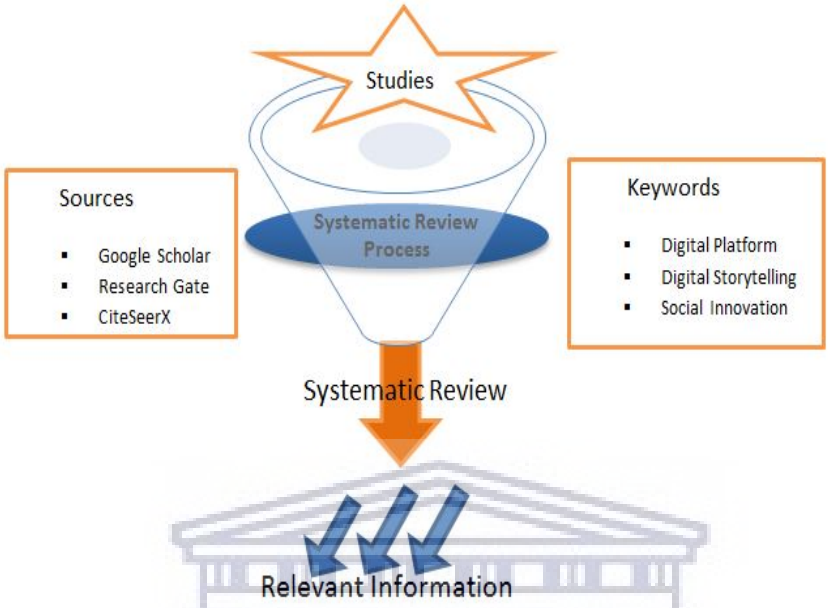


Figure 8: Systematic Review Concept

These documents, once found, can be analysed and reviewed through scanning, reading thoroughly and interpreting the content. Throughout the analysis and reviewing process, certain keywords for the study must be selected, and the time range for the documents must be specified. This method is used to address the awareness of the problem.

Interviews

The interview method of collecting data involves gathering information through oral questions asked by the researcher using a set of pre-designed questions. According to Kothari, this method can be used through personal interviews; in this research technique the researcher asks questions to the participant, at times the interviewee may ask certain questions and the researcher responds to these (Kothari, 2004). Interviews are advantageous as the researcher is in direct contact with the participants. Interviews can be structured, semi-structured, unstructured

or focus-group, depending upon the need and design. Semi-structured interviews with probes are used in this research project.

Observation (ethnography)

This method implies the collection of information by way of a researcher's own observation, without interviewing the participants. The information obtained relates to what is currently happening and is not complicated by either the past behaviour or future intentions or attitudes of participants (Kothari, 2004).

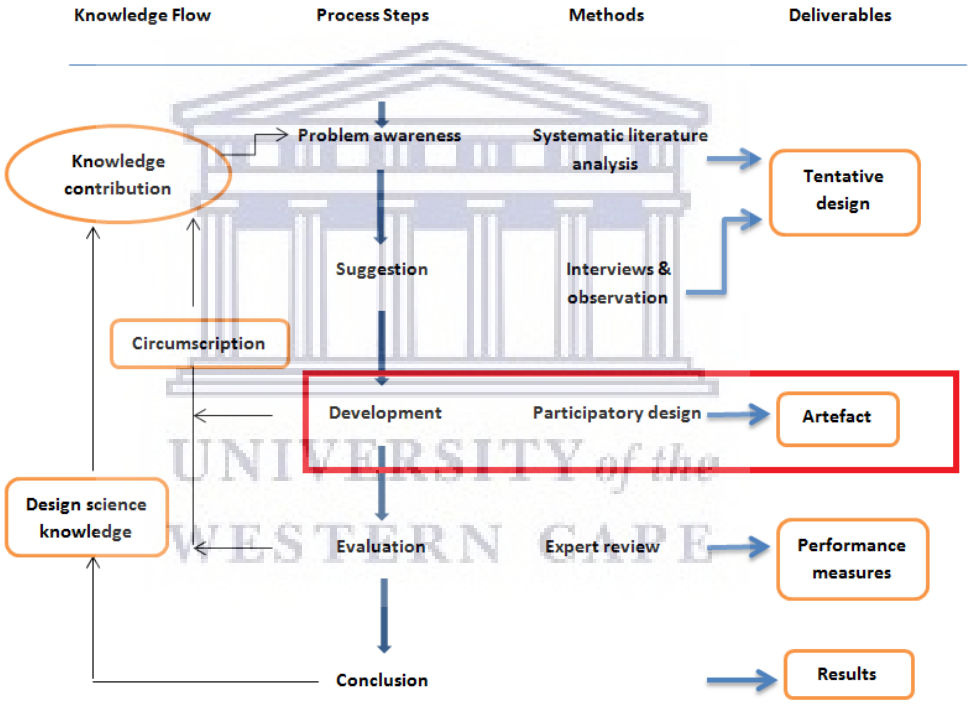


Figure 9: Participatory design is used to inform the development of the artefact.

Participatory design

Participatory design (PD) is defined by Simonsen & Robertson as "*a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-in-action'*" (Simonsen & Robertson, 2013, p. 2).

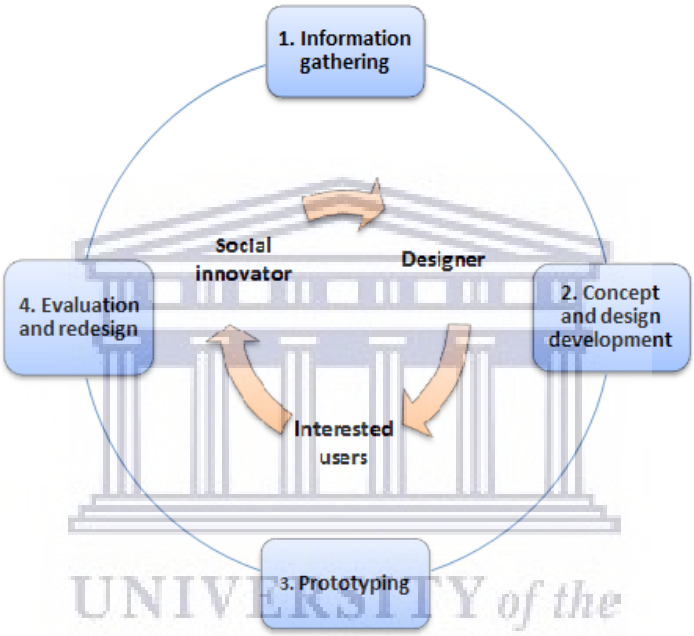


Figure 10: Participatory Design Model

The participatory design (PD) approach is used here to design and configure the prototype. PD constitutes a rich diversity of theories, practices, analyses, and actions, with the goal of working directly with users and other stakeholders in the design process to help ensure that the result meets users' needs and that the resultant product is usable.

This model consists of 4 steps that need to be followed in order to get to the final completed framework.

1. **Information gathering**: Information must be collected based on the target audience, kind of information to be shared, what the purpose of the framework is and to find how the information will be shared.
2. **Concept and design development:** Heuristics needs to be chosen for the design. These can be chosen from those suggested by Preece et al. (Preece, Rogers, & Sharp, 2015)
3. **Prototyping:** This can be initiated with a low-level prototype design on paper which can be followed by a high-level prototype design using a software tool (for example Just-In-Mind).
4. **Evaluation and redesign:** Feedback when testing the prototype, is used to redesign the prototype. This can have several cycles in the hope of achieving optimisation.

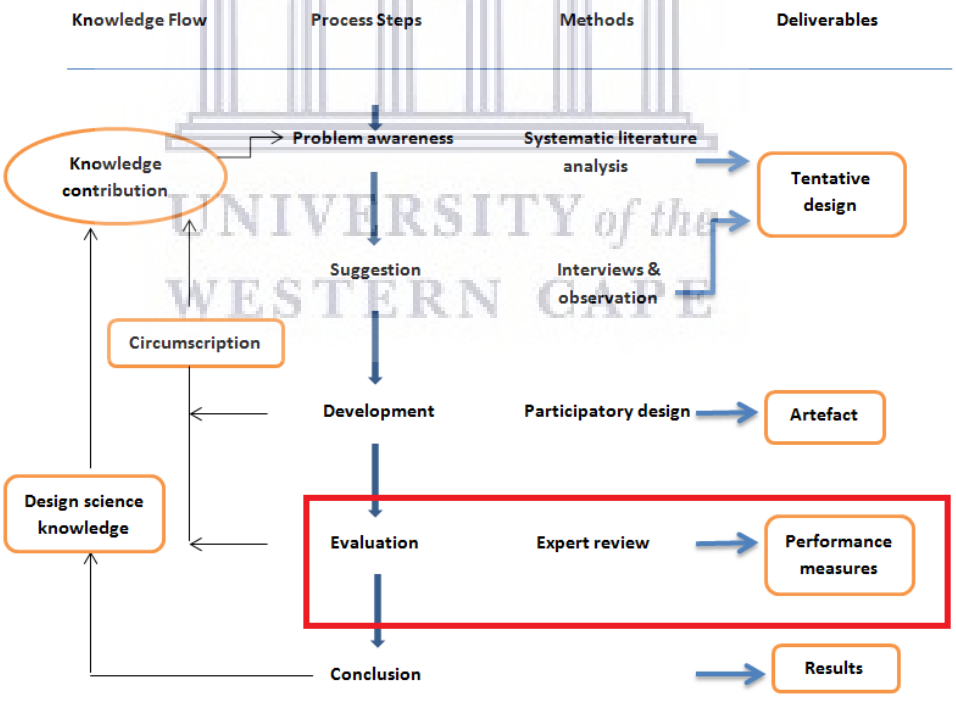


Figure 11: Expert review was used to get performance measures

Expert review

An expert review is an examination technique designed to identify usability problems in an online product or service. A small group of usability experts, usually between 1 and 4, carry out the review. This method is used to test the usability of the artefact, and to check the interface and compare it against the desired usability principles.

Heuristics and usability principles

In the design stage of project development, the design principles which are commonly referred to as heuristics are set out. These design principles need to be interpreted and operate within the design context. Usability principles which emphasize the importance of speaking the user's language tend to be more prescriptive than others (Rogers, Sharp, & Preece, 2011).

- Visibility of system status: always keep users informed about what is going on, through providing appropriate feedback within a reasonable time
- Match between system and the real world: speak the users' language, using words, phrases, and concepts familiar to the user, rather than system-oriented terms
- User control and freedom: provide ways of allowing users to easily escape from places they unexpectedly find themselves, by using clearly marked 'emergency exits'
- Consistency and standards: avoid making users wonder whether different words, situations, or actions mean the same thing
- Help users recognize, diagnose, and recover from errors: use plain language to describe the nature of the problem and suggest a way of solving it
- Error prevention: where possible prevent errors occurring in the first place
- Recognition rather than recall: make objects, actions, and options visible

- Flexibility and efficiency of use: provide accelerators that are invisible to novice users, but allow more experienced users to carry out tasks more quickly
- Aesthetic and minimalist design: avoid using information that is irrelevant or rarely needed
- Help and documentation: provide information that can be easily searched and provides help in a set of concrete steps that can easily be followed (Rogers, Sharp, & Preece, 2011).

Results

The results of the research project are discussed in Chapter 4 (see Figure 12).

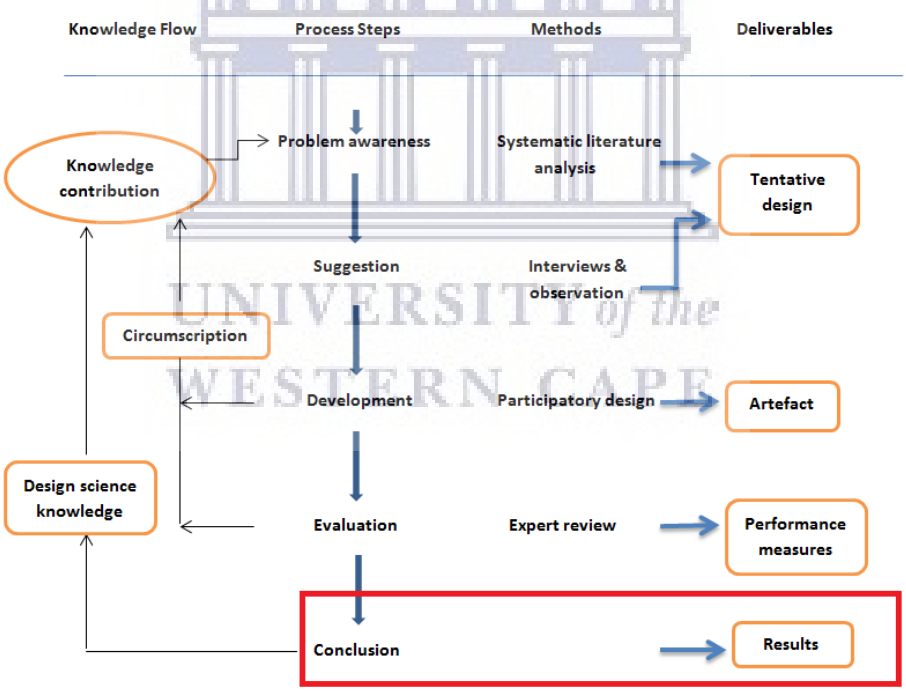


Figure 12: The results of the walkthrough

RESEARCH DESIGN FOR THE DIGITAL STORYTELLING PLATFORM

Research questions

Each research question is addressed using a specific method or methodology (see Table 2).

Table 2: Research questions table

Research question	Research Methodology/methods
Main:	
How should a digital platform for digital storytelling be designed to enhance social innovation and information sharing?	Design Science Research
Sub-questions:	
What would the impact of digital storytelling for social innovation be within the constraints of the digital landscape of South Africa?	Systematic literature review, interviews, and observations
How can a framework for a platform for digital storytelling be developed, to promote informal learning and the sharing of socially innovative stories?	Participatory design

DSR methodology

To develop the artefact the DSR methodology is used and each aspect is now discussed in detail.

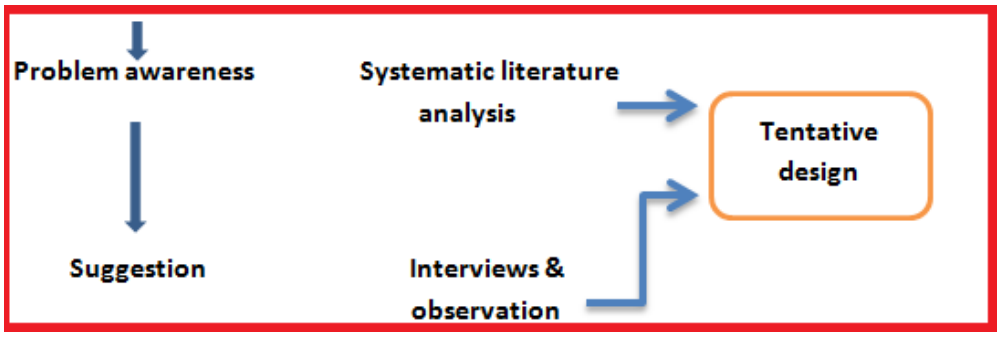


Figure 13: Problem awareness and suggestion

Problem awareness

To address the problem awareness aspect, a systematic literature analysis has been carried out.

Systematic literature analysis

This technique has been used to review and evaluate only peer-reviewed electronic documents found using search engines in terms of key concepts and within a specific timeframe. It has been done as follows

Search engines used:	Google Scholar and CiteSeerX
Databases considered:	Scopus, Science Direct and databases available to UWC.
Key-words and concepts:	human-centred computing; social networking sites; social content sharing; collaborative and social computing devices; requirements analysis; interactive learning environments; scenario-based design; blogs; digital platform; digital storytelling, social change; informal learning; and social innovation.
Time range:	2009-2019

The results of the document analysis have been used to inform and design the interview probes. These results have also informed what to observe during observation sessions.

Suggestion

Since the platform must make provision for all types of users, it was decided to consider different contexts for data gathering towards a suggested initial design of the platform. Several innovation sites for this research project were identified for digital storytelling by the Erasmus+ Common Good First (CGF) European Union project—a larger project that spanned several countries. Since Macassar Pottery was the first social innovation site visited by CGF and close to the university site it was also used for this research effort. Most of the identified social innovation sites could not afford to be away from their day to day business since they needed the money generated each day to run their organizations. Due to this issue, they could not afford to spend two days on workshops.

For this research, multiple contexts were considered, including the abovementioned township pottery organisation, and participants from a Higher Education Institution (lecturers, etc.) that attended digital storytelling workshops.

Five workshops—over a period of six months—were used and 20 participants were observed. Table 3 shows the sequence of research activities followed at each workshop site.

Table 3: Sequence of research activities at each digital storytelling workshop

Informing participants about the aim of the project and signing consent forms for their participation.
Observation of participants during the development of digital storytelling projects. Instruction led or facilitated by workshop instructor.
Observation of participants during "performance stage" viewing of digital stories.
Semi-structured interviews with all participants using a set of predefined probes after they had completed their stories and after viewing their digital stories.
Face-to-face interviews with workshop instructors and workshop assistants.
Write a report based on each workshop and what the research can conclude about each workshop.

Data sources have included observations, audio-recorded semi-structured interviews, and field notes. Data has been collected in each workshop full day workshop.

Township workshop

The researcher first observed the opening session which included the "story circle", script writing and audio stories recorded by the participants. The "story circle" requires the participants to tell their story to the others in the circle, to share their experience and for those that listen to the story, to listen deeply/attentively to the story being told (Lambert J. , 2013).

After this session, the researcher had a discussion with the participants about the first session and how they experienced it.

Table 4: Attended workshops

	Date of workshop and site	Work environment	Activity	Number of participants	Number of instructors	Observation day	Type of data collection
Workshop aimed at social innovators							
1	02/03/2018 Macassar	Pottery	Podcast/Movie maker	3	3	2	Observation
	22/03/2018 CoLab UWC	Computer lab and conference room	Create digital stories using iMovie				Focus group interview
Workshops aimed at educators at a tertiary institution							
2	08/11/2017 Hotel Verde, Cape Town	20-seater conference room	Create a story using iMovie/Photo story	7	3	1	Observation
3	26/04/2018 Cassinga Training Lab UWC	Computer lab	Use Multimedia Tools to create Digital Story	2	3	1	Observation and Individual interview
4	10/05/2018 Cassinga Training Lab UWC	Computer lab	Story circle, script writing, image editing and creating and editing podcasts	2	3	2	Observation
	11/05/201 Cassinga Training Lab UWC	Computer lab	Use Multimedia Tools to create Digital Story				Observation and Individual interviews
5	31/05/2018 Cassinga Training Lab UWC	Computer lab	Story circle, script writing, image editing and creating and editing podcasts	6 Interviewed 4	3	2	Observation
	01/06/2018 Cassinga	Computer lab	Use Multimedia				Observation

	Date of workshop and site	Work environment	Activity	Number of participants	Number of instructors	Observation day	Type of data collection
	Training Lab UWC		Tools to create Digital Story				Interviews individual and focus group

The second session took place at the University of the Western Cape at the CoLab. The participants were shown technological tools (software and hardware) to use to create their digital stories.

Higher Education Workshops

During each of the four workshops, participants wrote a personal narrative for their digital story as outlined by the instructors. As part of the writing process participants worked through the writing process, including prewriting, drafting, revising, editing and sharing their story in a story circle once all the participants had completed their narrative.

Each workshop began by explaining what a digital story is, this was done by one of the instructors, and then an example of a digital story was played. Once participants had selected a topic, they wrote drafts of their stories and collected pictures, music, and videos to illustrate their written story.

When the participants had finished writing, they imported their collected tools; pictures, audio, and videos, onto the lab computers, ready to create their digital stories. Participants then took their written story and created a digital story using *MovieMaker, weVideo* or *iMovie* software on the computer. Once all participants had finished, participants that felt like sharing their story did so at the end of the workshop.

Observation and field notes

In the first type of workshop, the participants were from a township and had little knowledge of digital expertise apart from their knowledge of cell phones and their applications.

The second type of workshop was for tertiary educators focused on the use of multimedia tools using the concept of digital storytelling and how those tools can be used in the higher education institutions by lecturers.

During the observation phase, descriptive and reflective information about the setting was recorded via field notes, which described accurately and as broadly as possible the activities and the research setting. The field notes also reflected the researcher's observations of what participants did and said during the workshop.

The researcher's attention was focused on the use of technological and multimedia tools that the participants were using to edit audio and pictures and to create the digital stories

Interviews

Semi-structured interviews (Schön, 1987) were conducted with both the instructors as well as the participants of the workshops, using probes (see Appendix C and Appendix D). This type of interview allowed the participants the freedom to deviate from the question or probe and provided rich data for the researcher.

For each interview with the instructors, the researcher made an appointment to meet at an agreed place and time. These interviews focused on the instructor's philosophy of digital storytelling and their use of multimedia tools to promote the use of technological tools in the Higher Education Institutions. These interviews were recorded.

A further 11 interviews were conducted with the participants from both types of workshops. With the participants from the pottery, seven interview probes were chosen based on the level of literacy and e-skills of the selected participants: two probes considered their story creation experience and what they had learned from script writing their stories. Another two probes focused on the kinds of cell phones they have used before and the ones they were currently using. Two more probes considered their use and knowledge of information and communication technologies (ICTs) and the applications they mostly use on their phones, another on how they use their own devices. Since they were participants who use data to access the Internet, they were also asked how often they buy data and how much they usually spend. The researcher used a digital voice recorder to capture the interactions and conversations of the participants. These interviews were transcribed. This was done to learn how individuals utilize technological and multimedia tools and to assess any changes in each participant's attitude towards the use of technological tools, see Appendix C.

The participants from the higher education institution were interviewed using a different set of probes. The seven probes were chosen to discover the knowledge and exposure the participants from this site already had. Thus, the main focus of the probes was to find out the experience, number of years, digital platform usage and factors that might discourage the participants from using digital platforms. One of the probes asked about the skills and training that would be required to use these digital platforms, see Appendix D.

ANALYSIS

Qualitative data analysis

The qualitative data from the interviews and the field notes were analysed as follows: data analysis began immediately after the data collection process and continued throughout. This process of collecting data first and then analysing the

findings very soon afterwards allowed the researcher to identify emerging themes and explore them in several further rounds of reading the field notes and listening to the interviews.

Summarized explanations were made by writing in the margins of the field notes and transcripts. These explanations highlighted common patterns and topics to focus on. These examples then became the basis for codes and sub-codes.

Interview analysis

The researcher recorded important findings or quotes from each participant's responses as a table during the interviews and at the same time made an audio recording of the interview. The researcher combined all the participants' tables into one table after all the interviews were done. The tables made it easy to see patterns, similarities, and differences in the responses of the participants.

The interviews with the instructors were recorded in a similar fashion.

Analysis of field notes (taken during observation)

The researcher kept observational field notes for each workshop in a separate Word document on her personal computer. These documents included the headings Observation Report, Observer, Date, Setting, Time, and Number of Participants. During each workshop-session the researcher noted the following times: when the session started, any transitions between activities, and the end of the session.

The researcher also recorded—in the field notes—as many observations as possible to accurately capture the ambiance of the workshop. Furthermore, it was noted how the participants were using multimedia tools to create their digital stories. Included in the field notes were verbal events such as participants

commenting about how interesting the workshop was or comments about the use of the software being used: *Audacity*, *iMovie* or *Movie Maker* and photo editing software: *Pilxr*, *Gimp,* and *Photoshop*. At the end of each workshop session, the researcher reviewed the field notes.

Development

To address the development process step, a participatory design method was followed throughout.

Figure 14: Development process step

Participatory Design Cycle 1

Information gathering: The design of the first cycle was informed by the information gathered from document analysis, observation, and interviews.

Concept and design development: The heuristics chosen for this design were: visibility of system status; the match between system and the real world; aesthetic and minimalist design; as well as recognition, rather than recall.

Prototyping: The first prototype was designed using a low-level paper-based prototype—initially a drawing. It was reviewed and then re-designed using post-it notes since these simplified making changes to the design (see Appendix H).

Evaluation and redesign: Five participants participated in the first cycle—two males and three females. Two participants were familiar with digital platform interfaces and the common features these platforms have. Three participants had little knowledge of the critical things that would be needed for a digital platform but had some idea about design.

The first session was not audio recorded and the times of the sessions differed depending on how the participants interacted with the prototype. The researcher was present during this period of testing with participants. The goal of this first session was to identify optimal features for improving the design of the digital platform. The paper-based prototype was presented to the participants and each participant was asked to follow a list of tasks to interact with the prototype. After completing the tasks, each participant had to complete a Feedback Capture Grid document (see Appendix G) to state what they liked, their criticisms, questions they had, and any ideas they could give on what needed to be improved with regards to the functionality. Throughout this process, the researcher was observing and taking notes while each participant was interacting with the low-level prototype.

Participatory Design Cycle 2

Information gathering: For the second session four participants gave feedback—two males and two females. All these participants were seeing the design for the first time. All participants were familiar with digital platform interfaces and the common features these platforms have. All the participants were smartphone users, and the most used applications on their phones were social networking sites.

Concept and design development: The heuristics chosen for this design were: visibility of system status; the match between system and the real world; aesthetic and minimalist design; recognition rather than recall: make objects, actions, and options visible

Prototyping: The second prototype was designed using a software prototyping tool *JustInMind*[3].

Evaluation and redesign: The second session was not audio recorded. The time each participant took to interact with the system differed. The goal of the second evaluation and design session was to gain information about the user interface, and the results would be used to improve this prototype.

Participants were asked to follow a set of tasks to interact with the system. Then participants were asked probing questions about the system. The questions were: What did you like? What was the worst thing about your experience while interacting with the system? What other aspects could be improved? What other comments do you have? Following these probing questions, participants made suggestions on the content and interface of the prototype.

Participatory Design Cycle 3

Information gathering: The third session had five participants— three males and two females. The participants involved in this cycle of testing were not involved in either of the previous testing cycles, it was their first encounter with the prototype. All participants were familiar with digital platform interfaces and the common features these platforms usually have.

Concept and design development: The heuristics chosen for this design were: visibility of system status; the match between system and the real world; aesthetic and minimalist design; recognition rather than recall: make objects, actions, and options visible

[3] https://www.justinmind.com/

Prototyping: The third prototype was a redesign of the second prototype still using *JustInMind*.

Evaluation and redesign: The third session was not audio recorded. The goal of this cycle was to improve the design and to increase the probability of technology acceptance. This goal was achieved by assessing whether or not the user interface and system functions of the prototype were consistent with the end user's needs. The participants gave feedback after interacting with the system and also gave suggestions based on their experience. This was used to improve the design and functionality of the prototype.

Evaluation process

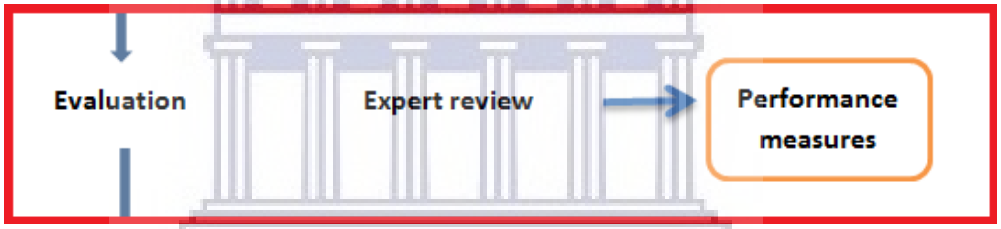


Figure 15: Evaluation process step

Expert review

The experts who interacted with the system were informed by the researcher that the application is a *proof of concept* and thus would not be fully functional. According to Singaram & Jain (2018), a proof of concept is a smaller version of the proposed application and is not necessarily bug-free but does show how the application can be used and later developed to be fully functional (Singaram & Jain, 2018)

To address the evaluation process step, an expert review was done to identify the feasibility and usability of the application for full development. According to (Preece, Rogers, & Sharp, 2015) expert reviews are frequently used to evaluate interface usability. The method involves only a few usability experts. Typically,

according to Preece *et al.*, five usability experts find approximately 75% of a system's usability problems. Therefore, it was decided to use 5 experts for this part of the DSR methodology.

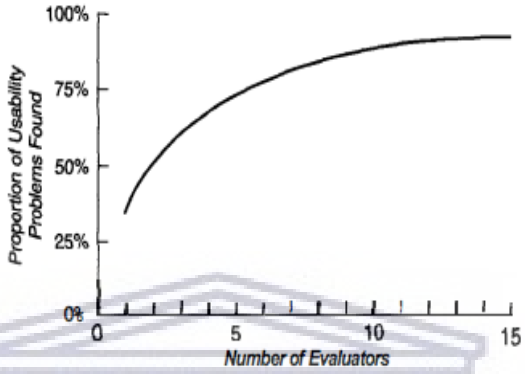


Figure 16: Evaluators versus problems found (Preece, Rogers, & Sharp, 2015, p. 409)

The review was carried out by five experts that are employed at the Western Cape Co-Lab for e-Inclusion and have considerable experience in mobile application development and web development. The application was demonstrated to each expert individually and they were then asked to interact with the system and complete a review form (see Appendix F).

Conclusion

Figure 17: Conclusion process step

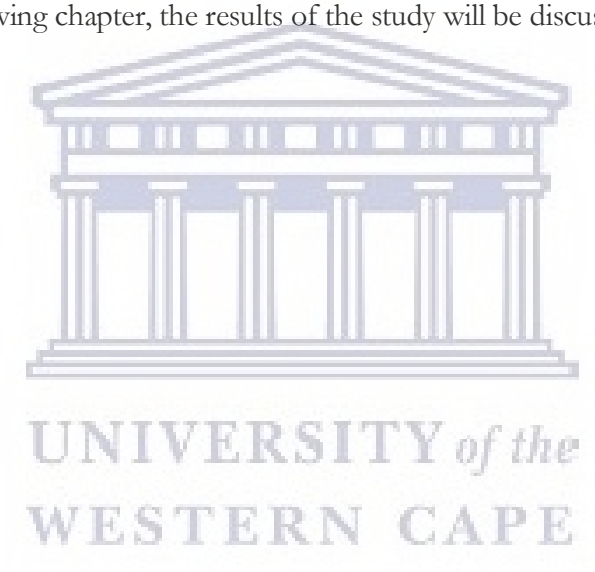
Results

The conclusion of the DSR methodology will be discussed in detail in Chapter 4.

SUMMARY

This chapter described the philosophical foundation that supports the research to ensure the consistency of the study. The four important elements that influence the way in which this research project is undertaken were discussed. It was concluded that Critical Social Theory as defined by Habermas would be used as a theoretical perspective and that the DSR methodology would be best suited for the research. Lastly, the methods used to evaluate the development of the artefact were described.

In the following chapter, the results of the study will be discussed.



Chapter 4

RESULTS: PRESENTATION AND DISCUSSION

INTRODUCTION

In the previous chapter, the design of the research was highlighted. In this chapter, the results of each step of the DSR methodology will be presented.

TENTATIVE DESIGN

The results of the systematic literature review, initial observations and interviews, were used to design the initial prototype.

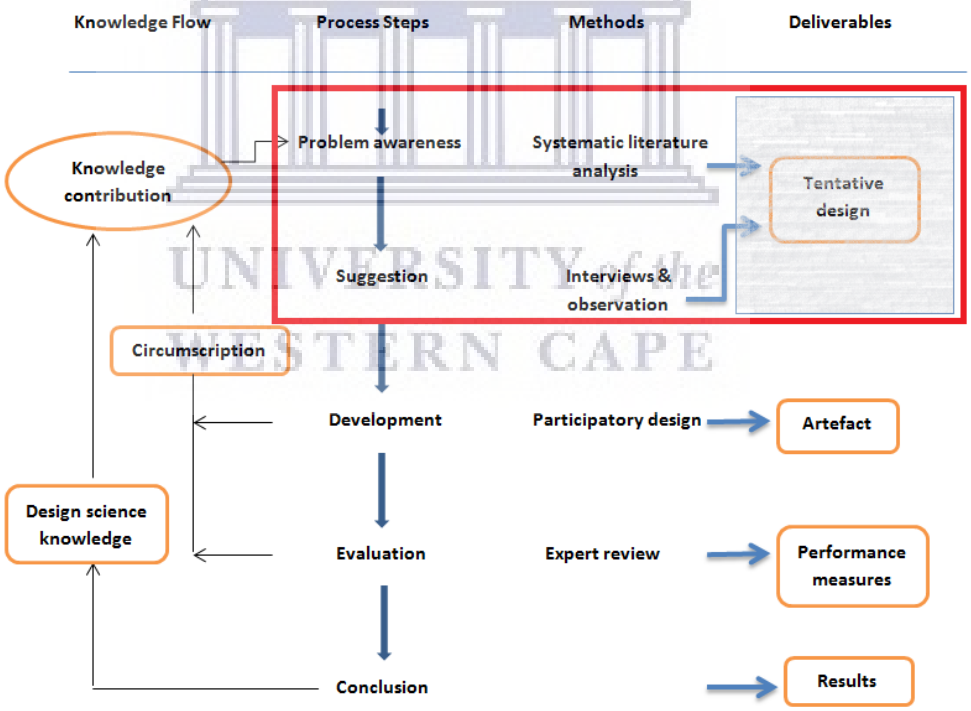


Figure 18: Tentative design deliverable

Systematic literature review

The keywords and concepts defined in Chapter 1 together with search engines (e.g. Google Scholar), databases (Scopus and Science Direct) and a time range (2009 – 2019), were used to identify peer-reviewed work related to the research (see Table 5). These were analysed and the results were used as input to design the interview probes (see Table 6).

Table 5: Documents found during the systematic literature review

Documents Selected	Author	Key-concepts
The Fourth Industrial Revolution Opportunities and Challenges (2018) The Fourth Industrial Revolution by Klaus Schwab (2016)	Xu, M., David, J. M., & Kim, S. H Schwab, K	The Fourth industrial revolution
Digital Storytelling as web passport to success in the 21st Century (2010)	Malita, L., & Martin, C	Digital storytelling
The digital platform: a research agenda (2016)	De Reuver, M., Sorensen, C., & Basole, R. C	Digital platform
Sustainable collaborative services on the digital platform (2010)	Baek, J. S., Manzini, E., & Rizzo, F	Social innovation, Interactive learning environments
Personal Learning Environments, social media, and self-regulated learning (2012)	Dabbagh, N., & Kitsantas, A	Informal learning
News sharing in social media: The effect of gratifications and prior experience (2012)	Lee, C. S., & Ma, L	Social content sharing
Human-centered computing. In Handbook of ambient intelligence and smart environments (2010)	Sebe, N	Human-centered computing
Mobile computing devices in higher education (2013)	Gikas, J., & Grant, M. M	Collaborative and social computing devices
Social networking sites and our lives (2011)	Hampton, K., Goulet, L. S., Rainie, L., & Purcell, K	Social networking sites

Table 6: Probes used to do interviews

Probes
Social innovator workshop
How do you feel about sharing your story?
What have you learned about story creation or script writing of your story?
What kind of a cell phone are you currently using?
Which phones have you used before?
What applications do you mostly use on your phone?
How often do you buy data to have access to some applications? E.g. Facebook, WhatsApp, downloading the apps (play store)
Any additional comments?
Workshop for lecturers
How many years of experience do you have with smartphones and computers?
Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?
If yes, do you find these platforms easy to use?
What extra skills or training do you think you would require in order to use these or other platform services?
In your opinion, what would be the advantages of using a digital platform to inform the public of your project?
Which factors discourage you from using digital platforms?
Is there anything else you would like to tell me?

Interviews and Observation

Social innovator workshop

Table 7: Overview of the two-day workshop

Day 1	Day 2
• Purpose of the project • Story circle • Scriptwriting and review • Storyboarding • Each participant to start with their own story • Feedback and next steps – work on individual stories and collect material	• Recap of what was achieved on Day 1 • Feedback from participants • Demonstrate how to assemble the story using the suggested software: put together images, audio, video or narration • Allow questions and clarification • Check the required tools and resources if participants have all of them: images, music, script (audio) • Creation of each participant's digital story using iMovie

OBSERVATION

The workshop, which was aimed at social innovators, took place at a Pottery in Macassar, the following observations were made:

The participants had difficulty understanding due to the language barrier and one of the assistants had to interpret. None of the participants had completed their final high school level. During the script writing, 2 participants wrote their stories and there were some difficulties even though they were able to write. The assistants helped in script creation. One participant was not able to write because of his writing skills challenges. He recorded his story using a Samsung phone. The participant was free to use the alternative method which was audio recording instead of writing and he had no problem in doing so. All the participants were happy that they could create and share their stories freely in a safe environment.

INTERVIEWS

Semi-structured interviews were conducted with a focus group consisting of three participants. This was done after Session 2 of the workshop.

The interview results revealed interesting aspects in terms of the digital skills of the participants:

- they all had limited digital literacy skills.
- the cell-phones these participants used were low-cost Android phones—Mint, Mobicell and Nokia.
- the cost of data was a limiting factor for these participants—they mentioned that they used a limited number of applications on their cell phones since they could not afford to buy data or airtime frequently.
- the applications they used the most were WhatsApp, Facebook, YouTube, Google, and Bing—a search engine.

For a summary of these interviews see Appendix C.

All the participants spent a certain amount of money every week. The amount they spent differed based on the applications they accessed on their devices: applications such as *WhatsApp*, *Facebook*, *Bing* (a search engine) and *YouTube*. Participant three purchased more airtime once a week to use it for phone calls, SMSs and to access the Bing search engine. Participant two purchased small amounts of airtime three times a week. Participant one purchased less airtime, this participant only needed data for *WhatsApp* and to access *Facebook* free mode, hence the low cost.

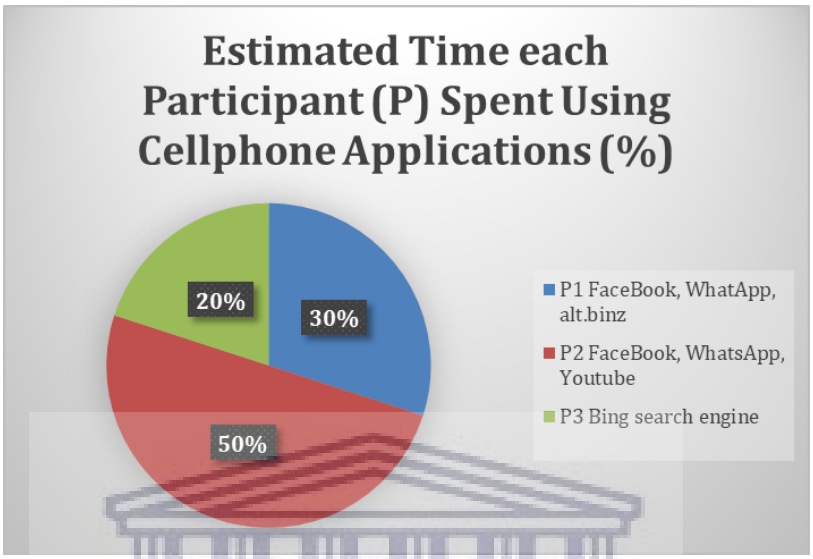


Figure 19: Estimated time spent using cell phone applications

Figure 19 shows that almost all participants use the same applications but the time each participant spends on their cell phones differs. The applications used by the participants were considered useful by them. They indicated that by using the search engines they could find information easily. Furthermore, information sharing and communicating was simplified using *Facebook* and *WhatsApp*. The figure also indicates that one participant was more "connected" than the others. The level of the digital divide is more pronounced in townships such as Macassar.

Workshops for lecturers:

INTERVIEWS

The *Lecturer workshops* were completed using the same structure as the *Social innovator workshop*. The overview shown in Table 7 is the same overview that was used for the *Social Innovator workshops,* the only difference is that the second workshop was completed in one day instead of two.

The following is the list of probes that was used to conduct the interviews with the participants.

Table 8: The list of probes

The List of Probes that each Participant was asked by the Researcher	
1.	How many years of experience do you have with smartphones and computers?
2.	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?
3.	If yes, do you find these platforms easy to use?
4.	What extra skills or training do you think you would require in order to use these or other platform services?
5.	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?
6.	Which factors discourage you from using digital platforms?
7.	Is there anything else you would like to tell me?

Each probe will be explained and interpreted in the next section. The results are presented in the form of graphs, tables, written interpretation, and explanation of what these may reveal about the data that was collected by the researcher.

Probe 1: How many years of experience do you have with smartphones and computers?

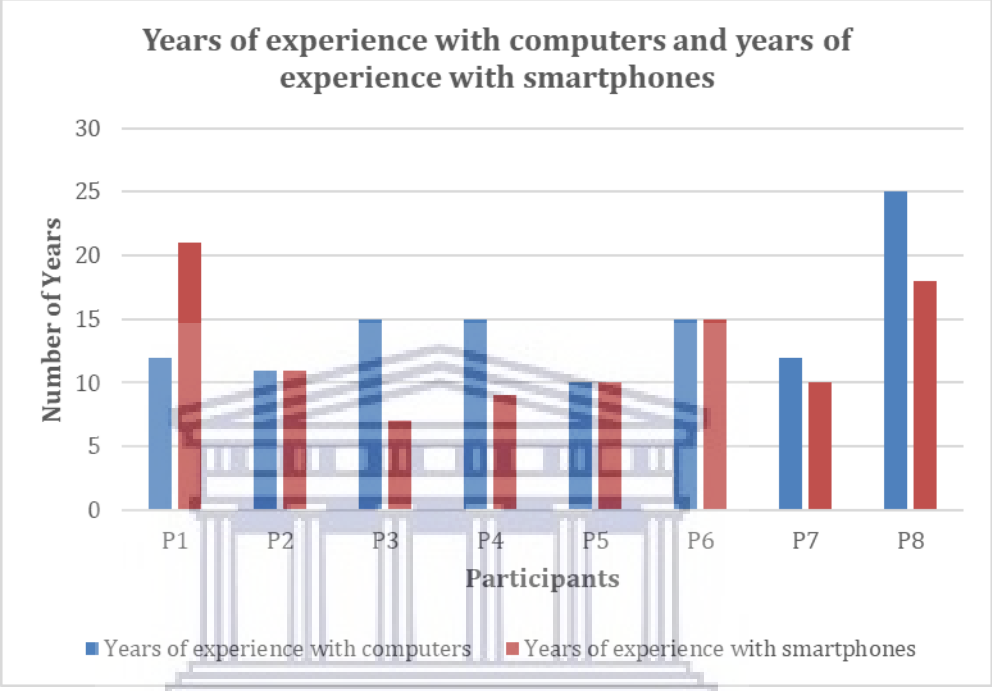


Figure 20: Participants' experience with smartphones and computers

The number of years each participant has with smartphones and computers is presented on the graph above (see Figure 20). Four participants had more years of experience with computers than with smartphones. Three participants had used smartphones and computers for a similar period. Out of the 8 participants, only one had used a smartphone for a longer period than a computer.

Probe 2: Have you posted videos, photos, or a digital story on a social or other platform using a smartphone or computer?

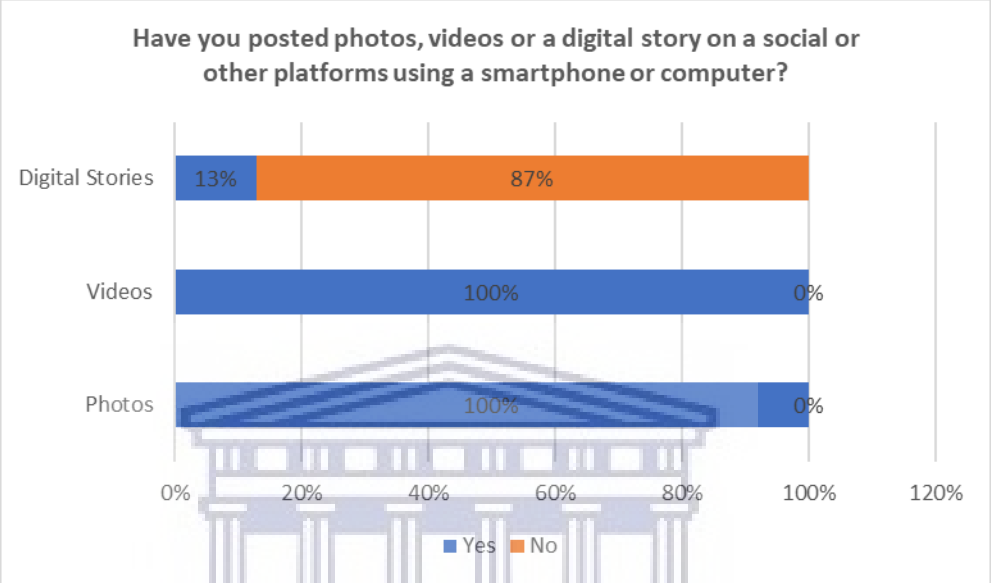


Figure 21: How often participants shared visuals

The graph shown in Figure 21 clearly indicates that all the participants have shared photos and videos previously on platforms; whereas the graph shows that only 13% of the participants have ever shared a digital story on a platform. This indicates that not many participants have exposure to digital stories or to digital storytelling.

Probe 3: If yes, do you find these platforms easy to use?

Responses to this probe show that many of the platforms the participants use are easy to navigate and use. Seven out of eight participants stated that the digital platforms are easy to use to share photos, videos and digital stories.

Moreover, some of their positive comments were:

"I mostly use Facebook and Instagram; the interface is okay and easy to use."

"It depends on which platform I use and the content I am sharing on that platform. Blogs are a bit challenging; I had to play around with them until I found the one that I was comfortable using."

"Most of them are easy to use, I use YouTube to share videos. In overall they are fairly easy to use"

Probe 4: What extra skills or training do you think you would require in order to use these or other platform services?

The responses to this probe showed the significance of using multimedia tools when teaching; it enhances student learning. Five out of 8 participants stated that they would need more training on how to use these tools. The other two participants put an emphasis on getting training on how to use different platforms for sharing educational content and to get an exposure to different platforms and software tools to use.

Probe 5: In your opinion, what would the advantages of using a digital platform be to inform the public of your project?

Table 9: Advantage of using a digital platform

Advantages of using a digital platform to inform the public of a project
Use multimedia tools to create content and share it on a platform, people and students can have easy access
Students would have access
More inclusive and less exclusive even with disabilities
It would make people more interested and reach a wider community
People prefer visuals than reading nowadays, a digital platform would help to share digital stories and can be saved and watched later by users
It would be fast and easy to access the shared content or information by users
Have information that is readily available all the time to anyone who can use it to their advantage

Table 9 lists the advantages the participants stated. The responses of participants show that there is a need to share content to a wider community. Some of the responses stated that it would be an advantage to share content or information that would be easily accessible to people.

Probe 6: Which factors discourage you from using digital platforms?

Table 10: Factors discouraging participants from using digital platforms

Participants (P)	Factors discourage them from using digital platforms
P1	Too complex Not user friendly Time consuming Cost of connectivity
P2	Privacy and security issues
P3	Lack of knowledge Learning new things is daunting
P4	Security issues
P5	Cost of connectivity
P6	Privacy and security issues
P7	Design of the interface, Taking long to complete tasks
P8	Lack of knowledge Lack of skills to use the available tools causes resistance to change

Table 10 is a detailed summary of the results of Probe 6. These results list the factors that participants identified in terms of their experience when they are using digital platforms.

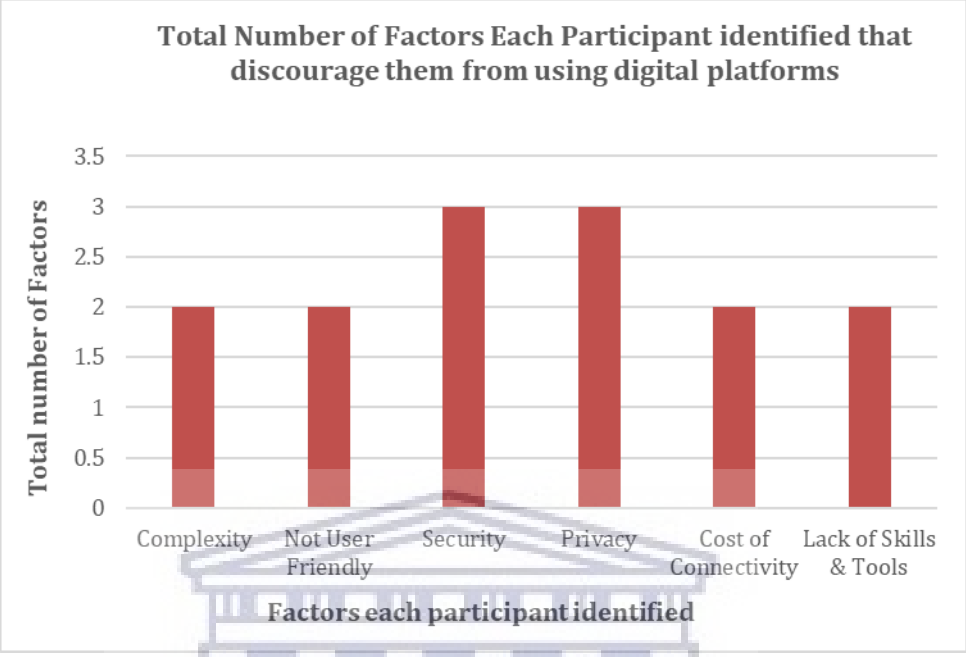


Figure 22: Factors participants identified

Figure 22 shows the factors that the participants have identified. Two participants identified complexity and the level of user friendliness as factors that would discourage them using a platform. The other three participants felt that they would be discouraged to use a digital platform if there are privacy and security issues. Two mentioned that their biggest concern is the cost of connectivity. Two also indicated that their lack of skills on how to use the platform, discourages them from using platforms. As can be seen in Figure 22 security and privacy are the leading factors that discourage participants from using digital platforms.

Probe 7: Is there anything else you would like to tell me?

The last probe allowed the participants to freely comment about Digital Storytelling in general and about the Multimedia Tools Workshop they attended.

Some of the participants' positive comments are:

"The use of multimedia tools to create digital stories was very useful and insightful. It highlighted different technological and multimedia tools available to use. It also gave insight if one is willing or want to move to the use of digital platforms."

"Digital Storytelling would enhance any Higher Education Institutions learning and creativity. Resources or information or any content created using the Digital Storytelling concept would be available all the time anywhere for accessibility."

"Using multimedia tools is great. Take for example using podcast which is simple and will be most useful and the students and staff can use it. Starting small using multimedia and technological tools would be helpful and great and then move to bigger things. I am very excited to have learned about the use of multimedia tools and the concept of Digital Storytelling, the university staff should be doing this."

"The workshop was very useful, a lot of things I did not know. It opened my eyes to the importance of using multimedia tools. And the use of digital stories was good, more especially when you had to write your script first. In overall the workshop was helpful."

"It would be great if the digital platforms are also available on smartphones where you can access them even when you are offline due to connectivity challenges. Accessing the content offline would be helpful."

"I have been playing around multimedia tools to create digital stories. It's a whole new skill set for me and I would recommend it to anyone it's amazing the content or information you can share with a short 2-5-minute video/ digital story."

OBSERVATION

The researcher observed that the whole process of creating a digital story was challenging for the participants. The participants were all eager to learn how to use the multimedia tools, especially the software that was used at the workshops. The participants enjoyed the workshops, they seemed to have found something that stimulated their critical and creative thinking. Each participant was able to use the tools after the instructors had demonstrated how to use them.

Discussion with workshop instructors

INTERVIEWS

Interviews were conducted with the Multimedia tools workshop instructors. The workshops were facilitated by three instructors. One instructor focused on the content of collecting images and how to use the photo editor software. Another instructor focused on the content about audio editing and how to use Audacity audio editor software. The last instructor focused on the process of creating the digital stories, showing the participants which available pieces of software to use to create, edit and publish their digital stories.

The summary of the interviews completed with the three instructors is shown below.

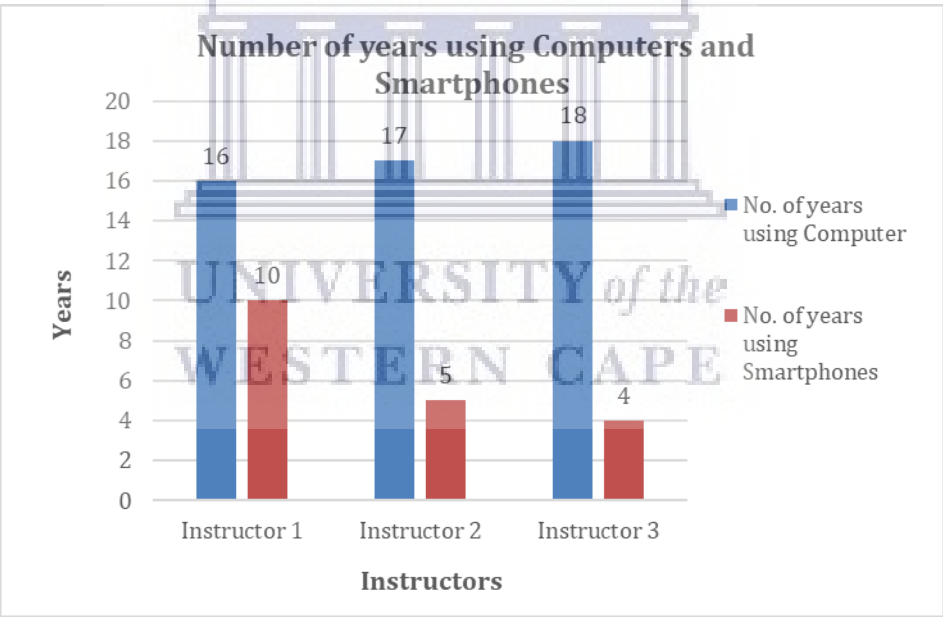


Figure 23: The number of years using computers and smartphones

The results illustrated in Figure 23 show that all the instructors had over 15 years of experience of using computers but fewer years of using smartphones.

The responses of the instructors showed that it is easy for them to use platforms. One instructor stated that it is easy for him because he uses Apps most of the time. The other instructor mentioned that since he is tech savvy, he finds platforms easy to use. One other comment was:

"But this can be challenging for people who are not well equipped with the necessary skills. Some are still wary about technology."

The third instructor said that some platforms are easy to use, and others not.

Table 11: Summarised results of instructors

Instructors (Instr.)	**What extra skills or training do you think you would require in order to use these or other platform services?**	**In your opinion, what would the advantages of using a digital platform be to inform the public of your project?**	**Which factors discourage you from using digital platforms?**
Instr. 1	-Workshops like Multimedia Tools to equip people -Training or guide on how to use updated or upgraded software	-Creating awareness would open a whole new world -Allow people to be creative -Digital storytelling brings new ways of sharing information	-Security issues -Plagiarism—people who use work of others without crediting the author
Instr. 2	-Technical skills—to be able to troubleshoot, having little knowledge would be beneficial -Research skills—need to keep abreast with change, trends and updates -Digital literacy skills short courses—to cater for different needs and capabilities	-Reach masses because many people subscribe to digital platforms -Use it as a healing process with individuals who went through traumatic experiences -Educational approach—can be used as assessment -Lecturers could use digital storytelling to teach	-Having to pay for software if it's not free—"I use open source software most of the time" -Complexity—"I've been exposed to a lot of different multimedia app tools, sometimes you find something that is maybe free *cross-platform*."
Instr. 3	-Skills on how to identify learning preferences	-To learn more—share information and advance knowledge and skills through digital platforms -Create more possibilities for people to educate and improve in many areas	-Privacy -Fraud -Dangers—seeing viral videos that are not sharing original content

Table 11 summarises the responses of the instructors to the three probes.

One of the instructors stated that teaching people how to use tools is outdated since everything is available online.

Moreover, here are some interesting comments the instructors shared at the end of their interviews:

Instructor 1:

"As an instructor facilitating in these multimedia tools workshops, I discovered that it is challenging with the older participants because they have limited computer and tech skills.

There is a barrier between the older and the younger generation in terms of using technological tools and adapting to the digital age.

Basic computer literacy with older lecturers is another challenge. And it's challenging to get them on board, but when they do understand what they are and why they are doing it and how it works in relation to the students"

Instructor 2:

"There are many uses of digital storytelling. It can be used in many different contexts, can be used in teaching, for healing, for learning. I'm sure if more people start using digital story they can achieve more.

Digital storytelling should be marketed better to reach more people more especially here on campus (UWC).

With digital storytelling, the program or the way in which is presented it can always evolve because of the advances in technology and so can explore new avenues of digital storytelling.

It comes down to communication because a story is a communication it links down to multimodality where we are catering for different audiences need. E.g. people who have difficulties to read and someone that is from rural areas where some can't read but they can watch a video and understand, you can teach them a skill by making them watch a video.

It's all about the use, the implementation of it."

Instructor 3:

"One of the things that I've learned is learning to work with the little that I have within the UWC community. It's not about age, it's about the approach to the use of technology. Excited about the possibilities of technology."

ARTEFACT

The prototype was developed following the participatory design method.

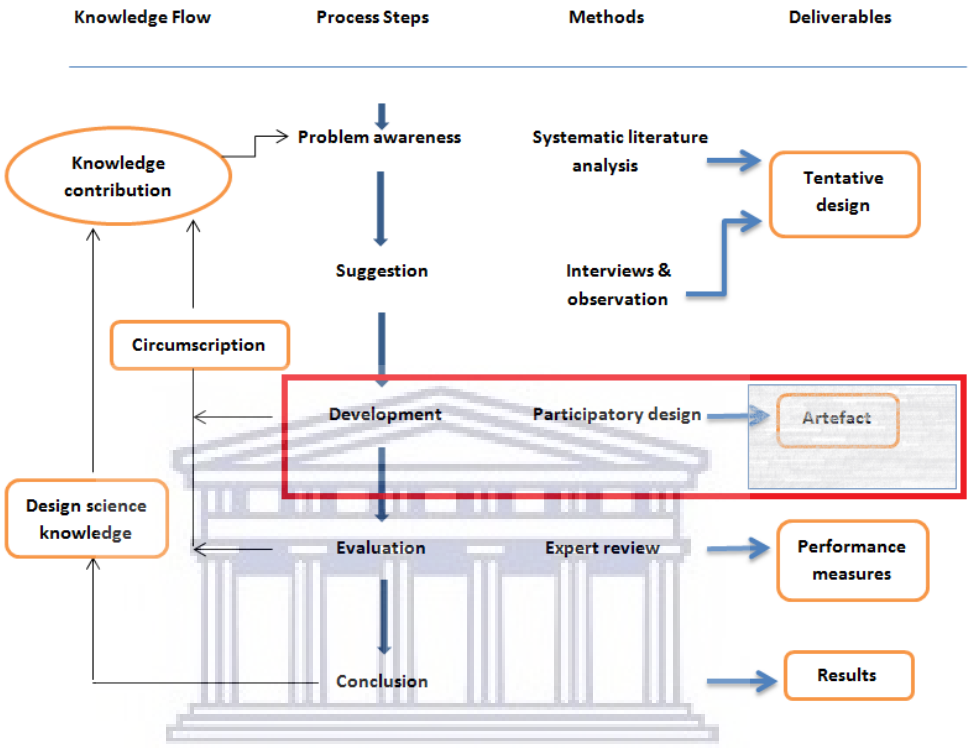


Figure 24: Artefact deliverable

Participatory Design Cycle 1

A paper-based prototype user interface was sketched. Sample sketches are shown in Figure 25 and Figure 26. Results from Design Cycle 1 are as follows: participants identified usability factors which would make them more likely to use the platform.

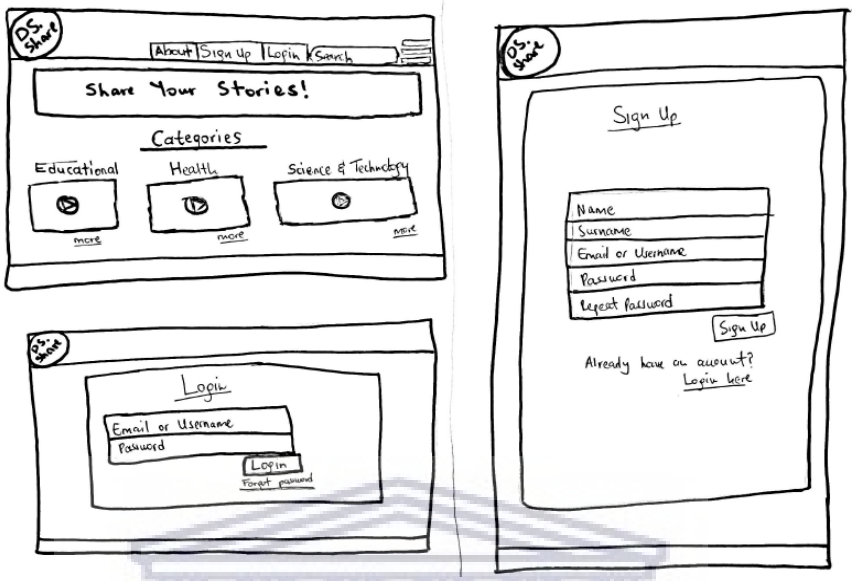


Figure 25: Initial low-level design of the first few screens

In addition to the content and features of the platform, participants stated the following points are important considering at the initial phase of design—minimal screens to access information, information on the interface should be easy to read and follow.

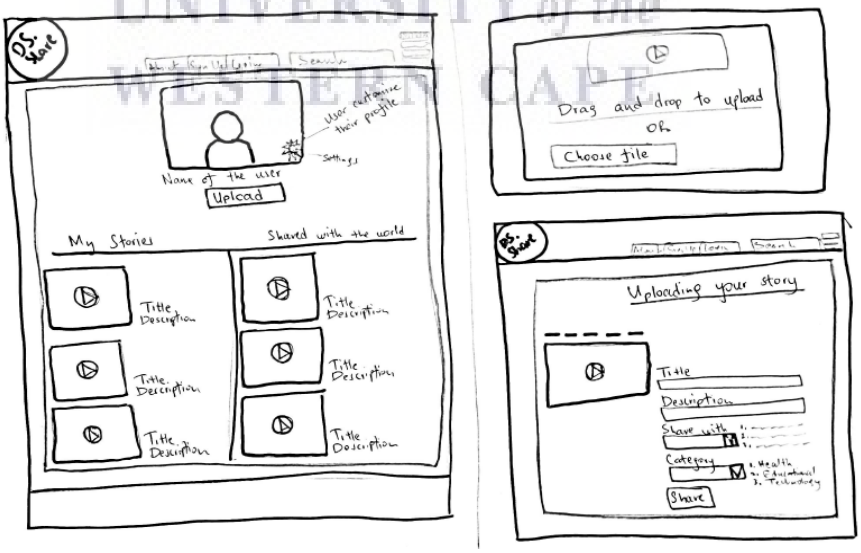


Figure 26: Second page of the low-level design of the interface

The participants also mentioned that the interface should be clear and efficient. Confidentiality and privacy issues need to be given a high priority to ensure that the private information about users is not compromised.

Participatory Design Cycle 2

The results of Design Cycle 1 informed Design Cycle 2 (see Figure 27 and Figure 28). All the suggestions mentioned by the participants of Design Cycle 1 were considered when designing the second prototype.

Figure 27: Design cycle 2 – landing page

The participants followed a list of task scripts to interact with the system. After each participant had finished, they answered a list of probes. The participants gave some positive responses, such as–the interface is user-friendly; it was easy to follow

and execute the required tasks and navigating around was simple. They suggested having a confirmation email once a user is registered for security and privacy purposes.

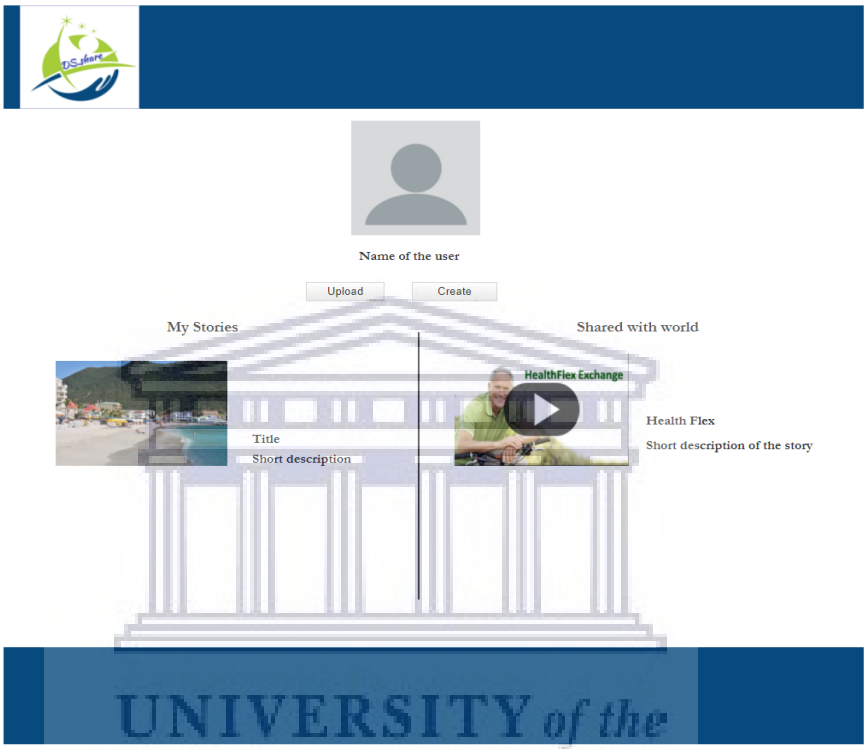


Figure 28: Design cycle 2 – profile page

Some participants said it would be nice to have a rating system and a function that shows how many users viewed their digital stories. Finally, the participants suggested adding a screen where users can create their own digital stories if they do not have one ready to be uploaded.

Participatory Design Cycle 3

The final design was informed through the developmental stages of the participatory design cycles 1 and 2. Based on the previous cycles the changes

suggested by users were made. The design improved and there were changes in the interface, see Figure 29. The participants liked the changes made and mentioned that many users struggle with digital platforms that are not straightforward, have too many screens and display irrelevant information.

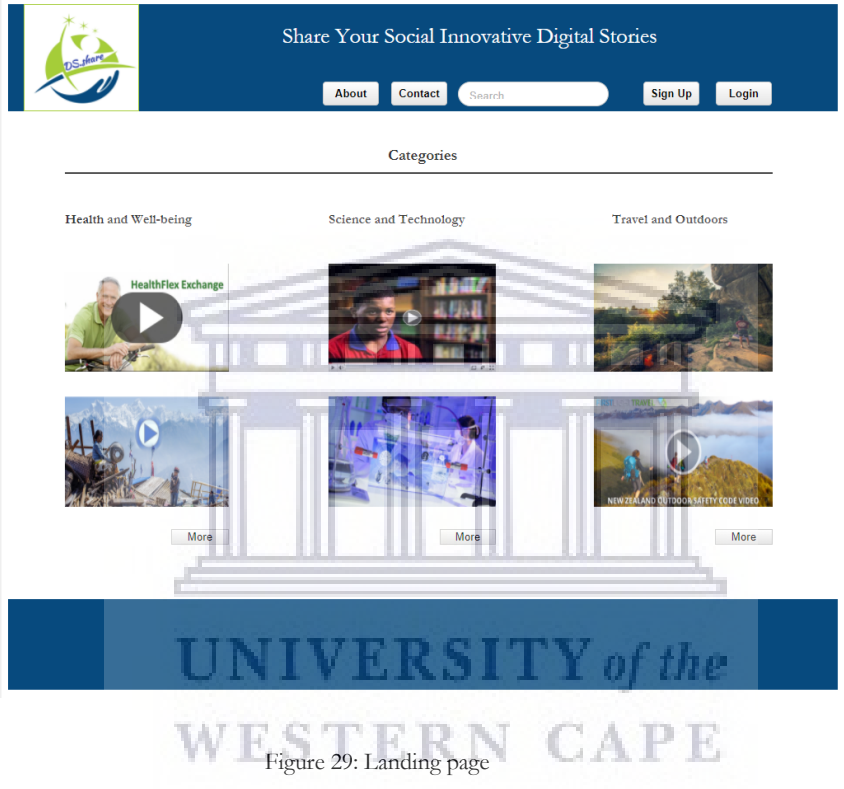


Figure 29: Landing page

Figure 30 shows the 'create' screen, this screen helps users to see options available to them in order to be able to create their own digital stories. One suggestion that came up was to have a function that would help users create a digital story within this system. Since this project is a *Proof of Concept* the *Create* screen seemed to address this aspect sufficiently.

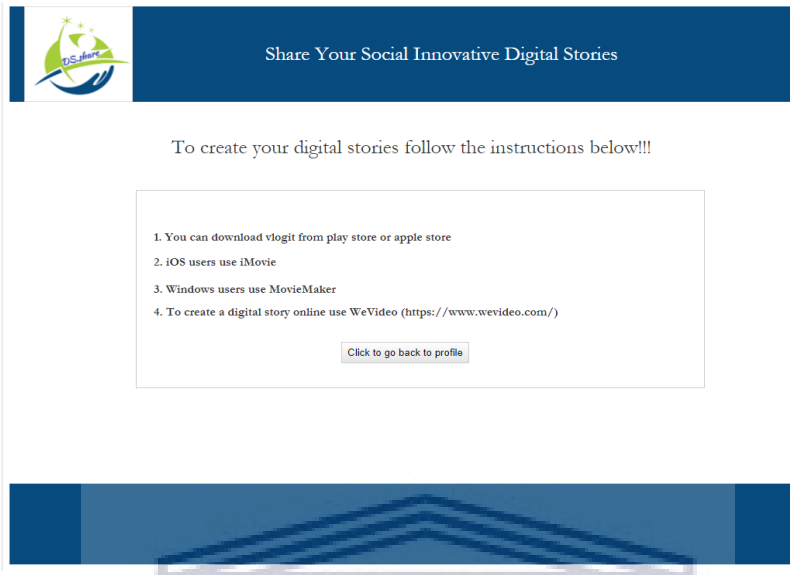


Figure 30: Create a page

Figure 31 shows one of the screens that a user sees right after selecting a file to upload from their own file system. The feedback received for this screen was positive. Participants liked the fact that they were able to give a title to their story, give a short description and select a category for each story.

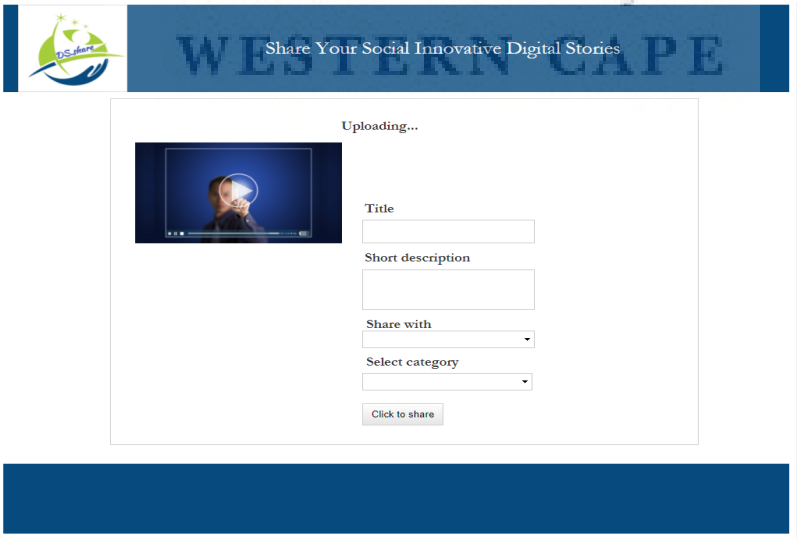


Figure 31: Uploading process page

PERFORMANCE MEASURES

To obtain performance measures, an expert review method was followed. Five evaluators participated in this process: three web experts and two usability specialists.

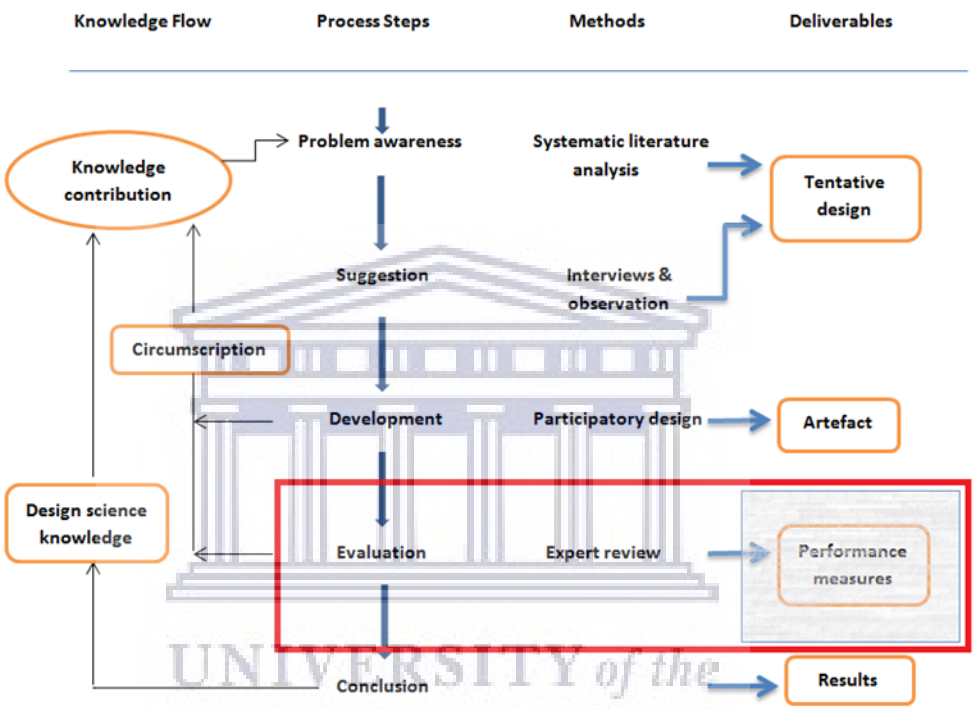


Figure 32: Performance measures deliverable

The success of websites depends on the fact that users should not experience any difficulties during the navigation of the site. The feedback from the expert reviewers gives an even better opportunity to improve the design and development of this website.

Table 12 shows four categories of the site's usability strengths, as experienced by the expert reviewers.

Table 12: Usability strengths

Category	**Usability strengths: expert reviewers' feedback**
Navigation	-Easy to navigate around -No misleading links on the pages -Each page has links that open the destination page -Simplicity: the site focuses on what's important for the user's -Familiar layout and that helps to quickly find what a user is looking for
Ease of use and communication	-Separated into different categories that make it easy to find different digital stories -No difficulties on the interaction with the website
Design	-Consistency in the: -font case (capital and small) -alignment of the header -size of images -Can browse digital stories without having to log in first -Registration forms are not long, it's easy to fill them in -Appropriate choice of colour for all pages
Content	-Updated information about the project. -Appropriate information about uploading and creating a digital story -Useful and relevant content on each page

The following problems were identified by the experts. The detailed information is presented in Table 13.

The following s**everity ratings** were used by the experts to rate usability problems:

- 0 = I don't agree this is a usability problem at all
- 1 = Cosmetic problem only: [do not] fix unless extra time is available
- 2 = Minor usability problem: low priority
- 3 = Major usability problem: important to fix
- 4 = Usability crisis: important to fix

Table 13: Usability problems

	Severity Ratings of Experts (E)					Average
Usability problems	E1	E2	E3	E4	E5	
1. Design of home page needs to be improved, especially the separation of the categories		1	1			1
2. Font size needs to be adjusted				2		2
3. Ineffective search functionality button			4	4		4
4. Inconsistent buttons on pages					3	3
5. Have a short description under 'upload' and 'create' button	2					2
6. Fix error handling process when uploading digital story under the description		3				3
7. Returning to home page not clearly defined			2	2	3	2
8. All videos are on the home page: make a link directing to a new page for all categories	2				2	2
9. Footer not being used for anything					3	3

The results presented in Table 13 show that there is a difference in the priority that should be given to the rectification of the usability problems identified.

- Problems no. 1-2 are problems that can only be fixed if there is extra time in the development process otherwise these two cosmetic problems can be left unattended.
- Problems no. 5, 7 and 8, these are minor problems and they take low priority depending on the availability of time in the development process.
- Problems no. 3, 4, 6 and 9 need to be fixed, they are major usability problems, this simply means that it is vital to fix them.

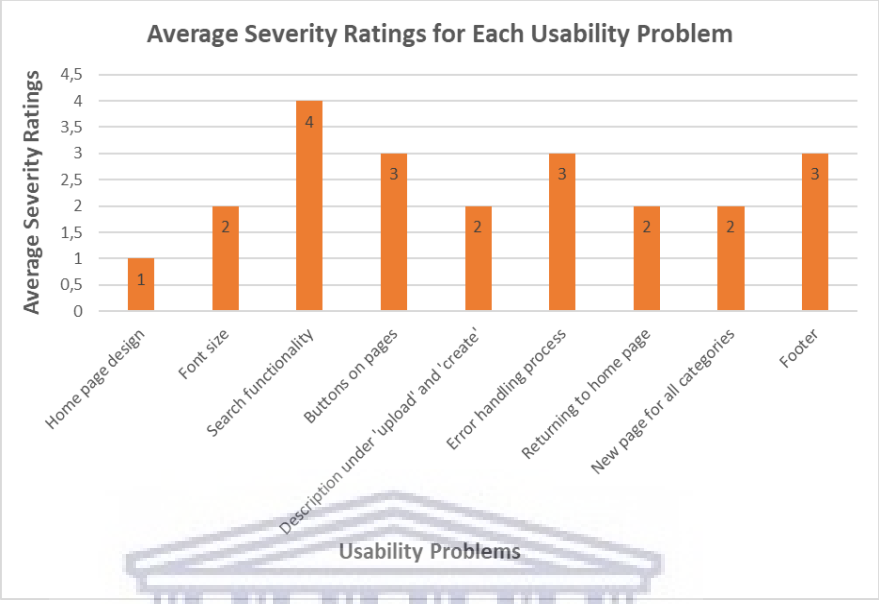


Figure 33: Average severity ratings for each usability problem

Nine (9) common usability problems were identified on the website. A discussion of these problems follows, and the proposed solutions are identified in Table 13.

- **Problem 1**: This problem is related to the design of the home page. This is concerned mainly with the structure of the home page and the frames used to separate the sections.

  Proposed solution: Add a separation line between each category. Each page should be the same length. Important information should always appear at the top and the logo should be consistent on every page.

- **Problem 2:** This problem is concerned with the font size. This is related mainly to the font style, colour and size used throughout the website.

  Proposed solution: It is necessary to use readable fonts**.** The style applied to text, for example on headings and paragraphs, must be consistent and italic text should be avoided, but underlining is expected in hypertext links.

- **Problem 3:** This problem is related to the search functionality within the website content. The feedback shows that the search bar design needs to be improved.

  Proposed solution: A simple search bar icon to initiate the search needs to be visible; this will help users not to lose their way in the website when they want to search for content.

- **Problem 4:** This problem is related to the inconsistency of buttons on all pages of the website. This is mainly related to the fact that not all pages have buttons in the header of the page.

  Proposed solution: Add all buttons in the header of all pages to provide consistency on pages, to make the website more user-friendly.

- **Problem 5:** This problem is related to incomplete information. The result shows that under 'upload' and 'create' buttons there should be a short description of what is expected from the user.

  Proposed solution: Add a short descriptive sentence in a pop-up that would guide the user. Avoid lengthy sentences or long paragraphs, use simple words. Understand the user's needs or objectives.

- **Problem 6:** This problem is related to the error handling process when a user is uploading a digital story, there is no error displayed when a user makes a mistake when they are adding a description.

  Proposed solution: Make sure that an error message is displayed if a user has made a mistake when they are writing a description of the digital story they are uploading.

- **Problem 7:** This problem is related to returning to the home page not being clearly defined. Users should be aware of how to reach the home page from wherever they are on the site.

  Proposed solution: Find an easy way that will be visible to users whenever they want to return to the homepage e.g. arrow pointing to the

home page, home button or logo and specify that it redirects the user to the home page.

Problem 8: This problem is associated with the digital stories that appear on the home page and how to access the rest of the stories.

Proposed solution: Make a new page for each of the categories. Each category must have a separate page that shows all the digital stories associated with that category. For example, when a user clicks 'more', then immediately, they are redirected to the page that shows all those digital stories.

- **Problem 9:** This problem is related to the footer of the website not being used for anything.

  Proposed solution: Add important information that will help the user once they reach the end of a website e.g. home button, contact us button or site map.

SUMMARY

In this chapter, the results found were summarised in the form of graphs, tables and explanations. The conclusion of the DSR methodology was discussed, and the results of the DSR methods were explained.

The, discussion of the results and the conclusions drawn from this research will be explained in the next chapter.

Chapter 5

DISCUSSION AND CONCLUSION

INTRODUCTION

In chapter four, the results of the research were presented. This chapter commences by giving a summary of the study and revisiting the research questions. It is followed by a discussion of the outcomes of the research.

Digital storytelling is contributing significantly towards how information is shared and communicated in this digital age. It offers various ways in which a wide variety of content or information can be shared amongst different audiences[4]. Digital storytelling is used in different industries and for different reasons. In a study conducted by Cueva *et al.* the digital storytelling concept was used for health promotion and awareness making of cancer (Cueva M. , Kuhnley, Revels, Schoenberg, & Dignan, 2015). According to De Vecchi *et al.* it can be used for mental health: digital storytelling can help as an educational tool that can be used to support young people by reflecting on their lives; identify personal coping strategies and positive life experiences; and help people to learn from their peers via their personal perspectives (De Vecchi, Kenny, Dickson-Swift, & Kidd, 2016). Furthermore, digital stories shared can be a healing process (Briant, Halter, Marchello, Escareño, & Thompson, 2016). The concept can be used in marketing, since "*stories can help build awareness, comprehension, empathy, recognition, recall, and provide meaning to the brand*" (Singh & Sonnenburg, 2012, p. 189). The automotive industry is increasingly using digital storytelling; new doors for all sorts of content creators

[4] https://www.linkedin.com/pulse/storytelling-digital-age-gavin-coffey

have been opened. "*The automotive industry is no exception when using the power of storytelling to build brand relationships and market products directly to consumers*"[5].

Marketing through digital stories builds relationships among members in the industry and customers build a relationship with the brand. Digital storytelling has a greater power than written storytelling "it *favours the occurrence of the emotional dimension of consumer relationship experiences, transforming individual consumption into collective ones*" (Pera & Viglia, 2016, p. 1148).

In this study, the focus was on digital storytelling for social innovation. What can be described as "social innovation"? According to Moulaert "… *social innovation can … be viewed as a general, shared 'consciousness' about the nature of problems that modern societies face and the ways that they should be confronted*" (Moulaert, 2013, p. 3). Thus, in the South African paradigm, it means sharing success "stories' that could be useful to other social innovators or social entrepreneurs. The development of the platform, the artefact in this project, is the vehicle for sharing these digital stories for social innovation.

In a study about the opportunities and challenges of the fourth industrial revolution, Xu *et al.* mention that the world has recently entered the dawn of the fourth industrial revolution:

"*The speed and measure of the changes being brought about by the fourth industrial revolution are not to be ignored. These changes will bring about shifts in power, shifts in wealth, and knowledge. Only in being knowledgeable about these changes and the speed at which they are occurring can we ensure that advances in knowledge and technology reach all and benefit all.*" (Xu, David, & Kim, 2018, p. 90).

[5] https://purplepublish.com/en/storytelling-in-automotive-industry/?cn-reloaded=1

Much of these envisaged changes will be driven by the ubiquity of computing and the connectedness of people because of mobile technology. According to Pew Research, it has been reported that mobile devices and the Internet play a significant role in modern society (Poushter, Bishop, & Chwe, 2018). The use of mobile phones to access the Internet is even more important in poorer countries where fixed Internet use is not very widespread, because of its cost. The mobile phone can be an important tool in terms of helping poor people gain access to useful information and for the sharing of information through digital storytelling.

Figure 34: Smart phone users in South Africa 2014 – 2023 (estimation from 2019)[6]

In Chapter 1, it was mentioned that cell phone ownership in South Africa was 89% in 2014 (Poushter & Oates, 2015). Recent statistics show that cell phone ownership in South Africa in 2017, according to Pew Research, has increased to 91%—a significant increase compared to 2014. Smartphone ownership has been on the rise

[6] Source: Statista (https://www.statista.com/statistics/488376/forecast-of-smartphone-users-in-south-africa/, accessed 13/5/2019)

since 2015 (see Figure 34). Out of the 91% of South Africans who own cell phones, 51% own smartphones and 40% own feature phones (Poushter, Bishop, & Chwe, 2018).

With the increase in smartphone usage and access to the Internet, there is a belief that everyone has access to technology and thus information. The Internet connectivity, according to Pew Research, is having a positive impact on life in Sub-Saharan Africa. However, a digital divide still persists, and Sub-Saharan Africa still lags behind other parts of the world, in terms of Internet use (Silver & Johnson, 2018). This is because, despite the increase in smartphone ownership and an increase in the Internet penetration in South Africa, the cost of connectivity is still an issue. According to Goldstuck, the digital divide remains stark and the strongest divide is revealed in relation to income inequality. This inequality highlights the level at which lower income South Africans are frozen out of the Internet economy (Goldstuck, 2017).

DISCUSSION OF RESULTS

The discussion of the research findings is structured around the research question, namely:

How should a digital platform for digital storytelling be designed to enhance social innovation and information sharing?

This question was unpacked as two sub-questions:

- *What would the impact of digital storytelling for social innovation be within the constraints of the digital landscape of South Africa?*
- *How can a framework for a platform for digital storytelling be developed, to promote informal learning and the sharing of socially innovative stories?*

Each of these sub-questions will now be discussed in terms of the findings.

WHAT WOULD THE IMPACT OF DIGITAL STORYTELLING FOR SOCIAL INNOVATION BE WITHIN THE CONSTRAINTS OF THE DIGITAL LANDSCAPE OF SOUTH AFRICA?

The findings in relation to this question will now be discussed in terms of: (1) the impact of digital storytelling for social innovation and (2) the digital landscape.

Impact of digital storytelling for social innovation

The findings of this research indicate that the ability to learn and understand how to use multimedia and technological tools will have an impact on social innovation. The Macassar Pottery participants are a good example, they were open to be educated and inspired – the researcher observed that the participants were learning without realising it. Provided they are informed about the task required; the use of digital stories has a powerful impact as an all-round skill development tool as it can strengthen various skills. The shared stories have inspired the social innovative idea in the Macassar Pottery, acting as active agents of change, who play an essential role in creating solutions for the problems faced by the unemployed youth. These stories create emotional resonance and serve as a strategic purpose to bring change in the community—thus social innovation.

The discussion will further refer to the workshops conducted and their participants, namely: the *social innovator workshop, the Higher Education Institution workshops and interviews about the workshops with workshop instructors.*

Social innovator workshop

The findings of this research indicate that the challenges faced by South Africans in the digital age fluctuate between moderate and high depending on the exposure in the community and environment. In other words, participants from Macassar Pottery were always engaged despite the language barrier and literacy challenges experienced during workshops. The first workshop focused on the story circle and

script writing. Participants shared their stories and created their story scripts. One of the participants was functionally illiterate—for his story, he recorded an audio. The participants were introduced to and assisted with the technologies, but they could not create their own stories and had to be facilitated. Despite these challenges during the workshop, the digital stories were created successfully. The use of digital media in this case assisted with the creation of stories that could be shared to showcase the socially innovative application of making pottery, to provide opportunities for unemployed young men. Findings from this study document that literacy challenged participants can learn to use new media tools.

The above findings are also in agreement with the current literature which encourages digital storytelling for youth to help them to be able to deal with everyday struggles (Khebbaz, 2016). Furthermore, this technology allows less literate participants to present their feelings through their own digital stories, without necessarily being able to write.

The Macassar Pottery's initiative is a social innovation because it upskills the unemployed young men, thereafter, helping them to tell their own stories through unique ceramic ware[7] (Littlewood & Holt, 2013).

The Higher Education Institution workshops

The findings of this research indicate that the utilisation of the digital storytelling concept in Higher Education Institutions (HEIs) contributes to the development of digital skills for both students and lecturers. This finding agrees with the research outcomes of Price *et al., t*heir study investigated the impact of using digital stories in promoting a deeper understanding of nursing concepts for nursing students. According to them, the study found that the use of digital storytelling fostered

[7] http://www.macassarpottery.com/

creativity and promoted effective learning (Price, Strodtman, Brough, Lonn, & Luo, 2015).

This research revealed that most lecturers are still reluctant to explore and utilise the digital tools that are available for teaching purposes. Although the use of technology for teaching and learning is promoted and encouraged and more technology is available for teaching, lecturers still seem hesitant to use it since they struggle and find it a bit a challenging to incorporate it in their teaching.

The participants who attended the HEI workshops, mostly lecturers, had quite extensive experience with computers and smartphones. They were also acquainted with social networking sites, and they indicated that they knew how to post photos and videos on these platforms. They also indicated that they are aware of the advantages of using digital platforms. Findings from this study showed some factors that discouraged the participants from using some of the technological tools available to them—the most important being: fear that their privacy and security will be compromised (see Figure 22).

However, some of the lecturers viewed digital storytelling as a valuable tool to increase the research skills of their students, to improve their students' creativity (using digital and technological tools) and to promote critical thinking. The results also showed that the lecturers were interested in using the concept of digital storytelling (and the required technological tools for digital storytelling) in their teaching. Alismail has found that multimedia is a powerful and beneficial tool for teaching students. Furthermore, (Alismail, 2015), educators should endeavour to find multiple ways to integrate multimedia into their classroom and assignments.
The findings of this research, based on the lecturer's interviews, indicate that digital storytelling can be used for many different purposes to engage students and give them the opportunity to gain valuable skills. Research conducted by Schrum *et al.*

supports these findings and states that digital storytelling can be used in small assignments focused on discrete topics (Schrum, Dalbec, Boyce, & Collini, 2017 June).

The importance of social innovation in HEIs cannot be stressed enough. According to Elliot, social innovation in higher education inspires and supports diversity, social inclusion, citizenship and local learning communities and partnerships, these are essential to economic growth and regeneration (Elliott, 2013). HEIs play a significant role in knowledge and skills development. Organizations that are successfully innovating, use HEIs to a great extent in their innovation activities, and this might indicate that these organizations recognise the role that HEIs play in social innovation (Blass & Hayward, 2014).

Interviews about the workshops with workshop instructors

The multimedia-tools workshops that took place at the HEI were facilitated by three instructors. Throughout the workshops the instructors interacted with the participants. The discussion with the instructors revealed that there is great potential of transforming the learning process through digital storytelling.

The instructors mentioned that they discovered, as a result of their experience in facilitating these workshops, that digital storytelling can be used in many different contexts. The instructors indicated that there is a barrier in terms of using the available technological tools, between the older and the younger generations. Some of the results indicated what skills and training would be required for users to be able to use digital platforms. the results also showed the advantages of using digital platforms and what discourages the users from using these platforms. The instructor's insights about these points were mentioned and summarised in Table 11.

Constraints of the South African digital landscape

According to Millard (2015), the digital divide is multi-facetted and can be described as (see Figure 35):

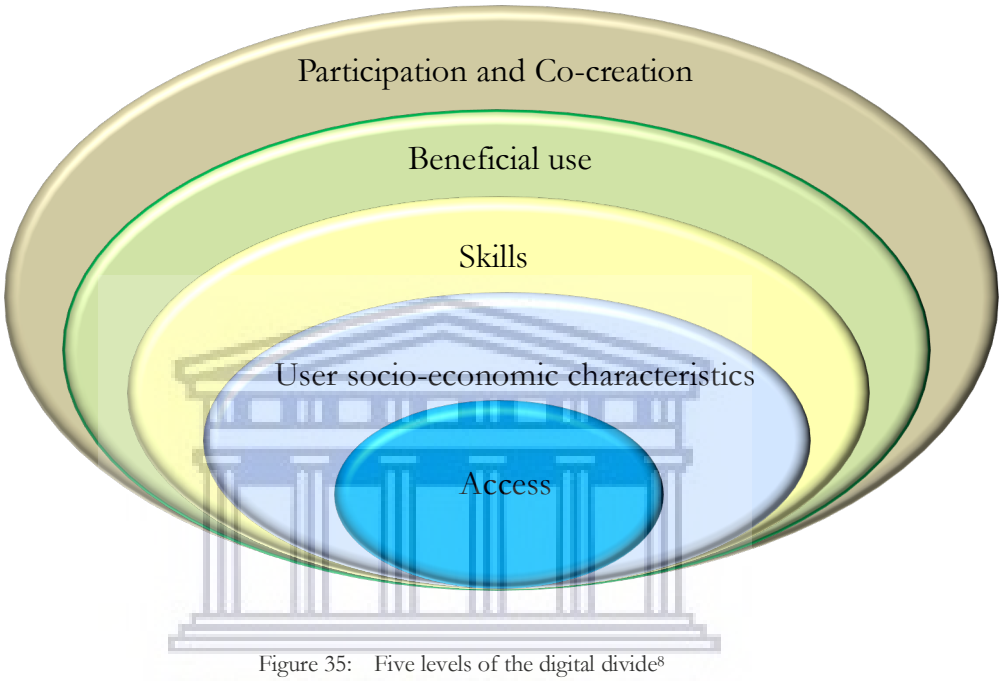


Figure 35: Five levels of the digital divide[8]

- *Access*: To be able to use ICTs, access is needed. This is problematic for most South Africans because of the cost.
- *Socio-economic characteristics*: Education and literacy levels, and even factors such as gender and age, have an influence on ICT use.
- *Skills*: Once access and education is not a limiting factor, possessing digital skills to be able to use ICTs meaningfully, might be limited.
- *Beneficial use*: The user must be convinced of the benefit of using ICTs.

[8] Millard, J. (2015). The Digital Divide and the Global Post-2015 Development Debate. In K. Andreasson (Ed.), Digital Divides. The New Challenges and Opportunities of e-Inclusion (p. 16). Boca Raton: CRC Press.

— *Participation and co-creation*: For digital storytelling, this is the level at which the user must function to be able to tell a digital story and to share it.

The digital divide in South Africa is still prominent and thus very few will be able to function at the "*Participation and co-creation"* level. This was especially pronounced and noted by the researcher, during the workshops in under-resourced communities.

HOW CAN A FRAMEWORK FOR A PLATFORM FOR DIGITAL STORYTELLING BE DEVELOPED, TO PROMOTE INFORMAL LEARNING AND THE SHARING OF SOCIALLY INNOVATIVE STORIES?

The findings of this research indicate that involving users for a design of any digital platform is important, right from the initial stages of the design. This is important since the platform will be used by users. Users understand more of what they need from an interface level to the content that is displayed on the platform than do the developers, hence it is very important to involve them. *Participatory Design Cycles (1-3),* were designed with the involvement of users to test the prototypes. Each *design cycle* informed the next one, with the changes suggested by users, after each testing that users performed, being implemented at the end of each *design cycles*.

According to the results of this research, when the participants evaluated the prototype designs, they mentioned the importance of having an interface that is appealing to the users, an interface that is not cluttered with too much information and of minimising the number of pages with irrelevant content.

Some desired features for this digital platform, were to have a rating system and a function that shows the number of users that viewed a digital story. As this research project was to design a proof of concept prototype, these features will be incorporated in future enhancements of the prototype.

The performance measures used by the expert reviewers, yielded good usability scores in their feedback. The evaluation was measured in terms of—navigation, design, content, ease of use and communication. The results also showed that minor changes would improve the design. According to De Reuver *et al.* understanding what causes a digital platform to succeed is still lacking. There is a need to do more research on this topic (De Reuver, Sorensen, & Basole, 2016).

The results of this research indicate that digital storytelling can provide an improved learning experience for students. Digital storytelling can contribute to the development of skills for the beneficial use of technologies—this is true for both students and innovators. Digital storytelling can also help socially innovative entrepreneurs to showcase their work. The findings presented in this dissertation make an important contribution to how a digital platform for digital storytelling can be used for social innovation and an improved learning experience for students.

LIMITATIONS

The pre-defined period for collecting data was a limiting factor. The time frame was a challenge when it came to the number of workshops that could be attended in communities to collect data. The researcher only collected data at one community workshop. This study forms part of a bigger project (an Erasmus+ funded European project: Common Good First) and most of their community workshops only took place in 2019. The researcher collected data in 2018.

FUTURE WORK

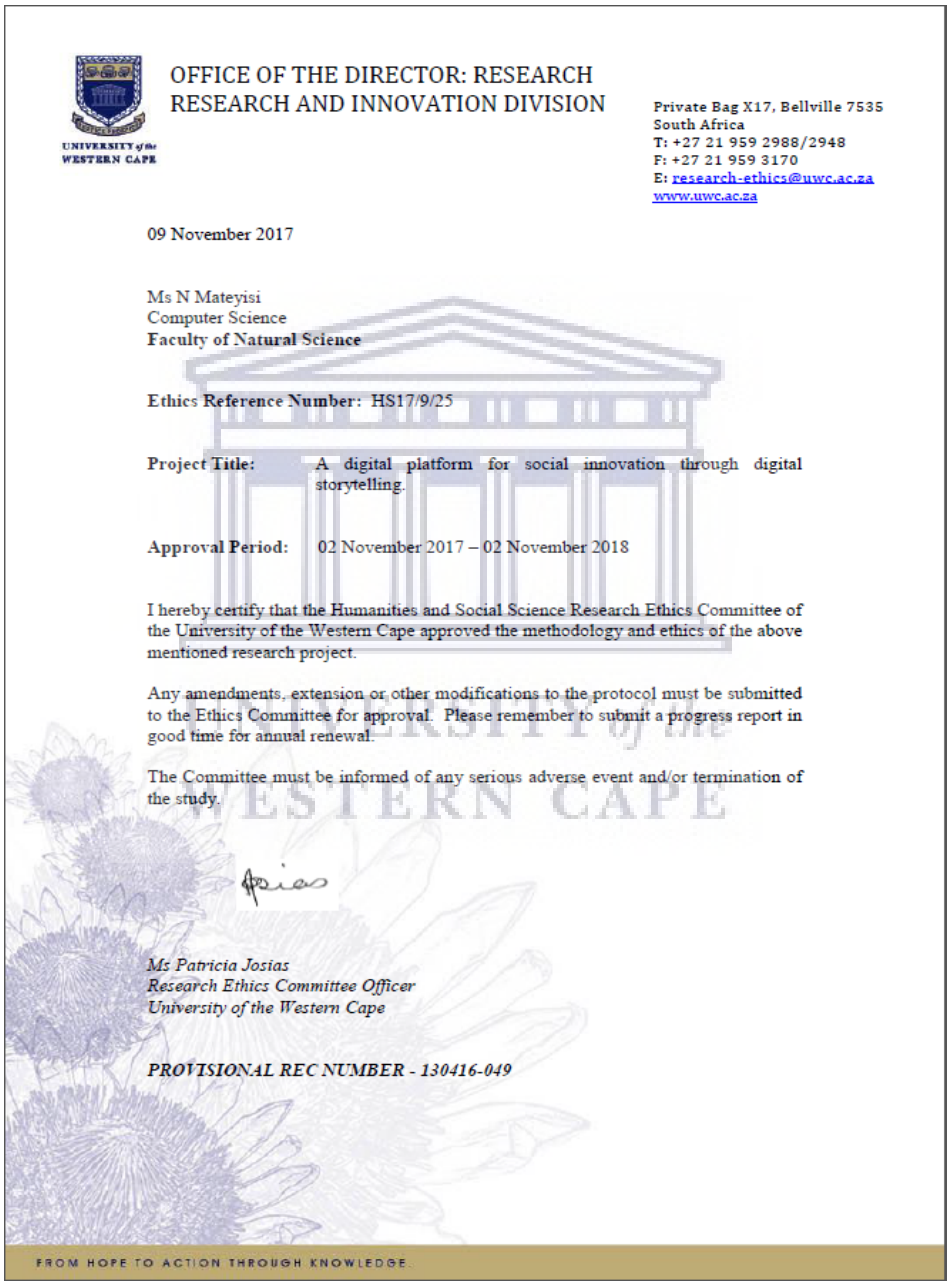
The findings presented in this dissertation make an important contribution to the knowledge in the digital storytelling field. However, it could be stretched in numerous ways by removing some of the limitations assumed in this research. The digital platform created for this research project is a proof of concept prototype.

To further this study, the Usability Testing of the prototype should be continued. This can be done during workshops.

With further analysis and development of the prototype a fully functional digital platform can be developed. More of the desired functionalities mentioned by participants can be added.

Further research should be conducted on how Higher Education Institutions could include digital storytelling in their teaching and if such an inclusion would improve student learning. Additionally, the research on the impact of digital storytelling on communities should be continued.

APPENDIX A



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09 November 2017

Ms N Mateyisi
Computer Science
Faculty of Natural Science

Ethics Reference Number: HS17/9/25

Project Title: A digital platform for social innovation through digital storytelling.

Approval Period: 02 November 2017 – 02 November 2018

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.

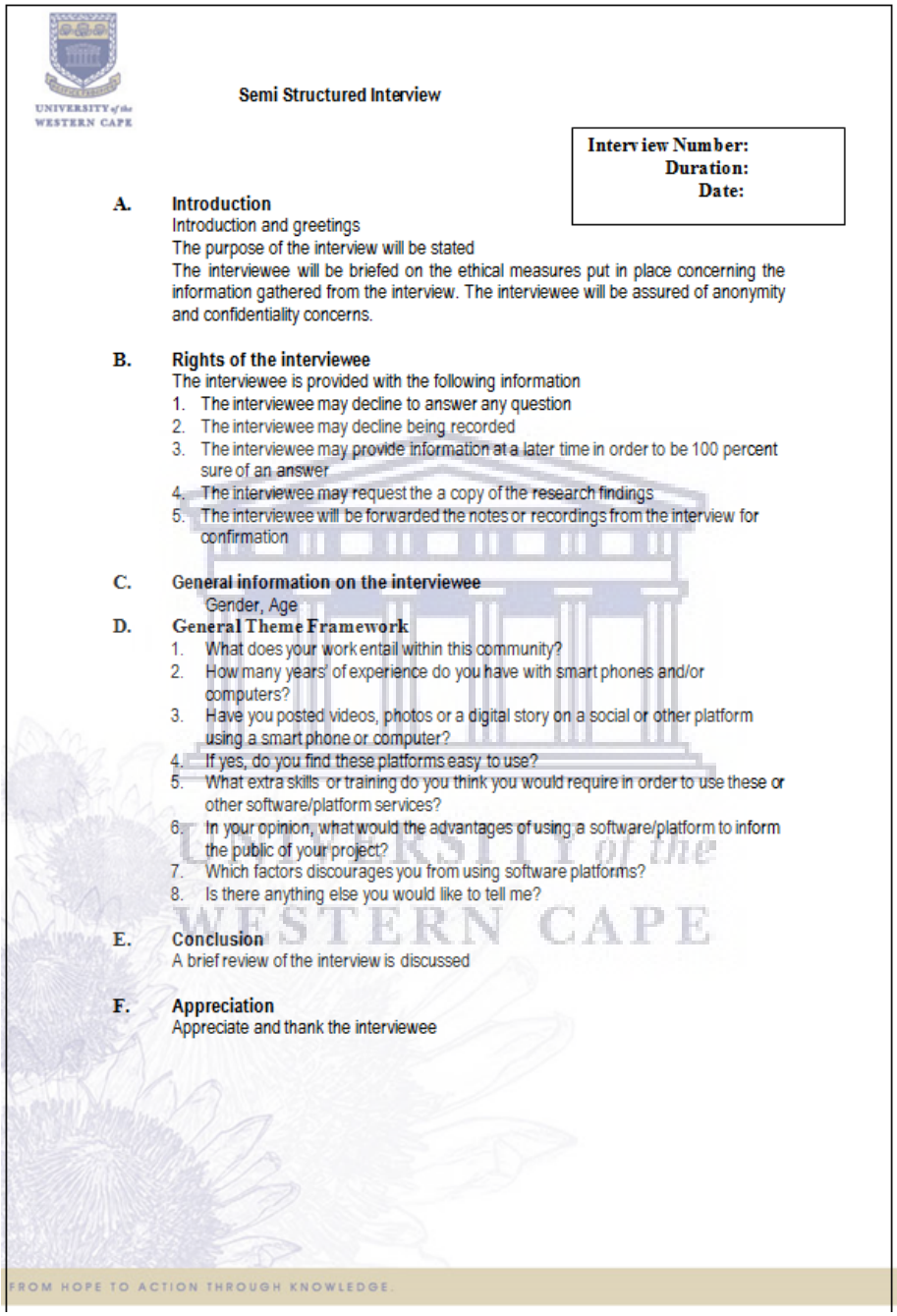
The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER - 130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE

APPENDIX B



UNIVERSITY of the WESTERN CAPE

Semi Structured Interview

Interview Number:	
Duration:	
Date:	

A. Introduction

Introduction and greetings

The purpose of the interview will be stated

The interviewee will be briefed on the ethical measures put in place concerning the information gathered from the interview. The interviewee will be assured of anonymity and confidentiality concerns.

B. Rights of the interviewee

The interviewee is provided with the following information

1. The interviewee may decline to answer any question
2. The interviewee may decline being recorded
3. The interviewee may provide information at a later time in order to be 100 percent sure of an answer
4. The interviewee may request the a copy of the research findings
5. The interviewee will be forwarded the notes or recordings from the interview for confirmation

C. General information on the interviewee

Gender, Age

D. General Theme Framework

1. What does your work entail within this community?
2. How many years' of experience do you have with smart phones and/or computers?
3. Have you posted videos, photos or a digital story on a social or other platform using a smart phone or computer?
4. If yes, do you find these platforms easy to use?
5. What extra skills or training do you think you would require in order to use these or other software/platform services?
6. In your opinion, what would the advantages of using a software/platform to inform the public of your project?
7. Which factors discourages you from using software platforms?
8. Is there anything else you would like to tell me?

E. Conclusion

A brief review of the interview is discussed

F. Appreciation

Appreciate and thank the interviewee

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

APPENDIX C

Interview with 3 participants who attended 2-Day Multimedia Workshop: Using multimedia tools to create Digital Stories

Interview: Focus group

Questions **Participants**	**How do you feel about sharing your story?**	**What have you learned about story creation or script writing of your story?**	**What kind of a cell phone are you currently using?**	**Which phones have you used before?**	**What applications do you mostly use on your phone?**	**How often do you buy data to have access to some applications? E.g. Facebook, WhatsApp, downloading app (play store)**	**Any additional comments?**
1	-Refreshing since I don't usually share my story with anyone	-Experienced new things like talking and writing my story which stimulates new thing that was there, but I never knew about them (sitting with people and be able to talk without being ashamed)	-Hisense	-Mobicell -Nokia	-Facebook -WhatsApp -Alt.binz (search engine)	-1 times a week -Usually, buy R15 airtime for data -Use freebase when I don't have data to access Facebook	-It is always better when one shares their story -It helps in letting go of what happened in the past

Appendix C

Questions **Participants**	**How do you feel about sharing your story?**	**What have you learned about story creation or script writing of your story?**	**What kind of a cell phone are you currently using?**	**Which phones have you used before?**	**What applications do you mostly use on your phone?**	**How often do you buy data to have access to some applications? E.g. Facebook, WhatsApp, downloading app (play store)**	**Any additional comments?**
2	-It was fantastic -It was exciting to share my story -It was the first time sharing my story	-You get to progress and see things differently than before.	-Mobicell	-Mobicell Android phone	-Facebook -WhatsApp -Youtube	-3 times a week -Usually buy for R5, R12 or R15 for data	-I never shared my story before. -I was a bit surprised that I shared my story
3	-Felt good -It was inspiring when I shared the story -I felt proud I was able to share my story as it is a story that I don't share most of the time	-I saw where I was before in the past. -The things I experience, it was interesting to look back and see the change that happened in my life -When I look back and see where I am today, I saw progress and great future	-Minicell	-Mobicell Android phone	-bing (search engine)	-1 or 2 times a week -I buy R20 or R25 airtime	-This workshop was a process of healing memories

APPENDIX D

Interview with 8 participants who attended a Multimedia Workshop: Using multimedia tools to create Digital Stories

Type of interview: semi-structured

P = Participant

DP= Digital Platform

Q = Questions insightful

DS = Digital Storytelling

Probes **P**	**How many years of experience do you have with smartphones and computers?**	**Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?**	**If yes, do you find these platforms easy to use?**	**What extra skills or training do you think you would require in order to use these or other platform services?**	**In your opinion, what would the advantages of using a digital platform be to inform the public of your project?**	**Which factors discourage you from using digital platforms?**	**Is there anything else you would like to tell me?**
1	Computer = 12 Smartphone =21	Digital Story = No Video& photos = Yes	The platforms are easy to use and they are user-friendly, it also depends on your purpose and what you use the platform for.	Training in using different platforms on how to share educational content.	To use the multimedia tools to record lectures so that students and people who will not be able to attend and are off campus can have easy access to the material	They are too complex, and sometimes they are not user-friendly. Tedious Time-consuming It is not easy to have access because of the cost of connectivity	The use of multimedia tools to create digital stories was very useful and insightful. It highlighted different technological and multimedia tools available to use. Gave insight if one is willing or want to move

Appendix D

Probes P	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
							to the use of digital platforms.
2	Computer =11 Smartphone =11	Digital Story =No Video & photos =Yes	Most of them are easy to use; I use YouTube to share videos. In overall they are fairly easy to use	Photography, image editing, and video editing software tools	It can be easily shared with the public. A lot of people prefer visual than reading using a DS platform would be good for saving the digital story for watching later.	Privacy and security issues	DS would enhance any HEIs learning and creativity. Resources or information or any content created using the DS concept would be available all the time anywhere for accessibility.
3	Computer =15 Smartphone =7	Digital Story =No Video & photos =Yes	The digital platform that I have used and still using is easy to use and they don't give me problems when I want content from the platform.	More training is needed on practical stuff in terms of multimedia tools	Want students to have access to it	My own ignorance, learning new things is quite daunting	Using multimedia tools is great. Take for example using podcast which is simple and will be most useful and the students and staff can use it. Starting small using multimedia and technological tools would be helpful and great and then move to bigger things.

Probes P	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
							I am very excited to have learned about the use of multimedia tools and the concept of Digital Storytelling, the university stuff should be doing this.
4	Computers =15 Smartphone =9	Digital story =Yes Video & Photos =Yes	The platforms are easy to use and very basic for anyone to be able to use them	Video editing skills Advanced photo editing and using photo editing software tools like Photoshop	Cross boundaries, more inclusive and less exclusive even with disabilities	Security issues, people can get access to your information and use it	The workshop was very useful, a lot of things I did not know. It opened my eyes to the importance of using multimedia tools. And the use of digital stories was good, more especially when you had to write your script first. In overall the workshop was helpful

Appendix D

Probes P	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
5	Computer =10 Smartphone =10	Digital Story =No Video& photos =Yes	Yes, the interface is easy to navigate through and around it	More exposure to different platforms and software tools like the one you use to create digital stories and editing software.	It will make people more interested and it will reach a wider community.	The cost of connectivity The effort to access it.	It would be great if the digital platforms are also available on smartphones where you can access them even when you are offline due to connectivity challenges. Accessing the content offline would be helpful
6	Computer =15 Smartphone =15	Digital Story =No Video & photos =Yes	Most of them are easy to use; I use YouTube to share videos. In overall they are fairly easy to use	Photography, image editing, and video editing software tools	It can be easily shared with the public. A lot of people prefer visual than reading using a DS platform would be good for saving the digital story for watching later.	Privacy and security issues	DS would enhance any HEIs learning and creativity. Resources or information or any content created using the DS concept would be available all the time anywhere for accessibility.

Probes P	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
7	Computer =12 Smartphone =10	Digital Story =No Video & photos =Yes	It depends on which platform I use and the content I am sharing. Facebook is easy to use and navigate around it. Blogs are a bit challenging; I had to play around with them until I found the one that I was comfortable using.	A basic guide about a platform. Storytelling side of it should be training on movie making/digital stories	Fast and easily accessible to users so that they can get the share content or information.	The interface and how to use it. If it takes longer to complete a task e.g. Blogs can be tiresome if the interface is not good	I have been playing around multimedia tools to create digital stories. It's a whole new skill set for me and I would recommend it to anyone it's amazing the content or information you can share with a short 2-5-minute video/ digital story
8	Computers =25 Smartphone =18	Digital story =No Video & Photos =Yes	I mostly use Facebook and Instagram; the interface is okay and easy enough to post and share	Need training on sharing information responsible. More especially when it comes to someone else's content like images	Great way to share and captures a lot of content in a platform and always available to anyone who can use it to their advantage	Lack of knowledge Lack of skills to use the available tools and that causes resistance to change	Attending a multimedia workshop opened my eyes and introduced me to great technological tools that I can use to share course content and giving a lecture to my students.

APPENDIX E

Interview with 3 instructors who facilitated the Multimedia Workshops: Using multimedia tools to create Digital Stories

Instructor: **Ins**

Probes **Ins**	**How many years of experience do you have with smartphones and computers?**	**Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?**	**If yes, do you find these platforms easy to use?**	**What extra skills or training do you think you would require in order to use these or other platform services?**	**In your opinion, what would the advantages of using a digital platform be to inform the public of your project?**	**Which factors discourage you from using digital platforms?**	**Is there anything else you would like to tell me?**
1	Computer = 16 Smartphone = 10	Digital Story = Yes Video& photos = Yes	Yes, they are easy to use, because I use apps most of the time	Training would be workshops like Multimedia Tools to equip people with skills. Training or guide on how to use updated or upgraded software	Creating awareness and would open a whole new world. Allow people to be creative, instead of relying more on paper-based information digital storytelling works better than writing a document	Security issues, plagiarism, people who use your work without crediting the author	As an instructor facilitating in these multimedia tools workshops, I discovered that it is challenging with the older participants because they have limited computer and tech skills. There is a barrier between the older and the younger generation in terms of using technological tools and adapting to the digital age. Basic computer literacy with older lecturers is another challenge. And it's challenging to get them on board, but when they do understand what they are and why they are doing it and how

Probes **Ins**	**How many years of experience do you have with smartphones and computers?**	**Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?**	**If yes, do you find these platforms easy to use?**	**What extra skills or training do you think you would require in order to use these or other platform services?**	**In your opinion, what would the advantages of using a digital platform be to inform the public of your project?**	**Which factors discourage you from using digital platforms?**	**Is there anything else you would like to tell me?**
							it works in relation to the students today, they are willing to learn.
2	Computer = 17 Smartphone = 5	Digital Story = Yes Video & photos = Yes	Yes, they are easy to use because I am tech savvy. But this can be challenging for people who are not well equipped with the necessary skills. Some are still wary about technology	Technical skills because they are an advantage., to be able to troubleshoot to find your way around the issue in your computer – having a little bit of knowledge would be beneficial. Research skills- need to keep abreast with the change, what are the latest trends, what is working and what is not, what has been updated. Easier to understand digital literacy skills short courses, to cater to different needs and capabilities. It takes someone who has a different personality, who	Reach the masses because there are so many people who subscribe to digital platforms nowadays. Can use it as part of the healing process with individuals that went through traumatic experiences, it's an emotional roller coaster. Educational approach, it can be used as a form of assessment. Lecturers could use digital storytelling and they can diagnose the students understanding the content they create.	Discouraged if I have to pay for software if it's not free – I use open sources software most of the time. Complexity – I've been exposed to a lot of different multimedia app tools, sometimes you find something that is maybe free cross-platform.	There are many uses of digital storytelling. It can be used in many different contexts, can be used in teaching, for healing, for learning. I'm sure if more people start using digital story they can achieve more. Digital storytelling should be marketed better to reach more people more especially here on campus (UWC). With digital storytelling, the program or the way in which is presented it can always evolve because of the advances in technology and so can explore new avenues of digital storytelling. It comes down to communication because a story is a communication it

Probes Ins	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
				likes to discover things and is able to teach them.			links down to multimodality where we are catering for different audiences need. E.g. people who have difficulties to read and someone that is from rural areas where some can't read but they can watch a video and understand, you can teach them a skill by making them watch a video. It's all about the use, the implementation of it.
3	Computer = 18 Smartphone = 4	Digital Story = Yes Video & photos = Yes (not so much, I am still very kind of weary)	Progressing and changing but not always for the better. Is very subjective Some platforms are easy to use but some are not so easy.	Awareness that things are available out there. Know what your learning needs are and know what your capabilities are Teaching people how to use tools is outdated since everything seems to be available online. Why continue teaching those.	There are a lot of cost benefits – can send group emails, create digital platforms social media to reach your audience. To learn more, share information and advance our knowledge and skills through the use of digital platforms. Create more possibilities for people to educate and improve in many areas	Privacy, fraud, dangers, and seeing viral videos that are not sharing original content. "still cautious about internet banking because of all the internet banking viral videos and all the things that are said	One of the things that I've learned is learning to work with the little that I have within the UWC community. "It's not about age, it's about the approach to the use of technology" Excited about the possibilities of technology

Probes Ins	How many years of experience do you have with smartphones and computers?	Have you posted videos, photos or a digital story on a social or other platform using a smartphone or computer?	If yes, do you find these platforms easy to use?	What extra skills or training do you think you would require in order to use these or other platform services?	In your opinion, what would the advantages of using a digital platform be to inform the public of your project?	Which factors discourage you from using digital platforms?	Is there anything else you would like to tell me?
				Teach skills on how to identify learning preferences. Bottom line is for people to know who they are and helping them in identifying what works for them. Redesign the way technology is introduced to people. Identify learning styles		about scammers and fraud" You have to be cautious about your use of technology Find out more could have taken the world.	

APPENDIX F

Expert Review

Expert reviews involve the analysis of a design by a UX expert with the goal of identifying usability problems and strengths.

The **review** is carried out by a small group of usability **experts**, who analyze the product or service to identify any potential usability issues

1. **List of usability strengths**

2. **List of usability problems** mapped to where they occur in the design

3. **Severity ratings** for each usability problem

0 = I don't agree that this is a usability problem at all
1 = Cosmetic problem only: need not be fixed unless extra time is available on the project
2 = Minor usability problem: fixing this should be given low priority
3 = Major usability problem: important to fix, so should be given high priority
4 = Usability catastrophe: imperative to fix this before the product can be released

4. **Recommendations** for fixing each usability problem

5. **Examples of best practices** to guide improvements

Researcher: :_____

Expert reviewer name: _____

Date : _____

Signature :_____

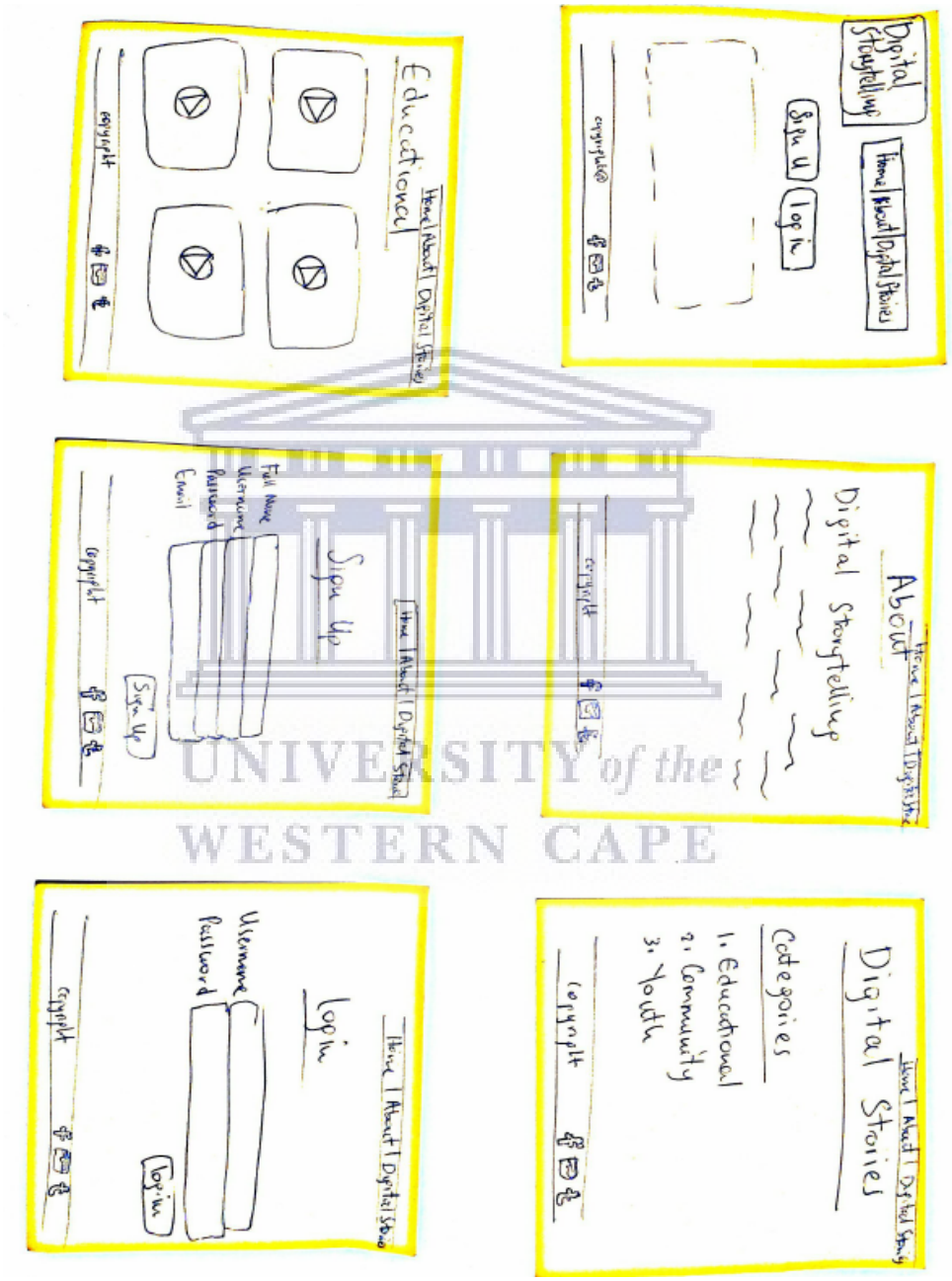
APPENDIX G

Feedback Capture Grid

Likes	Criticisms
Questions	**Ideas**

APPENDIX H

Post It Notes Prototype



BIBLIOGRAPHY

Crotty. (1998). *The Foundations of Social Research: Meaning and Perspective in the Research Process*. Sage Publications Ltd.

Castellani, S. (2016, 09 22). *Product marketting in the digital era*. Retrieved 10 25, 2017, from Everything-you-need-to-know-about-digital-platforms: http://stephane-castellani.com/everything-you-need-to-know-about-digital-platforms/

Cueva, M., Kuhnley, R., Revels, L. J., Cueva, K., Dignan, M., & Lanier, A. P. (2013). Bridging storytelling traditions with digital technology. *International Journal of Circumpolar Health*, 72(1).

Mancuso, J., & Stuth, K. (2014). Storytelling and Marketing: The Perfect Pairing. *Marketing Insights*, 18-19.

Lund Research Limited. (2012). *Principles of research ethics*. Retrieved October 30, 2017, from http://dissertation.laerd.com/principles-of-research-ethics.php

Sharda, N. (2005, May 1). Movement Oriented Design: A New Paradigm for Multimedia Design. *International Journal of Lateral Computing, 1*(1), 7 - 14.

Sadik, A. (2008). Digital storytelling: A meaningful technology-integrated approach for student learning. *Edicational technology research and development*, pp. 487-506.

Rule, L. (2004). *Digital Storytelling*. Retrieved June 25, 2010, from http://electronicportfolios.com/digistory/

(2015). *Western Cape Digital Readiness Assessment: Summary Report*.

Miller , E. A. (2009). Digital storytelling. *Doctoral dissertation, UNIVERSITY OF NORTHERN IOWA*.

Manzini, E. (2014). Making things happen: Social innovation and design. *Design Issues*, 57-66.

Vaishnavi, V. K., & Kuechler, W. (2015). *Design science research methods and patterns: innovating information and communication technology*. CrC Press.

Harari, Y. N. (2011). *Sapiens: A Brief History of Humankind*. London: Vintage.

Baek, J. S., Manzini, E., & Rizzo, F. (2010). Sustainable collaborative services on the digital platform: Definition and application. *In DESIGN RESEARCH SOCIETY INTERNACIONAL CONFERENCE*. Montreal.

Cross, J. (2011). *Informal learning: Rediscovering the natural pathways that inspire innovation and performance*. s.I:John Wiley & Sons.

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and higher education*, 3-8.

Malita, L., & Martin, C. (2010, May 6). Digital storytelling as web passport to success in the 21st century. *Procedia Social and Behavioral Sciences*, pp. 3060-3064.

Sharda, N. (2010). Using Digital Storytelling for Creative and Innovative e-Learning. *eLearn, 2010*(4), 6.

Simonsen, J., & Robertson, T. (2013). *Routledge Handbook of Participatory Design*. New York: Routledge.

Smeda, N., Dakich, E., & Sharda, N. (2010). Developing a framework for advancing e-learning through digital storytelling. (pp. 169-176). In IADIS International Conference e-learning.

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. Decision support systems. 251-266.

Hampton, K., Goulet, L. S., Rainie, L., & Purcell, K. (2011). *Social networking sites and our lives. Pew Internet & American Life Project*. Pew Research Center.

Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210-230.

Lin, K. Y., & Lu, H. P. (2011). Why people use social networking sites: An empirical study integrating network externalities and motivation theory. *Computers in human behavior, 27*(3), 1152-1161.

Livingstone, S., & Brake, D. R. (2010). On the rapid rise of social networking sites: New findings and policy implications. *Children & society, 24*(1), 75-83.

Sebe, N. (2010). *Human-centered computing. In Handbook of ambient intelligence and smart environments*. US: Springer.

Lee, C. S., & Ma, L. (2012). News sharing in social media: The effect of gratifications and prior experience. *Computers in Human Behavior, 28*(2), 331-339.

Droge, C., Stanko, M. A., & Pollitte, W. A. (2010). Lead users and early adopters on the web: the role of new technology product blogs. *Journal of product innovation management, 27*(1), 66-82.

Granberg, C. (2010). Social software for reflective dialogue: questions about reflection and dialogue in student teachers' blogs. *Technology, Pedagogy and Education, 19*(3), 345-360.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*, 18-26.

Rueben, S. L., & Jakobson, G. (2013). *U.S Patent No. 8,566,301*.

Psotka, J. (2012). Interactive learning environments. *In Encyclopedia of the sciences of learning*, 1604-1606.

Schwab, K. (2016, January 14). *The Fourth Industrial Revolution: what it means, how to respond*. Retrieved 11 15, 2017, from World Economic Forum: https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Robin, B. R. (2008). Digital storytelling: A powerful technology tool for 21st century classroom. *Theory into Practice*, pp. 220-228.

Robin, B. R. (2016). The Power of Digital Storytelling to Support Teaching and Learning. *Digital Education Review*, 17-29.

Reynolds, G. (2007). *An army of Davids: How markets and technology empower ordinary people to beat big media, big government, and other Goliaths.* Nashville: Thomas nelson Inc.

Younus, U. M. (2017). *Fourth industrial revolution.*

Maheshwari, V. K. (2016, January 13). *The Concept of Social Change*. Retrieved November 22, 2017, from vkmaheshwari: http://www.vkmaheshwari.com/WP/?p=2163

Event Psychologist. (2016, February 28). *The Psychology of Storytelling: Implications for brands and experiential marketing*. Retrieved November 20, 2017, from The Events Psychologist: https://theeventpsychologist.com/

Pew Research Centre. (2017, 01 12). *Mobile Fact Sheet*. Retrieved 11 22, 2017 , from Pew Research Centre Internet & Technology: http://www.pewinternet.org/fact-sheet/mobile/

My Broadband. (2016, 09 28). *Smartphone penetration in South Africa hits major milestone*. Retrieved 11 22, 2017, from My Broadband Trusted in Tech: https://mybroadband.co.za/news/smartphones/180894-smartphone-penetration-in-south-africa-hits-major-milestone.html

Van der Bijl-Brouwer, M., & Van der Voort, M. C. (2013). Exploring future use: scenario based design. Advanced design methods for successful innovation-recent methods from design research and design c. 57-77.

Van Dijk, J. A. (2017). Digital Divide: Impact of Access. *The International Encyclopedia of Media Effects*.

Tracey, P., & Stott, N. (2017). Social innovation: a window on alternative ways of organizing and innovating. *Innovation, 19*(1), 51-60.

Benmayor, R. (2008). Digital storytelling as a signature pedagogy for the new humanities. *Arts and Humanities in Higher Education, 7*(2), 188-204.

Bull, G., & Kajder, S. (2004). Digital storytelling. *Learning & Leading with Technology, 32*(4), 46-49.

De Reuver, M., Sorensen, C., & Basole, R. C. (2016). The digital platform: a research agenda. *Journal of Information Technology*, 1-12.

Mack, L. (2010). The philosophical underpinnings of educational research.

Grix, J. (2004). The foundations of research. 83.

Crossman, A. (2017, 03 07). *The Major Theoretical Perspectives of Sociology: An Overview of Four Key Perspectives*. Retrieved from ThoughtCo.: https://www.thoughtco.com/theoretical-perspectives-3026716

Gray, D. E. (2013). *Doing research in the real world.* Sage.

Ahmed, A. (2008). *Ontological, Epistemological and Methodological Assumptions: Qualitative versus Quantitative.* Taiwan: ERIC Online Submission.

Carson, D., Gilmore, A., Perry, C., & Gronhaug, K. (2001). *Qualitative marketing research*. London: Sage.

Neuman, L. W. (2000). *Social Research Methods: Qualitative and Quantitative Approaches* (4 ed.). USA: Allyn and Bacon.

Crotty, M. (2003). *The Foundations of Social Research: Meaning and Perspectives in the Research Process* (3 ed.). London: Sage Publications.

Habermas, J. (1971). *Erkenntnis und interesse* (Vol. 422). Boston: Beacon Press.

Grundy , S. (1987). *Curriculum: Product or praxis*. Philadelphia: The Falmer.

Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Delhi: New Age International.

Dresch, A., Lacerda, D. P., & Antunes Jr, J. A. (2014). *Design science research: a method for science and technology advancement*. Springer.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal, 9*(2), 27-40.

Kellner, D. (1990). Critical theory and the crisis of social theory. *Sociological Perspectives*, 11-33.

Robertson, T., & Simonsen, J. (2012). Challenges and opportunities in contemporary participatory design. *Design Issues*, 3-9.

Rogers, Y., Sharp, H., & Preece, J. (2011). *Interaction design: beyond human-computer interaction*. John Wiley & Sons.

Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 9.

Schön, D. A. (1987). *Educating the Reflective Practitioner. Toward a New Design for Teaching and Learning in the Professions. The Jossey-Bass Higher Education Series* . San Francisco, California, United States: Jossey-Bass.

Miles, M. B., Huberman, A. M., Huberman, M. A., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook. sage*. Thousand Oaks: Sage.

Preece, J., Rogers, Y., & Sharp, H. (2015). *Interaction design: Beyond human-computer interaction.* . Sussex , United Kingdom: John Wily & Sons Ltd.

Vaishnavi, V., & Kuechler, W. (2015). . *Design science research methods and patterns: innovating information and communication technology*. CRC Press.

Vaishnavi, V., & Kuechler, W. (2006). *Design Research in Information Systems*. Retrieved August 23, 2016, from http://www.business.unr.edu/faculty/kuechler/DR/

CRD. (2001). *Undertaking Systematic Reviews of Research on Effectiveness. CRD's Guidance for those Carrying Out or Commissioning Reviews*. NHS Centre for Reviews and Dissemination, University of York.

Kuechler, B., & Vaishnavi, V. (2004). *Design Science Research in Information Systems*. URI: http://www. desrist. org/design-research-in-information-systems/. Online.

Design Research in Information Systems. (2016, August 23). from http://www.business.unr.edu/faculty/kuechler/DR/.

Muller , M. (2003). *Participatory Design: The third space in HCI. Human Comoputer Interaction: Development Process.*

Habermas, J. (1978). *Knowledge and human interests.*

Korhonen, H., Paavilainen, J., & Saarenpää, H. (2009). Expert review method in game evaluations: comparison of two playability heuristic sets. *In Proceedings of the 13th international MindTrek conference: Everyday life in the ubiquitous era* (pp. 74-81). ACM.

Justinmind. (2014). *All-in-one prototyping tool for web and mobile apps.* Retrieved 09 26, 2018, from Justinmind: https://www.justinmind.com/

Schön, D. A. (1987). *Educating the Reflective Practitioner. Toward a New Design for Teaching and Learning in the Professions.* The Jossey-Bass Higher Education Series.

Singaram, M., & Jain, P. (2018, 01 13). *What is the Difference between Proof of Concept and Prototype ?* Retrieved from Entrepreneur: https://www.entrepreneur.com/article/307454

Cueva, M., Kuhnley, R., Revels, L., Schoenberg, N. E., & Dignan, M. (2015). Digital storytelling: a tool for health promotion and cancer awareness in rural Alaskan communities. *International journal of circumpolar health, 74*(1).

De Vecchi, N., Kenny, A., Dickson-Swift, V., & Kidd, S. (2016). How digital storytelling is used in mental health: A scoping review. *International Journal of Mental Health Nursing, 25*(3), 183-193.

Briant, K. J., Halter, A., Marchello, N., Escareño, M., & Thompson, B. (2016). The power of digital storytelling as a culturally relevant health promotion tool. *Health promotion practice, 17*(6), 793-801.

Pera, R., & Viglia, G. (2016). Exploring how video digital storytelling builds relationship experiences. *Psychology & Marketing, 33*(12), 1142-1150.

Singh, S., & Sonnenburg, S. (2012). Brand performances in social media. *Journal of interactive marketing, 26*(4), 189-197.

Silver, L., & Johnson, C. (2018). *Internet Connectivity Seen as Having Positive Impact on Life in Sub-Saharan Africa.* Pew Research Center.

Xu, M., David, J. M., & Kim, S. H. (2018). The Fourth Industrial Revolution: Opportunities and Challenges. *International Journal of Financial Research, 9*(2), 90-95.

Goldstuck, A. (2017, July). *Exec-Summary-Internet-Access-in-SA-2017.* Retrieved from http://www.worldwideworx.com: http://www.worldwideworx.com/wp-content/uploads/2017/07/Exec-Summary-Internet-Access-in-SA-2017.pdf

Stoltenkamp, J., Siebrits, A., Kies, C., & Braaf, N. (2015). Community digital story project: George community needs.

Khebbaz, S. (2016). Youth media and social change: Using digital storytelling as a tool that engages youth to become change agents. *Capstone Collection.* Retrieved from https://digitalcollections.sit.edu/capstones/2906

Schrum, K., Dalbec, B., Boyce, M., & Collini, S. (2017 June). Digital storytelling: Communicating academic research beyond the academy. *In Innovations in Teaching & Learning Conference Proceedings. 9.* Mason Publishing Journals.

Price, D. M., Strodtman, L., Brough, E., Lonn, S., & Luo, A. (2015). Digital storytelling: an innovative technological approach to nursing education. *Nurse educator, 40*(2), 66-70.

Alismail, H. A. (2015). Integrate Digital Storytelling in Education. *Journal of Education and Practice, 6*(9), 126-129.

Lambert, J. (2013). *Digital Storytelling: Capturing lives, creating community*. New York: Routledge.

Littlewood, D., & Holt, D. (2013). Institutional framing of CSR and social entrepreneurship interactions in South Africa. *ISBE Conference.* Cardiff.

Moulaert, F. (2013). *The international handbook on social innovation: collective action, social learning and transdisciplinary research. Edward Elgar Publishing.* Edward Elgar Publishing.

Elliott, G. (2013). Character and impact of social innovation in higher education. *International Journal of Continuing Education and Lifelong Learning, 5*(2), 71.

Blass, E., & Hayward, P. (2014). Innovation in higher education; will there be a role for "the academe/university" in 2025? *European Journal of Futures Research, 2*(1), 41.

Poushter, J., Bishop, C., & Chwe, H. (2018). *Social media use continues to rise in developing countries but plateaus across developed ones.* Pew Research Center.

Lambert, J. (2010). *Digital storytelling cookbook.* Berkeley: Digital Diner Press.

de Reuver, M., Sørensen, C., & Basole, R. C. (2018). The digital platform: a research agenda. *Journal of Information Technology, 33*(2), 124-135.

Poushter, J., & Oates, R. (2015). *Cell phones in Africa: Communication lifeline texting most common activity, but mobile money popular in several countries.* Pew Research Center. Retrieved from https://www.pewresearch.org/global/2015/04/15/cell-phones-in-africa-communication-lifeline/