



**DESIGN AND DEVELOPMENT OF A SOFT SKILLS ACQUISITION APPLICATION FOR
YOUNG CHILDREN IN INFORMAL CONTEXTS**

by

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A thesis submitted in fulfilment of the requirements for the degree

Master of Technology: Graphic Design

In the Faculty of Informatics and Design

Cape Peninsula University of Technology

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Cape Town Campus

November 2020

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I, Nicole Lewis, declare that the contents of this thesis represent my unaided work and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.



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Abstract

There is an urgent need for young learners to acquire soft skills due to rapid technological advancements. Research shows that the earlier young children's soft skills are developed, the better it prepares them for their academic and professional lives. Mobile technology is gaining momentum; people are referring to their mobile phones as an extension of themselves, by altering and simplifying their daily activities. Research has shown that people believe mobile phones have a positive impact on health, education, children and the economics of their country. South Africans believe mobile phones 'free them' and save time (Silver *et al.*, 2019). There is an increased interest in using mobile phones as a learning device for younger children. This study addresses both the need for developing soft skills in young learners and the potential of mobile learning to do so, by exploring design principles for a mobile application (app) for developing the soft skills of young learners.

The research was conducted framed by Cultural-Historical Activity Theory (CHAT) and using the methodology of Design-Based Research (DBR) in an attempt to acknowledge and describe the experience of co-designing a mobile blueprint with various stakeholders for young children to acquire soft skills informally.

In this study, the community, consisting of designers, care professionals and caregivers, and young children, was interviewed, participated in design workshops and was surveyed to gain insight into how to create an effective mobile application blueprint for young children from ages four to five to gain soft skills.

Initial results indicated that in Cape Town, there were various methods by which children were informally learning soft skills. The three soft skills focused on in this study, identified through the literature review, that is creative thinking, communication and ethics, were however not yet engaged by the participants of this study. Participants also had little previous knowledge of mobile applications for young children of this age teaching soft skills.

From the literature the following design principles were uncovered; basic elements of design, the principle of active learning, engagement, co-design and context sensitivity.

Engagement with young children revealed two additional design principles that were formulated during analysis of data collected: the principle of existent imitation documentation and non-designer constructive analysis. Existent imitation documentation describes the process of adding realistic elements and scenarios as children draw with their physical visuals and experiences as conducting research indicates, and non-designer constructive analysis which emphasises the importance of translating/interpreting and analysing non-designer feedback of source of design material by a designer. A finalised mobile application blueprint was created. The mobile application blueprint is called Key to allude to a way of opening doors to future possibilities. Key incorporated a bright and simplistically styled design with four soft skill play-through scenarios that has safety features and which would be easy to navigate for the caregivers and children engaging with the app.

Results further revealed interesting contradictions between the caregivers and care professionals of the different sites, for example who was responsible for teaching soft skills to young learners or in relation to the potential of mobile learning for young children, which encouraged the designer of the study to engage the children themselves in the design process.

The research gives recommendations on the local and global use of the findings for future graphic designers venturing into designing mobile applications for acquiring soft skills. This research informs the process of mobile application design by offering existing design theory elements and principles, a blueprint model of co-created mobile application design and aids research into relations between mobile devices and young children, caregivers and Montessori¹ care professionals.

¹ Montessori is defined as a method of child-centred education developed by Doctor Montessori for caregivers seeking to nurture their young child(ren) by means of specific activities other than the conventional formal schooling systems (Oxford reference, 2020).

Acknowledgements

I wish to thank:

- God, for giving me the constant strength and desire to complete this piece of work.
- My partner, Justin Lee Adams for his constant support, confidence in my abilities and love.
- My supervisors, Associate Professor Daniela Gachago and Doctor Alettia Chisin for being my voice of reason, guidance and constant encouragement.
- Doctor Alettia Chisin's DRAW sessions guiding me step by step through what a Masters at the Cape Peninsula University of Technology entails.
- The graphic design staff members at the Cape Peninsula University of Technology alongside administrators that allowed me to work as a mentor, tutor and lecturer's assistant and realize my interest in the academic field of graphic design.
- The graphic design staff members at the Cape Peninsula University of Technology that believed I should keep on keeping on.
- Jill Van Dugteren, my third-year lecturer for always pushing me towards my dreams.
- Doctor Deon Solomons at the University of the Western Cape Mathematical department for allowing me to sit in my partner's university classes while I did my research.
- The participants, without them the seriousness of this research could not be revealed.
- My company manager at Laragh Courseware that continues to show interest and support me by allowing me to work part-time to pursue my dreams.
- My company art director at Laragh Courseware for being kind and supporting me while I followed my dreams.

Dedication

“At the end of the day, it’s not about what you have or even what you've accomplished.

it's about who you've lifted, who you’ve made better.

It's about what you've given back”

- Denzel Washington

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Abbreviations

4IR	The Fourth Industrial Revolution
ADEA	Association for the Development of Education in Africa
CHAT	Cultural-Historical Activity Theory
DBE	Department of Basic Education
DBR	Design-Based Research
ICTs	Information and Communication Technologies
IRR	Institute of Race Relations
NPC	Non-playable characters
OFCOM	Office of Communications
P21	Partnership for 21st Century Learning
SDGs	South Africa's Sustainable Development Goals
UNICEF	United Nations Children's Fund

CHAPTER ONE

INTRODUCTION TO THE THESIS

1.1 Introduction

The Fourth Industrial Revolution (4IR) is changing the way we live and engage with each other. It has changed the expectations of future employees, putting additional emphasis on soft skills and foregrounding professional knowledge, which has quickly become outdated with the rapidly changing pace of innovation (Siraj, 2017). How to train and develop soft skills is becoming an important facet of formal and informal learning² contexts across all educational levels. Research shows that the earlier young children's soft skills are developed, the better it prepares them for their academic and professional lives (Meginty, 2017).

Digital technologies have evolved rapidly since the iconic rotary phones of the past, into portable devices such as mobile phones offering an array of opportunities for engagement and learning and attracting users of all ages. An increasing number of caregivers³ are offering young children mobile phones as a means of recreation and 'babysitting' (Siraj, 2017), ultimately transferring to these digital devices some of the responsibility of teaching children knowledge and skills.

Understanding the two facets above, this thesis reflects on a co-design process with and for young children to develop soft skills, such as creative thinking, communication and ethics by designing a blueprint for a mobile application and a set of graphic design principles to guide co-creation processes in Cape Town. The researched topic, development of a blueprint of a mobile application and graphic design principles, are explored in the context of Cape Town. Its mobile usage exceeds that of any region in Africa (Stipp, 2019).

² Unlike formal learning where a designed learning program is taught by trained educators in an educative designated institution, informal learning is self-directed, whereby a learner can set their own goals during the learning process and learn in or outside of a educative institute (O'Neil, 2019).

³ Caregiver in this study implies the guardian under which the child(ren) is taken care of. The word is used in place of parent as children could be under the care of another family member or legal guardian and to not be inconsiderate of such situations.

1.2 Background to the research problem

Following the rapid technological developments of digital systems, it is fair to assume that many aspects of children's lives will be different in their future and will increasingly involve digital technology. Additionally, although children are learning all the time, both face-to-face and online and both formally and informally, there is not enough systematic research around the potential of mobile learning in informal learning contexts in a time where there is general consensus that in order to thrive in these a-changing-societies soft skills are becoming essential as a future requirement in the workplace (Meginty, 2017).

According to Siraj (2017), children of the ages four to five will enter the workplace in 2035 needing soft skills such as creative thinking, coupled with a strong and early foundation in literacy and numeracy knowledge. Creativity is important for a future workplace coupled with essential communication skills (Greene, 2019). Siraj states that it is vital for children as early as age four to five to become competent learners capable of developing strong ethical skills and technological skills such as social media literacy.

Research indicates that creative thinking, communication and ethical skills, and technological skills are important skills to focus on during these years by the social environment for children aged four to five ((Doyle, 2019) (Greene, 2019) (Siraj, 2017)). Many caregivers are offering their children mobile phones as 'babysitting' devices, allowing access to hours of video streaming and gameplay daily that is focused mainly on recreational uses rather than academic or social development for children (Siraj, 2017). There are many negative associations linked to mobile applications that are not educational, and which may lead to developmental deficiencies (ibid., 2017). Developing a blueprint for teaching young children soft skills through a mobile application is so far untapped. It is an opportunity to prepare the young for school and their future workplace, and prepare them for online technological engagement. As a commonly used digital technology, mobile phones are now seen as an extension of an individual (Davel, 2017: 4) and are affordable for both low to high-income households (Matthews, 2018).

Mobile phones have become affordable in Eastern, Asian and African countries, and in particular, South Africa, which has the fastest growth rate of technological and internet penetration (Matthew, 2018). Cape Town's mobile usage and internet penetration is the highest across Africa (Matthews, 2018). It is estimated that mobile phones are being used as a 'babysitting' device by a substantial number of caregivers; as much as 60% locally (Matthews, 2018).

The African based project called PLAY established in 2019 (Department of Basic Education, 2019) is an example of growing interest in preparing learners for future technological readiness. In this project, the South African Department of Basic Education (DBE) has acknowledged the need to change the traditional curriculum, focusing on the 3R's, reading, writing and arithmetic, by incorporating problem-solving, critical thinking and creativity into the syllabi of formal primary education institutions (Henley School of Business, 2019). The DBE is beginning to understand the importance of soft skills in the lives and future of children, but mobile technology is as yet a largely unoccupied resource to teach young children important skills (Matthews, 2018). In preparing for South Africa's future, it is essential that children develop strong soft skills alongside technical skills. South Africa's expanding technological infrastructure demands highly-skilled workers with the appropriate education and training (Matthews, 2018). Cultural-Historical Activity Theory (CHAT) and a Design-Based Research (DBR) approach was used as a theoretical and methodological framework to create multimedia soft skills content on a mobile application blueprint *for* and *with* children in Cape Town, to gain insight into the community's mindset with regards to the relations between mobile technology and soft skill acquisition. CHAT recognises the cultural diversity, context and sensitivities in a different system which suits the context in which this study functions namely Cape Town, a highly diverse cultural space, in South Africa.

Cape Town is the provincial capital of the Western Cape and is considered one of the most multicultural cities in the world; with 4.5 million individuals who following the South African government categorisation are recognised as "Coloured", "Black African", "White", "Asian or Indian" or "other" (World Population Review, 2019). Beyond its racial diversity, Cape Town's highly diverse context exemplifies the South African Constitution in terms of which

11 official languages are recognised, boasting a richness of cultural, religious and socio-economic status (Matthews, 2018, 2017). This study focuses on the following diverse groups of people: (i) caregivers, care professionals, the design community, young children, aged four to five, and stakeholders at Montessori Preschools (site B) based in Cape Town and (ii) caregivers, care professionals and young children aged four to five, who engage in a Christian institution section called 'Kiddies' sector (site A) in the Southern Suburbs. These different sites allowed the development of a context-sensitive application that would speak to the diversity of the Western Cape, specifically Cape Town's population. These sites differed concerning language, race, class, religion and culture respectively. The sites are described in more detail in the research method chapter.

1.3 Statement of the research problem

The importance of soft skills has increasingly been recognised as important for children's academic and technological development to successfully prepare them for their future lives in a changing society. The opportunities of technological development in young children's lives include better social interaction, improved safety of a child and reassurance of a caregiver (Schmitt, 2018) while the challenges of technological advancements can lead to young children forming non-malignant tumours due to over exposure and caution has to be taken by caregivers with regards to young children (Arora, 2019) (more detailed information found in Chapter two of this study).

Research has indicated that companies are seeking valuable soft skills such as creative thinking, communication and ethics. Relevant research suggests these skills to be introduced to young children of ages four to five (you need to add references here). While these skills are being addressed in formal schooling, these skills are not yet being addressed or researched systematically in informal contexts, such as a child's home environment or in a religious setting such as a church (Matthews, 2018). Caregivers from Cape Town are offering their young children mobile technology for recreational purposes. I gathered from informal conversations with some of my stakeholders, such as one of the principals of the Site B Montessori preschool, Simos (2019), and online commentators at the PLAY conference (Department of Basic Education, 2019) that not enough is being done

informally for supporting soft skills development via a mobile application . Little research is being conducted into designing a mobile application for a diverse context such as Cape Town, South Africa. This study engaged in a co-design process to establish a blueprint for a mobile application for young learners to gain soft skills. In the process I tested and developed a set of design principles to guide future projects in this field.

1.4 Aim

The aim of my research is to uncover the potential of mobile learning, by exploring graphic design principles by means of a co-designed blueprint mobile application to address the need for developing soft skills in young learners. My research was to develop graphic design principles for the design of a mobile application for young children to help them acquire fundamental soft skills. I designed blueprints to guide mobile application development for young children.

1.5 Main research question

What are the graphic design principles that can guide a mobile application blueprint development for young children in the Western Cape to develop soft skills?

1.6 Sub - research questions

1. What methods are currently being used to develop soft skills in informal contexts with a focus on four to five-year-old locally (the Western Cape) and globally?
2. What design principles exist guiding mobile application design for young children?
3. What graphic design principles need to guide the co-creation of a mobile application for the acquisition of soft skills for young children across two diverse contexts in the Western Cape?

1.7 Objectives and outcomes of the study

The first objective of this research was to understand the current method(s) of soft skill acquisition among young children in Cape Town. The second objective was to discover existing graphic design principles for mobile application development for young learners

and perceptions of participants regarding my study. Finally, I discussed a set of graphic design principles for mobile application development in diverse contexts for young learners and I co-designed a blueprint for a mobile application.

1.8 Outline of this study

Chapter one provides the introduction and background of the research topic. My study aimed to reveal design principles of a co-created blueprint to support soft skills acquisition via a digital application on mobile phones for young children. The research problem statement, as well as research questions provided, offers the frameworks necessary to further the research objectives.

Chapter two presents relevant literature concerning the creation of blueprints of a mobile application for young children to acquire soft skills in an informal setting, by focusing on three main sections: soft skills, how young children relate to mobile technology, and graphic design principles pertaining to mobile application design for young children. Research in to various basic and specific graphic design principles was used to substantiate the need for a blueprint intervention.

Chapter three focuses on Cultural Historical Activity as a theoretical framework: I drew upon Vygotsky, Engeström, as well as other key sources to describe the outcome, subject, tools, community, rules, division of labour and contradictions of this study which will occur within a specific socio-cultural context explained in Chapter five.

Chapter four discusses the methodology used to gather and analyse data for this study. I used Design-Based Research (DBR) as a conceptual framework for its iterative capability to assist in producing an educational structure (Jones, 2008). The study consisted of four DBR phases; the first phase consisted of building a foundational research basis by researching different sources of soft skills acquisition for young children from international and local literature. Phase two included interviews, workshops and data collecting methods with relevant participants and the production of a mock-up prototype. In the third phase, participants offered constructive feedback on the initial blueprint design of the mobile application as well as presenting the design to their children for feedback. In phase four,

the final blueprint was designed based on findings and feedback from the previous phases and findings from the social media platform Instagram. Phase four included the final graphic design principles.

Chapter five briefly focuses on the findings of the data collected in Phase one but fully analyses Phase two of DBR by using the triangulation method of acknowledging various information to prove the purpose of this study. Phase two incorporated data collected through CHAT activity system to discover any contrasting viewpoints of participants. Chapter five analyses Phase three by looking at, and explaining, the first blueprint mobile design created and the feedback given from participants relating to the blueprint. A redesign or edit of the blueprint was created for Phase four.

Chapter six explores the findings but focuses on Phase four of this study and the final grouping of design principles used to co-create the mobile application blueprint. In Phase four participants were asked to provide feedback on the design or edited mobile application blueprint. A final design was created based on their feedback.

Chapter seven summarises the study and discusses the findings in relation to the sub-questions and the main question of this study. This chapter explores the usefulness of this study to other/future designers, the usefulness of CHAT and DBR in the study and final conclusions or reflections of the study.

CHAPTER TWO

LITERATURE REVIEW

“The potential possibilities of any child are the most intriguing and stimulating in all creation.”

(Wilbur, 2008)

2.1 Introduction

To understand how crucial soft skills can be developed through a mobile platform for four to five-year-old children, I first looked for pertinent research in this area. I read studies that focus on three main aspects of soft skills development: the role of mobile phones in formal and informal education, with a particular focus on development/acquisition of soft skills, and the graphic design theory elements and principles to support a successfully designed blueprint application creation. Specific graphical user interface and dynamics, overall design and mobile application interactions, governed by graphic design theory elements inform practical principles to better understand how to design a blueprint for a mobile platform directed towards young children.

This literature review focuses on research concerned with creating an environment where playful and interactive acquisition can be imagined and ideated by understanding the importance of teaching soft skills, by looking at varied and important current cases of successful acquisition in formal and informal settings, both globally and locally. Mobile phones have become a means to deeply immersive, significant and confidential experiences among individuals of all socio-demographics. Acknowledgement of the positive and negative impacts of mobile technology on young children will be discussed. A further focus on the importance of incorporating graphic design principles towards a blueprint mobile application are researched together with well-designed existing mobile applications to compare design theory elements and practice for designing a blueprint for this study.

2.2 Developing soft skills for young children

Educators are beginning to discover the increased importance of incorporating educational measures to develop soft skills for learners, to prepare them for their future endeavours (Schilz, 2008). Greene (2017) states that “soft skills, sometimes called key skills, core skills, key competencies, or employability skills, are those desirable qualities that apply across a variety of jobs and life situations.” Soft skills may be represented as a list comprising the following (Shown in Table 2.1: Soft skills):

Table 2.1: Workers skills demand, 2018 vs. 2022, top ten (World Economic Forum, 2018)

Today, 2018	Trending, 2022	Declining, 2022
Analytical thinking and innovation	Analytical thinking and innovation	Manual dexterity, endurance and precision
Complex problem-solving	Active learning and learning strategies	Memory, verbal, auditory and spatial abilities
Critical thinking and analysis	Creativity, originality and initiative	Management of financial, material resources
Active learning and learning strategies	Technology design and programming	Technology installation and maintenance
Creativity, originality and initiative	Critical thinking and analysis	Reading, writing, math and active listening
Attention to detail, trustworthiness	Complex problem-solving	Management of personnel
Emotional intelligence	Leadership and social influence	Quality control and safety awareness
Reasoning, problem-solving and ideation	Emotional intelligence	Coordination and time management
Leadership and social influence	Reasoning, problem-solving and ideation	Visual, auditory and speech abilities
Coordination and time management	Systems analysis and evaluation	Technology use, monitoring and control

Research indicates that hiring-managers believe that soft skills are important to execute any business-related tasks on a ‘humane level’ (Mitsch, 2017). Osborne, the Head of Learning and Development at a leading online course provider, Udemy, argues that the road to a successful career is paved by obtaining a good knowledge of soft skills (Mitsch, 2017). Studies show that 94% of job candidates believe employees with strong soft skills have a higher promotion rate compared to employees with strong technological skills (Osborne, 2018). Research states that a lack of well-established soft skills increases chances of being retrenched (Beach, 2018). For this study, the focus is on the development of creative thinking, communication and ethical skills with particular reference to social media literacy explained in this thesis. These skills are crucial to the cognitive and emotional development of young children according to relevant studies such as those conducted by Siraj (2017) and Greene (2017).

The next section discusses three soft skills that this study engages with and how these are developed in young children via mobile applications and graphic design principles employed in the design of these mobile applications.

2.2.1 Creative thinking skills

The skill of creative thinking can be defined as a way of perceiving a situation or obstacle through a new perspective that can at first offer unorthodox solutions. The creative thinking skill derives from an unstructured developing process such as brainstorming or lateral thinking, offering fresh ideas. Creative thinking is associated with artistic constructs. Not all creative thinkers, however, are artists. Many creative ideation processes involve thinkers from other disciplines, such as scientists and business people (Doyle, 2019). The term 'creative' means coming up with something new: a highly desirable skill in contemporary workplaces (Doyle, 2019).

Anthony (2019) states that young children from ages two to seven are formally entering Piaget's preoperational period where cognition begins; interacting with symbolic play, manipulating words to depict ideas and fine motor skills to control writing utensils or move objects. By the age of five, most children can draw with intention, often adding detail. Caregivers are encouraged to support their children's new-found ability to play between the realms of reality and fantasy. This encouragement promotes intellectual development of the soft skill creative thinking and hard skills (drawing with detail for example). The relevance towards young children acquiring creative thinking on the mobile application blue print is that creative thinking supports the ability to inquire, reflect and become curious to create solutions, supporting Piaget's preoperational period (Anthony, 2019) and advancing a child's soft skills for the future which have been recently placed on top of the list of soft skills in the workplace (Schwab, 2018: 12). How creative thinking is being embedded in the mobile application is showcased in Chapter five.

2.2.2 Communication skills

Communication may be defined as the exchange of information (Lexico Oxford Dictionary, 2019) and is considered one of the most relevant and essential skills in any socially

demanding environment (Doyle, 2019). The relevance of young children acquiring communication skills via a mobile application is that with strong communication skills they can build human relations, listen attentively and adapt a conversation to suit any particular circumstance avoiding misunderstanding. Further in relation to young children, communication skills allow them to exchange ideas and emotionally connect in a society (Doyle, 2019). How this is interpreted through the mobile application blueprint is again discussed in more detail in Chapter five

It is important to note that communication can be developed through various approaches. Children may prefer different methods of connecting with others: vocally, through facial expressions, gestures, writing, drawing, eye contact, touching or using utensils (Doyle, 2019). In chapters five and six I will engage in more detail with the various methods of communication I have designed and ideated for this study.

2.2.3 Ethics and social media literacy

“Make the kind of society where people find it easier to be good”

- Peter Maurin (Markkula Centre, 2019)

Ethics may be defined as the moral principles controlling an individual's behaviour in relation to the rules surrounding an action (English Oxford Living Dictionaries, 2019). The relevance among young children concerning ethical education lies in understanding the characteristics of honesty, equality and respect in society (Business Dictionary, 2009; Rischenole, 2011). Within today's culturally diversified and digital society, it is important to teach young children to treat others ethically and be accountable to be able to peacefully transition and interact in their community that could gently be introduced through a mobile application. An example of how ethical consideration is considered into design is shown and discussed in Chapter five.

An important part of ethical practice is the morally accountable use of technology, including social media literacy. Social media literacy is the ability to access, understand, analyse and utilize the content using various tools in a media format both ethically and effectively (Future Classroom Lab, 2019). An individual literate in social media learns to be a

'responsible knowledge seeker' and takes responsibility for a broad range of information and communication media (Future Classroom Lab, 2019).

An example of how ethics, and in particular social media literacy, is considered in the design of the mobile app blueprint is shown and discussed in Chapter five.

A mobile application blueprint could simplify the ability of four to five-year-olds to informally engage with the complexities of the three soft skills, creative thinking, communication and ethics (social media literacy), and independently progress for their future benefit.

2.3 Teaching soft skills globally and locally to young children

Recent discoveries and the development of 21st-century technological advancements require humans to begin learning soft skills as early as 18 months old (Ross, 2017). Skills that are important to develop among children aged five and older include critical thinking, communication, collaboration and creativity together with core academic skills in Mathematics, Languages, Sciences and Project Management (Ross, 2017). The Montessori Method's educational system created by Maria Montessori in the 1900s (Augustyn *et al.*, 2020) has established itself as the best way of acquiring soft skills. The personalised methods of caregivers used towards children aged three and older are equally important in an effort to teach soft skills (Site B participant - 2, 2020).

2.3.1 Global context

Partnership for 21st Century Learning (P21) has incorporated years of a structured framework and guides (showcased in figure 2.1) to teach core skills; critical thinking, communication, collaboration and creativity (Ross, 2017). P21's framework highlights 10 ways a caregiver can incorporate skills development within an informal context to build skill acquisition for their child's future (Ross, 2017).



Figure 2.1: Partnership for 21st Century Learning (P21) framework (Rose, 2017)

Partnership for 21st Century's method of teaching soft skills comprises of ten guidelines offered to caregivers supporting the 'learning informal skills. These guidelines are comprising of:

1. Revealing and encouraging a child's interest
2. Obtaining resources and encouraging children to pursue early academic involvement
3. Incorporating a playful learning environment
4. Allowing children to interact with each other
5. Allowing children to become comfortable and responsible in an online environment
6. To be willing to incorporate online and active or offline "paper-based" projects

7. Using multiple approaches to reveal and motivate a child's learning preference
8. Scheduling a time for skill acquisition
9. Offering intentional storytelling to promote soft skills
10. Relating content awareness (Ross, 2017).

Among these ten guidelines for soft skills development, these are relevant to my studies: (3) incorporate a playful learning environment, (5) allow children to become comfortable and responsible in an online environment, (8) schedule a time for skill acquisition, (9) and offer intentional storytelling to promote soft skills. In my opinion I think these four considerations justify the need for a mobile application locally and will remind me to create a fun, interactive and considerate mobile blueprint young children and caregivers will approve of and enjoy.

The relevant factors are linked to the soft skills I would like to include on the mobile blueprint while contemplating research sub-question three: Does South Africa need to consider its local rich diversity in a mobile application? For the final factor, research has been conducted to reveal Cape Town participants' viewpoints on this matter as discussed in Chapter five.

2.3.2 The Montessori Method

In terms of literature dealing with how young learners acquire informal soft skills, the role of the Montessori Method became apparent and is discussed here.

Maria Montessori (1870 - 1952), born in Italy, graduated from medicine as the first woman to do so at the University of Rome in 1896. Montessori held a chair in anthropology and continued her studies in philosophy, psychology and education. Montessori is the founder of the Montessori Method, developed when working with children with disabilities, based on a belief that children learn best when they actively engage with learning materials. Montessori found that children aged three to six almost immediately interacted with beads, wooden slabs and weighted cylinders to learn pre-mathematical processes, reading movement and muscle training. After half an hour to an hour period, Montessori noticed the children seemed not to be fatigued or distracted but were calm and refreshed (Augustyn *et*

al., 2020). Maria Montessori developed a system where biological and mental advancements in children aged three to six were linked in daily preschool activity and matched children's interests with their mental capacity. The main focus was to teach children the importance of independent efforts. Group work was done through house chores (Augustyn *et al.*, 2020).

The word Montessori is defined in the Oxford dictionary as a system or method of child-centred education developed by Doctor Montessori for caregivers seeking to nurture their young child(ren) by means of specific activities other than the conventional formal schooling systems (Oxford reference, 2020). Maria Montessori's Method is still being used widely and has been recognised and established in Europe, India and the United States and in Cape Town. The Montessori school's ethos comprises of three R's namely responsibility, respect and resourcefulness whereby every month a rotation of one of the R's are focused on. The current lesson standard upheld within the Montessori school's curriculum are that problem solving, collaboration and respect are also lived everyday by for example, learn how to borrow an object, how to open and close door mindfully and to serve a guest (Augustyn *et al.*, 2020). The inclusion of the Montessori method in this study is an informative reference as to how to teach complex soft skills to young children. It is evident in the method of the Montessori method that everyday tasks can be an example to utilise or develop a soft skill, which must be considered when developing a mobile application blueprint for children ages four to five.

2.3.3 Local context

In relation to South Africa's soft skills development of young children, Barselaar – managing director of ManpowerGroup, South Africa states that while there is no doubt that technical skills are vital, especially due to the skills revolution that has occurred, the value of soft skills is paramount in today's new industrial climate (Harris, 2018). Barselaar's (2018) research has indicated that many South Africans wrongly believe that "soft skills cannot be obtained". There is a need to show that soft skills can be learnt and refined over time for the betterment of quality of life and employability (Harris, 2018).

Although the importance of acquiring soft skills is being acknowledged, examining various sources shows that there is a lack of literature with regards to interventions and research towards informal soft skill acquisition in South Africa. My study was aimed at closing this gap in research and adding to the literature on how soft skills can be taught in South Africa (see Chapters five and six).

2.4 Digitally developing the soft skills of children in formal and informal settings

The potential for soft skills to be developed digitally in young children has only recently been recognised. Interest in this vital area is, however, growing rapidly (Derry *et al.*, 2018; Meginty, 2017; OFCOM, 2018; Osborne 2018; Mitch, 2017; Ross, 2017; Siraj, 2017; Greene, 2017). Authors such as Paske *et al.* (2015) are at the forefront, guiding the nature of this particular research.

2.4.1 Teaching soft skills formally

Internationally, the importance of caregivers teaching soft skills at home has been recognised for many years (McAllister, 2018). Accelerated technological advances have, however, created a need to nurture a child's soft skills more rapidly in a formal environment as well as to prepare them for their future lives in a highly technological society (McAllister, 2018). In various formal learning environments, the term social and learning tools were incorporated in 2018 to replace the term soft skills. Examples of such tools are digital watches to track and aid in a learner's self-management, using a microphone to promote public speaking and build confidence, and finally utilising mobile phones or tablet devices to play collaborative games with other learners to promote a sense of social and behavioural development (McAllister, 2018).

Once the importance of technological advancements (2017 - 2018) and soft skill acquisition (2019) among young children was established internationally, South Africa began to update its technological infrastructure (World Economic Forum, 2017; Matthew, 2018; Jones, 2017). Use of mobile phones and the internet increased drastically (Stipp, 2019) so that South Africa could create an environment suitable for young learners to acquire soft skills digitally.

As of 2019, South Africa is looking at ways to expand their learning outcomes in basic education to help young children navigate the complex future ahead (Department of Basic Education, 2019). Locally no current digital formal acquisition methods have been implemented so far, however, to prepare learners for formal local soft skill acquisition, the Department of Basic Education (DBE) has realised that there is a dire need to improve the traditional curriculum focused on the 3R's reading, writing and arithmetic - additionally including problem-solving, critical thinking and creativity, among other soft skills expected to arise in the curriculum for the age group seven and older. South Africa's DBE has realised the importance of acquiring soft skills and their impact on future academic development in young learners. In 2019 South Africa's Sustainable Development Goals (SDGs), UNICEF (United Nations Children's Fund), the LEGO Foundation and the Association for the Development of Education in Africa (ADEA) came together for the first PLAY-based learning conference (showcased in Figure 2.2). PLAY-based learning melds South Africa's curriculum and technologies so that the concept of 'play' is at the forefront of teaching the future improved traditional curriculum (Department of Basic Education, 2019).



Figure 2.2: Play Africa conference (Henley School of Business, 2019)

2.4.1 Teaching soft skills informally

At present, there is little to no literature regarding how soft skills are being developed by caregivers or care professionals in South Africa in informal contexts. This study was conducted to respond to this gap, as set out in Chapter five.

2.5 Young children's use of mobile phones

Mobile technology has become highly affordable. More than 2.5 billion mobile phones were being used globally by 2019 (Clarke, 2017). People today often refer to their mobile phone as an extension of themselves (Klemens, 2014). Mobile technology changes the way we communicate with one another and the way daily tasks are managed (Goodman, 2019).

Mobile phone users may use theirs for daily tasks that include; communication, administration, navigation, storing information, giving financial advice, providing a flashlight and working as a calculator (Goodman, 2019).

Some of the reasons mobile phones have been given to children include increased social interaction, safety and security, learning responsibility, technological adoption and educational support (Chaffey, 2019). Many children can now do informal learning via mobile phones at any time. Pre-schoolers can develop their digital media literacy via phones by listening to stories that have an ethical underpinning. By means of this activity, young children confidently build their understanding of good ethical behaviour (Auxier, *et al.*, 2017: 123 - 126).

Confirmation of the way in which mobile phones are used in young children's lives can be found in the investigation of the report of the Office of Communications (OFCOM) 2018 of the United Kingdom into broadcasting, telecommunications and postal services. OFCOM drew upon quantitative research in the form of a Media Literacy Tracker to provide attitudes and understand behaviours among young children and caregivers (OFCOM, 2018). Results showed that, between 2017 – 2018, there was a:

- 1% increase in the use of mobile devices from ages three to four years old
- 5% increase of children owning mobile phones at ages five to seven
- 1-hour increases between 2017 and 2018 on the hours spent watching videos, playing games and watching online television
- A 1% increase in three to seven years old and 4% increase in five to seven years spending time on social media

From 2017 to 2019, there has been a significant increase in YouTube views by younger children. Between the ages of three and four, for example, the increase in viewing is 45%. A common trend in the OFCOM research indicates that the usage of mobile phones for social media, games and YouTube increases exponentially, the older a child becomes (OFCOM, 2018). Research shows that children aged three to four spend an estimated 6 hours 12 minutes on technological devices for recreational purposes a day if unmonitored. Children of five upwards admit they spend more time on online media (OFCOM, 2018). The importance of technological devices, specifically mobile devices is evident, yet for some caregivers this is worrying. OFCOM indicates that 19% of caregivers find it hard to control their children's screen time but defend this habit by stating that the benefits of the internet outweigh the online risks (OFCOM, 2018).

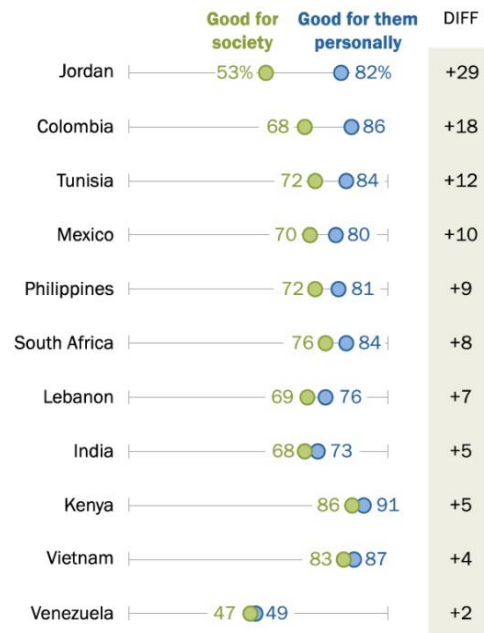
2.5.1 The positive impacts of mobile technology regarding young children

The exponential increase in mobile phone usage and access to phones by young children creates an urgent need to explore the impact mobile phones have on children. Research has shown that the benefits of children using a mobile phone include: better social interaction because social networks develop an online presence, and improved safety and reassurance for caregivers when their children are away. Research has indicated that young children who have phones learn about digital responsibility and become technologically adept at a young age. Although educational software is recent, there are mobile applications and online tutorials via videos or websites that offer additional assistance in formal schooling subjects (Schmitt, 2018).

Although local data are not readily available, we can assume that South Africa follows similar developments as reported globally, such as in the research of OFCOM (2018 - 2019) and Dolye (2019). Studies suggest that a majority of respondents believe that mobile phones improve social health, education, and children and economics (Silver *et al.*, 2019). A study that included South Africa, established that 63% of respondents characterised their phones as something that frees them. 65% of South Africans stated that mobile phones saved them time and that they could not live without their mobile devices (shown in Figure 2.3) (Silver *et al.*, 2019).

Mobile phones seen as better for individual users than society as a whole

% of adults who say mobile phones have mostly been ...



Note: Respondents who gave other responses are not shown.
Source: Mobile Technology and Its Social Impact Survey 2018.
Q11a & Q12a.
"Mobile Connectivity in Emerging Economies"

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Figure 2.3: Mobile phones for individual users versus society (Silver *et al.*, 2019)

The figure above shows how widespread phones are in South Africa and highlights the value of creating a mobile application blueprint to teach soft skills informally to young children.

2.5.2 The negative effects of mobile technology regarding young children

Children of all ages worldwide use smartphones for many reasons, such as security purposes, being able to call a guardian, for talking to friends or playing games. Although the positive impact of a mobile phone has been established for both caregivers and young children, studies indicate that increased exposure can be harmful to children (Arora, 2019).

Through a considerable amount of research pertaining to mobile phone radiation and children, studies have found that non-malignant tumours can form, especially located close

to the ears and brain, disturbed brain activity and disrupted sleep, due to excessive interactions with a mobile phone at a young age. Children have a tendency to bring mobile phones closer to their eyes and ears for long periods of time. Scientists believe that still-developing organs within a child can absorb 60% of the radiation that is emitted. This absorption can lead to possible carcinogens, having the potential to cause cancer, which bear the risk of cancer in future. Because the brain has its own neural network, the waves that are emitted from a mobile phone to a child can trigger changes in mood and behaviour, ultimately causing difficulty in their overall attention span (Arora, 2019). Caution has to be taken with regards to young children. Time restrictions help and the positioning of the device should be monitored (Arora, 2019).

Another challenge is the fact that mobile phones allow children access to inappropriate content. Manipulating children's video content (Bila, 2018) has become a growing trend. Nickelodeon's Paw Patrol (Shown in Figure 2.4) and Disney's Mickey Mouse: Clubhouse (Shown in Figure 2.5) are cited examples of this unfortunate event. Disturbing suicidal or horrific death-related suggestions played by these shows cartoon characters are injurious to mental health. The contaminated videos then spread into YouTube Kids channel in 2019 (Bila, 2018). The aftermath of these contaminated videos has led caregivers to be more aware of security issues, such as using more secure mobile applications such as username and password controlled. This factor must be considered in the graphic design structure of a blueprint for an application (Lewis, 2019).

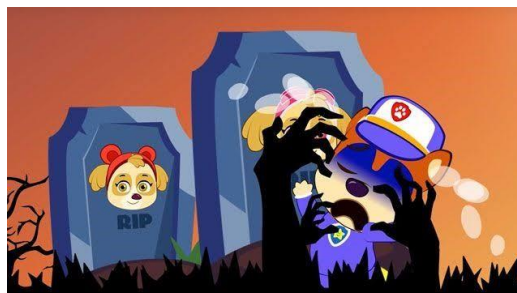


Figure 2.4: Paw Patrol Skye and Zuma's death and Chase's horror scene (Lewis, 2019)



Figure 2.5: Mickey Mouse ClubHouse: Mickey's family death scene (Lewis, 2019)

The benefits of mobile phones are undisputed, yet the challenges are grounds for controlling how children use mobile phones and should be considered when developing a blueprint for a mobile application. Constant and rapidly increasing technological advancements are the reality of a technological society. I believe that co-creating a blueprint for a mobile application that is responsibly used, can offer a tool to better a young child's future.

2.6 The importance of graphic design theory elements and principles

The process of co-ideation and design of a mobile application is not new. The systematic research of designing a blueprint for teaching soft skills on a mobile device to young children is. Developing an application to help young children acquire soft skills is relatively new, as I have shown in the previous section. There are no well-defined design principles as yet. The next section will discuss some more generic design principles and how they could be incorporated into the design of a mobile app for young learners. In order to create a blueprint for a well-designed application for young children, it is important to look at graphic design theory elements that successfully form the basis for designing my own. In addition to discussing the graphic design theory elements and principles I looked at selected examples of mobile applications with good graphic design elements to substantiate the design theory and principles and understand what important design considerations or content aspects needed to be included for the design of the mobile application alongside the co-creation input of my participants.

Ideating and successfully executing good design goes beyond developing sound concepts, since it is about integrating a firm foundation in fundamental graphic design theory. Although graphic design theory elements and principles can reach a variety of 'sub-principles' or 'elements' set for specific art styles, there are ten basic/elements that can be applied when developing any graphic design (Taheri, 2019):

- **Line:** Used for drawing and differentiating between thick or thin, pencil or pen and dividing spaces for the eye to follow correctly.
- **Colour:** Creates an impression and can tell a story against a background, used for pictures or vectors as well as in typography.
- **Shape:** Whether it is organic or geometric, shapes define and emphasize boundaries, colour or line.
- **Space:** Negative space can be defined as part of the design without line or typography and is often underutilised or misinterpreted.
- **Texture:** Texture is a relevant component to include on the digital or online world because it creates depth or dimension, allowing a design to become immersive.
- **Typography:** Known as the font, and can be considered one of the most vital design elements to incorporate. The colour, texture, shape and placement can differentiate importance, whether a product is playful or professional; vintage or modern.
- **Scale:** Scaling objects or shape and type can be useful to add focus or interest. Caution needs to be exercised when using this principle since the number of various sizes depends on the content and can cause confusion.
- **Dominance:** Dominance in terms of design has to do with forming a focal point for what is most important and what is considered the middle or background.
- **Balance:** Two aspects consisting of symmetry and asymmetry are what govern balance. Most creative individuals favour asymmetry since this feels more organically formed and include eye-catching contrasts.
- **Harmony:** Is considered the main goal to reach when designing. Harmony occurs when the previous nine principles are applied; when all designed elements are enough but never too much.

An example of a mobile designed application considering the elements of design principle theory for children is DragonBox (Shown in Figure 2.6). DragonBox is a business that uses a host of professionals to create applications for young children to engage with mathematical content at home and in school. From 2011 to 2019 DragonBox has won international awards and was praised for its brilliant design and its ability to make hard concepts easier to understand. In terms of a blueprint for my application, Dragon Box does not aid in soft skills design but it is well-designed graphic interface design speaks to basic graphic design principles based on a harmonious application framework through its well-suited use of colour palettes and vector characters (DragonBox, 2019).



Figure 2.6: DragonBox (DragonBox, 2019)

2.7 Other design principles relevant for the mobile app blueprint

Apart from these basic elements of graphic design theory, there are principles that focus on specific design processes such as designing a blueprint for a mobile application. For this study, I am particularly interested in establishing design principles that facilitate acquisition of soft skills such as creative thinking, communication and ethical skills via a mobile application (app). The principles discussed below were identified in my literature review on mobile app development for young learners and in my initial engagement with stakeholders. I will discuss these principles, showcase examples of mobile apps specifically designed for young learners to develop soft skills, and how they applied these principles. In Chapter five, two additional design principles are discussed that emerged from the co-creative research conducted within this study.

2.7.1 The principle of active learning

In creating applications for children, it is important to distinguish the difference between being physically and mentally active. An application cannot be classified as active if the only motions of children are to swipe or tap animations. An application needs to focus on the mentally active segment of learning called 'minds-on' learning. A minds-on approach requires intellectual manipulation and is critical in developing the cognitive abilities of children (Pasek *et al.*, 2015: 8). Research by Pasek *et al.* (2015: 9) suggests that children learn best when they are actively engaged, making decisions based on the decisions created by the content watched.



Figure 2.7: Peppy Pals skills mobile application characters

An example of the design principle active learning showcased in design can be seen through Peppy Pals.

Peppy Pals Social Skills (Shown in Figure 2.7: Peppy Pals skills mobile application characters) is a free co-operational pro-social learning application found at the Apple iStore. It was developed in March 2019 for teaching empathy, identifying emotions, persevering and understanding concepts from a different point of view (VanderBorgh, 2019). The educational application is divided into four different quadrants: two-game collections, videos and stories and five different animals named: Gabby the rabbit, Izzy the owl, Kelly the cat, Reggy the dog and Sammy the horse. Unique traits are related to each quadrant. The game consists of the adventures and misadventures of these characters and explores how each animal can care for the other amid troubling situations. The application

has an additional feature that allows a child to choose a buddy toy and facial gesture for their chosen animal character (VanderBorgh, 2019).

Common Sense children's application evaluator, VanderBorgh states that although the application seems technologically sophisticated, it may allow children to progress too quickly through the different levels. Nevertheless, the application has relatable scenarios that demonstrate the proper way in which communication takes place within a safe and friendly environment (showcasing here the active component). The overall application is rated by VanderBorgh $\frac{3}{5}$ for educational value and $\frac{4}{5}$ for ease of play with an option to have it set to English or Swedish. The application does not have a read out loud option. Although the application is meant for 3+ years old, VanderBorgh states that it should be adjusted for an age group that could read the content provided; unless a child's carer can offer to read to them (VanderBorgh, 2019).

2.7.2 The principle of engagement

For young children, three forms of engagement are essential in an application: extrinsic motivation and feedback, parasocial interaction and progressive feedback (Gunderson *et al.*, 2013: 1526 - 1530).

Extrinsic motivation and feedback aid in the learning process. Digital technology can be used to offer meaningful feedback. An example of extrinsic motivation and feedback may include directional motivation such as including the word "correct" or "incorrect" and positive feedback such as "amazing!" or "try again!".

Parasocial interaction is a form of engagement displayed in the form of animation such as fireworks or balloons. Progressive feedback reveals visuals leading to new levels. Through different forms of engagement with different designs, young children continue to be engaged in content and achieve rewards (Gunderson *et al.*, 2013: 1526 - 1530).

Intrinsic motivation is considered a 'driver' of engagement methods towards a young child's long-term development and can promote personal passions such as an interest in learning an instrument or art-related digital content. Young children who are intrinsically motivated to

learn and solve problems develop the soft skill of creative thinking at a faster rate (Pasek *et al.*, 2015: 1541).

An example of all three aspects of engagement together can be found in the mobile application called Class Dojo. ClassDojo (Shown in Figure 2.8 ClassDojo) is an application that simplifies communication of teachers, children and caregivers by teachers pinpointing what a child is struggling with or when giving constructive input. The process begins by children taking pictures of their hard work and learning the importance of the skill and term 'hard work'. Parents or teachers share photographs of classroom activities and homework moments to help encourage other students. ClassDojo is considered the top social developing application for various ages and essentially teaches children how to communicate effectively. The overall character design and placement are well executed while developing social interaction skills. ClassDojo is a fine example of creating social presence and opportunities for children to develop their own ways of communication within a community (ClassDojo,2019).

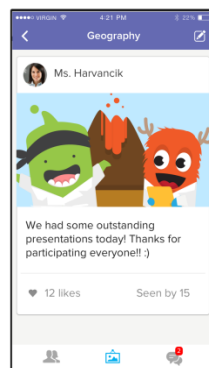


Figure 2.8: Class Dojo (Class Dojo, 2019)

Class Dojo has an interesting way of promoting three types of engagement. Through the continuous interaction between student and teacher extrinsic motivation and feedback are offered by teachers correcting or approving work being shared online, while Parasocial interaction is achieved by the developers offering teachers a range of animations to reward students for their efforts as well an additional animation for completing set tasks on their application. Finally, intrinsic motivation is achieved due to maths being a part of a student

and teachers' life through their formal schooling and so the continues and daily use of Class Dojo is achieved.

2.7.3 The principle of context-sensitivity

The relation between a child and mobile application is delicate and potentially addictive (OFCOM, 2018). Paruthi suggests, however, that there are factors that can be put in place to make content applicable for children (Paruthi, 2018: 37 - 39). These safeguards include: understanding favourable and non-favourable content that a child might interact with and plan accordingly (Paruthi, 2018: 37). Second, a successful mobile application creates different scenarios. The cultural and socio-demographic backgrounds of all children need to be considered in such scenarios (Paruthi, 2018: 38).

The basic elements of design theory run alongside four design principles relating to active learning, engagement, co-design and context-aware applications and content sensitivity. These principles may be directed at the entertainment aspect of educational design for children and enhance a child's learning experiences. The various principles offer well-designed educational content that allows learning as a means to self-stimulation; creating an optimal early learning environment which promotes cognitive exploration in an encouraging atmosphere through good graphic design practices (Pasek *et al.*, 2015: 21; Sigel; 1987: 220).

Context sensitivity is showcased through two examples in this study namely, Smiling Minds and Touch and learn. To combat increasing mental illness across various ages, Smiling Mind (Shown in Figure 2.9: Smiling Mind), built by a team of Australian psychologists, educators and designers, offers 10-minute daily sessions of activities and exercises for young and old to keep mentally fit. A structure was developed for children which employs audio directed storytelling or task assignment to increase mental wellbeing, concentration and focus, academic and emotional performance, relational-development and resilience. The application is included due to its success to combat the increasing mental health issues that affect all ages. Activities can be done as a family. Smiling Mind have successfully considered the sensitive issues of mental health issues concerning individuals of all ages and additionally have been successfully incorporated into various primary

schools where caregivers and teachers' feedback suggest that soft skills can be developed by using this application (Smiling Mind, 2019).

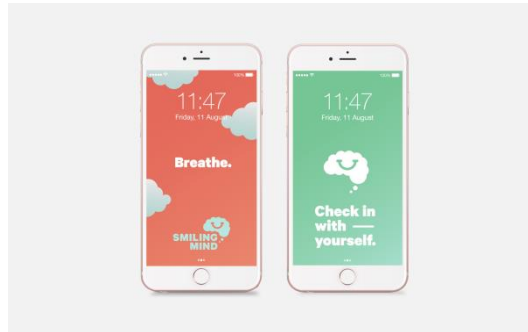


Figure 2.9: Smiling Mind (Smiling Mind, 2019)

A free application, Touch and Learn - Emotions (Shown in Figure 2.10: Touch and Learn - Emotions) uses photography and audio to help children recognise emotions by viewing facial expressions, body language and tone. The process allows a child to view four real images with audio saying the word “upset” and the child has to tap on the image that best represents this emotion. More than one image of the four is correct.

Touch and Learn includes the sensitive context of learning emotions through photography of diverse individuals and teaches young children that emotions can be open to interpretation. The correct answer is met with an approving sound. This application is included because it shows a child's understanding of facial expressions and how an application can help children recognise various expressions (Anderson, 2019). This is of particular interest for me, since the design of my blueprint application needs to showcase expressions, use audio to explain complex matters while adding another form of engagement and finally include variables that are open to the expression where there are no right or wrong answers.



Figure 2.10: Touch and learn - emotions (Anderson, 2019)

2.7.4 The principle of co-designing with children

The input of children using a particular app is critical for design (Langford, 2010: 114). According to Bock (2012) children are “naturals at co-designing”. With the right tools, children can express out-of-the-box ideas and help create unimagined concepts (Bock, 2012). Bock adds that co-designing between the ages of three to six years old has some risks and advises that some research aspects need the guidance of a caregiver or care professional (Bock, 2012).

When using the principle of co-design for designing a mobile application, certain factors emerge: emotions, values, ideas, dreams and ideal situations are important to consider and discuss in a way that suits the children's ages (Bock, 2012). The benefits of co-designing in this study included the ability to become an active facilitator in what is desired in a mobile application (Langford, 2010: 114 - 118). The co-design process in this study is discussed in detail in the methodology section.

2.8 Analysis of mobile applications

As a graphic designer, the applications introduced above have assisted me to start the design process for a blueprint for a mobile application. Peppy Pals for example is an exceptional application to use to design soft skills related content due to the good design compositions and professional feedback offered: I will take it into consideration when

designing my own blueprint. The critically acclaimed DragonBox showcases how and what harmonious design should look like. Touch and Learn - emotions and ClassDojo showcase just how technically advanced and linked any application blueprint needs to be to successfully incorporate complex content and design correctly. Analysis of the above application has led me to a list of the following initial graphic design principles to guide mobile application development (Smiling Mind, 2019; Anderson, 2019; ClassDojo, 2019; DragonBox, 2019; VanderBorgh, 2019):

- Using two-dimensional vector graphics that are not in human form is essential
- Use bright colours and exaggerated but friendly character expressions
- Incorporate different background environments (land, sea and space)
- Create content for the child and caregiver
- Use a captivating but simple storyline
- Incorporate visual portfolios for security and character development
- Have a social platform presence on YouTube, Facebook or Instagram.

The ten basic principles of graphic design have been applied along with the principle of active learning, engagement. Peppy Pals, ClassDojo and DragonBox have made me aware of the need to engage learners.

In the five applications, however there is little attention given to the cultural uniqueness of the particular country in which it is employed. Whether it is intentional or not, is not stated but while conducting research it would be interesting to determine whether South Africa's different languages, colours and customs such as various forms of saying hello, can be incorporated into the soft skills content design or if a generalised, more international-friendly blueprint for application design is favoured.

2.9 Summary

This literature review has featured three main topics comprising an understanding of the respective soft skills, creative thinking, communication and ethics (social media literacy), through a social media context and how it can be taught formally, informally, globally and within a local context. The second topic concerns how an application via a mobile device

can be used as well as the positive and negative impacts a proposed mobile phone present to young children in formal and informal contexts. The validity of creating a blueprint of an application through a mobile phone was established. I incorporated the research of basic graphic design principles to create the graphic user interface. Alongside utilising basic graphic design theory elements, I incorporated design principles for the blueprint mobile application content. As an interesting finding, there seems to be a lack of consideration of context in the cited design principles and mobile apps. I believe that the diversity of South Africa will need a strong focus on the cultural, linguistic and social context of the children who will engage with my app. In my data collection process, a strong focus was on this topic and I gained considerable insight as discussed in chapters three to five in this study. In the next chapter, my theoretical review of the Cultural Historical Activity Theory is discussed.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 Introduction

In this chapter, I will introduce Cultural-Historical Activity (CHAT) Theory since it provides a useful lens to unpack and explore the complex nature of participants' perceptions towards the mobile application blueprint process. Chapter three will therefore only be used as a platform to introduce CHAT as a broad framework, whereas in Chapter five, CHAT will be discussed by means of analysing and mapping participants' perceptions and further field-work findings of this study.

3.2 Theoretical framework

Cultural-Historical Activity Theory (CHAT) is considered the third-generation of the CHAT theory developed by Engeström (1987). This theory is initially based on Vygotsky's (1934) ideas generated in the cultural-historical school of psychology and developed further by Leont'ev (Weibell, 2011). Engeström calls the initial development by Vygotsky and Leont'ev, the first-generation (Weibell, 2011).

CHAT by Engeström is the theoretical framework used in this research. It allows me to explore and unpack diverse participants' attitudes and perceptions towards the use of mobile apps for developing soft skills among young children within the socio-cultural context in which they are embedded (Weibell, 2011). Engeström's third generation of CHAT aims to understand the human cognitive function by analysing the relations of a society through a wide range of factors (Shown in Figure 3.1) Engeström's activity system is moulded by societal, cultural and historical structures in a community (Cole & Engeström, 1993; DeVane & Squire, 2012; Engeström, 1987). The main unit of analysis in CHAT is the activity system. The units of an activity system create a network of sociocultural⁴ elements that showcases the unified actions of various groups who intend to achieve a certain end

⁴ The term sociocultural pertains to social and cultural aspects such as: family structure, power, race, reputations, child rearing practises, cross cultural difference and attitudes, cultural and ethnic identity (Cambridge Dictionary, 2020)

result (Cole & Engeström, 1993; DeVane & Squire, 2012; Engeström, 1987). The units within the activity system consist of object, outcome, subject, tools, rules, division of labour and community (Cole & Engeström, 1993; Engeström, 1987).

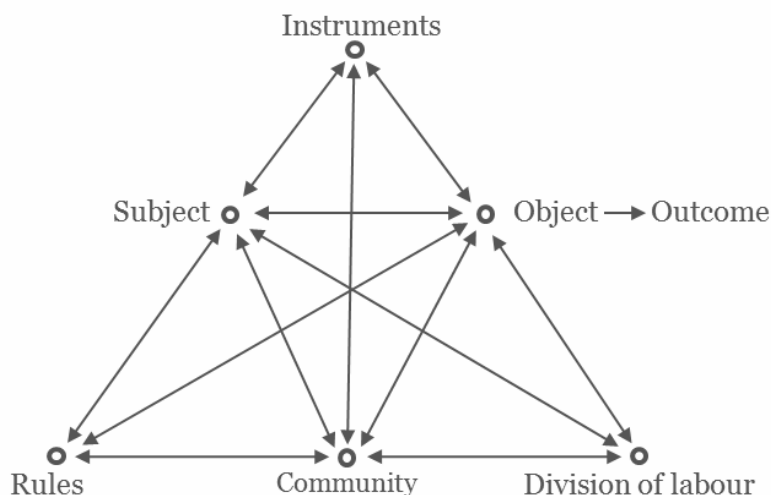


Figure 3.1: Engeström Activity System, 1987 (Engeström, 1987)

Vygotsky (1934), the creator of sociocultural theory, believes that communicative interaction plays a vital role in a child's learning as it allows for an iterative process of learning and reflection. Vygotsky notes that the culture within a society is influenced by CHAT because humans have different socio-economic brackets and/or varying socio-demographic stances (Cole & Engeström, 1993; Engeström, 1987). CHAT is a valuable framework to use in this study. Vygotsky considers the influence of communication methods and cultural influence in children much the same way that this study's setting in Cape Town consists of a heterogeneous society which manifests a high level of cultural, religious and socio-economic diversity.

3.2.1 Object and outcome

Human actions are motivated towards constructing an intangible or tangible object to fulfil a human need called an outcome (Engeström, 2000). For this reason, CHAT was established

upon an understanding of object-oriented action (Vygotsky, 1978; Leont'ev, 1978; Nardi, 1996). 'Object' within the activity system can help determine the 'why' in which things are done or the reason behind the outcome (Mwanza, 2002). In this study, the object is the blueprint for a mobile learning app and the outcome of the development of soft skills for young learners.

3.2.2 Subject

The subject in the activity system refers to 'who' or the person(s) matched to the system (Jonassen & Rohrer-Murphy, 1999). The subject's characteristics and understanding of the object are shaped through the interactions in the various elements of the activity system (Jonassen & Rohrer-Murphy, 1999). As mentioned in the above literature, the subject within this study is me - a designer and young researcher.

3.2.3 Tools

Tools can take various material or psychological forms that represent or explain human experience (Kozulin, 1998; Vygotsky, 1978). Material tools are the tangible items in the external world whereas psychological tools can be found in the cognitive frameworks developed to account for higher mental experiences (Kozulin, 1998; Vygotsky, 1978). The tools utilised help form a set of guidelines to assist the subject to carry out an action and can often change based on the way the subject uses the tool (Jonassen & Rohrer-Murphy, 1999). The tools used before conducting research are the internet, methodologies and techniques used to conduct research, a laptop, papers such as mock-up design templates, pens and markers. All are subject to change and include psychological forms of tools deployed during the course of this study, as mentioned in Chapter five.

3.2.4 Participants within the theoretical framework

The community in the activity system refers to a group which has a mutual interest and can create a division of labour structured by rules in the community (Jonassen & Rohrer-Murphy, 1999). Individuals in the community comprise various levels of expertise and can offer the skills, or division of labour, needed to achieve the actions within the activity system

in the lines of their socio-cultural conventions and rules that offer an understanding of becoming part of a community (Jonassen & Rohrer-Murphy, 1999).

3.2.5 Community

In this research, the term 'community' involves a list of participants that indirectly or directly contributed to this study and can be classified under site A and site B.

My first research site is a predominantly 'coloured'⁵ low to middle income-based rented church community hall in Observatory, Cape Town, called site A. Site A consists of the Kiddies sector operated by caregivers and care professionals of various educational backgrounds and professionals who care for children of the church community. The church members look after children of various ages from a few months up to eleven years old for the two-hour church service. An hour of various activities is planned for teaching "child-friendly" core Bible lessons such as loving your neighbour, the ten commandments⁶ and nine virtues Biblically called the 'fruits of the spirit' (patience, kindness, goodness, self-control, lack of envy, meekness, respect, forgiveness and truthfulness) (Bible info, 2020) with an hour of park playtime under supervision.

The second site I conducted research at were two Montessori schools, (site B) in the area of Cape Town. These Montessori participants, care professionals and children, represent the informal schooling sector associated with teaching of the Montessori method as mentioned in Chapter two, and inspired the co-creation of the blueprint of the mobile application. The school fees at these two schools range from R44 000 to R70 000 for 2020 annually excluding application fees, music instrument levies and placement deposits among all three schools. These schools offer a diverse racial spectrum and allow children to learn critical thinking and problem-solving using sensory-based educational methods

⁵ Coloured in a formal context referred to as Cape Coloured is a person of mainly mixed European ("white") with ("black") Asian, Indian or Khoi san ancestry officially defined by the South African government between 1950 to 1991 (Britannica, 2020).

⁶ The ten commandments: refers to a list of ten standard rules Christians live by. These rules can be discovered in the book of the Bible in Exodus 20 to Hebrews 5 (Bible info, 2020).

alongside 'peaceful' communication methods beginning from ages two-and-a-half to nine for their soft-skills development (Alpha Montessori, 2020).

Design professionals with various levels of expertise and diverse backgrounds aid in offering significant findings for this thesis. They include the final participants from this community. These professionals are from outside the two communities mentioned above. This additional set of participants was chosen to aid in the final decision about a blueprint for the design of a mobile application to teach soft skills to young learners.

3.2.6 Division of labour

Division of Labour (DOL) may be defined as the roles offered by this diverse group of individuals who have a shared purpose and varied skills and knowledge (Cole & Engeström, 1993; Engeström, 1987) in the process of co-creating a blueprint of the mobile application. This includes the active experiences of children of aged five to four, caregivers, care professionals and professionals who form part of the communities. Their knowledge contributed constructive feedback towards the formulating of a blueprint of a mobile application alongside a graphic designer who could creatively interpret the information given. As a researcher and graphic designer, I refined the blueprint in four phases as discussed in Chapter four, based on the input and feedback given by the community. Each of the roles played by these individuals shaped the way in which the blueprint was conceptualised and redefined within the activity system.

3.2.7 Rules

When creating a successful mobile application for young children, there are rules that have to be considered. These rules are shared by caregivers and care professionals for a specific environment when designing a mobile application for young children. Certain rules in the findings may be affected by cultural and/or historical social standpoints. For example, participants may include rules founded on religious views, or rules that cater to Maria Montessori Methodology. Participants may base their rules on professional and/or personal opinion, their own previous research or academic sources.

The rules created for this study are drawn from the community across diverse contexts. To explore the particular rules, a set of questions was asked from participants consisting for example of (i) what content young children should engage in, (ii) what circumstances and cultures need to be acknowledged or generalised, (iii) as well as any screen time constraints, mobile data expenses, (iv) whether the mobile application should be online or not, (v) the necessity to preview content before children's use and (vi) children's daily access to mobile phones; all of which is explored in more detail Chapter five. My research has considered the legal status of young children and the rules that surround providing a suitable, reliable and safe application on a mobile device for young learners to acquire soft skills.

3.2.8 Contradictions

The activity system itself was meant for much more, as Engeström points out: to serve as "a viable root model of human activity" (Engeström, 1987: 8). It is reliant on each unit or system working and can transform the outcome where units change (Engeström & Miettinen, 1999). Within the activity system, four types of contradictions can be found and can transform the whole system namely:

1. An internal alteration to units that form part of the central activity system
2. An alteration made by secondary contradictions of the central activity system
3. An alteration made by tertiary contradictions of the central activity system, whereby a cultural object better suited the object established in the central activity system
4. Contradictions are made between the central activity system and neighbouring activities.

Contradictions are not necessarily negative. They provide an impetus for change over time. Engeström mentions that contradictions are "the principle of its self-movement and ... the form in which the development is cast" (Weibell, 2011). In an activity system, contradictory data should be seen as a way to ideate solutions and create breakthroughs (Engeström, 1987: 45). Engeström states that a social dilemma cannot be resolved through separate

individual actions alone. Joint cooperative actions can manifest a historically new form of activity (Engeström, 1987: 20).

3.3 Theoretical framework outcome

In conclusion, the theoretical framework, Cultural Historical Activity Theory (CHAT), allows a specific community to connect to, to explore their perceptions towards successfully co-designing a blueprint of a mobile application. CHAT showed the importance of a methodology that Vygotsky discovered and Leont'ev enhanced and refined. These aspects are significant to this study. In this study, the perceptions in the units of the activity system produced different outcomes. Members have various socio-demographic backgrounds, resulting in different blueprint designs; as explored in Chapters five and six.

CHAT is effective for this study in creating an educational blueprint and discovering design principles for a blueprint. CHAT engages with the community's cultural differences, to help me structure, conduct and analyse research respectfully, and develop lasting soft skills among young children.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

In this chapter, Design-Based Research (DBR) is explained as the research design chosen for this study. DBR allowed the study to be iteratively conducted, researching the purpose of co-creating a mobile application blueprint and uncovering the design principles needed for such a process.

4.2 Design-Based Research

Engeström's third-generation Cultural Historical Activity Theory (CHAT) model popularised the work of Vygotsky and Leontiev, and serves as a theoretical basis for this study. A methodological framework, however, was needed for this research. In this study, Design-Based Research (DBR), developed in the years 1990 to 1992 by Collins and Brown, was incorporated as a methodological framework (Jones, 2008).

DBR offers a new perspective of theory development and refinement by blending empirical educational research with theory motivated design of learning environments which is often used to improve educational practices based on creating or refining principles which test and perfect a theoretically designed educational innovation (Design-Based Research Collective, 2003). The DBR methodology builds on the innovative solution/ design created and supports broader implementations/ redesigns by understanding the how, when and why an educational innovation can work in practise allowing the further understanding of the relationships regarding design theory and practise (Design-Based Research Collective, 2003). The DBR process is well documented, producing large volumes of data about the creation and implementation (Design-Based Research Collective, 2003). The data collected are in accordance with its various circumstances, rationales for design and design alterations through its different interactive, collaborative and flexible iterative phases (Jones, 2008). The nature of DBR in this study involved (i) finding solutions to real-world

settings such as soft skill acquisition among young children and (ii) demonstrating the value of design principles in developing an application for future designers (Jones, 2008).

DBR enables a designer to draw from educational and design fields, creating variables that form part of a complex systematic structure. It is impossible to alter one aspect without the others being altered similarly and advantageously. This interdependence relates to the CHAT activity system mentioned in chapter three; creating a carefully structured way of capturing qualitative data for this study. The purpose of the iterative nature of DBR was to isolate and define variables presented to produce significant outcomes, differentiating one iterative phase from the next (Wang & Hannafin, 2005). In terms of design, this recognition of variables helped co-create a well-crafted blueprint for a mobile application within this study (Design-Based Research Collective, 2003; Wang & Hannafin, 2005).

Derry *et al.* (2018) suggests that a valuable characteristic for researchers utilising DBR is to create a testable hierarchical workflow that allows for adjustments as shown below:

1. Create a theoretical framework to guide the designed outcome
2. Authentically create the design intervention
3. Evaluate the data based on the way in which the design can be implemented and taught
4. Evolve Design and Theory

Designing an intervention, as stated in the above point 2, can be termed the lesson level which consists of a process whereby facilitating, identifying variables and compiling case studies and other outcome data resources are undertaken to aid the authenticity of the design intervention. The point 2 data collection obtained from a macro analysis focuses on interviews, observational research, descriptive diagrams and conversation maps where participants' learning experiences and significant events in the study are noted (Marriam, 1988: 52). The role of macro-level intermediate representations is to achieve the core goal of DBR. This goal is to create outcomes that can be tested and shared via patterns discerned from the perceptions and operations of participants. A medium is used which consists of a blueprint for a mobile application (Barion, 2003).

Point 3 of the hierarchical workflow is defined as the iterative stage, at which mixed methodological studies can be carried out to aid in the adoption process of the design implemented (Barion, 2003). As an adaption to the DBR methodology, a similar conceptual framework was drawn up in 2019 for this study before conducting research in 2020 (Johnson *et al.*, 2015):

Table 4.1 Phases of Design-Based Research

Phase	Element	Activities
Phase 1:	Foundational research	Phase 1: Learn about the graphic design process regarding creating a blueprint mobile application for young children teaching soft skills through social media literacy Discover seminal authors that offer information on graphic design principles regarding the development of a blueprint mobile application for children. Discover existing mobile applications that justify the design principles provided Uncover if any existing culturally - sensitive graphic design principles that are specifically catered for Cape Town but not on international mobile applications can be applied to its rich socio-demographic Carry out interviews with stakeholders to define design problems and brainstorm possible solutions (care professionals, application designers).

Phase 2:	Problem analysis	Phase 2: Facilitation of 2 separately structured co-design workshops on the Site B and site A Kiddies sector with caregivers and care professionals to explore possible application design, storyline etc (working with mock-ups) Refinement or addition of graphic design principles
(Four to six months)	Design solution from a theoretical framework	
	Development of solution (prototype)	
	Testing and evaluation	
	Reflection	
Phase 3:	Analysis and Exploration	Phase 3: Development of first prototype (blueprint) based on findings in Phase 1 Facilitation of 2 co-design workshops in the two areas with caregivers /care professionals to reflect on engagement with application Caregivers have an option to offer their children the blueprint for additional feedback
(Two months)	Design and Construction	
	Evaluation and Reflection	

	Maturing Innovation & Theoretical Understanding	Refinement of graphic design principles
Phase 4:	Analysis of Complex Problem	Phase 4: Final blueprint designed Finalisation of graphic design principles Write up findings of the study
(Two months)	Develop a final solution	
	Test and refine a solution	
	Reflect	
	Create or enhance new Design principles	

Adapted from: Derry *et al*, 2018

4.3 Design-Based Research phases

Studies indicate that a mobile phone is the most used technological device and is found to be growing in demand in South Africa, particularly in Cape Town where a great percentage of caregivers offer their mobile phones as ‘babysitting’ devices to their children (Meginty, 2017; Stipp, 2019).

In understanding the main topics mentioned above and the many advantages of teaching soft skills, research by Pasek *et al.* (2015) indicate that a mobile application may be the

safest and most effective way to offer informal training to young children. Based on the theoretical research compiled, a strong and relevant methodology using DBR was created to co-create a blueprint application iteratively which was best suited for young children to accommodate their concerns and reveal design principles specifically crafted for creating an educational mobile application for young children. This study followed a four-phase approach.

4.3.1 Phase one: building foundational research

During Phase one, my literature review indicated a need for local research to gain an understanding of informal soft skill acquisition as well as design additional principles that specifically grounded itself to the mobile application created in South Africa. Research was then conducted in CHAT and DBR to prepare for a way to reveal/support the main findings of the literature review, to collect the perceptions of the co-design process with the participants of this study.

4.3.2 Phase two: scoping and problem definition

Phase two consisted of separate interviews and group co-design workshops, facilitated through email conversations and face-to-face, at site A's Kiddies sector and at site B schools. Sites A and B both agreed to a face-to-face group discussion as well as online conversations on Whatsapp through messaging and voice note interactions. These online conversations continued throughout the whole study from Phase two to four. Stakeholders in this study preferred being contacted through email and Whatsapp. The collecting of data occurred between the months of December 2019 to March 2020.

The workshops and interviews were held with caregivers and care professionals in order to discover their perceptions and input towards graphic design principles that would guide the blueprint design of a mobile application for young learners as well as children from sites A and B. Workshops helped gain insight regarding local research pertaining to mobile application creation, informal learning, design and rules set by caregivers. Various professionals were interviewed via email and/or other social media, Whatsapp and

Instagram, during the same December 2019 to March 2020 time frame (written consent was approved of face-to-face or digitally beforehand as seen in the appendices).

During Phase two, a qualitative methodological approach synonymous with DBR took place as described below, Table 4.2: Data collection methods across phase two):

Table 4.2: Data collection methods across phase two

Data collection methods across phase two			
Qualitative Method Application	Method Type	The audience within Cape Town	Purpose
Interviews	Qualitative	Caregivers at site A/ Care professionals at site B and other stakeholders	Further gaining insight and feedback on a mobile framework and content to be provided on the blueprint of the mobile application and discovering principles of design.
Co-design workshops	Qualitative	Caregivers at site A/ Care professionals at site B	

4.3.3 Phase three: Ideation and prototyping

Based on the research and interviews conducted among participants from church - site A, the Montessori schools - site B and various stakeholders in Phase two, a first blueprint design for young children was set out. I then gave the blueprint for the mobile application to the sites to interact with and offer constructive feedback. The Montessori schools did not support the development of a mobile application for children in formal learning context, however could see the potential of caregivers being offered a mobile application to educate

them about effectively teaching soft skills to their young children. They consequently suggested that their input in workshop two should not be included (Site B participants 2 and 3, 2020).

Between the co-creation workshops and emailed/face-to-face interviews of caregivers, care professionals and stakeholders, sites A and B allowed 10 children to participate in my co-creation workshop to aid in the development of a blueprint for the design of a suitable application in terms of style, the storyline and characters: shown in Table 4.3: Data collection methods of phase three.

Table 4.3: Data collection methods of phases three

Data collection methods across phase three			
Qualitative Method Application	Method Type	The audience within Cape Town	Purpose
Co-design workshops	Qualitative	Caregivers at - site A, and professionals at the Montessori schools - site B	Co-design of blueprint for a mobile application

4.3.4 Phase four: Testing and evaluation

Based on the existing and new design principles identified, an analysis of significant findings in this study, and a comparison and analysis of the design principles found within the theoretical framework, I designed a final blueprint for the mobile application with the help of participants credited in this study. The final blueprint design was then presented to participants for them to offer feedback on the preliminary design. Co-design workshop methods were used to conduct research with children. An additional poll was placed on

Instagram and Whatsapp to ask caregivers in Cape Town about the overall design and offer feedback between the previous design and new design. From this inquiry, the last design edit was then made and design principles finalised for this study; shown in Table 4.4: Data collection methods across phase four.

Table 4.4: Data collection methods across phase four

Data collection methods across phase four			
Qualitative Method Application	Method Type	The audience within Cape Town	Purpose
Co-design workshops and artistic documentation	Qualitative	Participants at site A and B / stakeholders	Finalising the last edits of the design.
Open-ended question	Qualitative	Participants on Instagram and Whatsapp	Further determining the last blueprint design of the mobile application

4.4 Sampling

Sampling is defined as taking a smaller representative group from a sizable population for investigation (Creswell, 2003). For this study four categories of participants were involved:

- **Caregivers** who have children of the ages 4-5 (at least 10)
- **Care professionals** working in a pre-school and a church crèche with children of the ages 4-5 (at least 5)
- **Children (optional to caregivers)** at the two main sites (5 children would be an ideal audience to get feedback from)

- Other **stakeholders/informants** such as mobile application designers, professional children's book illustrators and educational child psychologists.

Within this study, purposeful sampling (Palaniks *et al.*, 2015: 533 - 544) was used. Here, participants were approached who are most knowledgeable about the topic of this study and bring the richest experiences, effectively utilising most of the resources found (Patton, 2002). Purposeful sampling finds participants who are willing to contribute findings, communicate ideas and offer opinions focused on the topic at hand (Patton, 2002). In this study, the gatekeepers of the research sites were known based on personal networks/contacts which allowed for ease of access to the two sites that have been chosen to represent diversity in culture, religion and socio-economic status.

Site A: A Christian church in the Southern Suburbs that offers a crèche during Sunday service

Site B: Montessori pre-schools in the South Suburbs, known for their holistic approach to child development with a particular focus on development of soft skills.

4.5 Qualitative data

Purposeful sampling is utilised widely in qualitative research for its efficient data collection and analysis methods (Palaniks *et al.*, 2015: 533). The qualitative research methodology is used for conducting an investigation that requires researchers to collect, evaluate and implement data (Greene *et al.*, 1989: 255). Qualitative research methods consist of open-ended data collection methods obtained from one or more persons, usually through interviews, focus groups or through study-based observations. By analysing the data collected through words, behaviours and categorizing information, significant themes or patterns can be found presenting the diversity of ideas gathered (Greene *et al.*, 1989: 255). In this study, various forms of interviews such as face-to-face, group and online methods, and workshops of various natures such as co-creative, documentation and poll collective, as explained further in this chapter, were used to collect feedback from participants. The collected data were safely stored on an excel spreadsheet. My opinions and daily journal

log-in were captured on a word document. Images, voice recordings and scans of paper documents were stored securely on my password protected laptop.

In this study the Montessori schools (site B) are chosen as they are the local leading experts in teaching soft skills in formal learning contexts to understand what I can transfer about soft skills acquisition into informal learning contexts. However, due to the Montessori methodology which does not believe in using digital technology in formal learning contexts, they were only part of Phase two as informative participants of this study whereas the Church participants (site A) were part of Phases two to four of this study.

4.6 Data collection tools

From phases two to four, various data collection tools were included to aid in capturing data. The tools consisted of interviews, co-design workshops and survey methods that are explained in further detail.

4.6.1 Interviews

There are three types of interviews; structured, semi-structured and unstructured interviews (Gill *et al.*, 2008). For this particular study, a semi-structured approach was chosen due to its flexible incorporation of several open-ended questions leading to an unorganised set of questions to help prompt a longer response. This wider response may reveal new information or elaborate upon new information that could be important to the participant (Gill *et al.*, 2008). A semi-structured interviewing method was used throughout phase two to four, using emails, face-to-face interviews, Whatsapp questions and open-ended poll questions. Interviews were semi-structured to present participants with a set of basic questions and to develop new questions, based on the answers given.

The purpose for me as an interviewer in this study was to conduct the study in such a way that the process felt natural for the participants to help them feel comfortable with me. This was achieved by listening attentively, adopting an open and natural and respectful body response which encouraged a deeper response and helped reflect on what the participant had spoken about to offer a sense of interest (Gill *et al.*, 2008).

4.6.2 Co-design Workshops

An important aspect of both CHAT and DBR is collaboration and interaction with participants. In this study, I chose co-design workshops as a way to collect participants' input for the mobile application blueprint. Workshops and focus groups may be defined as qualitative research practices where a number of participants come together to discuss a particular topic. Co-design workshops contain the following characteristics: (i) a diverse range of participants who are invited, (ii) all views are accepted and discussed where many questions are spontaneously raised based on a broader initial questioning, (iii) any final decisions are made through democratic or professional input, (iv) the objective is to develop a consensus and (v) workshops are used as initial indicators of a trend (Sonkiya, 2018).

The characteristics of DBR in terms of CHAT meant that every iteration of the four phases produced new information that needed to be dealt with in an ethical and considerate manner. Due to the iterations and new information at every phase, the approach of the next workshop or interview had to be changed to suit the answers given. Survey methods of face-to-face interviews through artistic documentation with children and open-ended telephone questionnaires with caregivers were used in workshops (Denscombe, 2010).

As part of the workshop, I conducted face-to-face interviews via artistic documentation. These can be defined as an expression of emotions and/or experiences of an individual by using creative tools to discuss complex topics (Denscombe, 2010). During phase two and the beginning stages of phase three, the answers to interviews and workshops between the two study sites were conflicting; resulting in quick interventions that needed to be considered.

As a solution, with the help of sites A and B, I was able to conduct face-to-face interviews using artistic documentation with young children under the strict supervision of caregivers and care professionals. The young children were asked to draw their idea of greeting a friend, being kind and helping a friend. The survey method yielded results that helped clarify the data collected for the purpose of co-creating a mobile application and developing design principles: shown in figure 4.1 to 4.5.

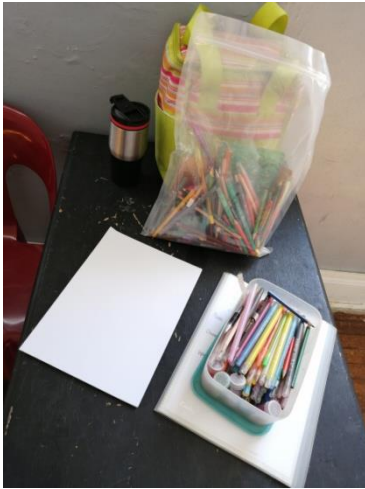


Figure 4.1: Site A co-design method location (Lewis, 2020)



Figure 4.2: Site B survey method location (Lewis, 2020)



Figure 4.3: Participant drawing (Lewis, 2020)



Figure 4.4: Participants drawings (site A) (Lewis, 2020)



Figure 4.5: Participants drawing (Site B) (Lewis, 2020)

An open-ended online questionnaire was designed to gather the opinions of a sizable number of participants in a short amount of time (Denscombe, 2010). This research tool was utilised in phase four among 12 additional participants because the current participants equally chose two blueprint designs in phase three. There needed to be one blueprint design only. The questionnaire was digitally approved by participants online after which was shared on the social media platform Instagram. Instagram allowed me to feature a 'storyboard idea' that allows for co-design tools such as questionnaires, surveys and opinions. The questionnaire asked participants to choose design one or two and explain why they chose the design.

4.7 Triangulation

Triangulation seeks the results of a study between dominant and secondary methods to converge, confirm and interact with data, increasing its legitimacy (Greene *et al.*, 1989: 255). In this study, triangulation was achieved by using iterations of different data collection methods, such as interviews and co-creation workshops successively over four phases to discover new local information pertaining to this study. This strategy helped create a well-designed educational soft skill blueprint mobile application using design principles that emerged during the research.

4.8 Ethical considerations and actions

To obtain permission to conduct research for this study, ethical approval had to be granted to protect the rights of all participants, and to accomplish the objectives set out by:

- Acknowledging the cultural diversity of Cape Town
- Complying with the ethical children's research method of 'gate-keeper' centred permission requirement
- Complying with an ethical standard of children's digital content development
- Complying with ethical standards of the Cape Peninsula University of Technology's research codes of conduct under which this research is undertaken (Cape Peninsula University of Technology, 2014).

The late inclusion of young children aged four to five was approved by the Cape Peninsula University of Technology ethics commission in 2019.

Apart from ethical considerations set out by the Cape Peninsula University of Technology, there are design research considerations that have defined codes of conduct as explained below. As a general pre-determined feature, participants were asked to sign or give verbal recorded consent to a confidentiality document by:

- Asking the correct gatekeeper formal permission to conduct research

- Stating the outline of the study in detail offering consent forms before conducting research
- Reassuring participants that pseudonyms and distorted or blurred imagery would be used unless stated otherwise
- Reassuring participants that all recording methods would be safely stored and deleted once the study was completed unless stated otherwise.
- Notifying participants that all the recordings documented would be available and deleted if desired.
- Informing participants that they could opt out of the study if desired.
- Stating that any data collected that showcases the participant harming themselves or others may be liable to a confidentiality bridge where relating authorities may be notified.

4.9 Summary

Design-Based Research was used to design an informal blueprint for a mobile application and successfully include the three forms of soft skills: creative thinking, communication and social media literacy as the core content to educate young children. The research methodology DBR was used in this study for its ability to iteratively accommodate the way in which content can be created with the help of the participants and professionals. The use of the four phases and research instruments DBR offered to capture data aided in the co-creation process of the blueprint of a mobile application as mentioned in Chapter five and six, for children within South Africa. This process made it possible to reveal new graphic design principles based on socio-demographic factors that could be built into a local and/or global framework for future soft skill blueprint and/or application development.

CHAPTER FIVE

FINDINGS OF PHASES ONE AND TWO

5.1 Introduction to findings

The purpose of this study was to provide a set of design principles for the design of a blueprint of a mobile application to help young learners to acquire soft skills. Incorporation of DBR outlined four phases in this study to pursue this purpose:

- Phase one: building foundational research
- Phase two: scoping and problem definition
- Phase three: ideation and prototyping
- Phase four: testing and evaluation

In Phase one, a literature review was presented and stakeholder interviews were conducted to help reveal existing design principles. The principles of **active learning, engagement, co-designing with children, context-sensitivity and design theory elements** that is line, colour, shape, space, texture, typography, scale, dominance, balance and harmony were chosen to create a basis for this study. Initial data collected from various participants involved in this study revealed a clear interest and need for soft skill acquisition to become an essential part of young children's daily tasks, as detailed in Chapter Two.

This study aimed to verify these design principles within the local context of South Africa by using existing literature, CHAT and DBR, to test and adapt these design principles and potentially add new ones if necessary, and simultaneously/iteratively co-create a mobile application blueprint by using these design principles. Chapter five covers the discussion of findings from Phases two and three, while Chapter six discusses findings from Phase four.

5.2 Phase two: scoping and problem definition analysed

In Phase two participants from the church - site A, the Montessori schools - site B and other stakeholders took part in the study during December of 2019 to March 2020 via interviews and co-design workshops. The purpose of Phase two was to make use of the theoretical framework CHAT's activity system, to understand participants' perceptions and reveal

potential contradictions between the participants in South Africa to verify the selected principles, and reveal new design principles, before designing the blueprint. As explained in Chapter three, collected data were categorised according to different elements of the activity system: subject, community, object, tools, rules, division of labour and contraindications in terms of the two major sites of the study. Site A was a church group and site B comprised Montessori schools. Findings are summarised along the different nodes of the activity systems across the two sites in order to show how differently positioned participants were. These findings are not necessarily representative of these groups in general but serve as an indication of how important it is to consider context in design.

5.2.1 Tools

The tools used before conducting research are the internet, methodologies and techniques used to conduct research, a laptop, papers such as mock-up design templates, pens and markers. While conducting research, participants found it best to conduct iterative interviews online due to their busy schedules. For this reason, the tools became the Adobe suite, digital design, editing and processing software, to create the blueprint and send via email and WhatsApp for feedback. This process proved successful and collected data were stored on an encrypted application and used to edit the blueprint for later iterative analysis and feedback. Further tools in this study involved also the educational philosophies and experiences of the participants. Through their various educational backgrounds and practices, they were able to offer educated feedback that helped give insight to various levels of the study that affected the design of the mobile application blueprint and also to design principles.

5.2.2 Subject

I am the subject in this study. I am enrolled as a Master's student (2019 - 2020) at the Cape Peninsula University of Technology and a graphic designer and animator at an international e-learning agency (2017 - current). There are three aspects in my life that have helped shape my passion for discovering design principles and co-creating a mobile application towards teaching soft skills acquisition informally:

1. **E-learning:** I am passionate about creating content through a template based on good design. Working at my company entails creating e-learning videos for various topics, mostly concerning employers - employee compliance acts, training orientation and university course education where design elements and principles need to be interpretable in various languages and across various audiences from different socio-demographic backgrounds.
2. **Passion:** Suffering from mental health issues at a young age deprived me of soft skills due to self-isolation that became apparent at university and in my work environment. My mental health improved over the years and I became passionate about finding well-designed alternatives to help people going through similar situations. My bachelor's (2017) research report covered alternative methods for overcoming Social Anxiety Disorder (SAD) whereas my Master's covers soft skill acquisition to aid young children.
3. **Games:** I have long had a passion for games of various types such as console, computer, mobile, arcade and board games and used it as a means to escape reality when in an unhealthy mental health state.

For these above-mentioned reasons, I approached this study as the subject, an instructional designer, social cultural entity and researcher for exploring the possibility of co-designing an informal mobile application blueprint for young children to acquire soft skills.

5.2.3 Community

Since children are not always able to express their views on complex topics such as explaining the diversity of the local context or sharing their views on informal education and mobile applications, the majority of the data collected initially were drawn from the community chosen (Shown in Table 5.1) for this study: caregivers, care professionals and stakeholders, supported by the literature review set out in Chapter two.

This community is drawn from church - site A, the Montessori schools - site B and members of my own design community, drawn from my places of work in Cape Town as

well as social media platforms such as email, Whatsapp and Instagram. Participants in this study are highly diverse since:

- They are from different upbringings and have diverse socio-demographic contexts; age, gender, ethnicity, income brackets and locations within Cape Town;
- The caregivers, care professionals and stakeholders have different levels of education;
- Participants in this study hold different worldviews and different T&L philosophies which impact on their openness towards the use of mobile application for young children within informal education;
- Participants in the study exhibited varying levels of design knowledge.

Since young children need to assist in the co-creation process of the blueprint for a mobile application, and in compliance with the design principle of a co-design, a part of my community in this study are young children between the ages of four and five from the sites A and B.

5.2.4 Object

‘Object’ in this study may be interpreted as validating reasons that caregivers and care professionals offered for developing a blueprint for an application for a mobile device that assists young learners to gain soft skills (Mwanza, 2002).

Participants at site A believe that it is soft skills can be taught both at home, but also by an educational institution as stated by Participant one: “Challenging, not having opportunities at home to help with soft skills at a level of an educational institution”; and Participant two: “[Name] is at a Montessori school where they are helped to manage themselves and their emotions.” Further site A participants accept the technological advancements ‘era’ as seen by the feedback of the participants as all caregivers at site A offer their young children phones for recreational and/or educational use as well as Participant four commentary which states: “There are some really great learning apps... let’s be honest the worlds going in that direction.” Finally, it was evident that a caregivers’ time factor was not the only

determining factor in the lack of teaching children soft skills; but the unsafe environment outside children's homes also necessitates that devices are offered as 'babysitters' to keep children safely occupied inside the home. In the last findings site A's response were that Participants 1,2 and 3 were enthusiastic about mobile phone usage for their children and the cost-effective nature of free applications; "great! makes life easier" (Participant 1), "helpful, convenient" (Participant 2) and "I like that there is an app for everything and that there is no commitment" (Participant 3).

In contrast, the care professionals at site B believe it is the caregivers who predominantly 'should' assist in soft skill acquisition with their child(ren). but currently soft skill acquisition is not their main practice as stated by a care professional: "I deeply feel that the adults these children are in the care of need an app to help them - I do not believe children can learn soft skills this way (only through care professional aid)". Additionally, site B participants are not as enthusiastic to accept the technological advancement 'era' taking place as Site B Participant one and two adds that they believe mobile applications takes away a child's individuality but can acknowledge that the future of the young generation is heavily 'digital device' dependent. Further feedback regarding the opinion of technological advancements by Participant 4 stated that "none of us (care professionals in site B) are keen on devices at this age; this is just actually not what we want but the reality is they (children) are exposed. I think another challenge in the game is that there's only one outcome that's not necessarily the outcome the child would have realized themselves." All Montessori schools' interviewees (Site B) are not enthusiastic to include technological advancements in the form of mobile devices in children's lives at ages three and older but understand that one day they will need to be exposed to the technology and further believe that it was the duty of the caregiver and not a device or care professional to offer informal methods of soft skill acquisition as proven by site B Participant four: "I often give my niece my phone to play with so that I can make food or if I am doing my hair and I am okay with that".

My interpretation from the findings above suggests that the two sites differ widely in their perceptions on the role of mobile application in the lives of young learners. The community that directly or indirectly formed part of this study consisted of a list of individuals,

comprising caregivers, care professionals and other stakeholders, such as designers. As stated previously site B are included as an informative group of professionals that assisted in the localisation of soft skill acquisition in a diverse formal context, but the community which would be directly benefit from this study was site A. This community provided strong evidence that they were interested in taking part in a study that could potentially benefit young children's acquisition of soft skills. The community in this study stated that they were mainly motivated by **seeing the benefit of the mobile application for their own child's future** as well as the idea that they were part of a **process of co-creating an educational application for their child to use while they were busy**.

5.2.5 Rules

Rules defined in this study are written and/or unwritten. According to Engeström (2001) young children start to learn rules set by a community of caregivers and care professionals for the benefit of the child. Rules in this study are helpful guidelines when designing a mobile application (Shown in Table 5.1). Questions related to the setting of rules were posed in interviews and during co-design workshops to establish similarities and differences in perceptions between site A and site B.

Table 5.1: Responses to activity system rules

Activity system	Purpose	Participant feedback	
		Caregivers (Site A)	Care professionals (Site B)
Rules	To discover: What content is appropriate to actively engage in?	The caregivers either choose or allow their children to pick mobile applications for the caregivers to review. Only one participant (CP3) believed that educational applications should be first option for their child	The care professionals' comment that Educational content should be the main mobile application for young children

	What circumstances and cultures need to be acknowledged or generalised?	Site A's caregivers are more concerned with young children understanding their immediate surrounding environments, cultures and diversities rather than looking at the global context of all environments, cultures and diversities.	The Site B - Montessori care professionals believe in a globalisation context , due to the Montessori teaching methods that attempt to educate children into a mindset of ' we are all part of a global community ' and that all races and languages should be considered when designing a mobile application
	Are there screen time constraints?	Site A's caregivers gave their children an average of between a half an hour to an hour .	The Montessori care professional was adamant that fifteen to twenty minutes was more than enough as this is the proven attention span a child between the ages of four and five are capable of.
	Whether the mobile application should be online or not?	All participants excluding one in this study believed that a mobile application should be offline as this poses less risk of children going onto applications they are not allowed to.	
	Is reviewing content before child use and daily access important?	With concerns about how caregivers and professionals review the applications downloaded, most have suggested that other than supervising their children at times, most applications have an 'in-application-lock/block' setting that they utilize	
	What are the reviewing methods of a mobile application?	All participants also indicated that they do not fully supervise their children on a mobile application but rather rely mostly on the blocking settings	

In the activity system, 'rules' offered the first important guidelines for designing the first mobile application blueprint to take place in Phase three. 'Rules' indicated that:

- I have to design a mobile application that considers children's design style since the child at times chooses what application they would like to play. Caregivers at times offer mainly educational applications to their children.
- The mobile application should be offline and an 'in-application-locking/blocking' setting should be incorporated into the game since caregivers do not fully supervise their child; as indicated while conducting research and in the literature review in Chapter two.
- There are two contrasting results that arose: that caregivers from site A believe that the mobile application should include design influenced by the local context of South Africa supporting context-sensitivity whereas site B believe that a global context should be considered. Although the caregivers offer their children their mobile devices for 30 minutes to an hour, site B all agree that the time should be 15 to 20 minutes.

5.2.6 Division of labour

Participants played an invaluable role in offering complementary and/or contradictory feedback towards the development of the mobile application blueprint and to help verify and possibly reveal additional design principles to the ones mentioned in the literature review.

My experience of conducting research with site A and B was informative and helped every part of designing the mobile application blueprint and making design principles manifest.

Site A consisted of caregivers who were the care-takers of the children during church service. Caregiver answers were affected by their religious beliefs, by using quoted scripture to answer questions asked by myself and showed how they incorporated Bible-related lessons and opportunities to raise their children in Christian teachings. Answers provided by participants from site A were that local contexts only should be incorporated

and everyday situations be designed to prepare their children for a future world in which such situations actually occur. In the context of my study, participants at site A were interested in the future readiness of their children.

Site B consisted of participants called directresses of Montessori schools who taught children in a holistic way. Participants of site B answered in a pedagogical sense by using their teachings of the Montessori method to foster an independent characteristic in each child attending. All the participants at site B believed that children should be exposed to the global context in the mobile application. Their reason was that through Montessori teachings, every individual is part of a global community that needs to be acknowledged and incorporated through design. Participants at site B were concerned with children's prompt understanding of individuality and that they are part of a community. My experience with both sites showed that there are different cultural stimuli governing answers to the questions posed to them in the co-design process.

During the final phases of analysing the data collected for designing the first blueprint after Phase two, I noticed that the two sites had contrasting feedback, as shown above and that more research needed to be done. The research conducted was among young children between the ages of four to five within the two sites. The young children participated in a co-creative workshop, termed *artistic documentation* (Denscombe, 2010) on the 27th of February (site A) and the 4th of March 2020 (site B) where previous contrasting feedback by caregivers and care professionals was clarified by analysing and interacting with participating children. Care and consideration were taken and ethical values included when conducting the workshop.

Inclusion of young children's input was invaluable in discovering what answers aligned more with a young child of ages four to five and helped clarify the design principles needed to devise a mobile application blueprint, as explained later in this chapter. Conversations with, and answers from, the children compared to the answers generated by the activity system in many ways affirmed that the design principles were correct for a mobile application blueprint as the following points suggest:

- Teaching soft skills informally on a mobile device allows children to actively learn the needed soft skills for their future through safe gameplay. Both caregivers and care professionals agreed that this method has the potential to be educational.

(The principle of active learning)

- Children need constant small tasks as indicated by a site B participant: children's attention span only ranges from between 15 to 20 minutes. These tasks can lead to a half an hour to an hour's worth of application interaction as indicated by the site A participants. **(The principle of engagement)**
- Data collected was clarified by interacting with the children; showing a need for direct co-creation input further discussed in this chapter. **(The principle of co-design with children)**
- Although there were contrasting indications by my direct and informative community (site A and B) on whether the context should be local or global, talking to the children and looking at the artworks presented after the workshop helped me understand that they too are inspired by their immediate surroundings. Caregivers further affirm this principle by indicating that they would prefer their child to be exposed to a game within a local context while site B participant 2 indicated that children are inspired by everyday events. **(The principle of context-sensitivity)**

5.3 Design principle development

My mobile application blueprint was guided by a set of design principles. Beyond the existing design principles shown in the literature review, through triangulation of data collected, I have defined a new design principle. The following entries in my research journal show how design principles influenced my design (research journal 2019-2020):

An extract from my research journal: 4th to 20th of March 2020

During the period of late February and the beginning of March, I have been in contact with Stakeholder participant - 1 the Founder of a site B Montessori preschool and booked the 4th of March to be at a time where I can conduct research with a diverse array of children ages four to five from between 9:30 to 10:30. Firstly I explained who I was in a way that

everyone in the co-design workshop understood, I explained that I would adhere to the Guidelines of my university and by the child based guidelines of conducting research with children. I then notified the children, letting them know that I spoke to their care professionals, the principal and their caregivers about the co-design workshop. I also explained that no pictures or names will be taken and that there was a care professional and caregiver at all times if they would not like to participate or needed a toilet break. I took special care in continually asking if the participants were okay, if they needed anything extra or had any further questions in order to protect the young children **[Considered here the principle of co-design with children]**

This time was vital in seeing how children interacted with not just me, but with (1) each other, (2) their mobile devices, (3) recreational activities at home and (3) what they do to socialise as well. Unfortunately, pictures and voice recordings were prohibited but the children had drawn for me. **[Considered here the principle of context-sensitivity and engagement]**

Of the four children, two of them were always done with the task - drawing much quicker than the other two children. As a result, I saw a way of applying the engagement principle directly by asking them: What would they like to add to the character? and Would the character like to be with someone else? These questions allowed children to draw their favourite toys, friends or pets and many other things that I thought could be used in design to further justify co-creation and context sensitivity in this study. **[Considered here the principle of context – sensitivity, engagement and active learning (techniques)]**

Once I was done with the workshop the children and I still had 10 minutes left in which they asked to draw more. After the care professionals and caregivers approved their request, what was significant was that children although intrigued by popular television or YouTube characters did not draw these characters but drew everyday life without me asking them to. **[Considered here the principle existent imitation documentation (new)]**

This finding was particularly interesting because previously site B's care professional stated when I asked the question if the characters should be mystical, alien or animal (brought about by research in literature and previous game character observation), the response

was that children are inspired by everyday life as they are learning. 'What they are mostly physically surrounded by inspires and connects them most' (site B's care professional). Although the staff are against the idea of a mobile application for children, if one 'simply' had to be done they suggested the inclusion and inspiration of artworks by children or everyday life from a child's perspective.

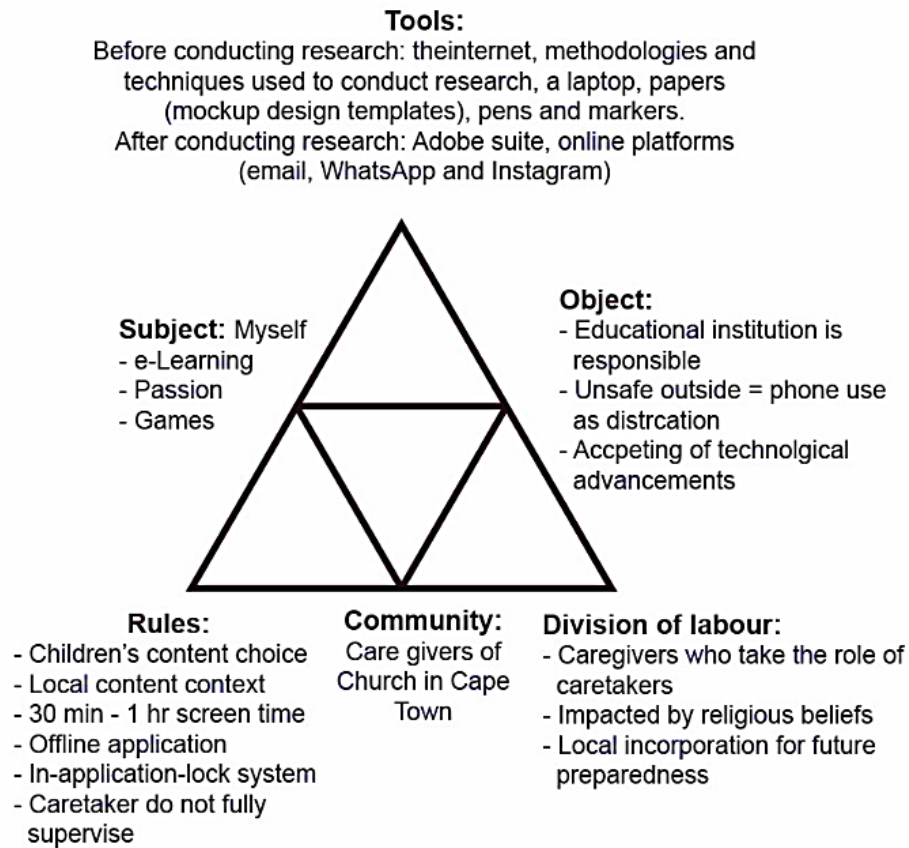
A new design principle that aligns itself with the need to co-create an application emerged by interacting with children. This was the design principle of **existent imitation documentation**. Children draw themselves in situations or document various other friends and family members doing certain activities. Montessori care professionals repeatedly noted that although children watch various television or YouTube shows with animals or imaginary creatures talking and teaching lessons, the activities they talk about or draw at preschool are about their everyday lived experiences.

The **principle of existent imitation documentation** can be engaged with by creating an application blueprint that touches on real-life situations through the way children draw their activities. Observing child-to-child interaction in terms of existent imitation documentation increases engagement and commonality that ensures a safer online-environment for children to freely interact with.

5.4 Contradictions in the activity systems

Employing CHAT's activity system in this study helped focus the perceptions of participants in the study and aided in the localisation of the design principles chosen (Shown in Figure 5.1).

SITE A:



SITE B:

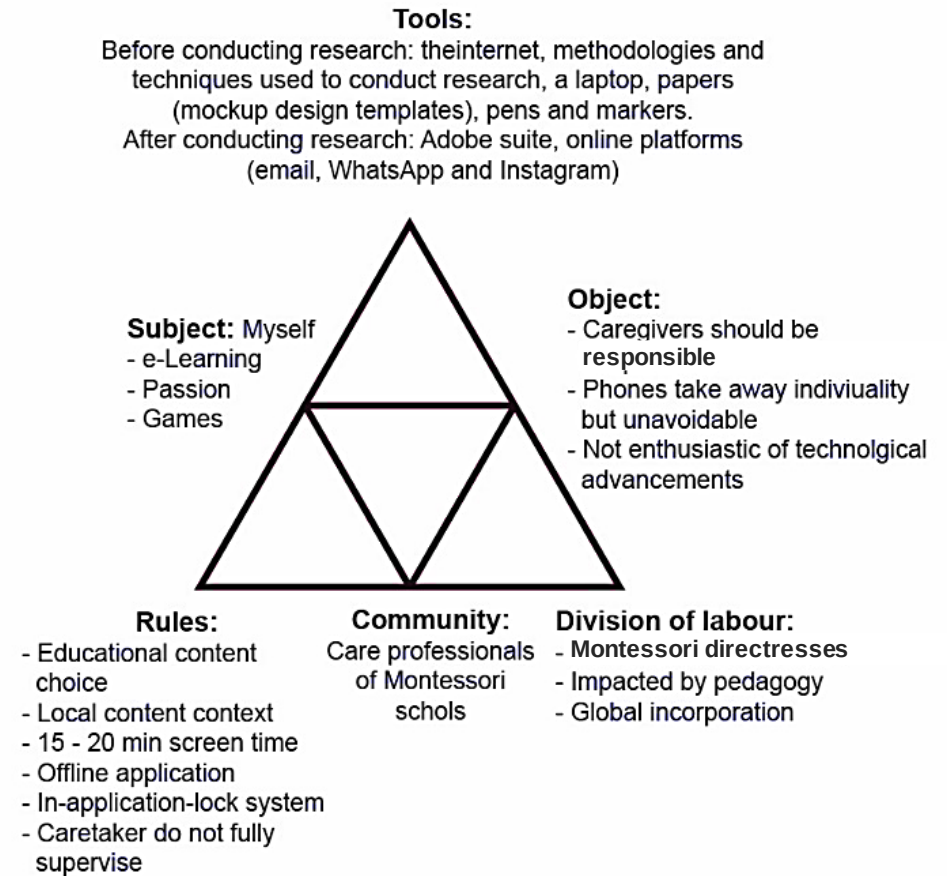
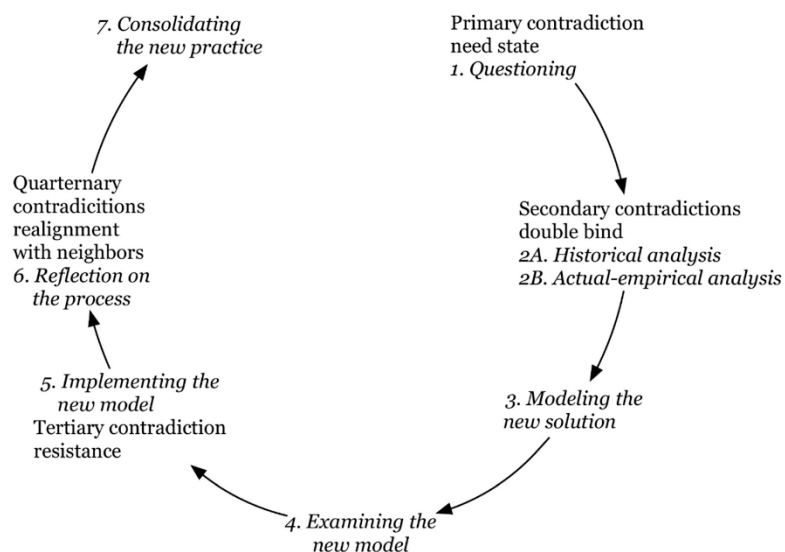


Figure 5.1: Activity system between site A and B

Late in the process of conducting research, I decided to engage children directly in the research, by asking them to provide artistic documentation (Denscombe, 2010). The participating children between the two sites to assist with designing the mobile application. The young children helped me clarify adult participants' perceptions and became the main source of character and style development for the design of the blueprint for the mobile application.

Clarification was found, and implemented; between my direct community (site A) and my informative community (site B). This process may be expressed through Engeström's expansive learning circle (Sannino, 2009: 314) which refers to a process whereby an activity system resolves its contradictions by "constructing and implementing a qualitative new way of functioning for itself" (Engeström, 2016: 24) as a way to guide and support developmental work: shown in figure 5.2.

Figure 5.2: Expansive learning circle (Engeström, 2016: 24)



5.5 Phase three: Ideation and prototyping

After phase two, scoping and problem-solving with the help of the theoretical framework CHAT, a thoroughly structured and considered guide for creating the blueprint for a mobile application informal soft skill acquisition was established, beginning Phase three ideation and prototyping.

5.5.1 The outcome: Key

From the 28th of April to the 1st of May I designed the first blueprint for a suitable, safe and reliable mobile application to assist young learners (Shown in Figure 5.3). The mobile application is called Key to imply keys unlocking the doors to:

- Soft skill acquisition
- A better-equipped future in school and work
- An educational and interactive playable story
- A safe recreational activity to engage children while caregivers do daily tasks

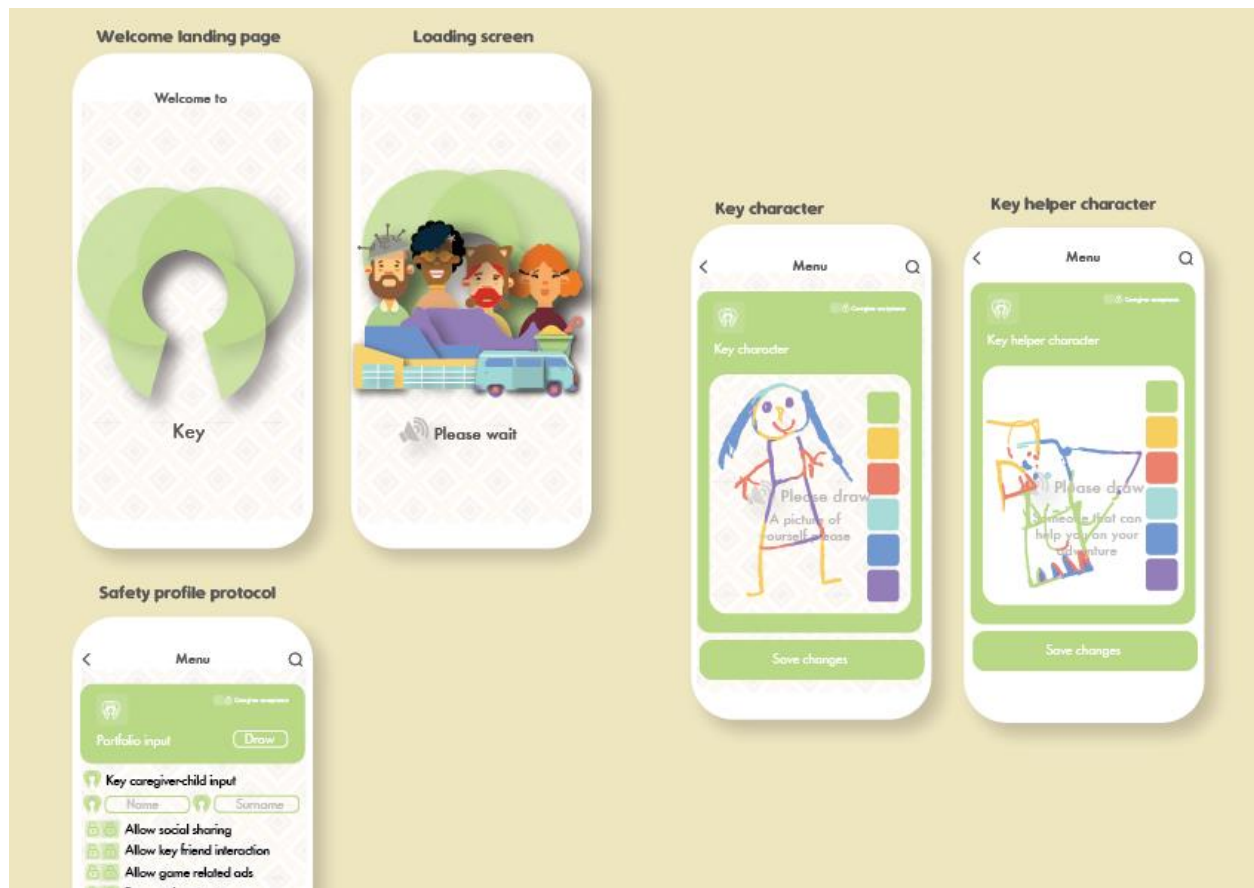


Figure 5.3: Key Blueprint page one (Lewis, 2020)

Key begins its first screen with the logo followed by a loading screen. A portfolio is then created with the help of the caregiver because it has been noted that the majority of the caregivers want a username and password and inspect the application and set 'in-application-blocking' (Shown in Figure 5.4) before offering applications to children. The following screen creates individualisation by allowing children to draw themselves as the protagonist of the game, including their preferred partner whether it be their friend, sibling, pet or favourite toy. They are given the opportunity and freedom to draw themselves and a partner on this application as their portfolio pictures.



Figure 5.4: In-application-blocking system

The freedom to draw themselves is in compliance with the views of the site B's care professionals as well as the new design principle of *existent imitation documentation*. The next three screens deal with settings to choose which preferred language option given context sensitive a caregiver would prefer their child to engage with in the game, followed by a caregiver's practical guide for explaining what soft skills are and the related soft skills in this game such as creative thinking, communication and ethics (Shown in Figure 5.5).

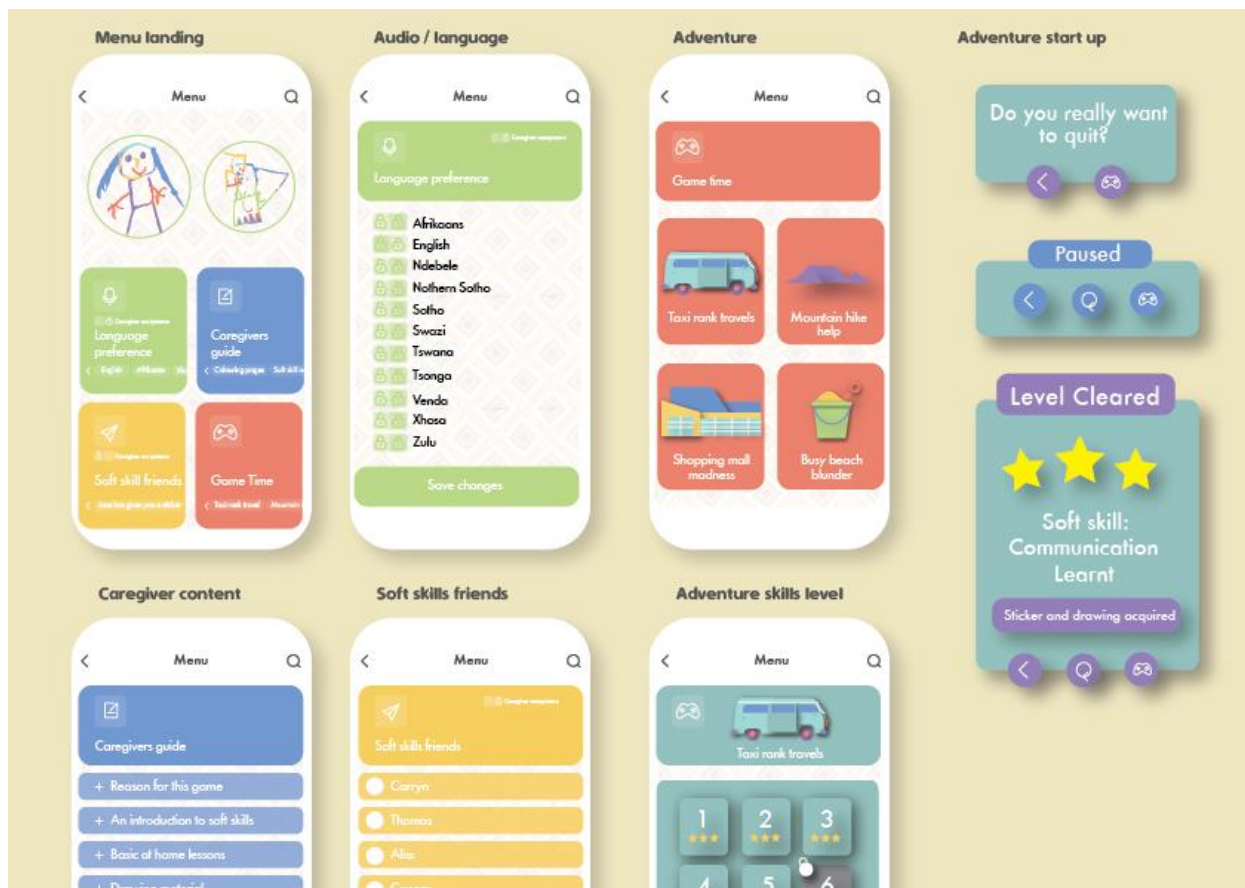


Figure 5.5: Key Blueprint page two (Lewis, 2020)

In understanding children's needs for social interaction and furthering their communication soft skills, Key includes a social friend group to which the caregiver's child can belong. The last two screens before entering the game-play of the application deal with the four-story categories or themes: taxi rank travel, mountain hike help, shopping mall madness and busy beach blunder. The majority of participants suggested I incorporate local context wherever possible to comply with the principle of context-sensitivity and to acknowledge South Africa's unique social diversity. The last screen shows the one to ten levels in each story mode to incorporate the principles of active learning and engagement.

The third and final blueprint page of my first design iteration (Shown in Figure 5.6) allows children to see the four-story modes game process and their corresponding characters. Taxi rank travel deals with communication and begins by **Travis** needing help understanding how people would like to be greeted. The literature review in this study

shows the importance of four to five-year-olds understanding that communication occurs in different ways. This is what the mobile application looks at first.



Figure 5.6: Key Blueprint page three (Lewis, 2020)

Second, Mountain hike madness looks at creative thinking with **Mike** who needs help utilising his surrounding environment to construct a water wand. Constructing fantastical (not real life) objects made from seemingly normal surrounding materials encourages creative thinking in children; allowing the process of “perceiving a situation or obstacle through a new perspective” as mentioned in the literature review.

Third, **Shelby** deals with ethical situations in Shopping mall madness whereby children need to enter a mall but can use various options to excuse themselves from entry. This game play allows for the “honesty, equality and respect within a society”, as Rischenole

explains in the above literature review. The mobile game itself shows the ethical mannerisms by which caregivers can feel safe by means of a profile and the ability to lock/block certain parts of the mobile application blueprint.

As a means to challenge the children playing Key, there is a stage where various levels expose a combination of communication, creative thinking and ethics through one game play. Here in Busy beach blunder, **Bunme** asks the game player to enquire (ethics) of the various beachgoers (communication) about a missing hair clip that shattered. The game players here find parts of shapes of the clip to fill the top-right shape by asking beachgoers and locating other pieces of it on the beach (creative thinking). The final stage is not as easy as the last three stages but ultimately allows for Key to help children gain knowledge of how to use the three soft skills in unison.

The non-playable characters in this game, Travis, Mike, Shelby and Bunme, are all inspired by the children's drawings (Shown in Figure 5.7) done while conducting research. The colours chosen in Key were determined by the caregivers, Montessori care professionals and stakeholders who all suggested bright colours be a prominent factor in attracting young children alongside design theory elements and recent design preferences of 2020. The design style shows a 2D 'paper lift' effect (Shown in Figure 5.8) as I felt this best describes the children's drawing done while conducting research to make them feel as though they are a part of the story.



Figure 5.7: Character inspiration



Figure 5.8: Paper Lift effect

5.5.2 Testing and evaluation of the blueprint for a suitable and safe mobile application

During the first to the fourth of May, I emailed or used Whatsapp to exhibit the above blueprint designs as an image or portable document format (PDF) to the participants. The blueprint design and storyline were well received and there were only a few comments from the participants for changes to the design, as mentioned in the journal entry below.

Journal entry: 1st to 4th of May

*The 'proper' feedback was as follows; from site A, site A participant - 3 mentioned that his only crit [criticism] was that of **pages one and two, it seemed dull in comparison to page three** and participant 4 suggested that I include the partnerships with companies focused on bettering a child's future. Although participant 4's comment falls outside of design and more into the post design: campaign, production and financial stability of a mobile application, it could be an important factor to consider for the future success of this mobile application. When calling the Montessori schools (site B) they both expressed that because they believed that caregivers are to be the true presenters/educators of soft skills, they felt it best to not be included in this part of the study.*

The changes were as follows: I increased the brightness of the colours used throughout the blueprint: I moved the general loading screen from a light green to a clear, playful mustard yellow. The possible partnerships or sponsorships Key could obtain were included if the blueprint design were to become a successfully developed game in the opening and loading screen: shown in figures 5.9 to 5.11. The redesigned mobile application blueprint was then emailed or sent through Whatsapp to participants for feedback, initiating the last iterative cycle, Phase four: testing and evaluation.

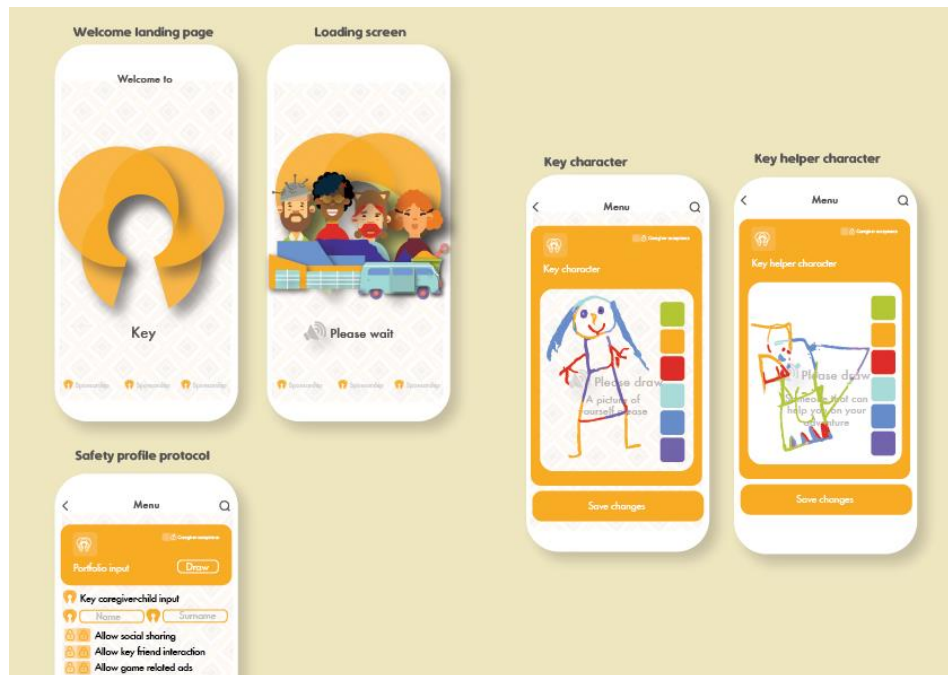


Figure 5.9: Key Blueprint redesign page one (Lewis, 2020)

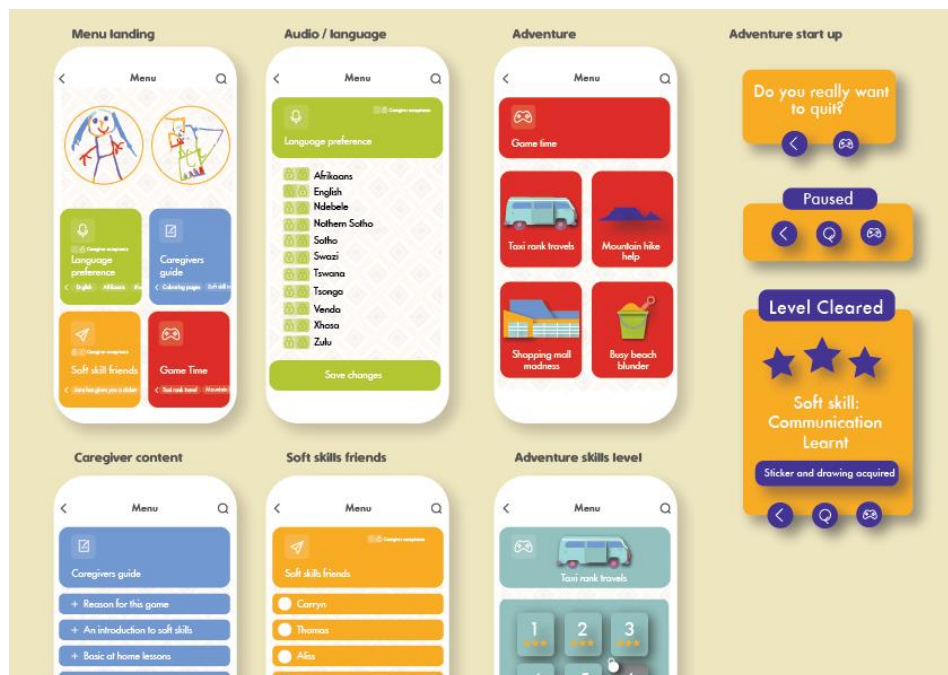


Figure 5.10: Key Blueprint redesign page two (Lewis, 2020)



Figure 5.11: Key Blueprint redesign page three (Lewis, 2020)

5.6 Summary of outcome of phases one to three

Phases one to three showed the findings of the literature review and the perceptions of both sites A and B, which effectively justified the need to include young children's feedback in this study. Participation of the young children for the two sites A and B allowed the perceptions of the adult participants to be clarified and the creation of the design principles needed for the development of blueprint for a safe, suitable mobile application. With the help of CHAT and DBR, a structured framework was created and a blueprint for a mobile application in Phase two appeared and was edited through Phase three in Chapter five.

CHAPTER SIX

DESIGNING A BLUEPRINT FOR A MOBILE APPLICATION

6.1 Introduction

Chapter six comprises DBR Phase four, in which the last iterative design of the mobile application was established and distributed to participants for testing. The evaluation and design principles chosen for this study were analysed and finalised.

6.2 Phase four: testing and evaluation

Phase four explores participants' feedback from the redesigned blueprint for a mobile application in a finalised blueprint design and the final co-designed model in this study. Within this study, participants at site B are seen as an informative aid in understanding the method in which soft skills are locally taught in a formal schooling environment (Phase two). Additionally, coupled with the holistic approach of the Montessori method and the participants personal ideals, site B opted not to proceed through to Phase three and four. This is one of the reasons why the design was sent out for comments to a community of designers via various social media channels.

6.2.1 Final feedback on a blueprint for a mobile application blueprint

In comparison with the first feedback given in Phase three, in Phase four participants who decided to take part in the final phase were asked to give feedback on the redesigned blueprint of a mobile application which helps children to acquire soft skills. Between the fifth and eighth of May, the designs were sent through various social media platforms to participants, marking a final iteration. An equal number of participants chose the initial design and the redesigned model; with substantiated commentary as to why they thought the design they chose fitted the criteria. Because no final design could be selected, I decided to use the social media platform Instagram to conduct research since it allowed a user to construct an online poll.

Journal entry from the 5th to the 8th of May:

Between the 5th and 8th of May, I reflected on Site A participants 3 and 4's constructive feedback and redesigned the mobile application to suit the edits given. I then further created a PDF to showcase the first and second design side by side as design 1 and design 2. The PDF was then distributed to the participants who offered further consent to proceed through Phase three and four. Between Site A and the stakeholders, only one extra participant preferred the new design (design 2) over the first design (design 1).

Upon discovering this I felt as a designer that the number of participants that referred to the new design was not enough and so created a poll on the social media platform Instagram. Instagram is a social platform that not only allows you to post life events but to share daily occurrences with an added feature of including quizzes, multiple-choice questions, polls and a love meter (how much you like something). I used this platform to showcase my two designs as my profile contains a generally diverse but mainly established graphic designer community following. On my Instagram account, I asked my Instagram community if they would like to consent in being a part of my design paper to choose which of the two designs they preferred to use in my study and over the course of a day, 12 people answered, five of which are graphic, fashion, animation as well as illustration designers, two photographers, two participants who were in the marketing and advertising sector, two mobile developers and one biologist - all participants with young children of their own. The majority (8) of the Instagram community who participated in the study chose the second design option which ultimately affirmed the response of the pool of participants that participated in this research.

*It is important to note that throughout Phase 3 and 4 there was always a barrier of design communication: as a designer I appreciated the compliments for the design I created but was more interested in eliciting constructive feedback to better the design from my participants as well as through the incorporated design principles. In understanding that not all participants were not familiar with design theory and general design principles, it was often hard to group feedback to constructively design the application blueprint. I will, in my study, classify this as a design principle called **non-designer constructive analysis**. Non-designer constructive analysis can be defined as the obstacle by which the design*

terminology, design theory and critical design feedback between a designer and non-designer need to be analysed to fully understand what design-related changes need to be made in future. I will explain this design principle in Chapter six with words and/or phrases discussed between the participants in this study and me.

6.2.2 The independent subjectivity of testing a designed product

Reflecting on Phases three and four, and the fact that participants lacked extensive knowledge of design theory elements and principles, it became clear that participants subjectively chose a particular design based on what they liked or preferred, and used the vocabulary relating to design with which they were familiar to convey their views.

Throughout Phases three and four, there was a barrier to design communication between the participants and myself because they were not familiar with design theory elements and the terminology of principles. It was essential to group feedback under theory elements of line, colour, shape, space, texture, typography, scale, dominance, balance and harmony, and principles.

Although it is not considered a principle outside this study, there has been an increased interest, mainly starting from the year 2018, among designers to decode non-designer related feedback (Beck, 2018). Beck (2018) states that there is an abundance of literature about designer-to-designer feedback and academic material on design analysis. Often the client that a designer is conversing with, has little previous knowledge of design theory or technique (Beck, 2018). This is a problem since client/participant feedback is more important than designer-to-designer feedback (Beck, 2018). This study only touches on some of the client/participant to designer feedback regarding soft skill acquisition through a mobile application blueprint, by showcasing how important the knowledge of design principles is to deciphering the feedback needed to better a design.

6.2.2.1 Developing a second design principle

To clarify problems in design communication between a participant and a young researching designer, I have included a table to assess the feedback given. I have grouped similar words together and then analysed these according to the design theory elements

and principles provided. The table below can be used for designer/participant communication and supports the second principle within this study called non-designer constructive analysis.

Table 6.1: Non-designer feedback categorised into design theory

Word and phrase	My interpretation of meaning in relation to design theory elements
Site A participant - 5: "colour scheme is attractive and bright" Site A participant - 1 "kids will be attracted to it" Stakeholder participant - 3: "looked like it was a kiddie app in colour"	Here participants may be referring to the correct balance of hue, lightness/darkness and intensity of colour
Site A participant - 3: "The colours need to be striking"	Site A participant 3 is referring to an imbalance of a colours value (the lightness and darkness). Additionally, I assume the word striking refers to their belonging to the primary colour range and not being too 'sophisticated'
Site A participant - 3: "Artwork and layout"	The way design is produced so that a viewer typically looks at it from left to right or up to down - designed on artboards
Site A participant - 2: "Easy on the eye"	Here Site A participant 2 is stating that there is harmony within the design expressed through the balance, variety, scale, unity, colour, space shape, line and form of the design shown
Site A participant - 1: "Interact" Words similar in this study include: Site A participant - 1: "navigate"	Here Site A participant 1 is talking about the functionality of the design, the buttons to direct a mobile user and smooth transition from one menu page to the next is easy to understand
Stakeholder - 3: "I like the simple design"	Shape, space, balance, scale, movement and unity is at harmony where Stakeholder 3 is able to view the mobile application blueprint as not too busy

Site A participant - 4: “gentle”	Referring to the relationship between colour and value. The hue value in design one was more subtle than the hue value of design two
Stakeholder - 2: “the bright red is too much red” also “(red) creates a kind of alerting’ feature	The hues value is too contrasting to the other colours surrounding it. This means that there is no overall harmony and the designs hues value needs to be adjusted or different colour where the hue more suits the colour palette was chosen will fit better
Instagram participant - 8: “seems more organised and intentional”	Here the non-designer feels that the overall elements of design and principle of design are being adhered to
Instagram participant 11: “resonates more”	This participant prefers this design more (second design) as it resonates with his design style.

Non-designer constructive analysis can be defined as the process of interpreting and categorising non-designer feedback into groups of design-related theory elements or principles to co-design a product or service. **Non-designer constructive feedback analysis** allows the designer to understand which theory or principle a non-designer participant is referring to, to design/redesign a product of service.

6.3 Reflections upon findings in Phase 4

Phase three began by first using the literature reviews findings and data collected to design a mobile application blueprint for acquiring soft skills and second to discover the feedback of the design from participants. Due to the feedback given, the design was redone and feedback sought again, marking the final DBR: Phase four. Because participants showed no distinct preference for either early or later design, additional participants were invited in the form of a poll (Shown in Figure 6.1) created on Instagram. These designers showed a clear inclination towards the redesigned application. Finally, in phase four, based on the feedback by one of the supervisors, herself a designer, feedback from a design colleague’s co-supervisor, the location names were changed and the brightness of the red in the design was lessened (Shown in Figure 6.2 to 6.4). Chapter six showed many ways in which design principles were implemented and how the two new design principles of **existent imitation**

documentation and **non-designer constructive analysis** successfully helped and formed part of the mobile application blueprint.



Figure 6.1: Poll design (Lewis, 2020)

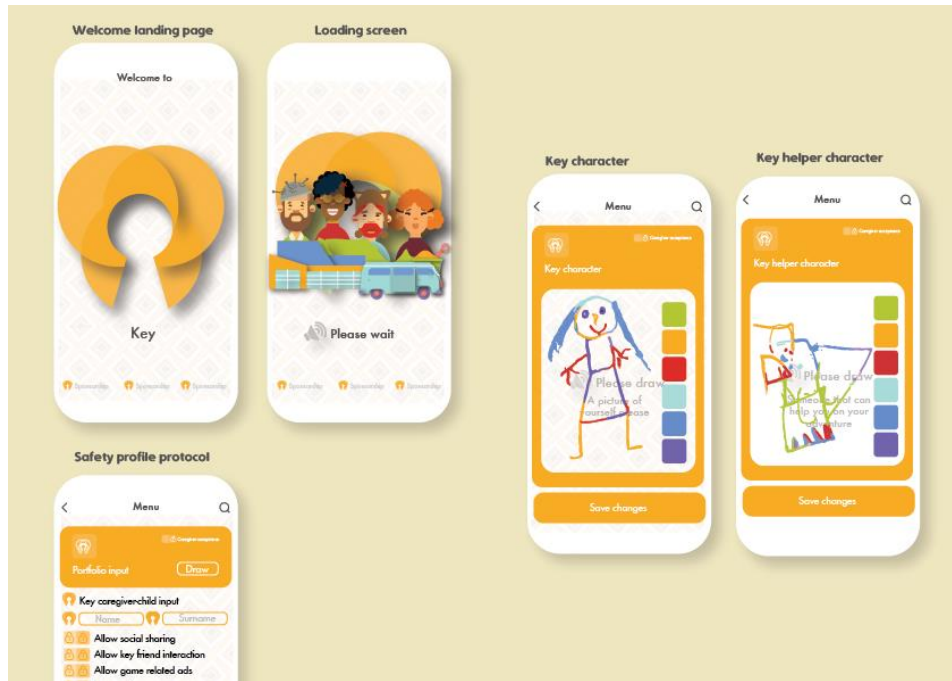


Figure 6.2: Key Blueprint final page one (Lewis, 2020)



Figure 6.3: Key Blueprint final page two (Lewis, 2020)



A table is presented below. One shows in what design process the design principle was used. The second presents the research sub-questions of the study and what design principle(s) were used: Shown in Table 6.2. How the design principle was used in this study, and where it can be found in the blueprint for a mobile application are discussed.

In this study, I have used various ways of exploring design principles for the development of a suitable, safe blueprint for a mobile application for children between the ages of four and five. I have looked at local and global literature on formal and informal learning, analysed popular mobile applications highlighting which factors to incorporate into my blueprint, and finally I have conducted my own research with diverse groups of caregivers, care professionals and children to determine whether these design principles were valid and whether there were new design principles that could be added.

Table 6.2: Design principles in the design process

	Design principles	Design process
Pre-design	Context – sensitivity	These design principles are used to establish the perceptions of the participants in the study. By understanding the socio-cultural context, preferred play-through application, types of engagements needed, design preferences for the user interface and restrictions; a design can begin to emerge set in considerate restrictions.
	Active learning	
	Engagement (relatable imagery and easy navigation)	
	Co-designing with children	
	Existent imitation documentation	
Mid-design	Design theory elements (harmony, balance, colour)	A design is created using the design elements needed and perceptions established in pre-design.
Post-design	Non-designer constructive analysis	Feedback is given from participants and used to redesign the blueprint established in mid-design.

6.4.1 How the design principle of context-sensitivity was interpreted in this study

In chapter two, I explored the importance of addressing the principle of context-sensitivity when designing mobile applications for learners. It is important to distinguish between favourable and non-favourable content as well as culturally appropriate scenarios (Paruthi, 2018: 37 - 39) in such a study.

The first design principle I focused on was context sensitivity. I found it essential to incorporate this design principle due to the following two findings. First, all the participants in the study wanted the surrounding environment and storyline of the application to show real-life scenarios; for example, daily crowded places so that their child/a child might experience the diversity of South Africa in a taxi rank, on popular beaches, mountains and shopping areas. Second, when engaging with the children it was apparent that their drawings were inspired by daily life events. Thus, the need to use real-life contexts became manifest and needed to be incorporated.

Context-sensitivity was incorporated throughout the mobile application blueprint by (i) offering different language preferences, and (ii) by allowing children to draw their own characters to reflect uniqueness and diversity, (iii) basing the storyline and environment on real-life scenarios children could experience in their daily lives.

6.4.2 How the design principle of active learning was interpreted in this study

The factors that govern active learning include physical body movements and mental learning as in intellectual manipulation. In this study I incorporated the design principle active learning through intellectual manipulation (Paske *et al.*, 2015: 8). This design principle is fully incorporated into this study: as acquiring soft skills is the main focus of this blueprint for a mobile application. This blueprint for a mobile application informally teaches creative thinking by using their imagination to construct tools out of surrounding objects, communication by digitally greeting members of the applications non-playable community and ethical skills by greeting and excusing themselves through the non-playable community

through a four-stage story play-through with various cultural and local language greetings and scenarios to help young children acquire a range of crucial soft skills.

6.4.3 How the design principles of engagement were interpreted in this study

There are four types of engagement to this design principle: extrinsic motivation and feedback, para-social interaction, progressive feedback (Gunderson *et al.*, 2013: 1526 - 1530) and intrinsic motivation (Pasek *et al.*, 2015: 1541) as explained in chapter two. For this study, I chose to use progressive feedback and intrinsic motivation. Progressive feedback is seen through the design I created leading to new levels and the number of stars obtained at a level. Intrinsic motivation is incorporated to promote long-term development by each of the four stages introducing a new soft skill. The fourth stage includes all three soft skills into an interactive game.

Extrinsic motivation and feedback, and parasocial interaction were not included in this study because it was motivated by a sense of answers being incorrect and correct as well as praising only when a task is complete. The Montessori educators (site B) believed that at such a young age it is best to learn and promote gently, and not associate progression with praise.

6.4.4 How design theories were interpreted in this study

Design theories look at elements of line, colour, shape, space, texture, typography, scale, dominance and balance forming a well-established design in harmony (Teheri, 2019) as explained in chapter two. This study incorporated all elements and uses three DBR phases to iteratively co-design such a mobile application. Among the design elements considered, harmony, balance and colour were the elements most engaged in because participants either wanted light or bright colours which affected the three elements respectively. Through the three iterative cycles, the colour of the mobile application went from light to bright. Finally, an adjustment of one of two colours created balance and achieved a harmonious design.

6.4.5 How the design principle of co-design with children was interpreted in this study

When using this design principle, framing children as active facilitators and co-researchers (Auxier, 2017) in this study became a necessity. Initially, I referred to caregivers, care professionals and stakeholders only; assuming that young children were not able to offer complex answers to complex questions. The feedback from caregivers and care professionals, however, was not decisive and young children were included at a later stage of the study. The incorporation of young children in this study proved to be useful since their artwork and my conversations with them helped reveal a new design principle in this study, and helped develop character designs, names and environment elements for the mobile application blueprint as well as clarify contradictions from collected data. Out of all the design principles that could offer a guideline for informal acquisition of soft skills through a mobile application for young children, incorporating children as co-designers was one of the most important aspects of this study.

6.4.6 Additional design principles emerging from this study

In this study, two design principles were defined in the analysis: existent imitation documentation and non-designer constructive analysis.

In terms of existing imitation documentation, it is necessary to frame children's daily life experiences in accordance with the content of the design created, to help shape a familiar and safe environment. Based on feedback from a Montessori educator and the children's artwork as discussed in Chapter five, daily life events are what inspire young children's drawings. Consequently, the general design of characters and the environment was inspired by the children's artwork collected in the co-design workshops. Existing imitation documentation is evident in children drawing their own two profile pictures twice: one for themselves and one for a friend they wished to include as a 'help-mate' on the mobile application blueprint.

The non-designer constructive analysis categorises non-designer participants' feedback in relation to the blueprint design and matches them to design principles. In this study

participants used comments such as “easy on the eyes” and “I like the simple design” implying that the design is balanced. Comments such as “the bright red is too much red”, “the colours need to be striking” and “looked like it was a kiddies app in colour” imply that the hues were contrasted, seemed pale or accurately depicted the surrounding colours chosen in the design. Grouping this feedback helped create a structure to edit the mobile application during the three phases.

6.5 Summary

Phase four comprised final feedback of the DBR iterative cycle. More data collected through a poll were needed to finalise the blueprint design. During my interaction with participants, it was interesting to note the various ways in which participants offered feedback. For this reason, a new design principle was established, termed non-designer constructive analysis, interpreting what non-designer participants could be alluding to when offering feedback. In chapter six the design principles of context sensitivity, activate learning, engagement, co-design with children, existent imitation documentation, design theory elements and non-designer constructive feedback were interpreted for the study showing which aspects of the design principles were applied.

CHAPTER SEVEN

CONCLUSIONS

7.1 Introduction

This study aimed to develop design principles for a mobile application to teach soft skills to young learners. Framed by CHAT and using a DBR methodology, I embarked on a co-design process with caregivers, teachers, and young children at two sites in Cape Town (at a church and Montessori schools), and a community of designers to answer the following main question: What are the graphic design principles that need to guide mobile application development for young children in the Western Cape to develop soft skills?

In order to answer the main question, I aimed at answering the following sub-questions:

1. What methods are currently being used to develop soft skills in informal contexts with a focus on four to five-year-old locally and globally?
2. What design principles exist guiding mobile application design for young children?
3. What graphic design principles need to guide the co-creation of a mobile application for young children across two diverse contexts in South Africa?

7.2 Sub-questions

In terms of **sub-question one** (What methods are currently being used to develop soft skills in informal contexts with a focus on four to five-year-old locally and globally?) my study revealed, that globally, advanced technologies such as smartphones, headsets and smartwatches are being used to teach critical thinking, communication, collaboration and creativity as explained in chapter two (Ross, 2017).

Locally, the research analysed showed that participants used various methods to teach soft skills following different theoretical and methodological approaches, however without using technology. While the care professionals applied the Montessori Method, the caregivers at the church relied upon their own lived experiences, movies, music and religious stories as examples. To respect these various methods for children to acquire soft skills, the mobile application steered away from religion and embraced diversity.

In answering **sub-question two** (What design principles exist guiding mobile application design for young children?), the literature review and conducted research in Chapter two and five indicated that caregivers opt for educational mobile applications generally teaching hard skills; that is to say measurable and teachable skills such as mathematics. The current mobile applications generally follow three design principles: active learning, engagement and design theories. The conducted research has shown that at times children are allowed to choose their own mobile application games and some recreational mobile applications might only include engagement and design theory elements. The conducted research has found participants lacked knowledge and engagement with applications that teach soft skills to young children.

In answering **sub-question three** (What graphic design principles need to guide the co-creation of a mobile application for young children across two diverse contexts in South Africa?), it was important to: (1) look at existing mobile applications for young children to see how the application caters for an array of children, (2) reveal what design user interface consisting of the design layout and interactive buttons styles needs to be incorporated and (3) co-create a considerate storyline with the participants in the study.

The existing applications I used as an initial guide to the study were: Peppy pals' skills, Smiling mind, Touch and learn – emotions, Class dojo and Dragonbox. As discussed in Chapter two of the study the above applications mainly used: two-dimensional vector-based graphics, bright colours, different background environments and incorporated a simple but short storyline. Designs showed principles of **active learning, engagement and design theory elements** that helped me define my first three design principles.

In this study, when given the choice, participants agreed that the blueprint be localised rather than westernised/globalised. The localisation of the mobile application was established in consideration of South Africa's diversity. Interviews and co-creative workshops highlighted the need of **co-designing with children** and **context sensitivity** while conducting research into a sensitive topic such as diversity within a country. While conducting research, a new design principle was established that clarified the blueprint and

certain questions that previously caused confusion: that of **existent imitation documentation**.

By understanding the data collected, three iterative blueprint designs were set out and critiqued between the participants and myself for final redesign. At times, the feedback given varied considerably, as non-designers were not familiar with design terminology, theory and technique. To understand feedback, **non-designer constructive analysis** was applied to help designers interpret certain feedback.

By using these design principles, a blueprint for a mobile application for informally teaching soft skills to young children was created called Key that considered the two contexts of this study.

7.3 Final design principles for a mobile app blueprint to develop soft skills in young learners.

Main research question: *What are the graphic design principles that need to guide mobile application development for young children in the Western Cape to develop soft skills?*

During the time of this study, the research from the literature review, interviews and co-design workshops guided what final design principles would be needed for creating a blueprint for an informal soft skill mobile application blueprint in the context of this study.

There are three phases that emerged in this study: pre-, mid- and post-design phases in which design principles reside. In pre-design of the creation of the blueprint, the perceptions of participants had to be understood concerning the design layout and content of the application. For this reason, the following design principles emerged:

1. Active learning
2. Engagements
3. Context-sensitivity
4. Co-designing with children
5. Existent imitation documentation

In mid-design while creating the blueprint, the use of the (6) basic design theory elements were incorporated: the line, colour, shape, space, texture, typography, scale, dominance, balance, and harmony. These design theory elements helped create a harmonious design that suited the audience accordingly.

In post-design, a second design principle surfaced in this study: non -designer constructive feedback, whereby the iterative feedback of participants was grouped to help designers such as myself better understand what participants critique means for the design I am working on.

7.4 Implications and reflection

A first finding that was important in shaping this study was that not all participants knew about soft skills, or more importantly, the need to include specific soft skills development among children aged four to five.

Participants from Site B were using the Montessori method and caregivers were drawing upon their experience to foster soft skill acquisition among young children. However, mobile learning emerged as an untapped resource for acquiring soft skills in an informal way.

This study explored relations young children have with mobile devices and established how they are used for recreational and/or educational means. In Chapter five it became evident that certain factors influence the design of a mobile device such as: local context, availability of mobile technology, the busy lives of caregivers, unavoidable progress of technology in the world, the distractions it can offer young children, and the benefit to both the caregiver and child, as well as the teaching potential offered. All these factors led to the creation of an application that helps children acquire soft skills. Although the mobile application was clearly labelled as research and as a blueprint design, many participants post-research asked for the release date of the application, which shows their interest in such a mobile application.

The activity systems of the two sites furnished contrasting viewpoints among the caregivers and care professionals across the two sites. This was one of the reasons why the four to five-year old participants were included in this study, emphasising the importance of the

process of interacting with the whole community, and in particular, with the direct users of the application under development. In this way, the co-designed application speaks directly to the users.

7.5 Implication of study for designers

Recognition of soft skills is becoming an increasingly important aspect in formal and informal teaching and learning of young children. Although there is considerable growth with regards to teaching soft skills technologically, globally (since 2017) and locally (since 2019) research clearly indicates the need to begin at ages four and five. Such soft skill improvement efforts have extended to formal schooling sectors between ages seven and older. While research has shown that there is no one true way to educate young children informally, mobile devices have huge potential for teaching soft skills as presented in this study.

The design principles developed in this study might prove beneficial to designers interested in designing mobile learning applications for young learners. These were obtained through participation with stakeholders who iteratively co-designed a blueprint for a mobile application. Two new design principles were identified to assist collaboration with non-designers and guide the designer in understanding the importance of daily life events of young children when designing an application for this age category.

The mobile application blueprint in this study helps designers understand the colour usage, design style, and the safety protocols needed to ensure that caregivers and children feel safe in a digital environment. In the South African context, the research affirms caregivers' preferences in wanting to reflect local diversity, in race, language and socio-cultural and economic standing through the storyline and game environment.

7.6 The usefulness of Cultural Historical Activity Theory in this study

Engeström at a workshop in Cape Town, South Africa, replied that activity theory does explain and simplify data so that patterns and relationships can be better understood (Engeström, July 2015).

Cultural-Historical Activity Theory (CHAT) offers cross-disciplinary analysis of diverse human perceptions. The two activity systems developed in this study provided a helpful overview of elements that need to be considered when designing mobile applications. Although I was new to CHAT, the diagrams offered were easy to follow once understood and the meaning of the various elements made accessible. CHAT revealed themes and a categorised display of the data collected, and confirmed the importance of looking at context; demonstrating differences and contradictions within and across the two activity systems.

7.7 The usefulness of Design-Based Research in this study

Design-Based Research (DBR) in this study guided data collection and analysis in a collaborative way and created long-lasting relations between myself and participants to attain rich feedback. They offered a deeper and more meaningful understanding of the data collected through iterations. By being able to sustain relationships with participants, and establish trust across the course of the study, it was possible to ask permission to conduct research with their young children later in the study. DBR offered a complex, multi-factorial tool to use in the co-creation of the blueprint for the application.

7.8 Limitation of study

In this study there were obstacles that in some ways delayed or altered the efficiency of the data collected, transcribed or otherwise:

- **Withdrawal for Site B in phase 3:** After the first workshop with the caregivers of Site B, it became clear that they were against the idea of a mobile application being directed to young children: they preferred that the mobile application be directed to the caregivers of young children. The care professionals firmly believed that it was the sole duty of the caregivers to teach soft skills to their children. There was a general aversion to technology in Site B; the care professionals understood the importance of mobile applications but opposed the idea of young children of the ages three to seven being able to use them independently. This strengthened my belief in developing context sensitive

application and emphasised the importance of co-creation of such apps. With site B not participating in the study, I decided to engage additional stakeholders, i.e., young children in an artistic documentation workshop and my design community for further opinion on a final design.

- **Limited time from participants:** I did not fully take into account how busy caregivers are, although I had read literature and articles about the busy lives of caregivers. I had to allow ample time for caregivers to reply to my emails or respond to confirmations of workshops. The busy reality of participants meant that the research took longer but no stress was added to quicken the response time of participants. The use of asynchronous mobile tools, such as WhatsApp supported communication by providing flexibility. Although it delayed my data collection considerably, it verified findings from my literature review; proving that caregivers have busy lives.
- **Openness:** In this study it became apparent that participants answered more freely and openly in different sites. Site A participants, belonging to a religious environment, felt freer in WhatsApp conversations than at the site itself. Similarly, Site B participants opened up once the head care professional left the conversation. With the help of DBR iterative tools and the semi-structured interview format, I was able to move between sites to create more suitable environments to engage with participants. Also, the use of alternative communication channels, such as WhatsApp and email led to more free responses from participants.

7.9 Final reflection and design contributions

This study was framed by a need to prepare young learners for the 4th industrial revolution via increased availability of mobile phones. This study set out to co-create a blueprint for a mobile application that could help young learners to acquire soft skills in a community of designers, caregivers, care professionals and their children.

The study reinforces the importance of mobile devices in everyday life and indicates the potential of mobile applications to support the informal acquisition of soft skills. The findings

indicated that informal acquisition of soft skills can follow a variety of methods, based on the Montessori approach (educational), or driven by historical upbringing, culture and religious guidelines of a Christian caregiver. However, there is a general desire by all participants to increase “human-diversity-education” to expose young children to the world digitally before stepping out physically.

Within the parameters a pedagogical application of technology such as smart phones, this research project makes several significant contributions. It provides a viable blueprint for a safe, reliable and useful application for a mobile phone which considerably assists young learners to acquire soft skills in an informal manner. Since this research adopts a context-specific approach rather than a general one, this research is suited to the specific needs of young learners within a particular geographical and socio-economic zone. This distinction between universal-type applications and that developed in this research project marks a significant new area for South African education by means of a local application and enables us to take steps towards the nurturing of talent in South Africa. Since the application is rooted in the cultural expressions and modes of expression to a specific context, young learners within that area are better able to identify with the application more easily, and learn more effectively and more quickly.

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APPENDICES

APPENDIX A: CONSENT PAGE



CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

Consent to participate in the research study

Study Title:

An exploration of the design and development of a mobile application for young children directed towards soft skills acquisition in informal contexts

I have read the information sheet relating to the above research study and have been given a copy. The purpose and nature of the project have been explained and I have had the opportunity to ask questions about this information. I understand what is being asked and the procedures in which I will participate in have been explained to me.

I understand my involvement in this project, and data drawn from this project will remain confidential. Only the researcher(s) involved in the study will have access to my identifying data. It has been explained what will proceed once the research has been completed.

I hereby fully consent to participate in the study which has been fully explained to me and having given consent I understand that I have the right to withdraw from this study at any given time without disadvantages to myself and without being obligated to give any reason.

Participants Name (BLOCK CAPITALS)

.....

Participants Signature

.....

Researchers Name (BLOCK CAPITALS)

.....

Researchers Signature

.....

Date: _____

APPENDIX B: INTERVIEW QUESTIONS



Cape Peninsula University of Technology

Cape Town Campus

Informatics and Design

Graphic Design

Principal Researcher:

Nicole Lewis

(Email: nicolelewismay5@gmail.com Tel: 073 3308 215)

Consent to Participate in a Research Study

The purpose of this letter is to provide you (the participant) with the information to consider in deciding whether to participate in a research study. The study is being conducted as part of my MTech (Magister Technologiae): Graphic Design thesis at the Cape Peninsula University of Technology.

Project Title:

An exploration of the design and development of a mobile application for young children directed towards soft skills acquisition in informal contexts

Project Description

The demand for essential soft skills alongside the need to be proficient within an individual profession has begun to become imperative. Research indicates that the ages of four-to-five are an ideal margin for soft skill acquisition to commence as children are formed by influential discoveries. Three soft skills have been chosen namely, creative thinking, communication and ethical skills supported through social media literacy.

The aim of this proposal is to design a mobile app with and for four to five-year-old children allowing them to acquire the soft skills needed in their future workplace and in turn developing design principles to create a digital mobile application. A foundation established in the use of:

- Relevant literature reviews
- Theoretical framework: Cultural-Historical Activity Theory
 - The design principles: (basic graphic design principles (line, colour, shape, space, texture, typography, shape, dominance, balance and harmony) active learning, engagement, co-design and of context-sensitivity)
 - Methodology: Design-Based Research using qualitative data collection with professionals:

Data collection method being used in this study
Interviews
Workshops

- ✓ Ethical considerations complying with:
- ✓ Any children's research method of a 'gate-keeper' permission requirement
- ✓ Standard of children's digital content development
- ✓ Standards of the Cape Peninsula University

The followed research paradigm of Design-Based Research is pragmatic whereby this proposal three phases will include:

Phase	Description
Phase 1	Building a foundational research basis by researching different sources of soft skills acquisition for young children from international and local literature
Phase 2	Interviews with relevant stakeholders and the production of a (mock-up) prototype with caregivers
Phase 3	Caregivers will offer constructive feedback on the initial blueprint design of the mobile application as well as offer the design to their children for feedback
Phase 4	The final blueprint will be designed based on findings from the previous phases and graphic design principles will be finalised.

I would kindly like you to answer questions towards my research (related to the phase of the study). Pseudo-names will be used in the final research report if you would like. I am happy to also share work with you for any changes at your convenience.

Confidentiality

Any personal information (if any) that is collected through note by typing and any digital information, such as phone numbers, email addresses, voice notes, pictures or names will be securely stored on password - protected computers and this information will be deleted at the end of the project. In the write up of the study, the direct quotation may be used but names or other identifying information will be removed.

Disclaimer

Please feel free to ask any questions. If you are happy to continue a page with questions will follow.

Please retain this letter for reference. Thank you.

Kind Regards

Nicole Lewis

Interview with participants

There are key points to start with; you will have received an information sheet and consent form for this study. I will take time to see if you have fully read the forms, if not we can spend time reading over it together. Some key points include:

Confidentiality: is followed strictly and is only allowed to be breached if you are at risk of being harmed or harming another.

Anonymity: your identification information will not be written down and any use of audio record with information will be destroyed.

Rights: it is your own right to at any point withdraw from the study and you have the ability to pass any question you feel uncomfortable with.

If you are happy to go ahead, I ask you to sign the consent form if you are using social media. I would like you to state that you (insert name) consent to the information on the form and would be happy with the narrative analysis and illustration process to continue.

Questions:

Stakeholders (psychologists, graphic designers, educators, principals,)

1. What do you think are the most important soft skills that young children need to acquire?
2. How are these soft skills currently taught/developed? In a formal and informal context? What are the opportunities – what are the challenges?
3. What are your views on teaching soft skills to young children (ages four to five) on a digital mobile app? What are the opportunities and challenges?
4. Do you know of any mobile apps that teach soft skills in an informal context?
5. Do you think the mobile app should consider Cape Town's rich diversity?

6. What are your thoughts on how an app can become sensitive to the diversity of Cape Town, respecting the different cultures, religions and racial and socio-economic backgrounds?
7. Do you know of any design guidelines that I could use to create a foundation for creating a mobile app for children?
8. Any other comments?

Care professionals:

1. What do you think are the most important soft skills that young children need to acquire?
2. How are these soft skills currently taught/developed? In a formal and informal context? What are the opportunities – what are the challenges?
3. What are your views on teaching soft skills to young children (ages four to five) on a digital mobile app? What are the opportunities and challenges?
4. Do you know of any mobile apps that teach soft skills in an informal context?
5. Do you think the mobile app should consider Cape Town rich diversity?
6. Any thoughts about how an app can become sensitive to the diversity of Cape Town, respecting the different cultures, religions and racial and socio-economic backgrounds?
7. Do you know of any design principles/advice/ guidelines that I could use to create for creating a mobile app for children?
8. Does your work environment use mobile devices to support learning and how? What are the rules of engagement? Is there training for staff to use these devices?
9. Do you wish caregivers (parents) would be more involved in teaching children soft skills and how?
10. In your opinion should a mobile app be offline or online? What other design considerations are there?
11. Any other comments?

Caregivers (parents):

1. How old is your child? Who looks after your child during the day?
2. What are the dominant cultures that your kids are exposed to/embedded in (at home/child care/extended family/community)?
3. How does your child spend his/her time at home?
4. Do you allow him/her on a mobile device?
5. What are your rules? How long? Supervised/unsupervised? Who chooses content/apps? How do you decide whether it's an appropriate content/app?
Do you have an app that controls what your child has access to? Where do you get information on the appropriateness of content /apps?

6. What are your current experiences with mobile apps? What are the benefits? The challenges?
7. What do you think are the most important soft skills that young children need to acquire?
8. How are these soft skills currently taught/developed? In a formal and informal context? What are the opportunities – what are the challenges?
9. What are your views on teaching soft skills to young children (ages four to five) on a digital mobile app? What are the opportunities and challenges?
10. Do you know of any mobile apps that teach soft skills in an informal context?
11. Do you think the mobile app should consider Cape Town rich diversity? Please explain.
12. Any thoughts on how an app can become sensitive to the diversity of Cape Town, respecting the different cultures, religions and racial and socio-economic backgrounds? what are important features/examples from your culture that you would like to see integrated into such an app? in relation to communication / creative thinking / ethics...
13. Do you know of any design guidelines that I could use to create a foundation for creating a mobile app for children?
14. Any other comments?

Thank you for your time

Workshop (1) with participants

Professional caregivers and caregivers (Phase 1):

This workshop will include 'mock-ups' of some mobile app designs, I would like you to offer your opinion through drawing on the mock up on an ideal look and feel of a mobile application that equips children with the necessary communicative, creative 'out of the box' thinking and instilled moral manners needed?

Topic discussion to discuss:

1. Do you know of any design guidelines that I could use to create a foundation for creating a mobile app for children?
2. How many characters should a mobile application involve?
3. What colour(s) do you think are appropriate for this type of mobile app?
4. What stories can be used to teach children (ages four to five) communicative, creative 'out of the box' thinking and instilled moral manners, within a Capetonian context?
5. Would you as a caregiver like to see anything not shown on the mock-up's provided?
6. How long do you allow your child(ren) to interact with a mobile app?

7. Any other comments?

Thank you for your time

Workshop (2) with participants

After the field research has been completed a set of questions will be directed towards the professional caregivers and caregivers.

To professional caregivers and caregivers (Phase 2):

Please help me answer these following questions:

1. How did you find this mobile application?
2. Do you think this mobile application has the possibility to teach young children the soft skills they need for the future and why?
3. How do you think this mobile application can become suited for the diversity of Cape Town?
4. Can anything be improved within this application?
5. **If you would not mind can you please ask your child what they think of this blueprint and what they would do to make it better?**
6. Any other comments?

Thank you for your time

APPENDIX C: CONSENT PAGE

Data collection permission



Introductory letter for the collection of research data

Cape Town, 17th of October 2019

Nicole Lewis is registered for the M Tech (IT) degree at CPUT (21460078). The thesis is titled *An exploration of the design and development of a mobile platform for young children directed towards soft skills acquisition at home, and aims to design an app with aid for four to five-year-olds which would allow them to obtain the fundamental soft skills needed in their future workplace through developing necessary soft skills and continuously developing design principles to create a successful mobile platform for this target group.*

The supervisor(s) for this research is/are:

Principal Supervisor: Asst. Professor Daniela Gushago
Co-Supervisor: Doctor Anne Chien

In order to meet the requirements of the university's Higher Degrees Committee (HDC) the student must get consent to collect data from organisations which they have identified as potential sources of data. In this case the student will use interviews, institutional and online surveys, observational field research and a pre-test and post-test to gather data.

If you agree to this, you are requested to complete the attached form (an electronic version will be made available to you if you so desired) and print it on your organisation's letterhead.

For further clarification on this matter please contact either the supervisor(s) identified above, or the Faculty Research Ethics Committee secretary (Ms V Naidoo) at 021 469 1012 or vnaidoo@put.ac.za

Yours sincerely



Daniela Gushago
Asst. Prof. Daniela Gushago
Centre for Innovation in Educational Technology (CIET)
Cape Peninsula University of Technology
P.O. Box 652 Cape Town 7800, South Africa



I, Mariene Simos, in my capacity as (principal and director) of Alpha Montessori give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of her research and the nature of the data to be collected.

This consent is in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	X	X	X	X
No				

Mariene Simos
18/10/19

<<insert name>>

Good day Nicole

Thank you for the info once again. I feel that it would be best for you to approach Blue Moon Generations school in Retreat and speak to principal Jackie Price as she has been their previous South African Montessori Association president and would best be suited to answer any questions on behalf of the Montessori group of schools.

I have already spoken with her on your behalf and she is expecting your call so please arrange a time with secretary Kim.

Also, (if unfortunately not be available on your proposed date.

Best of luck and kind regards

Mariene Simos | School Principal
On 13 Feb 2020, at 10:38, Nicole Lewis <nlewis@put.ac.za> wrote:

Good morning Mariene I have shown an email message I have messaged you last year as reference:

As forwarded: Thu, Jun 6, 2019, 2:45 PM

Good afternoon Jackie Price,

I would like to know if possible, can I please interview you and your respective staff over the course of 2 periods. One next week Wednesday the 13th and the following the 20th of February otherwise any other date would be appreciated? I have gotten the ethical clearance and signature of Mariene Simos but unfortunately, she has prior arrangements and has given me your details to further contact research.

I will further phone your secretary Kim for a time otherwise if you would like to offer one time I would be happy to come that time?

Kind regards
Nicole Lewis

WhatsApp 0733308215
Email: nlewis@put.ac.za
On Thu, 13 Feb 2020, 3:02 PM Alpha Montessori <info@alphamontessori.co.za> wrote:



I, Penny Jaffe, in my capacity as (principal and director) of Ray Peg Zee Montessori give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of her research and the nature of the data to be collected.

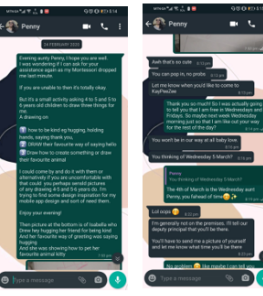
This consent is in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	X	X	X	X
No				

Penny Jaffe
24th February 2020

<<insert name>>



Student: Nicole Lewis
Supervisor: Daniela Gushago
Department of Informatics and Design
Cape Peninsula University of Technology
nlewis@put.ac.za

Consent form

I, Generations Schools Blue Moon, give the above mentioned permission to use the information shared which has been generated during the course of my participation in the interview for their research.

I understand that those involved in planning and implementing this joint module are intending to share the work generated in the module in the form of a research paper project.

I also understand that:

- Whether or not to give this permission is a personal decision, and it is entirely voluntary.
- There will be no rewards for giving this permission, as there will of course be no penalty for refusing it.
- The findings from the research are likely to be published in institutional reports, academic journals, books and book chapters and presented at academic conferences.
- My own identity or that of any other person included in my materials will be protected.

My signature below indicates my permission to use the material I have generated in the research project.

Signed at: Generations Schools Blue Moon (Place) on: 28 / 02 / 2020 (Date)

 (Signature)

Student: Nicole Lewis
Supervisor: Daniela Gushago
Department of Informatics and Design
Cape Peninsula University of Technology
nlewis@put.ac.za

Consent form

I, Generations Schools Blue Moon, give the above mentioned permission to use the information shared which has been generated during the course of my participation in the interview for their research.

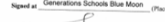
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 (Signature)

Student: Nicole Lewis
Supervisor: Daniela Gushago
Department of Informatics and Design
Cape Peninsula University of Technology
nlewis@put.ac.za

Consent form

I, Chirika Laitewake, give the above mentioned permission to use the information shared which has been generated during the course of my participation in the interview for their research.

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 (Signature)

Student: Nicole Lewis
Supervisor: Daniela Gushago
Department of Informatics and Design
Cape Peninsula University of Technology
nlewis@put.ac.za

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Signed at: Generations Schools Blue Moon (Place) on: 28 / 02 / 2020 (Date)

 (Signature)

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY
Consent to participate in the research study

Study Title:
An exploration of the design and development of a mobile application for young children directed towards soft skills acquisition in informal contexts

I have read the information sheet relating to the above research study and have been given a copy. The purpose and nature of the project have been explained and I have had the opportunity to ask questions about this information. I understand what is being asked and the procedures in which I will participate in have been explained to me.

I understand my involvement in this project, and data drawn from this project will remain confidential. Only the researcher(s) involved in the study will have access to my identifying data. It has been explained what will proceed once the research has been completed.

I hereby fully consent to participate in the study which has been fully explained to me and having given consent I understand that I have the right to withdraw from this study at any given time without disadvantages to myself and without being obligated to give any reason.

Participants Name (BLOCK CAPITALS)
VAUGHN LEWIS

Participants Signature


Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS

Researchers Signature


Date: 17/02/2019

I Vaughn Lewis, in my capacity as (father) of The Church in Cape Town give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

This consent is in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	x	x	x	x
No				

Vaughn Lewis 27/10/2019
-<insert name> -<insert date>

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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Participants Name (BLOCK CAPITALS)
Craig Jason Alexander
Participants Signature
[Signature]
Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS
Researchers Signature
[Signature]
Date: 20/10/2019

I Craig Alexander, in my capacity as (A caregiver to my son, a care professional at The Church in Cape Town and a professional Graphic Designer) at The Church in Cape Town and Langa courtrooms, give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

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	Thesis	Conference paper	Journal article	Research poster
Yes				
No				

Craig Jason Alexander 21/10/2019
-<insert name> -<insert date>

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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Participants Name (BLOCK CAPITALS)
CHANEL LINDSEY
Participants Signature
[Signature]
Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS
Researchers Signature
[Signature]
Date: 20/10/2019

I Chanel Lindsey, in my capacity as (caregiver and care professional) to daughter other children give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

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In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	x	x	x	x
No				

Chanel Lindsey 20/10/2019
-<insert name> -<insert date>

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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I hereby fully consent to participate in the study which has been fully explained to me and having given consent I understand that I have the right to withdraw from this study at any given time without disadvantages to myself and without being obligated to give any reason.

Participants Name (BLOCK CAPITALS)
NATHAN JACOB
Participants Signature
[Signature]
Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS
Researchers Signature
[Signature]
Date: 20/10/2019

I Nathan Jacob, in my capacity as (caregiver and care professional) to daughter other children give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

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In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	x	x	x	x
No				

Nathan Jacob 20/10/2019
-<insert name> -<insert date>

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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Participants Name (BLOCK CAPITALS)
WHITNEY SOMMERBERG
Participants Signature
[Signature]
Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS
Researchers Signature
[Signature]
Date: 20/10/2019

I Whitney Sommerberg, in my capacity as (caregiver and care professional) to daughter other children give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

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In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	x	x	x	x
No				

Whitney Sommerberg 20/10/2019
-<insert name> -<insert date>

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

Consent to participate in the research study

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Participants Name (BLOCK CAPITALS)
MACKERY ESCOPE
Participants Signature
Mackery Escop
Researchers Name (BLOCK CAPITALS)
NICOLE LEWIS
Researchers Signature
[Signature]
Date: 20/10/2019

I Vaughn Lewis, in my capacity as (father) of The Church in Cape Town give consent in principle to allow Nicole Lewis a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

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In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	x	x	x	x
No				

Mackery Escop 20/10/2019
-<insert name> -<insert date>

APPENDIX D: INTERVIEW TRANSCRIBED AND MOBILE DATA COLLECTED

Interviewer: Nicole Lewis

Date: 28th February 2020

List of acronyms: N=Nicole, P1=Participant 1, P2=Participant 2, P3=Participant 3 and P4=Participant 4

[0:09:45]

N: I will read the questions and then anyone can answer and then add input. Before we begin, I would like to clarify that “soft skills” is a combination of people, social, personality, attitude or characteristics that form a human being. Question one; what do you think are the most important soft skills or essential character skills that young children need to acquire between the ages of four to five?

[0:11:10]

P1: All I’m getting is my Montessori theory going, so children in this plane of development are in – what we call – a social embryonic stage. That would encompass skills that allow them to function socially with “please” and “thank you” and wait your turn before interrupting to have your say. It’s a part of what we do from the three-years olds that walk in the door. Very hard question to answer.

[0:11:45]

P2: The focus, if you look at Montessori, it’s often about allowing the child to develop independence and through their independence learn that they are part of a community. So, each classroom has a community and then a preschool has a community and then it goes broader – a school community etcetera. The child effectively starts learning that whatever they do not only have an impact on themselves but on their community. Words that you use often are “respect”; things that we also speak about is how your actions can affect the next person. If you look at the layout of our classrooms, it starts off with just how we put things out on a shelf. There is one activity each per classroom and that means the first lesson learnt is sharing, you need to wait your turn; it starts with even the layout of our classroom. We are encouraging those social skills, those soft skills. Things like empathy are not something we can learn; it’s learnt through experience and through internalizing and then to get to understand – you cannot teach someone to be empathetic. There is a huge emphasis on allowing the children those life experiences to acquire empathy. You do find that caring and role modelling has this complete ripple effect.

[0:13:43]

P3: It brings to mind that our classes aren’t just one age group. We do something called “vertical age grouping”, so we’ve got three, four, five and six-year-olds in the same community – the same

classroom. A three-year-old doesn't necessarily learn from me; they watch the four, five, six-year-olds and they model what they see. There's so much that goes into that. In my class, sometimes I notice that there have been unkind words, or if I've seen someone use their hands to hurt another child; we have a class meeting, a community meeting and we say "I've noticed today this has happened – what can we do with our hands? How should we behave to the next person?" So, we also don't single out it's very much about the whole community.

[0:14:39]

P2: It's not a case of what should you not do or what you can't do but rather the focus is on a more positive outcome – "what can you do?" A very important part of our classrooms is our peace table. If there is a conflict situation, we try to allow the children to develop those skills to problem solve and resolve the issue themselves by mediating. We don't shame them; you sit them down and you grab a third chair and you literally give every party an opportunity to speak and then what you do is you turn around and say "so why do you think your friend is sad?" You don't tell them, it's almost like you want to draw the answers from them because by doing that they are actually learning themselves. If you keep telling a child then there's no reason for them to learn. By discovering, realizing and acknowledging they come to that conclusion themselves.

[0:16:05]

N: Number 2, how are these soft skills currently taught, okay you already answered that. Are there any opportunities and what are the challenges when teaching these skills to children?

[0:16:27]

P1: When I did my Montessori training, part of Montessori's writings is you need to spiritually prepare yourself as an educator. If my mediation skills outside of the classroom are not great, I can't offer that support for the community. I'm finding that this practice of being a directress is so much about internal work. It's about leaving my stuff at the door and being an empty vessel almost, for a day, coming in and being able to facilitate and hold a space. My practice for myself is to be so "clean" - when I'm driving in the road and someone cuts me off, "oh okay so I've noticed you're in a bit of a rush I can see that you're in a rush, would you like to go ahead of me?" Cause how can I hold a space for them to learn that skill if my skills are lacking. I haven't been a teacher for a year yet and it's a constant thing I keep going back to. Self-reflection, could I have done that differently? I mediated this conversation; did I take the opportunity away from the child to realize what they could have done differently? Did I tell them to apologize to the other child? I did that so much, it's not my right to say that.

[0:18:30]

P2: Once you're in it, you realize it's a lifestyle. This is not just a teaching method, I'm a Montessori mom it doesn't stop the moment you leave work. Sorry, what was the original question?

[0:18:53]

N: What are the challenges and the opportunities you're faced with.

[0:18:56]

P2: Another challenge I also find apart from our challenge to be prepared is the challenge of parents. Children have absorbent minds and they're very quick to absorb energy as well. If you have a parent or parents that are not in sync with what we do it becomes a huge challenge because the child is constantly conflicted with the messages. If you look at a child's day; they generally spend most of their day at school than they do at home. To try and teach a child to be independent and considering but at home, they're the only child. Mom does everything for them and they get everything they want when they want, that I find also as a huge challenge. That is why it's very important for us; to do parent information evenings and workshops to educate the parents in the way we do things and why we do it.

[0:20:14]

N: That's so amazing because previously I was at a "cultural" child-caring event before I went to a Montessori so I could compare the two and everything you're saying is almost opposite because I've gone to site A's day-care. While they have a sermon, a parent will look after a child and I've gone to formal schooling as well where everything is so opposite. Do you guys have problems with parents; is it a whole new mindset for them, do they also need to shift?

[0:26:48]

P2: The nice thing about this campus is that when the parents get interviewed, they get asked. I think it's compulsory actually, that they attend these workshops. Yes, they are a challenge but it is generally 20% that cause 80% of the challenges. It's not usually, if I may generalize, their resistance to the method but rather their own issues that they come with so it's cultural, or political, or even gender-related issues that come to the foreground. We are such a diverse group and we are constantly attending workshops. It's not just about how you can facilitate the children but how you can create a space where the parents can be themselves without being judged.

[0:28:40]

N: What are your views on teaching soft skills to young children ages four to five on a digital app; what do you think would be the challenges or opportunities?

[0:29:20]

P2: None of us is keen on devices particularly at this age this is just actually not what we want but the reality is they are exposed. Would you do it in a story format or how would you do it in a game?

[0:30:05]

N: The idea is to make a story format so they're on this journey and as they're on it they learn different soft skills along the way through different challenges they face.

[0:30:18]

P2: I don't know about you girls but what is the biggest challenge with a device and a child? It's quite an obvious one. Time spent on it. I don't know anything about apps but try and limit the time spent on the app because a child at that age can only focus on one thing for about 10 to 15 minutes. So, try and limit the child because if you want to have an effective app they can't just zone out and sit there for hours.

[0:30:56]

P1: I think another challenge may be taking away the individuality of the child because in the game there's only one outcome that's not necessarily the outcome the child would have realized themselves. It's almost an adult through an app telling a child instead of them coming to that conclusion on their own.

[0:31:32]

P2: Children learn from one another so if it can be a scenario where they can either play it with a friend or that the actual app has some friends to play it with so it's not just a child with an adult voice giving instructions but rather in a community-based scenario. Also, very important particularly for us don't define gender, it should just be a child. Perhaps they can choose what colour hair they want before they start and what dress, or pants, or outfit they want to wear. Don't stigmatize the actual visual child if you are going to include that.

[0:32:30]

N: When dealing with apps do you think young children should be exposed to humans or would it be best for aliens or animals or...?

[0:32:41]

P2: At this age? They're all reality; they're not in a fantasy; people are often mistaken thinking that a three to six-year-old is into fantasy. No, they're not, it's very real. Dogs and animals talking? No, keep it real.

[0:33:02]

N: That's so strange because I was doing research with parents and they all said their child either loved animals or aliens and most of the children drew humans.

[0:33:20]

P2: Can I ask you a question, does a child know what an alien looks like? If you ask a child what an alien looks like they will tell you what it looks like - they know but it's because this is what they've been shown; Monsters Inc. all these movies this is all the adults' impressions. That's why we don't do Disney, we don't do any cartoons, no superheroes. There are no real superheroes, the real superheroes are people; real people who do really good things. It's not about fantasy and that's why if you go through our classrooms, you'll see that what they do are real activities. They sweep, they pour it's all about things they see in their environment. If you go into a primary school that's where your fantasy starts not in a four to five-year old's life.

[0:34:19]

P3: Also, just on the books that we read as well; I was like “Ahhh cool we can read Winnie the Pooh!” – he’s a talking bear. No, that’s not real and so many parents are misguided but, in our classroom, the books we read are very reality-based.

[0:34:50]

P1: That’s a very big difference between Montessori and anything else and if you do your research, you’ll see that that is proven. That child of this age does not have the capacity – they have an imagination. Let me give you a good example: instead of giving them outfits like a Doctor’s outfit or superhero ones, we put down some props like a hat, a scarf, a piece of fabric, an empty suitcase and they will come up with their own things. 9/10 times its actually real things they don’t want to play these superhero things because that’s not a part of their real world.

[0:35:50]

N: Do you know any mobile apps that teach soft skills in an informal context? Yes or no?

[0:36:09]

All: No

[0:36:15]

N: Do you think children apps should consider Cape Town’s rich diversity or should it be westernized/globalized?

[0:36:40]

P2: I don’t think it should be westernized in my opinion it should be globalized. We are so diverse in our country itself to do everything African denies all the other cultures. I would recommend global.

[0:37:13]

N: What are your thoughts on how an app could become sensitive to the diversity of Cape Town with respect to the different cultures, religions, racial or socioeconomic backgrounds?

[0:37:40]

P3: I’m just thinking the storyline shouldn’t be gender-biased and also could include various religions. Also, different ethnicities, if you have four or five different characters, make it diverse like they could have different accents and have those characters set up in the background of the scenarios you want to do.

[0:38:30]

P2: I really like the idea of the child building their own character to use. Remember, soft skills that a child should learn to become a valued member of society; regardless of age, race, culture, background aren't they all the same? They technically are, so the emphasis is not really on the differences but on the similarities. It's what makes us the same? And those go back to the basics again, being considerate, taking turns. I suppose in some cultures it is different, there's a difference between male and female but children adopt what they are taught. Children become aware of race naturally at a certain age but because of our past, and various other countries' past, you could actually say that children are taught those behaviours, you have to look beyond that and look at what makes us similar instead of different. I think that's often a challenge.

[0:41:30]

N: Really is. Does your work environment use mobile devices to support learning?

[0:41:36]

P2: Not that we deny the importance of it but the older the child the more age-appropriate it becomes. So, upstairs in the senior primary environment, we have to teach them computer skills. It's a necessity in our world but it has to be balanced. Children have to be exposed to that age-appropriately. We start with "concrete" then we go into abstract and because we start in concrete again proves at this age it has to be in the real. A device is a touch screen but that's about it. They don't get to feel the shell, or listen to it, or smell the sea in it – that's what we're trying to bring and we're trying to keep things as real and for as long as possible.

[0:43:30]

N: In your opinion should a mobile app be offline or online?

[0:43:59]

P2: For me, it has to be offline, the reality is load shedding is here for a while. Apparently, our data is coming down in cost but as a mom, you want the security of knowing your child is not online. If you are going to let them be on a device at least have it offline; you download it and have it on your phone.

[0:44:30]

N: That is my last question. Do you have any comments that you'd like to add?

[0:44:37]

P2: Do you have any more questions?

Good Morning Ms M Simos,

Firstly, thank you so much for your reply, I, unfortunately, am down with progressive flu-related symptoms and would not like to spread any of my germs around. I think an informal email would be ideal. My informal questions relate to soft skills development, my research has to lead me to believe that the following soft skills: communication, creative thinking, and ethics will be greatly needed for future workers and will need to be taught from ages 4 to 5 through a device that more than 60% of caregivers use in South Africa to babysit their children while busy - the mobile phone.

The question is as follows:

1. Do you think there is a soft skills deficiency situation occurring? (are young children becoming equip with the necessary communicative, creative 'out of the box' thinking and instilled moral manners needed)
2. What is your experience with your kids?
3. Does Montessori Preschool use devices to accompany tasks and how?
4. Are soft skills development incorporated into your educational program and if so how?
5. Do you wish caregivers (parents) would be more involved and how?

Thanking you again for your previous response and hope to hear from you soon.

Nicole

For any inquiry, my number is 073 3308215

My Supervisor is Professor Daniela Gachago IT division of CPUT - gachagod@gmail.com

My Co-Supervisor is Doctor Alettia Chisin Design division of CPUT - ChisinA@cput.ac.za

Alpha Montessori <info@alphamontessori.co.za> Mon, Jun 10, 2019, 10:42 AM

to me

Morning Nicole

My responses below. Hope this helps

regards

Sensory Education for Our Future Generation

On 10 Jun 2019, at 09:48, Nicole Lewis <nicolelewismay5@gmail.com> wrote:

Good Morning Mariana Simos,

Firstly, thank you so much for your reply, I, unfortunately, am down with progressive flu-related symptoms and would not like to spread any of my germs around. I think an informal email would be ideal. My informal questions relate to soft skills development, my research has to lead me to believe that the following soft skills:

communication, creative thinking, and ethics will be greatly needed for future workers and will need to be taught from ages 4 to 5 through a device that more than 60% of caregivers use in South Africa to babysit their children while busy - the mobile phone.

The question is as follows:

1. Yes, I do, however in our Montessori system we encourage critical thinking and problem-solving skills using sensory-based material to develop cognitive thinking. We encourage peaceful and respectful communication skills through role-play, the use of a peace table to discuss resolutions, feelings and cooperation as well as inclusive situations in a diplomatic manner. Our system incorporates a "Grace and courtesy" area which we begin to install at age 2.5. This teaches social skills like how to greet and interact with people, manners, communication, listening, empathy, self-control and problem-solving. Examples include: How to interrupt politely, how to wait your turn patiently, how to speak kindly, use gentle hands when working and with others, how to use walking feet inside, how to share, answer a telephone, pull a chair out from under a table, how to create calm and silence when necessary, how to roll a mat, and lots more. By the time a child is age 4/5 they have had repeated practise in these ethics and morals which have become intrinsic to their developmental growth and thus act accordingly with ease as it is ingrained in them. Of course, having good role models in the schooling environment helps them to observe behaviour too.
2. I am a principal and directress who has taught for 15 years. Qualifies and studied in the Montessori Method
3. We do not promote screen time at school unless during a holiday programme or to view a documentary or educational short video on a theme relevant to our weekly learning programmes. Examples, life cycles of an animal, watching volcanoes erupt when learning about our geography typography, a science experiment etc.
4. Absolutely and very consistently. Our classes are vertically age grouped 0-3 yrs., 3-6 yrs., 6-9 yrs. etc. This way younger children observe and learn behaviours and manners from the older children and the older children reinforce their already acquired skills whilst guiding the younger children. The material in itself is auto-didactic allowing for self-motivated learning and problem solving without requiring adult intervention. Our routines and work cycle are inclusive allowing for both independent and group work thus promoting communicative and collaboration in our community. We make use of circle time to discuss relevant skills and role-play situations, read books related to these developmental skills like How to be a kind friend, ways to help us not feel jealous, why I must use kind words and create a peaceful body etc.
5. Yes, however, there has been a considerate improvement in my opinion to parents becoming more involved. We provide termly parent workshops where we discuss and provide tools for parents to keep a congruent philosophy of Montessori methods in the environment so there is consistency for the child who goes to a Montessori school. Things like disciplining, how to talk to children, how to handle aggression, how to create meaning, fun work and communication etc. I also provide a monthly newsletter with material related to improving soft skills development and it is received well within our local community.

Posted status on Instagram: If anyone could kindly be a part of my CPUT study during this pandemic. If you would like to be apart of it please offer digital acceptance as well as your answer, through to Instagram. Please note your identity will be respected in this study.

