mHealth and Empowerment Education in the Rainbow Nation:
A study of the CHAT program in South Africa

by

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Abstract:

Maternal and child health and nutrition (MCHN) disparities remain prominent influences in sustained high infant mortality rates for children under five living with HIV in South Africa. Empowerment processes used in critical health literacy regarding disease management and nutrition can address issues of contextual references to educational content by identifying problems, critically reflecting and acting upon social, economic and political barriers to health. This thesis explores the role of the Community Health Worker Assistive Technologies (CHAT) program to open space use dialogue, supported by educational media delivered by handheld tablets and booklets, as a means of addressing MCHN health disparities in South Africa. Videos recorded of household visits elicited inferential statistics regarding media usage, and further thematic areas emerging from participant/community health worker interactions. This thesis suggests educational media in conjunction with sufficient training can improve references to participant context and increase quality of care and opportunities for empowering dialogue.

Key Words: health literacy, empowerment education, dialogue, mHealth, community health workers, HIV/AIDS, maternal and child health and nutrition, educational media, South Africa, health facilitation, Paulo Freire.
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# Table of Contents

Abstract  
Acknowledgements  
List of Figures, Graphs and Tables

## CHAPTER 1 - INTRODUCTION

- Statement of Problem  
- Research Goal  
- Purpose of Study  
- Significance of Study  
- Research Design  
- Thesis Organization

## CHAPTER 2. LITERATURE REVIEW

1. Part 1 - Addressing CHAT's Target Population
   - Empowerment as a Health Goal and Process  
   - Health rationale for empowerment  
   - Evaluating Empowerment-Oriented Pedagogies
2. Part 2 - Foundations of Health Literacy
   - Health Literacy and Empowerment  
   - Effective Health Literacy Design
3. Part 3 - Exploring the role of Community Healthcare Workers (CHWs)
   - Defining Community Health Workers  
   - Community Health Workers and Cultural Proximity  
   - Complications within Community Health Worker Programs
4. Part 4 - The role of mHealth for CHWs
   - The role of mHealth in health literacy  
   - Barriers to mHealth  
   - Designing mHealth for engagement

## CHAPTER 3 - METHODOLOGY

- Overview of Study Methodology  
- Research Site  
- CHAT Educational Content
   - Key Health Messages and Discussions
- Selection and Training of CHWs
   - CHAT Household Visit Protocol
- Participants and Data Sources
- Coding Schemes and Thematic Analysis
- Coding Matrix  
- Thematic Analysis
Discussion of Method
Ethics

CHAPTER 4 - RESULTS

Descriptive Stats
  Total Scores
  Split Scores

Theme 1: Characteristics and Means of Content Engagement
  Prominent Content Engagement Sub-Themes
    1. Reference through reiteration
    2. Reference as Elaboration
    3. Reference through reflection

Theme 2: Strengths and Weaknesses of Facilitation
  Emerging Themes from Facilitation
    1. Confidence
    2. Low Confidence
    3. Opening Space for Problem Posing
    4. Building Relationships between Participants and CHWs

Theme 3: Prompted Empowerment
  Sub-Themes in Empowerment Discussions
    1. Use of Prompts
    2. Discussion of Barriers
    3. Community Collaboration

Summary

CH. 5 - DISCUSSION AND CONCLUSION

Introduction
Discussing the Findings
  Situating the Results within the Research Questions
    1. How does educational media support CHWs to engage in discussions during CHAT household visits?
    2. How is empowerment engagement influenced through educational media?
    3. What are the strengths and weaknesses of educational media within the CHAT environment?

Acknowledging Strengths and Limitations
Recommendations and Further Studies
List of Figures, Graphs and Tables

Figure 1 Example of the prompted educational content pertaining to a lesson on childhood nutrition (in English and isiZulu) contained in the booklets..............33
Figure 2 Example of the animated videos discussing childhood nutrition........34
Figure 3 CHW using tablet with caregiver and child. Permission has been granted by participants to use their image for research purposes. ..........................36
Figure 4 CHW using booklet, conducting household visit with two caregivers and child. Permission has been granted by participants to use their image for research purposes. ..................................................................................36

Table 1 List of key messages that guided the development of CHAT educational media ................................................................................................................32
Table 2 Coding matrix for scoring quality of care within recorded and transcribed household visits. .................................................................................................41
Table 3 Example of Thematic Coding of transcripts..................................................43
Table 4 Frequent codes collected and re-ordered in relation to dimensions of behavior ..................................................................................................................44

Graph 1 Changes in coding scores observed between 2014 and 2015.................50
Graph 2 Changes in higher mean scores between 2014 and 2015 for visits using tablets and booklets.................................................................51
Graph 3 Changes in lower mean scores between 2014 and 2015 for visits using tablets and booklets.................................................................51
Graph 4 Comparing content depth scores between tablet (experimental) and booklet (control) household visits between rounds of observation. ...........................53
Graph 5 Comparing context-sensitive engagement scores between tablet (experimental) and booklet (control) household visits between rounds of observation. ............................................................53
Graph 6 Changes in verbal engagement parity scores for experimental and control groups between 2014 and 2015.................................................................59
Graph 7 Changes in Non-Verbal Parity Scores across platforms during rounds of observation between 2014 and 2015. .........................................................61
Graph 8 Changes in empowerment scores between educational media during rounds of observation in 2014 and 2015. .................................................................66
Chapter 1 - Introduction
Statement of Problem

Despite advances in policy and access with regards to services and education, issues related to maternal and child health and nutrition remain a prominent concern in addressing mortality, disease management and wellbeing for vulnerable populations. For children under five in South Africa, HIV/AIDS remains the prominent cause of deaths (39.5%), with a mortality rate of 8.6 per 1000 person per year (Garrib et al., 2006). Intervention programs around nutrition-related child mortality and HIV/AIDS through health literacy packages have been shown to improve survival of HIV-infected adult caregivers as well as HIV-exposed children. Educational interventions regarding HIV/AIDS prevention, testing and management for caregivers and children offer a means to communicate messages and develop skills for individual and community empowerment to improve self-efficacy and self-esteem in addressing HIV infections and their socio-economic, psychological and health consequences, as well as offering improved access to testing and counselling related to prevention and information (Schenker, 2006). Strong networks of community health workers (CHW), through effective training and support, offer opportunities to improve localized access to care and support in delivering health literacy information, in the case of this study, focused on HIV, maternal and child health and nutrition (MCHN). Regarding the development of pedagogical content, health education programs that incorporate empowerment as a process and goal have been identified as a means to uniquely address social determinants and consequences of health, particularly around improved self-efficacy and self-care regiments within marginalized populations (Airhihenbuwa, 2006; Bergsma, 2004; Matthews, 2013; Wallerstein & Bernstein, 1988). Through pedagogical inputs such as problem posing, contextually relevant content and engagement, educational programming inspired by popular education can help encourage responsive and relevant to the specific group of participants involved and their community. The findings of this research project are intended to illuminate considerations for this particular context of the CHAT program, participants and facilitators, while prompting reflections for projects of a similar nature to consider regarding the development of dialogical space around health literacy.
While research on health literacy remains largely oriented toward outcomes at the individual level (Hatzenbuehler, Phelan, & Link, 2013), attention is needed to better understand individual concerns in relation to macro-level structural and institutional barriers, particularly towards provoking improved engagement and integration of wider community stakeholders through dialogue and discussions of empowerment education outcomes. Despite the recognition of CHW-led empowerment educational programs to bridge individual and community health barriers, sparse research exists in evaluating, developing and training with an emphasis on critical reflection and discussions. The unfamiliarity amongst many health care professionals regarding theoretical models of reflection and action within empowerment-oriented educational programs offers opportunity for the development of strong training, facilitation and delivery skills, particularly towards the social determinants of health for marginalized communities and individuals (Champeau, 2002). This study explores the role of educational intervention models, particularly mHealth innovation, to support CHWs in their delivery of home-based empowerment education and health literacy education around HIV and MCHN education, support and referral in a high HIV prevalence community in KwaZulu Natal, SA.

Particularly in South Africa, a “culture of silence” (Muthukrishna et al., 2007) exists around public health engagement, namely along lines of gender, sexual orientation, ability, HIV status, socio-economic status and age. Within existing research, disempowerment has been identified as key barriers both to the delivery of quality services by health providers and to the use of particular health services by stigmatized community members themselves, such as HIV-infected adult caregivers and HIV-exposed children (Hatzenbuehler, 2009; Hatzenbuehler et al., 2013; Kark, 1962; Nyblade, Stangl, Weiss, & Ashburn, 2009; Tucker et al., 2014; Wood, 2014). Particular to the scope of this study, disempowerment within health care in South Africa continues to remain a pervasive problem to provide quality, non-stigmatized care for many populations (Francis, 2013; Hatzenbuehler, 2009; Herek, 2004; Msibi, 2011; Nyblade et al., 2009; Ross et al., 2015; Tucker et al., 2014).

In an effort to overcome barriers to train health service providers in the delivery of health literacy interventions, where high turnover and resource scarcities often impede the ability to do so (Gilson et al., 1989; Golding, 2014; Schneider, Hlophe, & van Rensburg, 2008; Walt, 1988, 1990), a number of projects have examined the role of mobile technology initiatives in health, called “mHealth,” to improve the effectiveness of program facilitation. However, where silence persists surrounding barriers of identity, socio-economic status and
community, many socialized and systemic forms of marginalization remain unchallenged and unchanged. This unwillingness to provoke interpersonal and institutional attitudes and behaviours impedes the ability for empowerment to expand beyond individual considerations, hindering the promotion of self-efficacy, harm reduction, service utilization and self-esteem within marginalized and stigmatized populations through a denial of preventative care and support (Anderson, Ross, Nyoni, & McCurdy, 2015; Hatzenbuehler, 2009; Herek, 2004; Muthukrishna et al., 2007; Nyblade et al., 2009; Tucker et al., 2014).

Research Goal
Inspired by characteristics of popular education as problem posing, contextually relevant, and transformative, this thesis seeks to explore how educational media delivered by mHealth is able to support CHWs and participants engage in discussions of health-related empowerment during household visits. Additionally, this study seeks to inform how educational media is able to support empowerment pedagogical processes such as problem-posing inquiry and critical reflection during CHAT household visits. With regards to the educational media formats used in the CHAT study, this thesis will comment on the strengths and weaknesses arising from the use of tablets and booklet media format in relation to empowerment as a process and goal of health education.

Purpose of Study
Using participatory research methods, the overarching CHAT study aims to understand the role of mHealth in improving the knowledge, behaviour and training of community health workers working with marginalized populations through the use of a handheld platform (a multi-function tablet computer), to leverage available, low-cost devices and open source software. The contribution of this thesis to the larger CHAT project lies in the analysis of resulting video data gathered from interviews conducted during health visits to suggest future research directions for programs targeting marginalized populations and community health workers working on health literacy programs in South Africa through the possible use of mHealth. While the larger CHAT study was not designed specifically as an empowerment or popular education program, overlapping health goals of improved self-efficacy, wellbeing and critical health knowledge amongst participants suggest an analysis of the empowering characteristics of this program would an appropriate theoretical fit. In examining the impact of mHealth to support empowerment education
delivery, facilitation and training, this study explores new conceptions of effective health literacy programs that address the socio-cultural contexts in which a population is embedded. Specifically, this study seeks to inform and improve future development and design for CHAT, including user interface and interaction patterns that best meet the needs of stakeholder groups. The results from the CHAT pilot tests will inform a revision of the educational media content and interaction models to guide empowerment-oriented discussions. The coding scheme and thematic analysis findings will assist the description of opportunities, barriers and facilitations to inform the revision of the intervention materials and manual as well as CHW training procedures.

The efficacy of initiatives oriented toward addressing discrimination and inequality within health literacy service delivery depends greatly on the ability to understand the unique needs of a particular community or population (Kark & Kark, 1962). Distinguishing between the “felt and unfelt” health needs of a community is thus associated with the equally important consideration of the framework of knowledge in which the particular need was perceived, and hence the action taken by individuals, families or the community to meet the problem (Kark & Kark, 1962, p.117). Specifically, this study examines in what ways the delivery of empowerment education (as a process and goal) can promote reflection and action on social determinants of health in a particular cultural and community context. This is done to understand the unique influences context and reality have within a particular educational exchange to support participants in (re)gaining control of their health and health literacy.

**Significance of Study**

This study makes several contributions to the fields of international health education, mHealth, empowerment education and culturally-responsive health literacy interventions. Firstly, this study makes scholarly contributions to emerging intersections of study between empowerment-oriented pedagogy and mHealth to facilitate training and comprehension around critical reflection and social determinants of health for emerging educational platforms. Specifically, this study will contribute to research exploring the role of technological platforms to scaffold collaborative learning exchanges where quality of contextual relevance and empowerment facilitation are variable, particularly around traditionally taboo or stigmatized topics and identities. On a pragmatic level, this study
contributes to new modalities for training CHWs to sustain learning opportunities and improved confidence to deliver health literacy information where adherence to protocol and the availability of effective training is variable. Through the observation of participant and facilitator engagement of educational media designed to be culturally-responsive and contextually relevant, this study contributes knowledge and insight to initiatives seeking to design mHealth programs to improve the uptake of health literacy packages focused on HIV, maternal and child health and nutrition (MCHN) with marginalized populations in need of health literacy information. For example, educational media platforms designed for intervention programs can be of great use for NGOs and health clinics seeking to train CHWs around sensitive issues requiring particular localized knowledge of empowerment and anti-discrimination facilitation. Additionally, considerations of contextual relevance not just as a matter of design, but also engagement could improve the pedagogical processes around empowerment educational programs. Particular to the context of South Africa, this study provokes changes in attitudes and behaviours that have been embraced by policy, but have yet to be fully realized in individual, social and institutional levels regarding improved health literacy around social determinants of health.

Research Design

Interactions between community health workers, care givers and children under five living with HIV in KwaZulu Natal, South Africa, recorded during CHAT (Community Health Worker Assistive Technologies) program interventions in 2014 and 2015, will be analyzed to address the research questions of this thesis. Data were sourced from qualitative coding and thematic analysis derived from two rounds of interviews, the first in November, 2014 and the second in May and June, 2015. The forty interviews selected for analysis were refined through a preliminary viewing of the videos examining visual and communicational cues of quality care, resulting in forty transcripts sourced from two rounds of video interviews between community health workers, mothers and caregivers from the focus community. Transcripts were divided between experimental (tablet) and control (booklet) groups to explore how each platform is understood and engaged in the exchanges between community health worker and their clients. Transcripts were further categorized and ranked along a 5-metric coding matrix rating CHW experiences of non-verbal quality of care, content depth, context-sensitive engagement, verbal and non-verbal
engagement and use of empowerment prompts. These five metrics were selected to assess empowerment processes based on Freirean (2014) popular education pedagogy as well as critical health educational pedagogies and the quality of health facilitator-patient interactions. Transcripts were coded using a thematic analysis assisted by the software program Nvivo. Themes were gathered and analyzed from rigorous coding and recoding to establish an understanding of the role of mHealth within the CHAT program to support CHWs in delivering contextually-relevant, problem posing education through the integration of experiences gathered from the video interview data. Themes emerging from the exchanges between CHWs and patients were analyzed based on the theoretical framework of popular education, critical health literacy and critical pedagogy explored at length in the literature review.

Thesis Organization

In the following chapter, a presentation of the theoretical understanding of marginalization, health literacy, community health workers and mHealth will be situated within the theoretical paradigm of Paulo Freire (2014). Following this chapter, the research objectives, methodology and analysis of themes identified is explored, whereupon efforts are discussed to connect themes emerging from video interviews to theoretical understanding of empowerment as both a goal and process of education. Next, a summary and discussion of the findings around the efficacy of mHealth to support empowerment education facilitation is presented. The study concludes with a discussion of possible directions for establishing empowerment-oriented health education programs around the contextual realities in general and future extensions of research.
Chapter 2. Literature Review

This chapter elaborates on the need for health literacy projects to provoke and support empowerment discussions as a means to improve the understanding of participants regarding health and disease management. The first section highlights the need for intervention programs in addressing impacts of low health literacy for children under five years of age and their caregivers. Through an empowerment and critical health literacy framework lens, the following section explores the development of health literacy interventions, as a means to comment on the need for facilitation and training within health intervention programs. The second section discusses the role of CHWs in relation to uncovering meaning and engaging community-based health projects related to CHAT. The chapter concludes with an examination of the role of educational media, and specifically mHealth, to support health literacy interventions by community health care workers.

Part 1 - Addressing CHAT’s Target Population

The overarching CHAT study addresses one of the largest negative impacts on child health in South Africa, the high risk of HIV, poverty, and under-nutrition for children under five (Black et al., 2008; Caulfield, Onis, Blössner, & Black, 2004; Grantham-McGregor, 1995; Martorell, Khan, & Schroeder, 1994; Sigman, Mcdonald, Neumann, & Bwido, 1991; Whaley et al., 2003). In the KwaZulu-Natal province, where the CHAT program is based, HIV rates remain pervasively high, with antenatal HIV prevalence reaching 39.5% of the under-five population (South African Department of Health, 2010). HIV-exposed children remain at a higher risk for malnutrition, stunted growth and increased infections than HIV-negative children related to increased parental illness and poverty and inconsistent feeding practices. The high risk of child mortality in relation to HIV often stems from behaviour and knowledge gaps regarding nutrition and health regiments between caregivers and children.

Addressing these gaps is a priority for intervention programs pertaining to health-related knowledge and practices of HIV-affected children and their caregivers. Complications pertaining to disease management, such as failure to diagnose, late admission, delays in transferring, lack of resources, and malnutrition, are often preventable through improved coverage of low-cost interventions (Chopra, Daviaud, Pattinson, Fonn, &
Lawn, 2009). Evidence-based health literacy programs for HIV-exposed children and their caregivers have been shown to address issues related to malnutrition and associated infections impacting understandings of HIV and resulting maternal and child health and nutrition (MCHN) (Bradshaw et al., 2008; Chopra et al., 2009). Programs which rely on CHWs to promote health, offer home care or referrals have shown adherence to these protocols often deteriorate after initial training (Ashwell & Freeman, 1995; Berman, Gwatkin, & Burger, 1987; Mangelsdorf, 1988; Rowe et al., 2007; Zeitz, Harrison, López, & Cornale, 1993). Furthermore, due to the relative unfamiliarity of CHW involvement and facilitation within education interventions for empowering health literacy, opportunities exist in the development of effective training to promote the uptake of critical dialogue facilitation by health care service providers (Champeau, 2002). Viewed through an empowerment framework, the evaluation of mHealth to support training and uptake lies in the capacity for participants to reflect and act upon the world around them. Educational pedagogies that involve problem solving and addressing health barriers relevant to the local context have been identified as an effective way to nurture adherence and uptake through the use of dialogue.

**Empowerment as a Health Goal and Process**

The use of empowerment in educational programs as a pedagogical driver can be seen in the works of Paulo Freire and his efforts developing popular education programs in Latin America. Based on a participant-centred model of learning through dialogical social action, “empowerment education” was used by Wallerstein and Bernstein (1988) as a method of education involving diverse groups of people in an effort to identify problems. For the purpose of this thesis, empowerment education will be used to describe educational programs that incorporate processes such as critical reflection of social and historical roots of these problems, dialogical opportunities to envision a healthier society and the development of an transformational strategies to overcome obstacles in achieving these goals, (Freire, 2014; Wallerstein & Bernstein, 1988). Since empowerment can refer to both the journey and destination of an educational program, the definition should incorporate the nature of design, engagement and supposed outcomes in relation to what empowerment looks like within a particular context (Tengland, 2007).

When understood as a process, empowerment can refer to a method, an ideology, or philosophy intended to incorporate a transformative education experience for (and
alongside) participants to learn about the world around them. Elaborating on the Freirean foundations of popular education described above, empowerment education as a process can constitute the incorporation of specific skills into the learning process such as problem formulation, decision making and inquiring maintain a participant-focused approach to learning. Compared to more teacher-centric pedagogies, popular education challenges the control and power experts or facilitators often have in health science education pedagogies by centralizing the context, understandings and contributions of the participants (Tengland, 2007). More specifically, the degree to which empowerment is incorporated into the learning process depends on the nature of inputs such as curriculum, educational content, media and facilitators to respond to the context and needs of the participant.

Turning to empowerment as a goal or output of education, Tengland (2007) outlines principals of developing knowledge or “awareness raising” amongst participants about themselves and their reality. The intention of raising awareness around a particular subject or problem is to improved participant autonomy and self-confidence to determine and fulfill one’s life goals. Similar to the participant-centric approach to empowerment as a process, establishing empowerment goals requires an understanding of what empowerment (or inversely, the barriers to empowerment) look like from the perspective of participants in order to comprehend the scope of appropriate goals intended to improve quality of life. The link between identifying problems and finding fulfillment in their resolution, according to Wallerstein and Bernstein (1988), comes from the actions individuals and communities take to transform their lives, rather than passively receive “liberation”. However, it must be noted that this transformation is not achieved through the domination of others for the sake of overcoming marginalization. Rather, empowerment, as both process and goal, lies in working collectively with others to effect change (Wallerstein & Bernstein, 1988).

Health rationale for empowerment

As a contributing factor to risk and poor health management, lack of empowerment, or powerlessness, can impede health enhancement or healthy attitudes and behaviours based on a lack of control over one’s life. Empowering health education has been identified by Wallerstein and Bernstein (1988) as a means to enhance the ability for individuals and communities to identify, reflect and self-actualize improvements in the quality of their health through the use of empowerment as a goal and pedagogical process. Much like popular education, the scope of empowerment for health education requires the
involvement of individuals and communities in an active sense to establish the scope of empowerment and promote attitudes and behaviours conducive to healthy living and disease management (Wallerstein and Bernstein, 1988).

To establish the role of empowerment within health requires a return to Tengland’s (2007) understanding of empowerment as both a process and a goal. As a process within health education, empowerment is used as a guiding principal or characteristic to ensure the development of health education includes representation, relevance and a particular call to action regarding health barriers identified by participants. Wallerstein and Bernstein (1988) elaborate on Freire’s ideas in identifying pedagogical overlap between health education and popular education processes through the incorporation of active learning methods, participant engagement and contextual relevance to identify relationships between educational content and their own needs and priorities.

Incorporating empowerment-oriented processes into health learning requires a balance of understanding not only the nature of conducting health pedagogies, but their desired outcomes as well. For Tengland (2007), the overlap between health and empowerment goals lies in a mutual intention of improving quality of life. However, health education researchers have seen a shift in outcomes beyond the acquisition of new knowledge, greater self-efficacy and positive health behaviours (Baker, 2006), towards the development of more specific skills needed to navigate perceived barriers of access and utilization of health care, alongside motivation, problem-solving and applied knowledge and skills for specific self-care (such as HIV/AIDS prevention and management) (Paasche-Orlow & Wolf, 2007). Sørensen (2012) outlines four types of competency in her review of health literacy outcomes, referring specifically to access, understanding, appraisal, and application of health information provided. Like popular education, empowerment-oriented health education seeks to improve individuals’ and communities’ ability to interpret, judge, and critically evaluate both reality and the nature of knowledge to maintain and improve health metrics for participants.

While the development of self-esteem, autonomy, welfare and self-efficacy within participants can constitute improvements in health-related quality of life, a critique towards the use of empowerment as a goal within health education is that these goals are often not specific enough for the purpose of health-based pedagogies. Instead, an inclusive understanding of empowerment for health might incorporate specific health-related quality of life goals either as the removal of external obstacles (physical, social, political, economic
barriers to health) or the increase of health-related knowledge (consciousness raising, skills development) to address autonomy, self-confidence and self-esteem in specific areas of health. At the same time, this predetermination of health goals for improved wellbeing can contrast with the open-ended nature of popular education. This synthesis of popular education and health education is not meant to represents a model. Rather, it serves to provoke developers, facilitators and participants to reflect and understand how health pedagogies can remain participant-centered and empowerment-oriented while still establishing specific health goals.

**Evaluating Empowerment-Oriented Pedagogies**

In assessing the efficacy of a health education program to achieve a particular goal related to empowerment, outcomes such as self-efficacy and autonomy are best understood and assessed over longer periods of time which take into account the slower progression of health education uptake. For the purposes of this thesis and its contribution to the analysis of the CHAT program, the scope of analysis will focus mainly on the quality of engagement which occurred during educational exchanges. Therefore, the framework used to understand empowerment in this context is inspired by the processes of pedagogical models used by Freire (2014) in popular education in addition to the understandings the goals of critical health literacy education undertaken by Sørensen (2012) and Nutbeam (2000). The assessment of empowerment within the CHAT program seeks to understand how important characteristics of popular education contribute to the perceived quality of engagement between participants and facilitators – specifically, procedural elements of context (within content and engagement), problem-surfacing engagement (through dialogue), and dialogical instances of action or transformation in regards to key messages. To assess the quality of empowerment processes and goals occurring during the CHAT program, a coding matrix (presented in the Methods Chapter) was developed based on characteristics of context-sensitivity, empowering discussions, problem posing opportunities, depth of health knowledge discussed and the nature of facilitating and inhibiting interactions. The following sections elaborate on the importance of context, community connectivity and empowering pedagogies through of health literacy, community health workers and educational media to illustrate their theoretical foundation of the analysis of the CHAT program presented in this study.
Part 2 – Foundations of Health Literacy
Health Literacy and Empowerment

As a means of education to improve health understanding and self-efficacy for individuals and communities, health literacy has been identified as a means of addressing disparities in health knowledge and behaviours through educational interventions. Since emerging in the 1970s, health literacy frameworks and scopes have evolved to clarify influential factors regarding skills and understandings shown to improve self-efficacy in a variety of populations. Examining the application of health literacy, a number of programs have found success using discussions of empowerment in areas of adult and adolescent mental health (Pinto-Foltz, Logsdon, & Myers, 2011; Sorsdahl, Mall, Stein, & Joska, 2010), and HIV/AIDS (Salmen et al., 2015), with further opportunities to develop health literacy programs around culturally-situated stigma reduction, particularly in the Global South (Shaw, Huebner, Armin, Orzech, & Vivian, 2009). From the above studies, low levels of health literacy have been addressed through: 1) opportunities for dialogue to recognize health barriers, 2) the use of context and culture to ground health literacy messages and discussions 3) the basis of support originating from the community. The ability for health literacy to address a diverse realm of health outcomes can be attributed to the flexibility and scope of using health literacy as a participatory pedagogy.

Despite its use in a variety of settings, health literacy scholars have classified health literacy programs and their outcomes based on levels of criticality, skill development and engagement. Definitions of what constitutes health literacy have expanded upon the work of previous researchers in the field to recognize basic, communicative and critical literacy skills used to assess reading and writing (Nutbeam, 2000; Sørensen et al., 2012). Basic functional literacy speaks to the sufficient basic skills needed to allow someone to effectively function in everyday situations. Basic functional literacy programs are often relied upon as a method of intervention because of the ease of creating and distributing materials, most often through the production of leaflets and traditional patient education (Nutbeam, 2000). Despite providing information for a participant, such approaches do little to invite interactive communication, nor do they foster skill development and autonomy in relation to healthy behaviours. Often what is lacking from basic health literacy exchanges are opportunities for participants to return to their own social context, either through dialogue or another form of meaning making, to critically engage and reflect
on the information presented. Removed from critical and communicative styles of engagement, basic health literacy emulates the pervasive “banking” (transmission) pedagogy approach identified by Freire (2014). In “banking” education, delivery of facts and figures alone is assumed sufficient to instigate changes in learners’ understanding and subsequently behavior regarding their health (Matthews, 2013). However, in a paper evaluating the use of education in health promotion, Nutbeam (2006) suggests that programs which focus only on the transmission of information fail to take account of the contextual circumstances of the individual learners, and the impact of those circumstances on healthy attitudes and behaviours.

Educational programs involving “actors who come from another world to the world of the people” (Freire, 2014, p.180) must pay particular attention to the role of context to situate educational content and engagement around the realities of the participant over the realities of external to the community or individual. Context can be understood as the particular environmental (social, economic, political, gendered, cultural) influences on the knowledge, values and identities of participants. Context gives particular meaning to the historical and socialized reality of present barriers and opportunities experienced by participants. In this manner, context results in unique experiences and understandings of key messages. To pull focus towards the importance of context in health education, relevance in educational content and engagement begins with the realization that health is a resource originating from within one’s own social context, rather than provided by the health care system (Jewkes & Murcott, 1998). Without contextual relevancy, many political and educational plans fail “because their authors designed them according to their own personal views of reality, never once taking into account those in a situation to whom their program was ostensibly directed” (Freire, 2014, p.94).

To address issues of relevancy and uptake, programs intending to engage participants around topics of empowerment would benefit addressing context at two points: firstly, in relating content to context during the development phase, and secondly during the resulting pedagogical engagement which may occur between participants and facilitators. In other words, evaluating the strength of contextual relevance should be based on the relevance of inputs (key messages, educational media, graphics etc....) and the pedagogical engagement through which how participants assert, critique or reform key messages to their own context through dialogue, behaviours and gestures. Reflecting and acting on context during these stages can address not only to the development but also the
uptake of learning opportunities within their own lived realities. This reality lies in a web of context, supporting and submerging individuals and communities based on their relation to expressions of power.

Health literacy content which does not take context and active components of praxis into account often overlooks important systemic barriers such as access to care and treatment, requisite time and financial resources that may remain unseen by top-down transmission methods of education (Freedman et al., 2009). Understanding contextual influences of socio-historical and cultural barriers are not foreign to developments of health literacy, however, they are understood outside of most dominant bio-medical pedagogies. Social determinants of health (Freedman et al., 2009) and cultural determinants of health (Kark, 1962) represent means of understanding the characteristics of socially and culturally determined conditions and structures which inform how people live, grow, work, age and care for themselves and one another. However, as discussed above, context does not only inform the form and function of educational content (in the case of CHAT, educational media), but also putting key messages into perspective through the pedagogical and patient-centred engagement which result. By relating not only educational media, (in addition to the discussions which result), to social and cultural determinants of health, the reality of daily practice and the situated nature of health of individuals, families and communities are respected in conjuncture with key health deliverables. Additionally, discussions around educational messages address not only the effects of health disparities, but invite preventative skill development in relation to one’s own barriers and opportunities.

Returning to Nutbeam’s (2000) hierarchy of health literacy, communicative literacy begins to recognize the importance of context through the application of advanced cognitive skills to socialized communication. In doing so, Nutbeam (2000) suggests pedagogical engagement in this manner can aid in the analysis of relevant messages to activities, barriers and opportunities which affect the health of participants’ day to day. Moving beyond transmissive educational pedagogies, communicative literacy engages participants with the intention of extracting information, deriving meaning from different forms of communication and applying new information to changing circumstances. Most contemporary school health education programs involve this type of personal skill development (Nutbeam, 2000).
The ability for participants to independently understand health literacy information is fueled by improved motivation and self-confidence to act. However, the limitation of basic and communicative health literacy to support motivation often lies in the scope of fixating lessons on the individual, rather than in relation to the community level. Using 18 focus group discussions with health education participants and facilitators, Salmen et al. (2015) sought to establish changes in attitudes and behaviors of participants through a series of health literacy interventions in rural Kenya. Results from group discussions suggested that learners’ social support networks played an important part in strengthening disease care regiments, leading to improved treatment literacy for HIV-infected community members. Educational programs such as that of Salmen et al (2015) can be considered a form of empowerment-oriented critical health education because of the focus on networked support and the development of more advanced cognitive skills such as critical reflection and action. As a means of reference, critical health literacy programs strive to use teachable moments where participants can relate information to life events and situations in their community. More specifically towards empowerment, critical health literacy uses reflection prompts to identify barriers to understand and apply educational content to in an effort to improve the relevancy towards participants’ health.

Critical health literacy is an appropriate foundation to address education regarding maternal and child health and nutrition to facilitate learners obtaining, processing and understanding health information and services to make appropriate health decisions (Sørensen et al., 2012). However, developing skills and motivation to engage participants in dialogue are necessary to sustain and deepen the value of the exchange. The benefit of using participant-centred and contextually relevant educational pedagogies (such as popular education and critical health literacy) as a foundation for developing programs, as opposed to more traditional or prescriptive pedagogies, lies in its ability to involve diverse groups of people in an effort to identify problems and critically reflect upon their social and historical roots in an effort to act in the present. In opening space for this reflection, elements of problem-solving, dialogue and patient-centred design can open further dialogical and communicative opportunities.

**Effective Health Literacy Design**

Opposed to the banking model, problem posing education offers a framework for learning through the identification and exploration of barriers and issues facing
participants in the real world, or contextual experiences of the learner. In relation to
critical health literacy, problem posing education offers a pedagogical model for
undertaking critical reflection within health intervention programs (Freire, 2014;
Wallerstein & Bernstein, 1988). As an important feature of problem posing education,
context has been identified as a strong foundation for improving uptake in health
education. As a point of reference for participants and their communities, context can offer
a means to relate values, interpretation and treatment of health issues of participants to
educational material presented (Kark, 1962; Macdonald, 2002; Nutbeam, 2000; Sørensen et
al., 2012). Emphasizing the importance of understanding context (in this cultural context),
Hamid et al. (2012) studied 268 diabetic patients in American Samoa over the course of one
year to establish changes in these patients’ disease management derived from the
deployment of CHWs from the same cultural background (compared with from outside their
community). The study found that using CHWs from the community, along with
educational content adapted to the local context, had beneficial impacts on health system
utilization, particularly in low resource and high-risk populations. The incorporation of
cultural features was also identified as an important aspect of applying content to context.
It is the intent of this study to understand how facilitators and participants reference
context in relation to the content presented in the CHAT media and conversations
occurring during household visits. In doing so, this project seeks to understand the
influence of educational media to improve references to their own experiences within
content presented in health interventions.

Within problem posing educational models, dialogue emerges as a twofold means of
making meaning within educational exchanges and empowerment processes. Firstly,
dialogue offers a means to facilitate how participants make meaning of key messages.
Secondly, dialogue serves as a means for researchers to understand the meaning made in
relation to health literacy. Compared to models relying on the transmission of rote
information between teachers and students, dialogue has been identified by critical rote
scholars as an important tool in developing an active component to improve outcomes of health
exchanges. (Fernandez-Balboa & Marshall, 1994; Freire, 2014; Matthews, 2013;
Wallerstein & Bernstein, 1988). In their review of the literature concerning the efficacy of
dialogue within critical education models, Fernandez-Balboa and Marshall (1994) suggest
the learning through a dialogical process enhances understanding, retention and
application of content. However, they also highlight that the development of dialogue
requires a number of preconditions such as personal investment, motivation, humility and respect. In acknowledging these preconditions, it could be suggested that contextual relevancy for participants would also contribute to the motivation and investment of participants.

Despite the intentions of educational program developers to ground content within participants’ experiences to improve relevancy, to create learning spaces in which participants feel comfortable, confident and motivated to include dialogical references to their own reality and perspective is no easy task. In the experiences of Campbell and MacPhail (2002), developing critical consciousness amongst participants apparently improved outcomes of a project working with 164 young people to host HIV/AIDS prevention and management programs in Summertown, South Africa. In their review of the effectiveness of the project to engage participants in critical discussions, the authors highlight the need for research to examine the role of facilitation by those providing education, particularly related to understanding the form and function of critical thinking skills in opening space for dialogue. At the same time, educators and facilitators must be aware of predetermined answers to problems when developing problem-posing educational models. In a literature review on critical pedagogy, Matthews (2013) suggests that leaving answers to problems open-ended is a way for educational practices to remain patient-centred (instead of transmissive). Together, the studies of Campbell and MacPhail (2012) and Matthews (2013) suggest that conscious facilitation to open space for dialogue embodies a fine balance of offering support without removing participants’ opportunities to negotiate the contents of learning. Implementing opportunities for reflection and interaction between facilitators and learners could improve the transparency of the educational exchange, and thus improve motivation and investment by both parties.

In sum, educational opportunities to reflect and to act on content that contains relevant references (in content and engagement) to local community practices, resources, and understandings can improve participants’ engagement and retention of health information, more than can mere exposure to information or rote memorization. However, support and facilitation are beneficial preconditions to opening space where participants would feel comfortable sharing and identifying outcomes. Applying the above key principles, this research project explores how educational media platforms implemented within the CHAT project are able to support health literacy, and how participants and facilitators are able to reference context-relevant content in discussions.
related to health improvement. Furthermore, this study shows how empowerment emerges as a topic of discussions, and in what ways empowerment media can support facilitators (in this case CHWs), to engage participants around maternal and child health and nutrition.

Part 3 - Exploring the role of Community Healthcare Workers (CHWs)

Faced with financial and human resource constraints, South African health service providers are turning to community members to deliver and assess health literacy programs (Gilson et al., 1989; Nxumalo, Goudge, & Thomas, 2013; Schneider et al., 2008; van Ginneken, Lewin, & Berridge, 2010). Referred to as community health workers, lay workers from the community are being increasingly relied upon by non-government organizations (NGOs) and health centres to deliver intervention programs around preventative health education for at-risk populations in South Africa. This section explores the appropriateness of CHWs for health intervention programs, given their position within the community. Additionally, barriers of implementation are discussed to suggest opportunities for the CHAT program to support training of lay health workers. Lastly, considerations for how to train CHWs particularly around dialogical educational exchanges are presented.

Defining Community Health Workers

While the definition of CHWs varies with regards to their specific duties, for the consideration of the CHAT program, CHWs offer an approach to cultivating health information within target populations to promote health and reduce disparities within marginalized and underserved communities such as persons living with HIV/AIDS (Hill-Briggs et al., 2007). Referred to as either lay health workers or community health representatives, CHWs are, on the whole, community members without professional or specialized knowledge to provide advocacy, support, counseling and information surrounding health literacy within the community. Additionally, CHWs are often tasked with providing health checks, health education, screening, detection and basic emergency care and improved quality of care by contributing to localized patient-provider communication (Witmer, Seifer, Finocchio, Leslie, and O’Neil, 1995 as cited in Mayfield-Johnson 2011). For their services, some CHWs receive remuneration, while others operate on a volunteer basis. Beyond assessment and treatment of diseases, data collection, education, counseling and referrals for further care, an essential quality to the improved
accessibility of CHW outreach programs lies in conducting home visits (Braun, Catalani, Wimbush, & Israelski, 2013). By directly targeting households, CHWs can increase access to care for groups who have difficulty accessing clinics, such as secluded women, extremely poor, or stigmatized and marginalized populations.

Particular to South Africa, the rapid expansion of CHW programs, budgetary allocations and infrastructure can be attributed to policies and programming in response to HIV/AIDS and TB within the country. Since the mid-1990s, CHWs have been sought after to support state and NGO promotion of voluntary HIV testing and TB treatment (Schneider et al., 2008). In 2004, CHWs numbered an estimated 40,000 (National Department of Health, 2004a, as cited in Schneider et al., 2008), nearly matching the number of professional nurses in the public health sector, 43,660 (Day and Gray, 2005, as cited in Schneider et al. 2008). During this time, the government introduced the term ‘Community Health Worker’ as a description for these and other community workers in the health sector, adopting a more formalized policy framework for their training and payment (National Department of Health 2004b as cited in Schneider et al. 2008, p.180).

The demographic profiles of CHWs obtained by Schneider et al., (2008) through participant and group interviews in the Free State province in South Africa reveals an overwhelming female presence (92%), predominantly between the ages of 30 and 50 years old. CHWs are often recruited and selected through calls for volunteers through community-based organizations and local health facility staff (Schneider et al., 2008). After a screening process by the participating organization, those deemed suitable are trained through provincially contracted NGOs. Within NGOs and community-based health projects, CHWs represent opportunities for localizing and contextualizing health literacy initiatives facilitated by local staff and community members to improve community uptake of information and healthy lifestyle regimes.

Community Health Workers and Cultural Proximity

The roles of CHWs in South Africa have moved beyond health service delivery to include a wealth of skills and services connected to improving health literacy and empowerment opportunities within communities. Particular focus has been given to using CHWs to provide services for marginalized or volatile populations such as caregivers and children living with HIV/AIDS. CHWs have been seen to reduce health care costs by providing health education, screening, detection and basic emergency care in the wake of
health professional shortages and sparse health care facilities in rural locations within South Africa (Mayfield-Johnson, 2011). Beyond health checks, CHWs offer opportunities to involve members of the community to “culturally link” (Service and Salber, 1979 as cited in Mayfield-Johnson, 2011, p.68) information presented in educational media. Referred to CHWs as “bridgers” in Schneider et al. (2008), CHWs have an empowering role linking patients and communities with the health system while opening space for “a voice for people, fulfilling identity-related needs, building lay knowledge and expertise on health issues” (p.185). Between 2004–06, Schneider et al. (2008) assessed sixteen primary health care facilities in the Free State Province through two rounds of facility-based group interviews with 231 (2005) and 182 (2006) CHWs. Researchers sought to understand the professional abilities and roles needed for CHWs to provide comprehensive HIV services. Despite citing issues with managerial challenges and motivation, Schneider et al. (2008) found that the strength of using CHWs lay in their ability to speak about health and disease prevention information and health system access in relation to localized points of reference such as a community’s own culture, language and value system. Referring back to the importance of context in discussing critical health literacy, this element is of particular importance when discussing cultural, linguistic, social and financial barriers to health care (Schneider et al., 2008).

Opposed to more formalized and clinic-based educational exchanges, home-based care operated by community members creates a strong foundation for health literacy programs to remain community oriented in their delivery. In evaluating the ability for programs to do so, Wallerstein (1988) assessed the ability of the Alcohol and Substance Abuse Prevention (ASAP) Program to empower youth from high risk populations to make healthier choices in their own lives. Through interviews with and observations of participants and facilitators performed over the course of the five year project, researchers sought to understand participant facilitators’ abilities to enhance social competence, social support and community mobilization around health initiatives when cultivated at the community level. Wallerstein found that the incorporation of community members into the educational process offered opportunities for participants to act as equals and co-learners to create contextually-embedded knowledge through dialogue. Posing problem programs in this manner offered opportunities for group dialogue and critical thinking around familiar points of reference. Similar to the value of cultural linkages described by Schneider et al. (2008), the value in sourcing project facilitators from the community lies in their ability to
offer context to topics which arise in discussions (Wallerstein, 1988). Drawing on Freire’s (2014) understandings of facilitation by Freire, health educators, in this case CHWs, can contribute information after themes raised and reflected upon by participants. In doing so, rather than imposing their own cultural values on those of participants, program facilitators are better able to maintain “authentic dialogue” to help participants move out of spaces of cultural silence and internalized marginalization to redefine their own social reality (Wallerstein, 1988).

Complications within Community Health Worker Programs

While CHWs offer opportunities for accessible, localized care amidst health disparities, the ability to meet multiple needs within served communities alongside the development of required competencies in technical, interpersonal and facilitation skills can vary between CHWs and organizations. While the experiences of Schneider et al. (2008) and Wallerstein (1988) suggest the ability for CHWs to reference and encourage the contextualization of information in relation to the community and individual is a desirable facilitation capacity, the reality is often divergent. Training experiences often vary in quality, along with the complexity and amount of information presented, assessment of knowledge and understanding of health literacy educational material are prime concerns in the quality of CHWs (Hill-Briggs et al., 2007). A study conducted by Hills-Briggs et al. (2007) assessed the efficacy and satisfaction of eight CHWs delivering diabetes health information to African American patients. The resulting interviews found CHWs identified low self-confidence in knowledge and skills as educators, difficulties with maintaining a large caseload, and inefficiencies experienced in conducting home visits as barriers to program implementation and job satisfaction. Similar studies to Hills-Briggs et al. (2007) involving the evaluation of CHW efficacy suggest additional operational barriers include lack of integration and conflict with health professionals, unsupportive environments, poor supervision, lack of incentives, high turnover and cost-effectiveness (Berman et al., 1987; Gilson et al., 1989; Walt, 1988, 1990). Furthermore, due to the form and function of training for CHWs to supplement health care professionals, most enter the field as generalists rather than skilled in specific health delivery needs, highlighting opportunities to use training opportunities to specialize CHW efforts around marginalized health literacy development.
Low levels of training amongst CHWs can further exaggerate disparities in quality service delivery through significant staff turnover, leading to complications strengthening and sustaining research and training. Instances of “institutional memory loss” (Gerein, Green, & Pearson, 2006, p.46) occur within professional communities of practice such as nursing when professional leadership and intellectual resources are lost or not further developed due to new directions under new management. This loss is particularly pertinent to rapidly evolving programs in reproductive health, HIV/AIDS and tuberculosis, "where strategies must be reinvented and retaught due to the loss of key personnel and the resulting loss of continuity." Communities at risk of institutional memory loss such as nursing professionals lose a number of holistic skills when they fail to be shared amongst peers, particularly pertaining to contextual and patient-centred information.

Despite variability among the training developed for CHW deployment, increased field experience early on as a component of training, skills to identify unanticipated logistical barriers and gaps in training along with opportunities for self-assessed efficacy have been highlighted as points of focus for overcoming variable quality in confidence and ability amongst CHWs, beyond increased funding and management presence. However, even though CHWs in their study appeared familiar with local points of references, Schneider et al (2008) suggest that what CHWs are able to achieve must be understood within a broader network of support that seeks to strengthen their training in facilitation and dialogue for health. The need to sustain training opportunities for CHWs serves as the empirical driver for CHAT’s effort to understand how educational media may influence the practice and topics of discussions in relation to health literacy.

Part 4 - The role of mHealth for CHWs

Technology is a means, rather than an end, to facilitate learning exchanges between community members and health care workers. An increasing number of health care delivery models, including CHWs, are exploring the role of technology to enhance the quality of service offered within health service delivery (Bull & Ezeanochie, 2015; Golding, 2014; Shieshia et al., 2014; Thondoo et al., 2015). This section serves as an overview of mHealth as a platform in an effort to support the inquiry into the use of educational media to support the facilitation dialogical health literacy programs. Within this study, intervention materials will be referred to as mHealth, tablets, and educational media. As a point of differentiation between references to technological platforms, mHealth refers to the
use of computer-supported technology for health interventions, use of tablets as the particular form of computer-supported technology, and incorporation of educational media intervention materials containing either text, video, audio or images.

The role of mHealth in health literacy

Summarizing the findings above, the literature suggests that, when sufficiently trained, CHWs have been shown to offer effective health education with a diverse range of populations through culturally responsive and participatory forms of educational engagement. Nonetheless, CHWs continue to face significant performance pressures amidst under-resourced and inconsistent training. Projects evaluating CHW performance suggest that since many CHWs operate as generalists, high turnover in particularly remote areas where supervision and resources are scarce can impact quality of engagement (Gilson et al., 1989; Golding, 2014; Schneider et al., 2008; Walt, 1988, 1990). In an attempt to overcome these challenges, a number of projects have examined the role of mobile technology initiatives in health, called “mHealth,” to support health promotion and disease management programs. mHealth utilizes platforms ranging from text messages and social media feeds to software applications (called “apps”) downloaded to phones and tablets to facilitate and add depth to health information provided during learning exchanges (Bull & Ezeanochie, 2015). In a review of the literature, community health workers have incorporated mobile technology to collect field-based health data, receive alerts and reminders, facilitate health education sessions, and conduct person-to-person communication (Braun et al., 2013; Cherrington et al., 2015; Golding, 2014; Shieshia et al., 2014; Thondoo et al., 2015). South Africa in particular offers a positive environment to explore the potential integration of mHealth into health literacy and community health worker programs on the grounds of high use of mobile phones, a well-developed ICT industry and strong government support for mHealth development (Leon, Schneider, & Daviaud, 2012). In the South African Department of Health mHealth Strategy for 2015-2019, considerable focus has been given to strengthening the capacity of mHealth to support the empowerment and maintenance of good health, while looking for points of intersection with other initiatives in health systems delivery (Department of Health, 2015).

Benefits to quality of service delivery within programs using mHealth and CHWs have been identified as improving patient adherence to treatment and follow-up (Leon et al., 2012), reducing facility operation costs (Mahmud, Rodriguez, & Nesbit, 2010), and
improving capacity for program and patient monitoring (Braun et al., 2013). However, research regarding the implementation and adoption of information and communication technology is still ongoing given the relative infancy of mHealth programs and the ongoing emergence of new technological platforms and modalities of computer-supported learning. Through the views of CHWs in Uganda and Mozambique, Thondoo et al. (2015) sought to assess perceptions of health care delivery workers using mHealth interventions. Through 24 in-depth interviews and five focus group discussions with the CHWs, results of thematic coding found mHealth platforms had the most influence reducing the need for travel, improving efficiency and planning, receiving feedback and information, and improving communication with supervisors and other community health workers. While research such as Thondoo et al. (2015) suggests mHealth can support CHW logistics and administration, little research has been conducted regarding the role of mHealth to improve quality of care and fidelity to educational facilitation and training, particularly within health literacy delivery. Establishing accessible, sustainable and cost-effective methods of training remains crucial to ensuring quality of care, fidelity to program priorities and objectives, as well as offering opportunities for feedback and reflection for participants and management (Golding, 2014).

**Barriers to mHealth**

Research into the integration of mHealth platforms and pedagogies into existing health literacy and health interventions must take into account the relationships between technology and the context and scope of implementation, particularly in resource limited settings. Ali and Bailur (2007) identified a framework of key questions in five relevant analytical categories: institutional/organizational, social/cultural, financial, technological, and environmental sustainability. To ensure successful interoperability and integration of information services within health systems, stakeholders must address logistical and financial considerations in sustaining large scale use of mobile phone technology, particularly in resource-limited settings. Further challenges to technological integration include the complexity of ensuring interoperability and integration of information systems (Leon et al., 2012), the security and privacy of information and data confidentiality (Dolan, 2011), alongside improved connectivity and the removal of barriers to access and understanding.

While the findings of many projects will attest to the potentially strong contributions
of mHealth within the health system in South Africa, according to Leon et al. (2012), what remains unclear is the degree to which emerging technological platforms can align with other goals and modalities in the current public sector health system, particularly within social, technological, financial and organizational dimensions. Since many examples of mHealth programs are small scale, donor funded and often short-term (Mechael et al., 2010; World Health Organization, 2011), more research needs to be promoted in examining the scalability of initiatives to maximize their impact. From content design, representation and implementation, educational media remains value-laden. In many ways, given the high turnover of mobile devices and upgrades available, technology plays into a form of Marxist commodity fetishism, where we desire a device on the basis of novelty, rather than its ability to offer a reasonable solution to an identified problem. In their review of 1,749 articles discussing mHealth, Bull and Ezeanochie (2015) suggest that a strong motivation of mHealth research is to respond to profit potential in developing new apps and technological platforms as much as fulfilling the needs they aim to address. Because of the potential for profit within mHealth, project developers should remain critical of platform fidelity and investigate how the needs of participants inform the functionality and design of mHealth platforms.

In particular, efforts should look to build off of existing local systems of technology-supported education, with particular focus on participant engagement and user experience. In gauging the efficacy and appropriateness of technology to support critical dialogical exchanges, a number of fundamental considerations regarding successful integration of technological platforms must be considered before a particular platform can be considered successful. According to Wenger (2001), technology must be assessed in so far as it is able to improve participants’ sense of belonging through the development of knowledge building interactions in a matter that is cost-effective, and accessible with low barriers to entry. Bukachi and Packenham-Walsh (2007) highlight a consideration of four C’s in regards to the feasibility of integrating mobile platforms into health service delivery: 1) Culture of information and technology use; 2) Capacity to manage effective implementation, use, and maintenance of the new information technology; 3) Connectivity which refers to the interlinking or interoperability of information and technology systems; and 4) Costs or financial implications. Ali and Bailur (2007) posit a further consideration of environmental and institutional viability to capture the wider impact of producing and evaluating sustainable technology.
Given the above considerations, mHealth could have a role in supporting empowerment educational programs, through promoting contextually-grounded problem posing education and critical thinking around participatory-driven identifiable themes within a community. Rather than matching the community to the technological platform, critical focus should be on developing “usability” (Bull & Ezeanochie, 2015; Leon et al., 2012), namely the ability for programs to resonate, respond and engage participants. Like any educational platform introduced without an understanding of contextual feasibility, it is possible for technologies to reinforce the “banking” (transmission) method of education. Without conscious design and opportunities for critical thinking within the user experience, programs are at risk of replicating transmission mediated through new technology, rather than acting as a prompt for critical engagement and thematic meaning making as a patient-centred experience. Formed around engagement over transmission, it is posited that the use of mHealth can lead to reduced alienation and the increased democratization of information leading to greater self-determination and self-efficacy within health systems (Bull & Ezeanochie, 2015).

Designing mHealth for engagement
Understanding the role of mHealth through an empowerment framework highlights a number of intersections related to the present study. The appropriateness of these emerging modalities within empowerment-oriented education initiatives can be gauged by the ease of ‘usability’ for mobile platforms to support the key tenants of critical reflection and action. Namely, the appropriateness of using technological platforms for health literacy programs rests in the ability of platforms to mediate between the examination of systemic or contextual themes, while remaining a responsive and connective tool. Through opportunities to critically examine and constructively problematize technological platforms and computer-supported pedagogies, projects are able to dismantle and overcome assumptions. In doing so, programs should use such reflection and foresight to strengthen features in an attempt to avoid alienating end users. Through critical examination of technology within a particular context, opportunities for platforms to remain reflexive are strengthened.

The capacity of empowerment education to become a transformative action lies in the way it may enable participants to reflect and act upon the world around them. Active problem solving and challenging barriers to disease and nutrition management lie in
opposition to education as passive transmission. It is therefore the role of technological platforms and pedagogies to further the means of problem-posing education, to develop a sense of criticism and reflection, “not as passive objects, but as subjects of consciousness” (Freire, 2014, p.123). mHealth can only be deemed a success in relation to empowerment educational drivers insofar as it is able to cultivate participation, reflection and action around it. Devoid of critical engagement and an understanding of contextual influences on health education, technology can still disempower, alienate and encourage an arrest of inquiry.

Berger (2013) suggests that content developed for educational media should include stories and messages that resonate with users to seek deeper understandings and to remain critical. Content designed to trigger increased contextual application would have greater chances of being understood and undertaken by participants (Berger, 2013). However, in targeting marginalized individuals and communities, this progression towards reaching critical literacy, according to Freire (2014) and Airhihenbuwa (2006), is only achieved through opportunities to engage with health information reflected within the situated nature of past and present historical-cultural relations to power and oppression. Understanding health information in this manner allows a comprehensive understanding of not just the prescriptive elements of health management but improved understandings of socialized determinants of health, placing the context and authority of the individual and community at the centre.

Returning to the role of technology in communities of practice and community engagement, the appropriateness of technological platforms within these environments should be evaluated based on their ability to remain beneficial, accessible and effective in supporting existing networks and learning modalities amongst participants. In a study conducting qualitative discussion group with for CHWs following an mHealth intervention program assisting African American diabetics, Cherrington (2015) highlighted that CHWs were able to use platforms to assist in communication. In particular, platforms offered emotional engagement as CHWs would check in with one another and reiterate feedback via mobile telephones back to clinical care teams. The use of mobile technology helped improve reflexive support and engagement within CHW cohorts, demonstrating the ability of technology to connect members of communities of practice in meaningful ways. The stronger and more confident CHWs felt in their support and training, particularly in their support of marginalized populations, the higher the propensity to deliver quality care and
responsive engagement.

When viewed through an empowerment framework, health literacy can be an effective means of improving knowledge and behaviours needed to improve disease and health management. Dialogue emerged as an effective means to access the ways in which participants and CHWs make meaning of the exchange in addition to expressing their understanding of content presented. However, in supporting dialogue (which includes references to critical understandings of empowerment with critical reflection and action), more research is needed in regards to facilitation and training needed to support the development of CHW quality of engagement. In sum, this literature review suggests that a research opportunity exists in examining how new forms of educational media might be able to support CHWs deliver empowering and contextually-grounded educational interventions about maternal health and nutrition. It was also the intention of this literature review to suggest that a research opportunity exists in examining how new forms of educational media might be able to support CHWs to deliver health interventions concerning maternal health and nutrition.

Given the opportunities and challenges presented within the field of health literacy using empowering educational media presented in the literature review, this study addresses the following research questions:

1. How are CHWs and participants supported by CHAT to engage in contextualizing relevant content and enabling personalized reflection during household visits?
2. How are empowerment educational processes (for example, problem-posing discussions and critical reflection) supported by educational media within CHAT household visits?
3. What are the strengths and limitations of using educational media within the CHAT environment?

The following chapter presents the methodology developed to assess the use of educational media to support participants and CHWs in the CHAT study.
Chapter 3 - Methodology

This chapter explains the research site and participant sources used during the data collection period. Additionally, the mixed methods of inquiry used to analyze themes and data from the *Community Health Worker Assistive Technologies (CHAT)* pilot program are presented. Description of household interview transcription and coding methodology for CHW household interactions, as well as the open-ended coding that was performed for interaction themes, is presented. Finally, ethical considerations of this study are discussed.

Overview of Study Methodology

The study involved videotaped and transcribed interviews of 19 household visits in the Richmond Municipality, in the KwaZulu-Natal province of South Africa conducted by Community Health Workers (CHWs), where 12 visits were supported by a multi-function tablet device and seven visits were supported by printed handbooks. The contribution of this thesis to the larger CHAT program lies in the analysis of engagements between participants, CHWs and educational media regarding empowerment processes, discussions and outcomes. While the CHAT program did not specifically align with popular education principals, the incorporation of elements and processes used within Freriean (2014) pedagogy (problem-posing discussions, context-relevant engagement, learning as a means of transformative action) within the project (explicit or implied) serves as justification to analyze the project through an empowerment lens. All conversations that occurred during the visits were videotaped and transcribed for analysis. A coding matrix was developed to score visits based on dimensions of quality of care in addition to an open coding of themes relating to empowerment and educational media usage. The use of mixed methods in this manner was developed to gain insight into patient experiences in health literacy programs, where metrics allow researchers to assess service provision, utilization and its outcome.

While informed by the design of Banerjee’s (2003) work, a scoring scheme was developed for CHAT to analyze visits based on their quality of care in relation to the study’s areas of inquiry and the critical health literacy and empowerment framework discussed in the literature review. This means of scoring, referred to as a coding matrix, used the following five dimensions to gauge quality of care: 1) context-sensitive engagement; 2) non-verbal prompts; 3) empowerment discussions; 4) content depth and 5) verbal engagement. These five metrics of quality of engagement represent the intersection of processes and
outcomes between pedagogical foundations of popular education, health science and the study of affirming doctor-patient interactions. These dimensions were used to score the quality of engagement across each dimension and collectively for each household visit used. The resulting tallies were used for purposes of comparing household visits in the tablet (experimental) vs. handbook (control) conditions, as well as to assess the impact of CHAT on CHWs who started out (i.e., in their first visits) with low empowerment scores, as compared with the impact of handbook-mediated visits. Next, a thematic analysis was performed using open coding of discussion themes, which served to situate the health literacy goals of the CHAT project within the theoretical foundations of critical health literacy and empowerment. The themes that emerged from this coding, concerning how participants engaged, discussed and related to empowerment and health literacy within the program, provided a basis for an analysis and discussion of findings in the following chapters. Since CHAT is operating as a pilot program, the use of mixed analysis methods adds to the depth of understanding of both behavior and knowledge changes over the data collection period. An explanation of the population, data collection and analysis follows.

**Research Site**

The *Community Health Worker Assistive Technologies (CHAT)* program was developed by Professors Butler (University of California, San Francisco), Slotta (University of Toronto), and Horwood (University of Kwa-Zulu Natal) along with the Thandanani Children’s Foundation (TCF) in support of CHWs delivering home-based HIV and maternal-child health and nutritional (MCHN) education, support and referral on a handheld platform (i.e., a multi-function tablet computer) leveraging available, low-cost devices and open source software. Access to CHWs and entry into communities and households was facilitated through collaboration with the Thandanani Children’s Foundation (TCF). TCF facilitates community based care and support for orphans and vulnerable children affected and infected by HIV/AIDS in the KwaZulu-Natal midlands. TCF has a well-established system of community based care and support for orphans and vulnerable children and their households, aimed at supporting CHW teams to respond to the basic material, physical, cognitive and emotional needs of OVC within communities in Kwa Zulu Natal. Since 2010, TCF has provided home-based HIV testing, facilitated linkages to HIV care and treatment, and home-based support for HIV-infected children and their caregivers, including support for antiretroviral treatment adherence.
The study was conducted in Richmond Municipality, located along the southern boundary of the Umgungundlovu District Municipality. Over 45% of adults in Umgungundlovu are HIV-infected, with Richmond having the highest HIV-infection rate in the District (Day et al., 2010). In 2007, Richmond had a reported total population of 56,772 people (25% of whom were ≤10 years old) and 12,679 households (Statistics South Africa, 2008). Richmond is divided into 7 wards, with the large majority of the population living in rural tribal authority areas that have low levels of basic services. Housing is heterogeneous: 41% of residents in ward 5 live in traditional housing while 46% of residents in ward 6 live in slums (Richmond Municipality Integrated Development Plan Technical Community, 2007). The area has high levels of poverty and unemployment and low levels of education; in 2008, 77% of households in Richmond had an annual household income less than R72,000 (~$10,200), 60% of those over 20 years old had no secondary or higher education and 28% were formally unemployed (Richmond Municipality Integrated Development Plan Technical Community, 2007).

**CHAT Educational Content**

The educational content offered in the booklets and tablets was designed by the research team in partnership with Jive Media Africa. In particular, Jive Media Africa was responsible for the development of original content presented in static and dynamic media formats (e.g., sequences of line drawings with audio; animated video; or dramatizations). While the educational content between experimental and control groups was the same, the tablets offered a number of additional features with regards to data collection and means of educational content delivery. The tablets provided electronic data capturing to support communication with clinic-based health providers and CHW supervisors.

**Key Health Messages and Discussions**

Tablets offered CHWs the ability to electronically document what services were delivered, assess child health (using the WHO sick child checklist), which immunizations were received, and offered prompts for discussions about HIV, child nutrition, child disease and child development. As a scaffolded learning environment (Cuthbert & Slotta, 2004; Slotta & Linn, 2009), the pedagogical foundation for CHAT was based on models of sociocultural learning to engage CHWs and clients in discussions and reflections in relation to key health messages. CHWs were prompted to discuss client responses and possible actions around key messages to promote uptake and contextual application of the
information discussed. Prompts were based on empowerment engagements, used to motivate discussions of barriers and opportunities to clients’ health realities. The health education media content developed for both tablets and booklets was designed to be contextually and culturally relevant to the target communities, through the images, animations and text presented.

The CHAT program sought to make advances in CHW and participant knowledge in four key health topic areas: 1) nutrition (including breastfeeding, early childhood diet, and overall nutrition and health); 2) child development (age 0 to 9 months, 9 to 24 months, and 2 to 5 years); 3) danger signs of childhood illness (respiratory, diarrheal, malnutrition, sepsis); and 4) HIV (HIV testing, viral load, CD4 count, adherence to anti-retrovirals (ARVs), administration of ARVs to children). We began by developing a matrix to capture key health messages for each of these primary areas (see Table 1), which were derived from a comprehensive review of available guidelines and materials (e.g., from UNICEF, Word Health Organization and Hesperian Health Guides).

Table 1 List of key messages that guided the development of CHAT educational media

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Child Development</th>
<th>HIV</th>
<th>Child Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding for as long as the child wants;</td>
<td>Psychosocial development</td>
<td>Role of immune system</td>
<td>General signs and symptoms</td>
</tr>
<tr>
<td>Give a staple food such as cereal;</td>
<td>Caregiver-child interaction</td>
<td>Human immune-deficiency virus</td>
<td>When to seek care</td>
</tr>
<tr>
<td>Add fats and oils such as peanut butter,</td>
<td>Vocalizing, initiating and</td>
<td>CD4 cells</td>
<td>Home management of symptoms</td>
</tr>
<tr>
<td>avocado, butter, margarine, vegetable oil,</td>
<td>responding</td>
<td>Viral load</td>
<td>Respiratory illness</td>
</tr>
<tr>
<td>etc.;</td>
<td>Affirmation and praise</td>
<td>HIV, CD4 and viral load testing</td>
<td>Diarrheal disease</td>
</tr>
<tr>
<td>Add full cream milk products;</td>
<td></td>
<td>ARV adherence</td>
<td>Malnutrition</td>
</tr>
<tr>
<td>Add meat, chicken, fish or eggs;</td>
<td></td>
<td>Medication administration</td>
<td>Sepsis</td>
</tr>
<tr>
<td>Add beans, peas, lentils or nuts (protein and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>zinc) and vegetables and fruit (2 servings/day);</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If baby is getting no milk, then 6 feeds a day;

Discourage bought foods - not as nutritious;

Keep hands and food clean;

The following images show the differences in how content was presented in a sample lesson (in this case, Childhood Nutrition) first in the booklet (as text, images and prompts) and within the tablet (as an animated video and prompts).

**Figure 1** Example of the prompted educational content presented in the booklets pertaining to a lesson on childhood nutrition (in English and isiZulu).
In both the booklet and tablet educational content, prompts were embedded to prompt CHWs to encourage participants to reflect on health barriers, opportunities and the application of educational content into their own context. Prompted questions were included to invite participants to challenge or reflect on the appropriateness of the educational material presented. CHWs were asked to use these prompts to motivate discussions, using their own experiences and training to offer possible helpful actions.

Prompted discussion questions included:

- What important information have you learned?
- Do you agree with this?
- Have you ever experienced this?
- What does this mean for you in your life?
- What do you think you can do about it?
- Are there barriers that will make this difficult?
- What can help you overcome them?
Prompts were used to encourage reflection on contextual barriers which may be impeding participant’s access or realization of certain health necessities, with the promotion of an active component in addressing these disparities. Developed in relation to the work by Freire (2014), critical reflection related to empowering health literacy occurs when health information is reflected upon within the situated nature of past and present historical-cultural relations to power.

Selection and Training of CHWs

All CHWs were, at the time of study, volunteering at Thandanani (although paid a small stipend for daily expenses such as food and travel), recruited to support households in six communities within the Richmond Municipality. Each CHW was responsible for up to 50 households, and was expected to visit approximately two households per day. For each of the six communities, half of the CHWs were randomly assigned to a quasi-experimental group: half to the intervention group (“Group 1”) and half to the control arm (“Group 2”). Assignment of CHWs was determined using a random number sequence. Participating CHWs were trained on HIV, nutrition, danger signs of childhood illness, and child development. CHWs assigned to communities allocated to Group 1 (Experimental) were given a CHAT tablet, and provided training in its use. All CHWs received a manual prepared in English and isiZulu covering the topics of HIV, child nutrition, child disease, and child development. Issues regarding feasibility and the use and maintenance of the device, such as keeping the CHAT tablet charged, preventing and responding to theft, breakage, or failed communications were managed by the research team. All data was encrypted in a database residing on the tablet, so that if the tablet was ever lost, the data was not recoverable by strangers to the study.
Figure 3 CHW using tablet with caregiver and child. Permission has been granted by participants to use their image for research purposes.

Figure 4 CHW using booklet, conducting household visit with two caregivers and child. Permission has been granted by participants to use their image for research purposes.
CHAT Household Visit Protocol

CHWs conducting household visits were provided a two-day refresher training in home-based HIV and MCHN, given a CHAT tablet and booklet, and provided training in its use; 30 CHWs providing support to households in the control arm were recruited to participate, and provided with the two-day refresher training only. Training was conducted by a nurse from the Centre for Rural Health (CRH) extensive experience in training CHW about child health and development, as well as integrated management of childhood illness and HIV. CHW were asked to provide written informed consent for their participation in pre- and post- training assessments; observation of household visits; and structured interviews before and after the study period.

During their first visits, CHWs were accompanied by an observer who recorded the exchange on videotape. Permission was obtained for video capturing of caregivers and their children. Rounds of observation were conducted in 2014 and 2015. Recording of visits in this manner was intended to provide a form of “pre-post” comparison, giving a sense of the impact of CHAT on CHW efficacy and empowerment facilitation skills over time.

When the CHW arrived at each client household, GPS coordinates were automatically captured and cross referenced with prior visits. During an active session, client data could be referenced on the tablet. In order to ensure continuity of use (i.e., that the tablet hadn’t been put down or stolen during an interview), CHWs were prompted after a short time interval of inactivity (e.g. 10 minutes), proceeding to a “time-out” for that session, requiring renewed authentication to resume. On a regular basis, not less than once per week, the CHW “synchronized” his or her tablet data with a master health record maintained by TCF. This synching process updated the CHW tablet with any relevant client records and updated TCF records with newly obtained data.

Services delivered during household visits were all components of ‘usual care,’ normally performed using paper forms and checklists. However, unlike paper forms and checklists, the application showed all text fields in isiZulu or English (the CHW may choose which to show); prompted the CHW to refer a child to care; discussed immunizations needed based on the child’s age, and showed short illustrative videos about the key health topics (HIV, child nutrition, child disease, child development); and made additional resources (i.e., guidelines) accessible to the CHW electronically.

The household visits were conducted to assess the health of the children using assessment questions for caregivers, and a mid-upper arm circumference (MUAC)
measurement of the child to assess acute levels of malnutrition. The visits offered opportunities for CHWs to meet with caregivers and deliver health literacy information around key health topics: HIV, child nutrition, child disease, and child development. Household visits were organized to allow for initial introductions, child and mother observations, delivery of key health messages and discussions of barriers and possible actions. During the visits, participants were encouraged to include their input and perspective and to challenge information that they did not understand or agree with. Within the visits, educational prompts were used to assess levels of home-based caregiver compliance regarding preventive health behaviors for children living with HIV. CHWs were prompted to observe, ask and record infant and child wellbeing in relation to the topics and themes of the curriculum. Following the educational component of the household visits, CHWs would additionally address services delivered related to the goals of the TCF and their deliverables, such as improving access to identification, social grants and household gardens.

Participants and Data Sources
To test the impact of CHAT, a pilot test involving HIV-affected children under five years old and their caregivers in KwaZulu-Natal, South Africa, was conducted: the children’s health along with caregivers’ knowledge of HIV, child nutrition, child disease, child development were assessed at regular intervals over a 12-month period.

Researchers conducted a randomized controlled trial including 21 CHW (11 experimental and 10 control), 80 HIV-affected children and 120 caretakers (i.e., parent, legal guardian or primary caregiver) of children under five years old in KwaZulu-Natal. Data was collected from caretakers at baseline, three and six months on knowledge about HIV, child nutrition, danger signs of childhood illness and child development; HIV testing for themselves and their child; health service utilization for child illness; and perceived experiences with the CHW. Participating caregivers were asked to provide written informed consent for their own and consent for their children’s participation in the study. Participation involved home visits for collection of interview data from the caregiver using structured and semi-structured questionnaires at baseline and six-months. Home visits were conducted by TCF CHWs, with patient responses collected from both primary and secondary caregivers regarding knowledge about HIV, child development, child disease and child nutrition, HIV testing, and experiences with CHWs.
Coding Schemes and Thematic Analysis

Given the emerging relationship between mHealth and empowerment education, this study seeks to understand how educational media is perceived by participants (both caregivers and CHWs) within health literacy exchanges oriented towards empowerment as a goal. To address these research queries, a thematic coding matrix emerged from discussions and behaviours of video-taped and transcribed interviews, and was undertaken to provide both qualitative and quantitative understandings around how mHealth platforms were used, conceived of and referenced in relation to booklet-based educational content delivery. This method of data collection provides a comparison between experimental and control groups, in addition to the efficacy of the project as a whole.

Similar methods to develop coding schemes to inform both deductive and inductive analyses for mHealth and health literacy impact in patients have been seen in programs with rheumatic diseases (van der Vaart, Drossaert, de Heus, Taal, & van de Laar, 2013), long term health conditions (Edwards, Wood, Davies, & Edwards, 2012) and the quality of maternal health services (Banerjee, 2003), highlighting the efficacy of mixed methods approaches to provide insight into how platforms are used and what participants feel about the means of health literacy delivery.

Coding Matrix

Several gaps were identified in the search for an established scale that could address the intersections of critical health literacy, empowerment and educational media efficacy. Within the field of health literacy, coding schemes were found that gaged levels of understanding related to key health messages amongst participants, such as the Test of Functional Health Literacy in Adults (TOFHLA) and Short Test of Functional Health Literacy in Adults (STOFHLA), (Mackert et al., 2014). However, no measure of health literacy alone could serve to evaluate and compare patient empowerment processes and outcomes across different healthcare services (Faulkner, 2001; Small et al., 2013). It is usually necessary for researchers to develop their own coding scheme to address their research questions (Chorney, McMurtry, Chambers, & Bakeman, 2015). In the case of Bulsara et al. (2006) and the Patient Cancer Empowerment Scale, a Likert scale was developed to elicit quantitative data regarding participants’ relation to self-control over their illness. Similarly, this study developed a coding scheme where thematic areas of interest informed by popular education, critical health literacy and doctor/patient
interactions emerged with the use of a particular framework, while making space for the inductive analysis of emerging coding nodes from the transcription of dialogue between participants and CHWs and their use of booklets and tablets to scaffold HIV and child nutrition information.

In order to develop such a scheme, an overview of the surrounding literature, research objectives of the project and data was conducted to understand relevant behavior representative of particular constructs regarding mHealth for health literacy programs and their impact on participant dialogue (Chorney et al., 2015; Edwards et al., 2012). Throughout this familiarization stage, coding systems were constructed. Coded data was sought to elicit inferential statistics for rates, proportions and existence of codes related to thematic areas derived from transcribed participant responses. For this study, codes serve as labels to represent behaviours, conversation topics, and forms of socially constructed engagements identified by the researcher and literature from the transcription of CHAT house visits.

84 videos (55 from 2014, 29 from 2015) representing both control (booklet) and experimental (tablet) groups were initially viewed to gauge quality of care between CHW and participant interaction, paying particular focus to non-verbal forms of engagement. While 80 households were visited between 2014 and 2015, 19 households were used for analysis on the condition that they offered two rounds of observations from both 2014 and 2015. The other 61 households only recorded pre- or post-video recordings.

In developing a way to distinguish the quality of interactions between participants and CHWs in relation to empowerment and health education processes that occurred within the videos for each visit, a coding matrix, was developed. Based on critical health literacy frameworks (Nutbeam, 2000; Sørensen et al., 2012), popular education education processes (Bergsma, 2004; Freire, 2014; Wallerstein & Bernstein, 1988), mHealth uptake (Suthers, Dwyer, Medina, & Vatrapu, 2010) and inhibiting and facilitating behaviours of doctor/patient interactions discussed in Zanderbelt et al. (2005) and Bensing (1991), the following five parameters were used as the foundation for the coding matrix: 1) context-sensitive engagement (CSE); 2) non-verbal prompts (NVP); 3) empowerment discussions (E); 4) content depth (CD); and 5) verbal engagement parity (VEP). Transcripts of the videos were read while watching the videos themselves. Each household visit received a grade of 1 (poor), 2 (moderate) or 3 (strong) interaction for each metric, resulting in a distributed ranking of 2014 and 2015 household visits for both experimental and control groups. Table
2 illustrates the coding matrix used to examine quality of care within transcripts and videos recorded during household visits.

Table 2 Coding matrix for scoring quality of care within recorded and transcribed household visits.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Verbal Prompts (NVP)</strong></td>
<td>CHWs made little eye contact and inhibited the contribution of patients through interruptions or appeared unengaged in participant contributions</td>
<td>CHWs made some eye contact, appeared marginally engaged with participant through gestures and non-verbal affirmations</td>
<td>CHWs actively engaged patient contributions through eye contact, expressive gestures, enthusiasm and non-verbal affirmations</td>
</tr>
<tr>
<td><strong>Content Depth (CD)</strong></td>
<td>Examination of transcripts found discussions between CHWs and patients did not incorporate content discussed in the videos or booklets</td>
<td>CHWs referenced some points within content but did not appear to understand how to elaborate upon content discussed in the videos or booklets into the conversation</td>
<td>CHWs engaged in confident discussions with participants that incorporated references or elaborations the content of the videos</td>
</tr>
<tr>
<td><strong>Context-sensitive engagement (CSE)</strong></td>
<td>CHWs made no, or few, references to how videos might relate to the context of the patient. Discussions were more based on transmission of information than making space for discussion</td>
<td>CHWs were able to relate discussions towards some level of context for the patient, but content remained transmitted rather than generated from dialogue</td>
<td>CHWs were able to reference the experience of patients into the content of the video through references to their community practices, context and societal understandings</td>
</tr>
<tr>
<td><strong>Verbal Engagement Parity (VEP)</strong></td>
<td>CHWs dominated the conversation based on duration of speech and high numbers of turns taken in conversations favouring CHWs in addition to instances of inhibiting behavior (expressing criticism, inappropriate)</td>
<td>CHWs still remained in control of exchanges but offered opportunities for patients to include or challenge their understanding of the information</td>
<td>CHWs opened space for patients to verbally engage and explore the content provided in videos, demonstrated and prompted participation and encouraged participants to speak</td>
</tr>
</tbody>
</table>
Empowerment Discussions (E)

| **Empowerment Discussions (E)** | CHWs made no use of empowerment prompts. Participant did not elicit discussions or perceptions of topics related to empowerment or barriers. | CHWs used empowerment prompts some of the time with ranging confidence which offered some input from participants regarding problems, barriers and empowerment. | CHWs appeared to understood the role of empowerment prompts and encouraged patients to think critically about the information they received. In doing so, they were able to open space for problem posing. |

Rankings for each dimension as well as averages were noted, and subsequently organized by household ID numbers in an Excel spreadsheet, along with the date of the visit, the number of participants, the number of topics covered and the total number of visits conducted for each household, providing a comparison between households participating in both 2014 and 2015 interventions.

**Thematic Analysis**

In addition to the quantitative inquiry into changes in quality of household visits and discussions, the transcribed conversations were further examined to gain insight into thematic areas uncovered through the dialogue that occurred. To establish themes emerging from dialogue between the participants and CHWs, transcripts were organized and examined along three categories: descriptive comments (describing what was actually said by participants and CHWs), linguistic comments (focussing on the meaning behind the specific words the participant used), and conceptual comments (examining what and how it was said to illuminate the meaning behind the words) (Smith, Flowers, & Larkin, 2009). These emerging coded areas of the transcripts were collected, re-grouped and re-organized to represent concise themes “commenting on similarities and differences, echoes,
amplifications, and contradictions in what the person is saying” (Smith et al., 2009, p. 92) and their relation to overarching research areas of mHealth, empowerment education and contextual application. At this stage, it was important to acknowledge and respect both repeating patterns between themes, as well as divergent themes emerging from the data. In this manner, the capture of themes recognizes the ways in which participant accounts are similar to and different from the underlying theoretical and literary foundation.

The example below illustrates the protocol used in coding themes, based on a segment of dialogue discussing barriers to applying key messages. Transcripts presented on the left were read and re-read in search of codes spoke to themes or meanings embedded within them. CHW refers to the health worker conducting the visit, and W1 refers to the participating caregiver.

**Table 3 Example of Thematic Coding of transcripts**

<table>
<thead>
<tr>
<th>Transcript</th>
<th>Corresponding Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHW: Are there any obstacles that are going to <strong>make this difficult</strong>?</td>
<td>DISCUSSION OF BARRIERS;</td>
</tr>
<tr>
<td><em>Met with a confused look from W1, CHW elaborates on her question.</em></td>
<td>INVITATION TO PARTICIPATE;</td>
</tr>
<tr>
<td>CHW: Obstacles like things that will make it feel difficult for you to boil food or buy an egg for a child. Are there obstacles that may occur?</td>
<td>PATIENT CENTRED BEHAVIOUR</td>
</tr>
<tr>
<td>W1: Well there are obstacles that can be caused by lack of finances, but I am prepared to do it. Even though we run out of money sometimes.</td>
<td>CONFUSION</td>
</tr>
<tr>
<td></td>
<td>ELABORATION; PATIENT-CENTRED;</td>
</tr>
<tr>
<td></td>
<td>RE-CLARIFICATION; SYSTEMATIC BEHAVIOUR</td>
</tr>
<tr>
<td></td>
<td>IDENTIFICATION OF BARRIERS</td>
</tr>
<tr>
<td></td>
<td>FINANCIAL BARRIERS; PATIENT REFLECTION</td>
</tr>
</tbody>
</table>

In the initial viewing, videos were watched straight through, while reading along with the transcriptions to build a coherent sense of what happened during the household visits and the degree of empowerment discourse. Initial notes were made about the quality of interactions which occurred and initial emerging themes from the topics of conversations
and types of engagements that occurred. Videos were coded a second time according to three dimensions: 1) affective behaviour (attentive listening, empathetic gestures, communicating concern, warmth, interest), 2) systematic and purposeful behaviour (active interventions, willingness to discuss psychosocial aspects of problems, clarifying, structuring, probing) and 3) patient-centred behaviour (use of patient knowledge to understand problems, negotiation and consensus) (Bensing, 1991). Table 3 refers to codes collected and recorded using Nvivo in relation to each dimension of behavior in order to elicit themes relating to the quality of facilitating and inhibiting interactions that occurred:

Table 4 Frequent codes collected and re-ordered in relation to dimensions of behavior.

<table>
<thead>
<tr>
<th>Affective Behaviour</th>
<th>Systematic and Purposeful Behaviour</th>
<th>Patient-Centred Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checking In</td>
<td>Elaboration</td>
<td>Context Application</td>
</tr>
<tr>
<td>Invitation to Participate</td>
<td>Behaviour Prompt</td>
<td>Patient Centred transmission</td>
</tr>
<tr>
<td>Positive Affirmation</td>
<td>Value in Content</td>
<td>Participant Reflection</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>Knowledge Probe</td>
<td>Invitation to Participate</td>
</tr>
<tr>
<td>Gestures</td>
<td>Topic Introduction</td>
<td>Community Collaboration</td>
</tr>
<tr>
<td>Active Listening</td>
<td>Past topic Reflection</td>
<td></td>
</tr>
<tr>
<td>Active Engagement</td>
<td>Reflection Prompt</td>
<td></td>
</tr>
<tr>
<td>Confident Off Book</td>
<td>Value in Content</td>
<td></td>
</tr>
<tr>
<td>Paying Attention</td>
<td>Video Reflection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identifying Pictures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open-Ended Questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clarification through</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content</td>
<td></td>
</tr>
</tbody>
</table>

To understand the interactions that occurred in more detail, further coding was performed relating to codes of facilitating behaviours (attentive silence, verbal and nonverbal encouragements, summary of patients’ words, open and closed questions) and inhibiting behaviours (ignoring or changing the subject, changing focus, trivializing, premature advice or referral, inappropriate interruptions) between CHWs and participants (Zandbelt, Smets, Oort, & de Haes, 2005). Taking cross-cultural variability around
understanding participant-CHW behavior into account, South African members of the research team were asked to clarify the culturally contextual nature of certain behaviours such as eye contact, pauses and gestures to ensure codes captured localized understandings.

Within Nvivo, nodes, representing a particular code or sub-code, were time stamped within each transcript in relation to the corresponding dimension of behaviour they represented. After coding, codes and sub-codes were recorded in both a spreadsheet and mind map. A spreadsheet and mind map were created to, respectively, collect themes for each household and identify thematic relations between codes, sub-codes and larger thematic areas. Major themes were informed from the “sense-making” of participants regarding certain elements of the project, particularly around empowerment and the use of educational media (Wagstaff & Williams, 2014). In this manner, codes embedded within dialogue can offer a tangible form of expressing the encounter of the self with the world and how they understand their personal, social and health-related worlds, as a point of analysis. Distinguished from discussion, dialogue occurs when participants share stories and experiences, listen to and try to understand others’ perspectives, and do not seek to indoctrinate others with externalized perceptions and biases. Relating to the importance of context within empowerment educational exchanges explored in the literature review, dialogue offers a particularly salient point of analysis regarding manifestations of participants’ context, namely social and cultural values, unique background experiences, prior knowledge and assumptions (Wertsch, 1991). Through dialogue, researchers are able to gain insight into how meaning is constructed around particular elements of a research study through chained lines of thinking and enquiry where questions and positions are investigated through the provocation of research participants, in the case of CHAT, the CHWs.

Particular to the CHAT project, the transcription of dialogue between CHWs and participants during video observation provided a source of insight into how meaning is made within empowerment education exchanges using educational media platforms. Video records of the health literacy sessions offered opportunities to provoke the examination of instances of dialogue, praxis and reflection as means to understand occurrences of what Suthers et al. (2010) describe as “uptake,” or the analytical focal point where participants are able to understand health literacy information and give it relevance to their ongoing activity.
Discussion of Method

Understood in the Freirean paradigm, themes emerging from dialogue between participants and facilitators represent their ideas, values, concepts, hopes and obstacles relating to marginalization, oppression and humanization within a historical, socio-cultural scope (Freire, 2014). The analysis of meaning within dialogue offers an opportunity to uncover certain themes embedded within the way people curate or understand the world around them. The understanding of themes comes with a realization of the historical situatedness of how meaning is influenced, shaped and reframed over time in relation to power. Themes can be investigated from the abstract to the apparent realities through critical reflection and action, a process Freire (2014) identifies as decoding.

To be able to decode themes uncovered alongside marginalized individuals and communities within dialogical exchanges, proximity to one’s social, cultural and historical reality has been highlighted as a means to offer greater familiarity in how signs and significance within dialogue are understood (Kark, 1962). The cultural context of this thesis, while proximal to some researchers, represented a cultural crossing for others, altering the certainty of certain cultural codes. This can be informed by one’s proximity to the cultural codes, symbols and values embedded within dialogue, having particular significance to the production and acquisition of knowledge within health literacy. Because knowledge is accented in meanings particular to participants’ understandings of cultural expression, the ability of an outsider perspective of researchers not from the cultural context of the community must be addressed in relation to the incompleteness of understanding the entirety of themes and codes offered across cultural contexts.

However, the reliability of themes generated from the data should be judged by their ability to provide insight pertaining to the particular case studied. An examination of the transcripts to discern possible themes was conducted to a point of “theoretical saturation” (Rudestam & Newton, 2007), whereby thematic data was gathered until no new relevant data was discovered or categories were deemed well-developed and validated. Given the situated nature of participant experiences in relation to their health reality and their relationship with the project during the interviews, the variable and partial nature of understanding one’s experience as a “complete” or “concrete” case must be acknowledged, whether across cultures or from within. While the situated nature of participant experiences may be considered a limitation, it is believed this is only the case if experiences
of this project are used to draw findings from the relatively small collection of experiences into generalizable arenas. While the quantitative analysis derived from the coding scheme does highlight longitudinal trends between control and experimental groups for this project, the aim of this project is to provide depth over breadth to the ways in which mHealth relates to CHW and participant experiences. The coded results from the qualitative analysis of this study seek to illuminate the interpretive experiences and understandings of participants 1) using innovative technological platforms and 2) engaging in dialogue pertaining to health literacy topics and empowerment. The use of qualitative analyses in this project allows researchers to comment on the detail-oriented perceptions and understandings of a particular group, rather than to make generalizable claims across groups. This inability to generalize often comes as a critique against phenomenological analyses (Jovchelovitch & Bauer, 2000). However, it can be argued that methods inspired by the phenomenon of experience allows anything shared by participants to be considered significant and having meaning, which ultimately becomes the source data for analysis (Jovchelovitch & Bauer, 2000). Returning to the focus of individual context and capacity, participant dialogue as a point of inquiry aids in the uncovering of contextual information shared, provoked and reconfigured within the negotiated learning process of empowerment education and health literacy.

Ethics

The CHAT study received ethical clearance from the University of Toronto’s Research and Ethics Board for Social Sciences, Humanities and Education. No conflicts of interest were identified in relation to personal benefit in connection with this study. The CHAT study identified potential risks in loss of confidentiality and risks to reputation. With additional risks conducting household visits associated with phlebotomy, including pain, bruising, hematoma, and secondary infection. There is also the risk of theft or physical assault driven by the financial value of tablets, and fatigue from interviewing. Research personnel were trained in strategies designed to minimize these risks and their potential impact on subjects’. Another possible risk was from physical assault that results from theft, driven by the financial value of the tablet devices.

With regards to consent, both CHWs and participating caregivers were asked to provide informed consent for their own participation. Participating caregivers were asked to assent for their children’s’ participation in the study. The researcher explained the general
purpose of the study to the participating CHWs during regularly occurring planning meetings. All CHWs were given an Informed Consent Letter before the research began. No sensitive information was stored on the tablets during the research trials. With regards to coding, participant names and records were kept separate from details of household visits. To address any risks of identifying participant identities during the observation of the videos, caregivers and children were given pseudonyms to ensure confidentiality.
Chapter 4 - Results

In this section, the descriptive findings and results from the coded and thematic analyses are presented to address the major research interests of this thesis. Following a presentation of the descriptive findings of this project, the results of the coding scheme and their relation to three themes and sub-themes identified within the empowerment interactions are presented. The three emerging themes are: 1) content engagement, 2) strengths and weaknesses of facilitation, and 3) empowerment as critical reflection.

The first theme discusses how content was clarified, elaborated and referenced in regards to both tablet and booklet media form. The second theme explores how facilitating and inhibiting characteristics of the CHWs impacted the overall delivery of educational media. Finally, the third theme highlights the ways in which empowerment was critically discussed across different media forms, with particular focus on the discussion of barriers and overcoming them. The use of thematic analysis to explore the transcripts and video data collected provides texture and reference to the experiences of participants and CHWs, subsequently situating major and minor thematic areas related to the findings of the matrices of the coding scheme. Following an illustration of these themes, the theoretical framework and considerations regarding the use of educational media will be returned to in order to address the overall research objectives of this thesis – namely, in what ways does educational media support empowerment discussions in health literacy exchanges?

Descriptive Stats

Total Scores

Following observation of two rounds of video-recorded visits captured in 2014 and 2015, households (referenced by their household ID [HHID] number) received a score (1, 2 or 3) along each metric, as well as a mean score across metrics. This resulted in observable changes in scores between rounds of intervention. A graph illustrating the changes in average scores between the control and experimental groups is presented below in Graph 1.
Changes in coding scores observed between 2014 and 2015

The observable changes in mean scores highlight an overall positive progression across media forms regarding quality of care. While initial scores in the experimental (tablet) platforms emerge stronger in 2014, the positive progression in household visits where booklets were present offer stronger growth (+0.27) between rounds of observation. However, given the distribution of quality of care observed in households, scores were split to explore if particular characteristics or qualities emerged between high and low scoring households.

Split Scores
In an effort to further differentiate changes in scores overall and between experimental and control visits, scores were split between high (>2) and low (<2) to examine the results between high and low achieving household visits to highlight specific elements of quality of care across differently scoring groups. Within the high scores, experimental (tablet) households scored an average of 2.35 in 2014 (n=6), and 2.43 (n=7) in 2015, exhibiting a change in scores of 0.08. Control households resulted in average high scores of 2.3 (n=2) in 2014 and 2.45 (n=4) in 2015 with a change in scores of 0.15.

For the low collection, the average experimental scores in 2014, 1.43 (n=6) and 2015, 1.56 (n=5) resulted in a positive change of 0.13 between the two collection periods. For the control groups, the scores experienced a negative growth, moving from 1.44 (n=5) in 2014.
and 1.33 (n=3) in 2015. Bar charts illustrating changes between high and low scores for experimental and control groupings are presented in Graph 2 and 3. Between split and collective scores, the control group expressing low (<2) scores was the only group to experience negative growth amongst households regarding an analysis of the coding scheme.

**Graph 2** Changes in higher mean scores between 2014 and 2015 for visits using tablets and booklets.

**Graph 3** Changes in lower mean scores between 2014 and 2015 for visits using tablets and booklets.
When scores are split between high and low achieving groups, visits where tablets were present appear to decrease slightly in quality in higher scoring households, while low scoring houses highlight positive progression. Examining the visits where a booklet was used, high scoring groups were able to sustain their progress, while low achievers continued to struggle over time. The distribution of scores between media forms suggest certain media forms may be more appropriate or beneficial in improving quality of care between CHWs and participants displaying particular qualities. In order to explore the particular qualities contributing to the overall quality of care between 1) high and low scoring and 2) tablet and booklet households, the following sections will situate the results of the collective and individual metrics of the coding scheme in relation to frequent themes which emerged. The use of themes to expand upon the results of the coding scheme analysis provides additional qualitative texture by exploring the experiences of participants and CHWs in relation to the quantitative results.

**Theme 1: Characteristics and Means of Content Engagement**

Themes related to the characteristics of engagement between participants, CHWs and the educational content were noted and coded in relation to how educational media entered discussions. This was done in order to understand the ways educational media impacted participant interactions as well as how they influenced the context-sensitive engagement of key messages. This was performed to expand upon the quality of empowering processes that occurred in high and low scoring household visits. Engagement with CHAT health literacy content referred to the ways participants and CHWs were able to reference and elaborate on key messages in relation to the contextual health needs of participants through dialogue and gestures. Within the coding scheme, engagement was noted in the scoring of content depth (CD) and context-sensitive engagement (CSE). Additionally, visits where CHWs appeared have a deeper sense of the content through discussions which referenced the context of participants elicited higher instances of codes relating to health and empowerment-based engagement within the thematic analysis.

A representation of the content depth and context-sensitive engagement scores for experimental and control households between 2014 and 2015 is shown in graphs 4 and 5.
Comparing content depth scores between tablet (experimental) and booklet (control) household visits between rounds of observation.

Both high content depth and context-sensitive engagement scores were attributed to observable instances where confident discussions occurred between CHWs and participants which frequently referenced content in the videos and booklets. Context-sensitive engagement was noted when the content was connected to the reality of participants through references or examples from CHWs and participants. CHWs who introduced some
key messages, but who did not elaborate or expand on the material, or did not relate their
discussions to any content in the educational material, scored lower. Context-sensitive
engagement was measured by the frequency of observable dialogical exchanges where
participant knowledge and behaviours (seen as their ‘experience’) were referenced in
conversations pertaining to the content presented in the media. Returning to the discussion
of context relevance in the literature review, context can be engaged not only through the
presentation of key messages to participants by the educational media, but additionally
through the way facilitators engaged participants in their dialogical elaboration and
references.

In the experimental (tablet) cases for both metrics, lower scoring visits show a slight
progression between 2014 and 2015, with a stabilization of high content depth and
contextualization scores. CHWs showing strong contextualization skills while using tablets
sustained these skills over time. In both cases, visits where booklets were present show
positive progression from moderate to high levels of depth and contextualization,
highlighting improved understanding in stronger household visits to how content related to
the reality, communities and health understandings of participants over time. To elaborate
on the findings of the coding scheme, the following section will expand upon content
engagement through coded themes observed and noted through the video and transcribed
data collected during the visits.

Prominent Content Engagement Sub-Themes
Examining themes relating to content depth and context-sensitive engagement offered
insight into the ways key messages were reiterated, elaborated and reflected during
discussions between CHWs and participants. The following section will illustrate the
manner in which content and context was referred to through frequent codes emerging from
the analysis of dialogue occurring during the household visits.

1. Reference through reiteration
In many of the coded examples pertaining to engagement, content was referred to
through reiteration. Key messages presented in the content through both videos and
booklets were reiterated by CHWs to participants in order to stress importance and
improve chances for uptake. Coded incidents of reiteration occurred more often during
visits where tablets were present than those with booklets. The following example exhibits
an instance of reiteration from a household visit which CHW discusses with a participant (W1) about how to manage the timing of anti-retroviral (ARV) medication.

CHW: They say it helpful to take it together at the same time if there's more than one member in the family who takes medication. If 8 o'clock is the time set, the two or three of you have it together at 8. You encourage one another and you remind one another.

W1: I believe he is now used to it because he never misses his 7 o'clock set time.

CHW: It helps also to set alarm on the clock and cellphone too because it does happen sometimes that you get occupied and miss time. It helps to have helping devices to remind you.

W1: Yes. Once the 7 o'clock news starts, he quickly gets his medication.

Taken from a high scoring household using tablets, the CHW in the above example reiterates the importance of timing ARV medication, while the participant is able to interject with her own experiences, adding their own understanding to the discussion of a particular concept. References to “they” by the CHW and participant represent the characters or vignettes in the video, highlighting how content on the tablet was able to spur conversation through reference following the observation of a video.

During household visits where tablets were present and content depth and contextualization scores were strong, CHWs would frequently refer to examples from the videos to confirm and reiterate important information previously explored in their discussion with participants. In doing so, participants were able to reiterate concepts both through verbal confirmation from the CHWs as well as through reference to the video content. For households using the booklets, coded instances of reiteration through media reference appeared less frequently, most often reiterated through verbally repeating key messages presented in the written content. Reiteration of content through visual media appeared more often through reference to vignettes presented in the videos, more-so than the pictures or passages of the booklets.

2. Reference as Elaboration
In addition to reiteration, CHWs and participants were able to deepen their engagement with the content through elaboration. While reiteration offered an opportunity to emphasize key messages, elaboration expanded upon key messages to offer connections
between the context of participants to the content presented. Examples of strong elaboration were often made in reference to the context of participants through examples. In household visits where content depth and contextualization appeared low, content was either not elaborated upon, or it was repeated without additional reformation to clarify key messages to participants. The following excerpt occurred while a CHW paused a video discussing nutrition to elaborate with examples about nutritious food.

CHW: This doesn't mean you have to get all the food mentioned here at once. Each of it is enough. A child can get fats not only from cooking, it could be from butter, and full cream milk you see.

W1: Yes.

CHW: Foods containing zinc like meat, eggs, peas and peanuts. If she can have any of each, it's fine. She doesn't have to have all at once. She can even have broth from meat, it's good too.

[W1 continues nodding and making sounds of acknowledgement.]

Content elaboration was also observed in household visits using the booklet:

CHW: As you see in the picture [points to the picture on the booklet], there is a father holding his baby closely to him, the baby seems very happy. It gives the baby warmth and satisfaction and feeling loved, even though the baby doesn't know anything, but it can feel the love of a mother.

The first example discussing the benefits of healthy fats, the CHW makes reference to the participant’s child (“she”) and uses her family as the frame of reference for her elaboration. Contrasted against the second example, the first appears to have more reference and depth to the reality of the participant. However, in the second example, the elaboration remains focused on illustrating the importance or value in the information, a pattern not uncommon in other coded instances of elaboration and content reference. Given the diversity of scores pertaining to depth and contextual engagement, it is apparent that a range of understanding and willingness to elaborate existed within the CHWs during the household visits. While the media in the booklets and videos remained available for the CHWs to elaborate upon during the visits, codes pertaining to elaboration and the use of examples to elaborate, only occurred in higher scoring visits in both experimental and control visits. As these households exhibited higher scores for content depth in addition to
its relation to the context of the participant, the use of content as a means of reference and elaboration required the will and confidence of the CHW to do so.

Particularly noted in higher scoring visits using tablets, video interjections were frequently observed as a means of elaboration. While watching videos, CHWs would often pause the video to point out either a point they wanted to reiterate or elaborate upon, or identify something in the video related to what they had discussed earlier:

CHW: Did you see what a CD4 is?

W1: Mmm. [affirming she has seen what the CHW is identifying]

CHW: This is when they test how much of immune cells are present in the blood compared to the virus infected cells. Which one is more present? Immune cells should be more present in the body. They protect us from the virus. When the immune cells are destroyed by the virus, that means you will now easily get sick.

In the example above, the CHW paused the video to identify the topic (CD4 cell count), offered opportunities for the participant to include and/or confirm their understanding, and concluded by elaborating on the importance of the particular topic. Video interjection offered opportunities to abbreviate lengthy descriptions of content, regain focus and address instances of confusion or understanding from participants. In one household visit, a CHW asks, "Did you see when they explained how to prepare ORS [oral rehydration salts]? Can you explain how it's prepared?" illustrating how references to video content not only identified important information but allowed opportunities for re-voicing and elaboration of content in participants own words. References to media content in visits using booklets did occur through the identification of important images, however, these references and elaborations did not occur as frequently as they did during tablet visits. CHWs would often verbally elaborate on the written descriptions in the booklets.

3. Reference through reflection

Opportunities for reflection were noted in household visits as a way for participants to challenge, reform and act upon concepts related to their own reality. Prompts included within the booklet and tablet, such as “What does this information meant to you?,” “Do you foresee any challenges to doing this?” or “Do you agree or disagree with the information we talked about?” were used to prompt a number of reflective discussions between CHWs and participants. In high scoring visits, reflective discussions born from prompts, such as the
following example, offered opportunities to reiterate key messages through reference to the realities of participants:

W1: Exactly my child, it is very helpful to plow crops because there would be times where there won't be money and one would not know what to cook. But when you have planted something in your garden, you are able to get cabbage, spinach, herbs and potatoes and cook and eat.

CHW: Even sweet potatoes.

W1: Sweet potatoes too. You know I like planting crops. The problem is I don't have much space so I end up planting a bit of each because I'd want to have all of it.

When discussing the benefits to growing nutritious crops to help supplement the need to buy produce, the participant is able to connect the value of the action presented by the CHW to their own reality. Particularly in this example, the participant is able to reflect and connect the availability of resources ("crops") and the value of investing time and energy ("you are able to...cook and eat") to potential barriers ("there won't be money"). While coded instances of reflection such as the above example were prominent in high scoring visits for both tablets and booklets, they were significantly more frequent in visits where the tablet was present.

In low scoring household visits, reflection prompts went unused and participants were not engaged through further discussions following the presentation of key messages. Coded as “short response,” many participants would answer probing questions, or invitations to elaborate or reflect, with one word answers. “Short response” codes were identified in lower content depth and context-sensitive engagement scoring houses. Additionally, reflective prompts met with short responses were usually done so with closed-ended questions. Reflective prompts which used open-ended questions (“What do you do when...”, “Can you explain how you...”) elicited more turn taking, greater participation and longer responses on behalf of participants.

Theme 2: Strengths and Weaknesses of Facilitation

The examination of codes and themes relating to engagement during visits highlighted the important role of CHWs as facilitators between the content presented in the educational media and participants themselves. At their most effective, CHWs appeared most able to facilitate content when they introduced, engaged and offered space for
participants to relate or challenge messages presented in the content with their own insights and opinion. When conversations seemed most challenged relative to the rapport observed, the key messages appeared to be difficult to relate to on behalf of participants. However, particularly in higher scoring videos, this dialogical exchange often culminated in a verbal or non-verbal affirmation of how the information presented could assist participants in supporting themselves, their children, and their health needs.

Verbal engagement parity (coded as VEP) referred to the balance of participation and engagement between CHWs and participants during the household visit videos. CHWs who opened space and prompted participants to speak about how they understood or related to the content during household visits received a high score. CHWs who remained largely in control of the conversation but offered moderate opportunities for patients to include or challenge their understanding of the content received a median score, while those who dominated conversations without a high number of turn taking or invitations for participant participation received a low score.

In examining the coded transcripts, prominent features of verbal engagement included respectful statements, summarizing, invitations to participate, high rates of turn taking and reflections on the content provided. Observable inhibiting factors included changing subjects, expressing criticism, rushing questions and overlooking statements or interjections from participants.

![Graph 6 Changes in verbal engagement parity scores for experimental and control groups between 2014 and 2015.](image)
As seen in graph 6, the greatest progression amongst educational media occurred with the emergence of high scoring visits where booklets were present in 2015. Progression also occurred in visits using tablets in areas of verbal engagement as noted in the decrease in lower scoring households and for booklets during moderate scoring households. Contrasting the experiences of tablet visits following the second round of observation, the number of low scoring households appears to increase.

While coding for verbal engagement parity examined how participants and CHWs engaged and applied key messages through patterns of dialogue, the development of spaces where participants felt comfortable participating was also noted in how CHWs conducted and postured themselves during household visits. To this effect, appreciating the essence of facilitation between participants and CHWs required attention to what was unsaid just as much as what was said.

To explore how participants and CHWs were able to facilitate or inhibit quality content engagement non-verbally, videos of household visits were rigorously coded, scored and thematically explored to capture the ways in which CHWs were able to invite participation through non-verbal affirmations such as eye contact, expressive gestures, enthusiasm and attention. How strongly household visits scored depended on the form and frequency of observable non-verbal prompts and the degree to which they facilitated or inhibited engagement between CHWs and participants. The results of the coding scores for NVP are presented below in graph 7.
Visits where tablets were present show progression in low to medium non-verbal parity scores over time, while those visits using booklets which scored low continued to have difficulty establishing non-verbal parity over time. Comparing these results to those of verbal engagement, it appears that visits using tablets mirrored the progression of non-verbal engagement, whereby CHWs exhibiting strong qualities in verbal and non-verbal engagement were able to sustain the use of these skills over the duration of the project.

To explore the characteristics of lower and higher scoring visits, codes were observed to explore how, if at all, the influence of educational media pertaining to verbal and non-verbal engagement. In observing visits with lower levels of verbal and non-verbal engagement, literacy on behalf of the CHWs emerged as a prominent theme. It appeared that more time was devoted to transmitting information presented word for word, rather than developing conversations and deeper engagement with the materials in a participant-centred manner. However, those that exhibited higher levels of non-verbal engagement (more eye contact, open body posturing, positive expressions) or those who were likely to progress to higher scores in the coding metrics suggest opportunities for improving confidence and both verbal and non-verbal engagement over time. The following section will draw upon the thematic findings pertaining to facilitation to expand upon the results of the coding scheme.
Emerging Themes from Facilitation

To add texture to the resulting verbal and non-verbal scores, videos of household visits were rigorously observed, coded and recoded through the observation of interactions between CHWs and participants alongside the transcript of conversations. The themes that resulted from this process showed a collection of facilitating and inhibiting behaviours, gestures and dialogical instances that impacted how educational media was used during visits. Codes of this nature were based on both dialogical instances and observable non-verbal engagement which occurred during the household visits. In exploring themes related to variations in facilitation, three sub-thematic areas emerged as sites of differentiation between CHWs, their visits and the platforms used. The emerging subtheme areas were: 1) overall confidence, 2) opening space for problem posing and 3) building relationships.

1. Confidence

Confidence emerged as a strong thematic area relating to CHWs’ experiences of comfort and understanding to facilitate (or in the inverse, to inhibit) dialogue pertaining to both the content presented and the experiences of participants. While content depth and context-sensitive engagement speak to the levels of communicable understanding of the content, verbal and non-verbal engagement speak to the degree to which CHWs were able to nurture this understanding between themselves and participants through their actions and body posturing.

CHWs who spoke confidently about topics and key messages without having to rely on reading verbatim were often noted in household visits with strong verbal and non-verbal scores. Codes suggesting increased confidence in the use of educational media were noted when CHWs would identify a topic for discussion, look away from the educational media and make eye contact with participants while they discussed or elaborated on a particular topic. Observable instances which followed this pattern, along with verbalized reformation of key messages into a CHWs own words. Opposed to verbatim transmission where eye contact was directed most often at the booklets or tablet screens, confident discussions where observed when CHWs were able to speak from their own understanding and relate to the experiences of the participant.

Observable instances where CHWs were able have discuss content without having to recite content verbatim (coded as “off book”) were frequently noted in higher scoring household visits, in both tablets and booklets. Additionally, these instances were noted
alongside other affective codes such as summarizing, paraphrasing and elaboration in addition to eye contact and open postures. Furthermore, instances where CHWs would share the screen or open the booklet to face the participant suggested they were confident in their understanding to use the educational media for reference rather than as a verbatim text to be read. Engagement with participants in this manner suggest CHWs were able to confidently engage with participants “off-book” when a connection was established between a command of the material presented along with an openness to facilitate or invite participants to include their thoughts and understandings of the material, rather than simply transmit the materials presented.

High confidence on behalf of CHWs was most often received by participants with affirming utterances, confirming they had heard what CHWs have said, in addition to increased participant offerings, whereby the participant would offer their own thoughts on the key messages, or would be invited to participate on behalf of the CHWs. However, in some visits, it was observed that highly verbose CHWs who spoke for the majority of the visits would often dominate the conversations with their own elaboration and understanding of the content. When conversations lacked invitations for participants to engage or introduce their own perspectives or content, the exchange appeared to enter a form of transmission. In one household visit, a CHW showing high confidence in his understanding was met by disengagement on behalf of participants, who made little eye contact and few interjections. In this instance, high confidence appeared to act as a hindrance, whereby, the understanding of the CHWs overshadowed the ability for participants to shape the information presented into their own reality. While talking at length showed the understanding of the CHWs to be improving, the overall impact on the space for dialogue and verbal was impacted by their dominance of the space.

2. Low Confidence

Much like overconfidence, low confidence appeared to impact the development of space for dialogue within the household visits. Low confidence was coded when non-verbal behaviours of CHWs appeared closed off or turned away from participants during the household visits coupled with transcript notations of verbatim reading of the materials. Coded as “no eye contact reading,” CHWs who appeared less confident in their understanding of the key messages showed an increased reliance on the media to communicate the message than doing so themselves. Contrasting CHWs with higher
confidence, low confidence CHWs exhibited an over-reliance on the materials, identified through low participant-directed eye contact resulting in the disengagement of participants. Exploring variation in codes related to confidence across the educational media platforms, instances of “no eye contact reading” were coded more often in household visits where booklets were present. For CHWs with either high or low confidence, codes pertaining to non-verbal and verbal engagement highlight the integrated nature in the way content and the confidence to deliver it can be facilitated by both what is said and unsaid.

3. Opening Space for Problem Posing

Instances where CHWs exhibited confident facilitation skills elicited increased instances of dialogue and participation on the part of caregivers and children. Opening space was understood as the degree to which the verbal and non-verbal facilitation of the CHWs during the visit was able to encourage increased participation on behalf of participants. The nature of open spaces for dialogue between participants and CHWs was analyzed for its ability to elicit discussions where participants identified, reflected and sought to take action against barriers to their health and wellbeing. Dialogical participation was noted through increased turn-taking and longer dialogical inputs from participants. Codes pertaining to “invitations to participate” were recorded more often in household visits where tablets were used. However, in both low and high scoring videos, CHWs were able to invite participants in some way during the course of conversations. Prompts included in the facilitation guide used by CHWs included questions such as “what information did you learn?” and “do you have anything to add?” were used across media platforms and within households scoring high and low. Unprompted invitations to participate were only recorded in high scoring visits using tablets, where CHWs would ask participants to choose the topic for the day, or invite them to interject or ask questions while the videos were being shown.

In low scoring households, these spaces for dialogue were frequently closed off, lacking opportunities to reflect upon content following the videos or the presentation of a passage in the booklet. While the videos offered opportunities for interjection on behalf of CHWs and participants to comment on what was presented, lack of facilitation skills to use prompts or questions left the space for dialogue unused. Often CHWs would move to the next video, or in the booklets, turn to the next section and carry on. Participants appeared to be positioned passively in relation to the educational media, both with videos and the pictures contained in the booklets, rather than situated as an active component in
reforming how the information played into their reality. Particularly in lower scoring household visits, transcribed instances where participants would self-assert and ask questions about the videos or the presentation of the booklet were rare.

4. Building Relationships between Participants and CHWs

The strengthening (or subsequent weakening) of spaces for dialogue regarding the content presented and its relation to the context and barriers to health of participants offered insight into the development of relationships during the course of the household visits. Closely linked to opening space for dialogue, positive affirmations and active engagement from CHWs would often result in increased turn taking between themselves and participants relating to content presented in the educational media. In one visit, a CHW holds the booklet in her hands and reviews the content from the previous visit, enthusiastically exclaims “yebo!” (meaning “correct” in isiZulu) after each answer she receives from the caregiver. In other visits, CHWs would offer praise to see improvements made in the household related to the content discussed during the visits. The development of relationships was supported by visits showing strong scores in verbal engagement and non-verbal prompts, suggesting that the development of relatability between CHWs and participants can be strengthened through facilitation.

Instances where relationships appeared to be poorly developing between participants and CHWs were noted when participants seemed disengaged through lack of eye contact coupled with short responses and increased distractions. CHWs who asked questions or prompts in quick succession without allowing participants time to reflect or respond before going to the next section were coded as “rushing.” Rushing appeared only in low scoring houses both with the tablet and booklet. Noted in lower scoring visits, CHWs would fail to pick up on cues (verbal or non-verbal) introduced by participants regarding hardship or barriers they had experienced and relate them to content discussed in the particular unit being presented. In one household, a participant discussed how her socio-economic situation was dire enough to lead her to think of suicide. This discussion of hardship was met by silence and a conversation change by the CHWs, suggesting the CHW was either ill-prepared to handle a statement of this nature, or she chose to ignore it and move on.
**Theme 3: Prompted Empowerment**

Conversations occurring during household visits were of great interest in understanding the ways empowerment (or topics related to empowerment such as critical reflection, transformative strategies and barriers or marginalization) was discussed or observed during the household visits. Additionally, the role of educational media was analyzed in the ways it was able to support discussions and content related to empowerment. Instances of empowerment which occurred during the transcripts and videos were analyzed through the results of the empowerment discussions (E) metric of the coding matrix. In order to understand empowerment as a reflective and active process, the use of empowerment discussion prompts within the booklet and tablet educational content were observed and noted in the ways they elicited conversations between the CHW and participant. Unprompted discussions related to empowerment and marginalization were also noted and explored for thematic content. Additionally, both prompted and unprompted discussions regarding empowerment as a goal or process, or conversely, through the identification of barriers to empowerment and wellbeing, were noted and coded as being strong, medial or poor between both rounds of observation to explore any changes in the quality of interactions which occurred. The scored results of the nature of empowerment discussions and processes are illustrated in graph 8.

**Graph 8** Changes in empowerment scores between educational media during rounds of observation in 2014 and 2015.
The presence of empowering dialogue appears be consistent in household visits where the tablet was present, with notable improvement in low scoring houses to medial between 2014 and 2015. These findings show sustained levels of discussions occurring between rounds of observation relating to empowerment at a moderate level. Furthermore, in households where the booklet was present, the use of empowerment prompts and discussions pertaining to empowerment in general increase over time, with the number of low scoring visits showing improvement to medial levels. Household visits exhibiting high levels of empowerment scores were able to sustain the nature of their discussions across rounds of observation with both media platforms. However, the prominence of moderate scores in both tablet and booklet-led visits suggests understandings of empowerment and the role of critical consciousness rest largely in an intermediate level. In order to give context to the variation of empowerment discussions, the following section will explore the thematic dimensions of how empowerment and marginalization were understood across educational media platforms and households. Additionally, thematic understandings regarding discussions of barriers and community collaboration will elaborate on the dialogical dimensions of the exchange.

**Sub-Themes in Empowerment Discussions**

In both the booklet and tablet educational content, prompts were embedded to encourage CHWs to encourage participants to reflect on health barriers, opportunities and the application of educational content into their own context. Prompted questions were included to invite participants to challenge or reflect on the appropriateness of the educational material presented.

Prompted discussion questions included:

- What important information have you learned?
- Do you agree with this?
- Have you ever experienced this?
- What does this mean for you in your life?
- What do you think you can do about it?
- Are there barriers that will make this difficult?
- What can help you overcome them?
Prompts were used as a means of eliciting discussions related to contextual barriers which may be impeding participant’s access or realization of certain health necessities, with the promotion of an active component in addressing these disparities. Developed in relation to the problem posing education by Freire (2014), critical reflection related to empowering health literacy was noted when health information was reflected upon within the situated nature of past and present historical-cultural relations to power and oppression. In addressing themes emerging from the transcriptions of the household visits, three thematic considerations became apparent: 1) discussions of empowerment were largely encouraged through prompts, 2) discussions of empowerment were centred around identifying barriers regarding health and 3) discussions presented opportunities for community collaboration.

1. Use of Prompts

During the course of the household visits, conversations were largely guided through the use of empowerment prompts contained in the facilitation guides for both booklets and tablets. How prompts were used depended largely on the facilitation skills and confidence of the CHWs. In some instances, prompts would lead into discussions between the CHWs and participants regarding the content itself and its relation to the context of the participant and in other instances, they would not. For example:

CHW: What have you learned from watching this video?

W1: I wasn’t informed, but when I do get money I am able to get these things. There is nothing that I do not do. I also found out that carrots help with the cleaning of the eyes. As I say, when I do get money I buy these things, just like peanut butter, they eat it and margarine as well or I butter it on their bread. I do almost a lot of what they have mentioned in the video, because I knew this before, such as how to take care of the baby.

In this exchange following the observation of a video on childhood nutrition, the CHW used the prompt to explore what areas of the key messages were understood by the participant. In this case, the prompt encouraged the participant to reflect upon and reiterate what aspects of the key messages pertain to their own household context. Additionally, the prompt offered an opportunity for the participant to reflect on what elements of the key messages may be difficult and what actions might need to be taken to overcome them.
In some instances, prompts were reformed or elaborated upon to deepen the understanding of the question, or place the context of the participant in relation to the question.

CHW: Do you agree with this information? Maybe comparing to the information about HIV/AIDS you once learnt from someone else. It could not be in the similar manner, but do you agree with this information I'm providing you?

W1: Yes, I agree.

CHW: With this information?

W1: Yes.

While the questions posed in the above vignette offered the participant a chance to challenge any information they have received both in the household visits and within the community at large, the invitation was not taken up. In many households, both in high and low scoring houses, invitations to participate, elaborate or challenge information presented were not taken up. In other instances, invitations or prompts were met with one word answers, leaving the CHW to either prompt further or move on to the next question. Unprompted or elaborated prompts like the above example were rare, with most CHWs choosing to use the empowerment prompts verbatim. Many of the same preconditions for open space for increased verbal engagement and non-verbal prompts applied to encouraging discussions pertaining to empowerment. Namely, codes pertaining to higher confidence and facilitation skills were noted in more verbose reflections. Additionally, more verbose reflections also came from older participants, rather than younger caregivers, suggesting pre-existing comfort or social dimensions which increased their confidence or willingness to disclose their opinions about their own realities or the content provided to CHWs.

Despite variability in the responses on behalf of participants, what emerged as a distinguishing feature between high and low scoring households was the elaboration or reformation of prompts by CHWs. In lower scoring households, empowerment prompts were used verbatim, in that, the CHWs would recite the prompt and continue on, without allowing space for participants to reflect and answer. In higher scoring households in both booklets and tablets, prompts were rephrased more organically to elaborate or facilitate responses from participants. Often, discussions of barriers to applying or understanding the content were elaborated upon to invite participants to reflect on active components to address health literacy barriers.
2. Discussion of Barriers
The use of empowerment prompts exploring barriers to acting and applying upon information and levels of understanding were developed in line with problem posing educational models articulated by Freire (2014). In its ideal form, problem posing education situates educational topics in relation to the context of participants through opportunities to reflect and address systematic barriers directly experienced by participants. During household visits, empowerment prompts were used to encourage participants to identify barriers and possible actions to overcome them in relation to the content presented in the educational media. Codes for empowerment prompts appeared more frequently in households where tablets were present. Examining both prompted and unprompted discussions during visits, the most common barriers experienced by participants regarding their health and the health of their children included mental health, family dynamics, socio-economic status and community-situated myths. An example of the health prompt used by CHWs is presented below:

CHW: Are there any obstacles that are going to make this difficult?

Met with a confused look from W1, CHW elaborates on her question.

CHW: Obstacles like things that will make it feel difficult for you to boil food or buy an egg for a child. Are there obstacles that may occur?

W1: Well there are obstacles that can be caused by lack of finances, but I am prepared to do it. Even though we run out of money sometimes.

When discussions of barriers arose, participants most often identified inadequate finances as the most prominent hindrance to accessing services or incorporating key health literacy messages presented during household visits into their daily routines. Similar to the example above, participants identified missing or late child support grants and job insecurity as the most prominent financial barriers to improving their own health or the health of their children.

While some participants were encouraged by prompts or behaviour probes to reflect and identify barriers, many participants would say they did not foresee any barriers to implementing the key messages presented into their households. Participants who did not identify any barriers to their understanding or engagement with key messages were not prompted further by CHWs. However, as seen in the above example, when participants
appeared to not understand a particular concept, such as empowerment or obstacles, CHWs scoring high in verbal engagement parity and content depth would often elaborate to ensure participants had the necessary understanding to answer the prompts.

3. Community Collaboration
   Emerging from the coded transcripts as a form of unprompted empowerment discussions, community collaboration was noted in both high and low scoring household visits using both educational media platforms. As a founding principal of popular education and empowerment pedagogy, community collaboration offers opportunities to encourage transformative action regarding systematic barriers to quality of life and wellbeing experienced by members of a particular community. Collaborative discussions were coded when CHWs would prompt an active position for participants to share key messages with other members of the community. The following excerpt from a high scoring visit using booklets illustrates how CHWs were able to use collaborative prompts to promote active components to key messages discussed:

   CHW: And you will now be able to advise others on what healthy foods to give to their children. You can now correct someone who is feeding their child wrong because you are now informed.

   Community collaboration was coded when discussions prompted largely by CHWs connected particular messages to the context of the wider community. Additionally, collaborations were coded as a “call to action” for participants to communicate and share the information they learned regarding health literacy to the community at large. In a number of household visits, CHWs would advise caregivers to share the information they had learned about a particular topic with members of their community who couldn’t attend the visits provided, or to use the information they received to identify and act upon health disparities or misinformation they encountered in their community.

Summary
   Overall, improvements in the empowerment quality of discussions were exhibited in the use of both educational media platforms. However, splitting the scores between high and low scoring visits showed that lower scoring CHWs using tablets improved over time, while higher scoring CHWs improved more with the booklet. The appearance of codes
pertaining to strong use of prompting, high confidence and strong engagement with the materials highlight qualities of CHWs that contributed to high scores. For lower scoring visits, low confidence, challenges of literacy and the absence of verbal and non-verbal prompts contributed to lower quality exchanges. In household visits where codes pertaining to empowerment were brought up, it was often discussed in relation barriers and opportunities for community collaboration. In the following chapter, the results from the coding scheme and thematic analysis will be placed in perspective, in relation to the research and theoretical foundations discussed in the literature review to address the research question at hand – namely, what is the role of educational media in supporting empowerment education dialogue in health literacy exchanges?
Ch. 5 - Discussion and Conclusion

Introduction
In this chapter, results of the quantitative coding scheme and qualitative thematic analysis will be explored in relation to the theoretical foundations of empowerment education pedagogy and studies undertaken by critical health literacy researchers. A discussion of the characteristics of empowerment education, the nature of CHW facilitation and the role of educational media to support these processes will follow. The chapter will conclude with a reflection of the strengths and limitations of the CHAT study as well as recommendations for future CHAT incarnations and additional research for critical health literacy programs.

Discussing the Findings
Through engaging content, facilitation and the identification of participant goals and barriers, health literacy educational interventions can incorporate empowerment as a process and goal to address maternal and child health and nutrition. Through pedagogical engagement such as patient-centred discussions, critical reflections of key health messages and skill development addressing individual and community barriers to health, programs such as CHAT seek to improve self-efficacy and self-esteem regarding disease management and maternal and child health and nutrition. This thesis sought to explore how educational media, particularly delivered by mobile health platforms, was able to strengthen opportunities for the empowerment processes through dialogue facilitated by CHWs as a means of identifying and addressing health disparities and empowering goals of caregivers and children under five affected by HIV/AIDS in South Africa.

The results of the CHAT study suggest that the presence of educational media improved references towards empowerment topics in prompted discussions in both medias in certain visits. However, in an effort to address variations of quality of engagement across household visits, improved facilitation training for participating CHWs before and during the project could help sustain confident discussions. Training of this nature would be particularly useful for CHWs showing difficulty connecting with participants to increase their familiarity and training of empowering pedagogical engagements and how to reference them. Returning to Bensing's (1991) discussion of facilitative behaviours on behalf of health service providers, skills associated with the development of affective
behaviour (checking in, invitations to participate, positive affirmations, gestures, active listening), systematic and purposeful behaviour (knowledge probes, reflections, open-ended questions, clarification, elaboration), patient-centred behaviour (contextual references, patient-centred discussions, community collaboration) would be worth exploring in the development of further CHW training. Additionally, opportunities to reflect and act on barriers or opportunities in relation to overall quality of engagement with caregivers and their dependents. Given the results of the coding matrix and prominent themes regarding empowerment engagement, rather than establishing a “one-size-fits-all” approach to platform development and application, educational media should seek to remain a flexible means of support for CHW verbal and non-verbal engagement with participants. Additionally, the role of empowerment in establishing educational processes and goals, whether explicitly related to popular education or incorporated through the use of similar processes, should remain flexible and responsive to the participants involved. With this in mind, the development of facilitation skills for CHWs to centralize and nurture the experiences of participants should remain a priority within empowerment education projects (for example, how to have discussions which address contextual references and elicit problem posing?).

The following discussion will specifically address the research goals outlined in the introduction chapter. Additionally, conceptions of empowerment education, health literacy, mobile health and CHWs discussed in the literature review will be returned to in relation to the findings, discussing the strengths and limitations of the study and make recommendations for future research and CHAT program development.

Situating the Results within the Research Questions

Understanding the quality of visits was integral to the analysis of the CHAT program in relation to the use of empowerment processes within health education. This analysis was performed through the use of specific metrics of the coding scheme along with strong or distinguished themes emerging from re-coding of the transcripts and videos of each visit. Through an examination of the coding matrix results, the overall quality of participant and CHW interactions pertaining to discussions incorporating elements of empowerment processes appeared to improve for both educational media platforms over the course of visit observations. However, exploring the displacement between high and low scoring visits illustrates the quality of interactions outside of the average visit. The following section will
elaborate on the findings of the coding matrix to understand their significance in relation to the research goals outlined in Chapter 1.

1. How does educational media support CHWs to engage in discussions during CHAT household visits?

In supporting CHW engagement of participants within the CHAT program, educational media appeared to compliment CHW facilitation of participant engagement through the reiteration, reflection and elaboration of topics pertaining to health literacy and the contextual discussions of key messages between participants and CHWs in high scoring visits using either educational platform. In comparing participant/CHW engagement between media forms, videos presented on the tablets offered an opportunity for reference to engaging visual media more so than the images presented in the booklets. This was particularly noted in households where literacy on behalf of CHWs and/or participants appeared low. However, the use of educational media in this manner was dependent on the strength of CHWs verbal and non-verbal facilitation skills.

When the capacity, motivation and experience health care workers fluctuated, engagement with media platforms and the development of dialogue relating to key messages and topics introduced by participants appeared to follow suit. CHWs who showed a confident understanding of the materials and how to engage participants in discussions found benefit in using the media as a tool for reference without needing to rely on it fully to deliver key messages. Those that struggled to grasp the material (either through low confidence, low literacy or low levels of facilitation skills), relied too much on the platform, which appeared to impact participant engagement. As a result of this fluctuation in facilitation and delivery, the need for support from educational media (i.e. through prompts and referential content) in addition to overall facilitation training is made more apparent.

Regardless of the media used, it appeared that sustaining engagement where participants felt comfortable discussing topics relating to empowerment, or marginalization, depended largely on the degree of facilitation and prompting from CHWs as well as an established rapport and confidence through purposeful and affective behaviour. While skill levels and experience with empowerment education pedagogies varied between CHWs, the use of specific facilitation skills training could offer more opportunities for mutual acts of communication and engagement in conjuncture with educational media to support
references, reiteration and elaboration of key health messages. Without this attention, CHWs exhibiting lower facilitation levels may default to transmissive or “banking” means of engagement, impacting overall uptake and contextual-relevance on behalf of participants (Freire, 2014).

It is important to recognize the strengths and weaknesses of CHWs’ facilitation skills in the development of context-relevant engagement observed during household visits. Returning to the discussion of context presented in the literature review, context is most effectively understood as both a matter of context-sensitive design and the ability to contextually discuss topics inspired by the content presented. As a matter of content-sensitive design, CHWs were better able to utilize their role as a “cultural link” (Mayfield-Johnson, 2011) to facilitate the process of referring to and elaborating upon the information presented in the educational media when strong verbal and non-verbal engagement was present. Content-sensitive engagement was noted when CHWs were able to facilitate discussions by relating health topics to barriers and active solutions identified by participants through references to educational media content. Beyond the information presented, CHWs were able to contribute to the discussions of barriers specific to the context of participants by way of their community-based service provision. When participants identified travel costs and financial security as prominent barriers to accessing health and nutrition services, the value of basing CHW visits out of the home became apparent as a means to increase the scope of program delivery, independent of the media platforms used.

CHWs can encourage critical health literacy programs as a resource to increase access and relevancy with regard to the information presented. Because CHWs are often the initial point of exchange within critical health literacy, as supported by the experiences within the CHAT program and the field of health programming at large, training in empowerment education facilitation, specifically around the ways educational media can support empowerment processes, should remain a strong consideration in program development. The ability for local CHWs reference elements of cultural proximity, such as local histories, languages and practices, is often seen as a desirable characteristic in health literacy facilitators. However, as supported by the work of Mayfield-Johnson (2011) and the results of the CHAT study, equally pressing qualities of a desirable candidate include outreach and dialogue facilitation skills to connect participants’ contextual understanding of their own health barriers and opportunities with key messages presented. Facilitation
training of this nature would add considerable value for CHWs who feel their training is
generic. Developing and evaluating ongoing facilitation training for program workers
should remain a priority within empowerment education intervention programs, where
content depth, contextual reference and critical discussion facilitation are integral to
discussion and knowledge exchange (Hill-Briggs et al., 2007; Mayfield-Johnson, 2011;
Schneider et al., 2008; Wallerstein & Bernstein, 1988).

In understanding the role of educational media to supplement this training, variation in
the characteristics and qualities of confidence, familiarity and facilitation makes it difficult
to generalize what platform was most supportive to CHWs of the CHAT program. The use
of tablets appeared to positively influence quality of interactions more so in lower level
CHWs than higher. This may suggest tablets were more appropriate in scaffolding
reference and elaboration of key messages when incoming CHW confidence, familiarity and
literacy appears low. Booklets appeared to be less appropriate in helping improve the
quality of interactions over time for CHWs who exhibited low verbal and non-verbal
engagement scores. With this understanding, low literacy, as an example of an influence on
poor engagement, could be addressed either through the supplementation of text-heavy
media for videos. Additionally, literacy could be included in training and facilitation
programs for CHWs during intake. When using booklets, improvements in quality of
engagement for high performing CHWs were noted in visits with high levels of affective
verbal and non-verbal behaviours, such as eye contact, invitations to participate and
contextual references as a means to supplement the use of videos. Because CHWs often
represent the first contact with program delivery, those responsible for their training and
facilitation development must take into account the variability of skills and characteristics
of their participating CHWs in relation to the dynamics of participants and their level of
understanding and reality. In doing this, appropriate educational media forms can be
deployed in relation to their effectiveness to support both high and low quality CHWs
instead of one platform to support all their needs.

2. How is empowerment engagement influenced through educational media?

Where health literacy and empowerment education intersect, opportunity exists to
involve diverse groups of people in an effort to identify, reflect and act upon barriers to
health. Pedagogical engagement of participants through prompts and discussions to
identify problems, reflect on their historical and social roots, and envision a healthier society through transformational action constituted empowerment education as a process. Both critical health literacy and empowerment education researchers advocate for the use of empowering pedagogical processes such as active critical reflection between learners and facilitators to collaborate on a patient-centric means of generating knowledge (Airhihenbuwa, 2006; Champeau, 2002; Freire, 2014; Nutbeam, 2000; Sørensen et al., 2012). As a goal, empowerment can be understood as the improvement of specific areas regarding quality of life through acquired knowledge, increased self-efficacy and improved problem solving skills. However, it is important to frame empowerment goals and processes in relation to 1) the specific field they are engaging (in this case, health education) and 2) the goals and barriers identified by participants through dialogical engagement.

The analysis of empowerment processes and goals within the CHAT program suggests problem posing and reflective discussions related to barriers to health and wellbeing can be prompted or supported through educational media. Through prompting and references to media content by CHWs, some participants felt comfortable identifying financial instability, job insecurity and travel time as barriers to accessing or implementing key features of health education messages. Opportunities for prompted problem posing and reflective discussions occurred during both tablet and booklet. However, while they occurred more frequently during tablet visits, households using booklets saw strong improvements in empowerment-related scores between rounds of observation as well. Empowerment processes entered into discussions where participants felt comfortable unpackaging barriers and marginalization they experienced in relation to the topics presented. However, the variability in high and low scoring CHAT regarding discussions and processes relating to empowerment that occurred during visits suggests not all exchanges between learner and facilitator result in an empowerment-oriented process. The variability observed between CHWs who were and were not able to invite discussions regarding problem posing or reflection suggest additional facilitation training is needed to support CHWs unfamiliar with specific skills or facilitative prompts related to empowerment discussions. Both prompted and unprompted discussions of empowerment depended on levels of understanding, confidence and affective behaviours on behalf of CHWs to open space where participants felt comfortable including their perspective and experiences.
Due to the scope of observation within the CHAT program, empowerment goals of increased self-efficacy, increased knowledge and the application of active strategies to overcome barriers were difficult to establish. The subtle and ongoing nature of empowerment outcomes requires succinct metrics and longitudinal studies and observation to examine how participants reflect and act on aspects of specific health goals and more generalized empowerment goals. In relation to the spectrum of critical health literacy engagement outlined by Sørensen (2012) and Nutbeam (2000), the nature of discussions observed within CHAT remained largely functional and communicative, with participants identifying, repeating and affirming content without critically reflect upon its relevancy or application through challenges or affirmations. However, examining empowerment as a process within health education, certain visits suggested educational media deepened content engagement and contextual reference and elaboration over time. The degree to which discussions were able to incorporate empowerment processes such as opportunities for community collaboration or the identification and engagement of barriers by participants depended more-so on the skills and confidence of the CHW to open space with strong verbal and non-verbal facilitation than the type of platform used.

Elaborating on the development of empowerment processes, the engagement of participants in critical health literacy exchanges requires not only an understanding of context and content, but strong interpersonal skills to support the development of relationships with participants, program implementation and the strengthening of capacity for discussions around empowerment at the individual and community levels (Champeau, 2002; Mayfield-Johnson, 2011). Consistent with Champeau (2002) and their work developing empowerment education programs for HIV prevention, the skills and awareness necessary for critical consciousness require intentional educational efforts, particularly amongst facilitators. On the basis of the findings of CHAT, the nature of empowerment discussions remained conditional towards the existence and quality of empowering processes and facilitation, particularly verbal and non-verbal facilitation, the familiarity and contextual relevance of content engagement.
3. What are the strengths and weaknesses of educational media within the CHAT environment?

Regarding the strengths and weaknesses of the particular educational media used, visits using tablets showed stronger overall scores, particularly through sustained levels of content reference and the emergence of prompted empowerment discussions relating to marginalization over time. Videos themselves became the subject of contextual references towards aspects of the participants’ livelihoods and community. Visits using booklets showed stronger overall growth between rounds of observation relating to quality of engagement scores, particularly in areas of verbal and non-verbal engagement over time.

However, in understanding the strengths and weaknesses of each platform, it is important to understand the impact of CHWs skill and confidence on the resulting engagement with participants. CHWs with lower confidence related to literacy and low verbal and non-verbal engagement appeared to inhibit participant contributions to discussions, regardless of the media form used. As seen in the results, facilitative behaviours such as eye contact, invitations to participate and affirmative gestures contributed to the role of educational media to support improved rapport between participants and CHWs. However, when CHWs made little eye contact and did not prompt or engage participants through gestures or discussions, educational media was often used as a transmissive tool to disseminate key messages.

Particularly for critical health literacy, the appropriateness of using technological platforms rests in the ability of these platforms to delivery key messages, while improving opportunities for discussion between participants and facilitators. In the case of CHAT, lower-scoring CHWs showed more progression using tablets, while higher scoring visits appeared to benefit more from the use of booklets. Additionally, low literacy levels appeared to impede elaborative discussions because of an overreliance on the media. In evaluating educational media to support empowerment pedagogical processes and goals, it is important to understood the appropriateness of a particular platform in relation to the needs of the users (In this case, participants and CHWs) to support the development of skills needed to invite discussions relating to critical reflection, application and action. While the results of the coding scheme suggest an overall improvement in the quality of engagement in the presence of both media forms over time, the variability of scores suggests some platforms were better suited for certain CHWs than others. More
specifically, the efficacy of media platforms to prompt or offer reference towards empowerment processes such as critical reflection and action during the CHAT program depended largely on the quality of engagement and facilitation on behalf of CHWs. However, when facilitation and quality of engagement appeared high, media forms served as supplementary tools to relate, reference and elaborate key messages. Improved scores relating to the content of discussions regarding empowerment and confident elaborations of content depth within lower booklet-using visits suggest improvements in reference and familiarity could be developed overtime. However, the inclusion of ongoing project evaluations during project cycles as well as after would be beneficial in noting changes in quality of engagement to address support needs in an effort to strengthen the form and function of educational media.

When CHWs refrained from elaborating or referencing key messages or vignettes presented in the media, the delivery method tended towards the banking method of education described by Freire (2014). However, engagement observed in visits where facilitation and referential understanding appeared strong, videos offered an opportunity to identify, elaborate and challenge key messages presented through dialogical exchanges about the content presented. When used in exchanges supported by strong facilitation skills and critical awareness, educational media can offer opportunities to expand and contextualize health information within the context of a community. However, as seen in the results of the CHAT study, this depends greatly on the training and the appropriateness of support for particular CHWs. With this in mind, health literacy and empowerment education programs using educational media, particularly emerging platforms such as mHealth, should be wary of weaknesses in facilitation resulting in “banking” exchanges between CHWs and participants where participants receive immediate answers to their questions rather than being engaged in a discussion of the content in its entirety (O’Donovan, Bersin, & O’Donovan, 2015; Pimmer, Linxen, Gröhbiel, Jha, & Burg, 2013). Given the scope of observation within the CHAT program, empowerment processes were more accessibly observed as they occurred during the educational exchanges. Establishing the impact of empowerment goals often requires long term observation to establish how educational and empowerment-oriented discussions are able to influence quality of life and barriers to health.
Acknowledging Strengths and Limitations

This thesis sought to understand the ways educational media influence quality of exchanges and the degree to which discussions of empowerment tended towards critical reflection through what was said and observed between CHWs and participants during household visits. The CHAT program was able to identify how facilitation, used to deepen context-sensitive and critically reflective references to educational media, contributed to the increased engagement through references, prompts and elaborations. Rather than having participants engage with media on their own, the collaborative nature of CHAT allowed for CHWs and participants to co-generate knowledge which referenced the context of participants through 1) context-sensitive inputs such as design and 2) context-sensitive engagement of participants and their contexts through collaborative discussions of key messages and media. Through the use of flexible and responsive educational media, the strength of the CHAT program lies in the ability for educational media to adapt and respond to the needs of participants and facilitators.

The opportunity to engage and analyze a project which was not specifically outlined as empowerment education, and yet simultaneously containing elements of empowerment processes and health-related empowerment outcomes, offered insight into the realities of developing and adapting popular education characteristics for use in health education. While empowerment might not necessarily be included within the scope of outcomes within health sciences education, the analysis of CHAT highlights opportunities for collaboration between health education and popular education pedagogies by virtue of empowerment-oriented pedagogical processes framed in specific health goals.

Regarding the data collected, projects which rely on transcribers and researchers outside the cultural proximity of the community must be reflected upon regarding possible incomplete interpretations about what was seen and heard during visits. Additionally, because the foundations of this thesis relied on transcripts translated from isiZulu to English, the limitations of linguistic reconfiguration must be considered.

Regarding the implementation of the CHAT program itself, issues with data recording and video capturing impacted the availability of complete, observable and comparable data within visits, resulting in a smaller sample size. Improvements in data collection and recording for tablets, as well as opportunities to match the detail of tablet records for booklets would improve the saturation of comparable data between larger sets of visits. The coding scheme used to analyse this data intended to give insight into how...
participants and CHWs would makes sense of a given phenomenon within the specific context of this program (Cohen, Manion, & Morrison, 2000). Additional investigations into the transferability of considerations from this coding scheme must reflect on the appropriate means of analysis for the specific context, needs and participants it is aligned with.

In understanding the nature of empowering outcomes as a result of empowering processes born from educational interventions, outcomes of self-efficacy, active liberation and community collaboration are more cohesively understood through increasingly long term and thorough relationships between participants and researchers. Understanding the development of empowerment outcomes for the CHAT program requires more opportunity to specifically engage with participants regarding their ongoing application and reformation of key messages into their routines and health practices outside of the educational setting. Further CHAT research would benefit from the incorporation of opportunities to observe and understand participant’s abilities to incorporate active or transformational strategies discussed during the educational exchanges into their livelihoods.

**Recommendations and Further Studies**

Given the importance of ongoing training and process evaluations, future CHAT incarnations should reflect on the role of facilitation training for CHWs to improve opportunities for dialogue during household visits. Furthermore, future training sessions would benefit from assessments of CHW comfort and confidence in opening space for group discussions and patient-centred pedagogies to develop appropriate means of support. Ongoing process evaluations and opportunities to involve participating CHWs during the project could improve efforts to develop appropriate platforms and content to support CHWs exhibiting strong or weak facilitation skills. In doing so, familiarity with critical reflection and action could be improved through training sessions before, during and after project cycles. In addition to opportunities to invite participant involvement into educational exchanges through patient-centred and problem posing discussions, so too would inviting CHWs to reflect and act upon barriers to their own performance and quality of care offer opportunities to overcome issues in service delivery.

Since CHWs are often the first to introduce discussions of health literacy for many participants, proficient training amongst lay community health workers must address
effective facilitation skills to compliment materials presented on educational media. Investigations into the efficacy and sustainability of projects of this nature could be of great benefit for NGOs addressing critical health literacy and empowerment-oriented development projects. Given the considerable focus mHealth has been given to improve health service delivery amidst health care worker shortages in South Africa, further research must be conducted to improve the ability for CHWs to access, reflect and utilize the facilitation skills needed to use educational media effectively. Programs interested in developing dialogical empowerment exchanges with educational media should explore the efficacy of prompts and sufficient and ongoing training to improve confidence and quality of dialogue between participants and health care service providers.

Given the importance of understanding patient-centred context in content design and engagement, qualitative studies should resist tendencies to generalize between sample groups and populations. Instead, transferability can reflect upon the unique findings of a particular context to inspire analytic investigations in communities facing similar situations. For example, particularly in South Africa, men who have sex with men (MSM) face particular barriers to accessing reflective and contextual health literacy information on the grounds of personal, social and institutional stigmatization against same-sex attracted individuals and communities. Despite the inclusion of anti-discrimination language in policy, socialized and political homophobia remain pertinent barriers to institutional and societal acceptance and engagement in South Africa, particularly within the health and education systems. In many Sub-Saharan African cultures, sexual activity between men is increasingly stigmatized. The pervasive nature of this stigma makes the provision of necessary health information challenging for the spectrum of MSM behaviours associated with elevated and non-elevated HIV risk (Imrie et al., 2013). Resistance from healthcare workers and organizations perpetuates a lack of responsiveness within public sector health facilities. This is particularly exasperated by the overburdening of healthcare workers along with insufficient training to provide services appropriate for marginalized and stigmatized populations (Rispel et al., 2011). Projects addressing patient-centred self-efficacy and health literacy delivered through educational media could be explored given the unique needs and challenges facing MSM regarding access and representation within health literacy. However, much like the CHAT program, the selection and facilitation of effective CHWs, particularly given the sensitive and stigmatized nature of the population, should remain a critical focus area in future research.
Summary and Conclusion

Health disparities experienced by caregivers and children under-five with HIV represent an opportunity to situate the notion of empowerment as both a means and goal for participants within the CHAT program to identify problems, critically reflect upon the social and historical roots of these problems, envision a healthier reality and develop active strategies to overcome obstacles. Particularly, well-defined and evidence-based health literacy programs for HIV-exposed children and their caregivers have been shown to address issues related to malnutrition and associated infections impacting understandings of HIV and resulting maternal and child health and nutrition (MCHN). To test the impact of CHAT, a pilot test of HIV-affected children under five years old and their caregivers in KwaZulu Natal, South Africa, was conducted where the children’s health along with caregiver knowledge of HIV, child nutrition, child disease, child development were assessed at regular intervals over a 12-month period. Researchers conducted a randomized controlled trial including 21 CHW (11 experimental and 10 control), 80 HIV-affected children and 120 caretakers (i.e., parent, legal guardian or primary caregiver) of children under five years old in KwaZulu-Natal. This thesis contributed to the larger CHAT program through the analysis of characteristics and impacts of educational media on quality of care using videos captured in two rounds of observation between 2014 and 2015 for 19 household visits. Visits were conducted by community health care workers trained by the Thanadnani Children’s Foundation. Following the observation and coding of the transcripts and videos, a coding scheme was developed by the research team to illustrate changes in quality of care, based on the ranking of context-sensitive engagement, content depth, empowerment, verbal engagement parity and non-verbal prompting. Additionally, transcripts and videos were coded to elicit themes which elaborated upon the qualitative findings of the coding scheme to illustrate how participants and CHWs engaged with the educational media during household visits.

Based on the findings of the CHAT study, educational media can offer support for intervention programs seeking to develop dialogical exchanges around empowerment, particularly through opportunities to reference, elaborate and reiterate important key messages. Overall, quality of engagement appeared to improve over time for both media forms. Booklets appeared more beneficial during higher scoring visits, while tablets offered more support within visits scoring lower. In order to address the displacement between high and low quality videos, the provision of sufficient training to strengthen confidence
and verbal and non-verbal facilitation skills amongst CHWs should remain a priority in
developing an appropriate strategy for media platform integration into the field.
Discussions of empowerment or barriers were aided through opportunities to reference
media content as examples and through the use of discussion prompts to encourage
reflection amongst participants regarding their own health realities. Programs interested in
developing dialogical empowerment exchanges with educational media should explore the
efficacy of prompts and sufficient and ongoing training to improve confidence and quality of
dialogue between participants and health care service providers. While empowerment was
not explicitly referenced in the scope of outcomes within health sciences education, the
analysis of CHAT highlights opportunities for collaboration between health education and
popular education pedagogies by virtue of empowerment-oriented pedagogical processes
framed in specific health goals.

Future CHAT incarnations would benefit from improved reporting and data collection
management for educational media forms outside the realm of tablets, as well as ongoing
process evaluation to adapt usage and training for CHWs and participants. While a number
of possible platforms could and should be developed to support improvements to access and
understandings of contextual health literacy information, the strength of their engagement
depends greatly on the ability for facilitators using the media to develop relationships,
rapport and trust between themselves and participants. Health literacy and empowerment
education projects seeking to use educational media to open space where participants feel
comfortable communicating their “felt and unfelt” needs (Kark & Kark, 1962, p.117). Only
by opening space for discussions of health within the framework of participant’s knowledge
and reality can the significance of educational content be realized.
Bibliography


sexual health services to men who have sex with men where their health and human rights are compromised. *Global Health Action, 8*, 26096.


