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Adult Education as a Vehicle for Health Communication

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An abstract of
A dissertation submitted to the Faculty of the James T. Laney School of Graduate Studies
of Emory University in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Behavioral Sciences and Health Education
2011

Abstract

Adult Education as a Vehicle for Health Communication

Ariela Michal Freedman

Health literacy is rapidly gaining attention in health education interventions, yet most still consider it to be an issue only for poor readers. Instead, health literacy should be seen as the dynamic intersection of the environment, the demands of the task, and the individual's skills and emotional state. Through this lens, everyone experiences health literacy challenges at some point. Thus, considering health education as health *literacy* education may help increase the effectiveness of future interventions. Further, while most health education interventions apply a scientific approach to selection and use of behavior change theories, little attention is paid to how individuals learn new information and skills.

The first component of this research provides an instructional foundation for interventions by integrating cognitive psychology and adult learning theory to explain how individuals acquire functional health literacy skills (the basic health-related skills needed for daily living activities in order to ensure personal health). The integration of these disciplines focuses on the importance of classroom environment and educational strategies.

The second component uses a qualitative case study example based on classroom observations and interviews with students and teachers in an Atlanta-area adult education center's health literacy class. This case study applies the theories described in component one to describe how students acquire functional health literacy skills, such as reading food labels or medication instructions. Results describe students' resulting health behavior changes, including improving nutrition, increasing physical activity, and increasing medication adherence. Results also describe how the classroom experience motivates students to function as lay health advisors by sharing information and skills with loved ones outside the classroom.

Ultimately, this study suggests that functional health literacy skills are the foundation of behavior change interventions. This study also demonstrates how the field of health education can benefit by looking to cognitive psychology and adult education to provide a rigorous instructional foundation for future intervention development. Finally, this study demonstrates that the skills learned in adult education classes may reach far beyond the walls of the classroom, thus making adult education a powerful communication vehicle for reaching low literate adults with critical functional health literacy skills.

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Acknowledgements

To the students, teachers, and staff of **Literacy Action, Inc.** – Many thanks for your enthusiasm and interest in participating in my study. You always made me feel welcome, appreciated, and respected during every visit. I hope that our work together, now and in the future, can lay the foundation for making that happen for all people in health care settings.

To my committee members – **Kathy, Hannah, Kat, and Ruth** – You are all incredible mentors and role models for me. I cannot thank you enough for your support, interest, and guidance throughout this process. I have learned so much from all of our conversations, and I appreciate your willingness to constantly challenge me to think in new directions. Thank you for caring about me so much – not only as a student, but also as a person, a new mom, and a future colleague.

To my **fellow BSHE doctoral students and graduates** – What an experience. I am proud to call you my colleagues and friends.

To the **cadre of friends and family helping take care of the bean**, especially on short notice – They say it takes a village to raise a child. This is especially true when working on a dissertation (and working two jobs). Completing my dissertation would not have been possible without your flexibility and generosity. Thank you a million times over.

To my parents, **Cynthia and David Freedman** – My best role models and biggest fans. Who would have guessed I'd like school so much? Thank you for always supporting me, believing in me, and getting excited with me about my passions, even when they are a little out there.

To **my daughter, Elena –** Seeing your sweet smile every morning has been the best motivator to getting this dissertation done. You are fantastic in every way – I had no idea that being a mom would be so much fun.

To **my husband, Casey –** My daily support, cheerleader, and best friend. We're a good team. You can have one of my letters. I love you.

This work would not have been possible without the financial support of Emory University's **Laney Graduate School** and the Rollins School of Public Health Department of Behavioral Science and Health Education **Letz Funds**.

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Introductory Literature Review

Defining Health Literacy

Health literacy can be defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Healthy People 2010, 2001). The 2003 National Assessment of Adult Literacy (NAAL) classified health literacy skills into three domains: clinical, prevention, and navigation of the health care system. The clinical domain includes activities associated with patient-provider interactions, such as completing patient information forms and dosing and taking medication correctly. The prevention domain includes activities regarding disease prevention, early detection and intervention, and self-care and management; for example, getting recommended screenings and vaccinations, identifying symptoms of a health problem, and consulting a health care professional. Navigation of the health care system includes navigational activities pertaining to individual health care rights and responsibilities, such as giving informed consent for health care, understanding the scope of health insurance plans and required co-payments, and accessing primary care instead of the Emergency Department (Kutner, Greenberg, Jin, & Paulsen, 2006). These broad-based skills are often called "functional health literacy skills," because they involve the daily living types of activities needed to achieve health. While these are the typically used behaviorally based examples of functional health literacy skills, one may also view health literacy from a cognitive perspective to see a broader range of activities involved with health literacy.

The connection between health and literacy

Research has demonstrated clear connections between poor health literacy skills and negative health outcomes. Individuals with limited health literacy skills are less likely to obtain preventive services, such as mammograms, flu shots, and Pap smears (Scott, Gazmararian, Williams, & Baker, 2002). Additionally, those with limited literacy enter the healthcare system when they are sicker, compared to those with adequate literacy (Bennett et al., 1998). Those with limited literacy also have less knowledge about their medical conditions and treatments, resulting in poorer disease self-management skills (Schillinger et al., 2002; Schillinger et al., 2003; Williams, Baker, Honig, Lee, & Nowlan, 1998; Williams, Baker, Parker, & Nurss, 1998). Further, individuals with limited health literacy skills are also at greater risk for having chronic conditions, such as high blood pressure, diabetes, and asthma (Schillinger et al., 2002; Schillinger et al., 2003; Williams, Baker, Honig et al., 1998; Williams, Baker, Parker et al., 1998). Individuals with limited literacy also have more frequent visits to the Emergency Department and more hospital admissions for preventable reasons (Baker, Parker, Williams, & Clark, 1998; Baker, Parker, Williams, Clark, & Nurss, 1997). For example, patients with low literacy were found to have a 52% higher risk of hospital admission compared to those with adequate literacy, even after adjusting for age, health status, and other socioeconomic variables (Baker et al., 1998). Overall, the cost of low health literacy to the US economy is estimated between $106 billion and $236 billion each year (Vernon, Trujillo, Rosenbaum, & DeBuono, 2007).

Scope of the low health literacy problem

Low health literacy is a significant problem that affects millions of people across the United States. Data from the 2003 NAAL reveal that 90 million adult Americans (40%) can perform only the most basic health literacy tasks (Kutner et al., 2006). Low health literacy is most prevalent among minorities, non-native English speakers, the elderly, the homeless population, and individuals from low socio-economic status or with little formal education (Kutner et al., 2006). Minority populations suffering the greatest prevalence of poor health literacy include Hispanic/Latinos (41%), American Indian/Alaska Natives (25%), and African Americans (24%) (Kutner et al., 2006). Those with limited health literacy are typically not able to understand medication warning labels (Davis et al., 2006), surgery consent forms (Sudore et al., 2006), or preoperative instructions for surgery (Chew, Bradley, Flum, Cornia, & Koepsell, 2004). As 2 out of every 5 patients may not be able to read and follow these important instructions, resulting in further illness and possibly death (not to mention increased need for medical intervention, leading to increased health care costs), health literacy should be a high priority for all responsible for communicating health information (Kutner et al., 2006).

Communicating health information to low-literate populations

Effective health communication can perform a variety of important functions, including raising awareness of health risks and solutions, and providing the motivation and skills needed to reduce these risks (National Cancer Institute, 1989). Aspects of effective health communication include the following:

- Availability (content is delivered in a place where audience can access it)
- Cultural competence (design and implementation takes into account the needs and beliefs of each group)
- Repetition (content is repeated over time to reinforce impact)
- Timeliness (content is provided when the audience most needs it and is most receptive to the information)
- Understandability (reading level, language, and format are appropriate for intended audience) (Healthy People 2010, 2001).

Communication varies greatly depending on age, gender, culture, and socio-economic status (Usita & Blieszner, 2002; Young, 1978). Crafting effective health communication messages and using appropriate channels to deliver them is imperative to improving the health of low literate populations. Traditional methods of communicating health information rely on the distribution of print media, and the majority is written at or above a 10^{th} grade reading level (Doak, Doak, & Root, 1996). Although some hospitals and clinics are beginning to revise materials to be more accessible to low literate patients, it is important to consider that print media alone may not be the best method to communicate important health information to low literate populations (Hohn, 1998). Even taking the burden off of low-literate groups by using television or radio requires an in-depth understanding of each group (Maibach & Parrott, 1995).

As Healthy People 2010 indicates, one of the main challenges in designing effective health communication programs is identifying the optimal contexts, channels, content, and reasons that motivate people to pay attention to and use health information

(Healthy People 2010, 2001). By focusing on understanding the cognitive mechanisms by which information and skills are originally learned, health communications researchers and practitioners can develop more targeted efforts to reach low literate populations. Adult educators are particularly adept at "knowing" this audience, and adult literacy centers are known contexts and vehicles for successful information and skill delivery among low literate populations (Institute of Medicine, 2004). Thus, by drawing on adult learning theories to inform the cognitive aspect of information processing and the motivational aspect of skill use, health communication researchers can potentially increase the impact of current behavioral theories when applied to health behavior change interventions. As explained below, the added value of adult learning theory is particularly evident when applied in the context of interventions designed to increase the health literacy skills of low-literate adults.

Adult education: teaching practical skills to low literate adults

The American Medical Association (AMA) and the IOM noted the potential impact of a growing number of individuals lacking the skills necessary to function fully in society who were also not well-served by existing methods of health communication. To remove low literacy as a barrier to communication, the AMA and IOM recommended the use of existing face-to-face systems, such as adult education programs, to teach functional health literacy skills to low literate adults (American Medical Association Council on Scientific Affairs, 1999; Institute of Medicine, 2004; Kutner et al., 2006). Serving over 2.5 million students across the country each year (U.S. Department of Education, 2007), adult education programs are poised to deliver health information and

teach functional health literacy skills at the same time (American Medical Association Council on Scientific Affairs, 1999; Institute of Medicine, 2004; Kirsch, Braun, Yamamoto, & Sum, 2007).

Adult Learning Theory

Adults learn differently from children, and educators teaching adults draw on a different set of principles to inform their practice (Merriam, 2008). Contrary to popular belief, adult learning theory is not actually one theory; rather it is a collection of theories about how adults learn (Merriam, 2008). These theories rely heavily on placing learning in the context of real life situations, making learning immediately relevant, and empowering learners to take an active role in posing questions and developing solutions (Knowles, 1973; Freire, 2000; Candy, 1991). Malcolm Knowles is considered the father of andragogy, which most people consider to be "adult learning *theory*" (Brookfield, 1986); however, Knowles actually did not attempt to prove andragogy to be empirically based theory. Instead, he described it as "simply another model of assumptions about learners," (Knowles, 1980) defining it as "the art and science of helping adults learn" (Knowles, 1980). Knowles' principles of adult learning are widely used and consist of the following:

1. Adults are autonomous and self-directed.
2. Adults have a great deal of previous experience and knowledge that must be incorporated into learning experiences.
3. Adults are goal-oriented.

4. Adults are practical, relevancy-oriented, and must see a reason for learning something.
5. Adults need to be shown respect and prefer to be treated as equals in the learning experience (Knowles, 1980).

Particularly in adult literacy classes, where adults are taking time from daily obligations to increase their literacy skills in various domains, it is vital that the curriculum be connected meaningfully to learners' day-to-day needs (Brookfield, 1986).

In 1978, Jack Mezirow introduced another theory of adult learning called Transformative Learning Theory (Taylor, 1998). This theory is grounded in human communication and helps to explain the processes through which adults come to change the ways in which they view the world (Taylor, 1998). According to Mezirow, "Learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experience in order to guide future action"(Mezirow, 1996). The process of perspective transformation is core to Transformative Learning Theory and involves three dimensions:

1. Psychological (changes in understanding of the self)
2. Convictional (revising of belief systems)
3. Behavioral (lifestyle changes) (Taylor, 1998).

Mezirow explains that perspective transformation stems from the occurrence of a life crisis or a troubling life situation, although this has also been interpreted to be classroom

situations in which teachers can challenge learners to question their beliefs or world view (Taylor, 1998).

As current health behavior theories demonstrate, it is not only knowledge (or lack of knowledge) that drives behavior (Bosworth & Voils, 2005; Cole, Holtgrave, & Rios, 1993; Glanz, Rimer, & Viswanath, 2008; Institute of Medicine, 2004; Jeffery, 2004; Resnicow & Vaughn, 2006; Rothman, 2004). Additional factors include self-efficacy, attitude, motivation, and a myriad of others, yet it is generally an underlying assumption that knowledge must be present in order to modify these additional factors leading to behavior change (Cole et al., 1993). Despite this underlying assumption, little attention is typically paid to the actual cognitive processes by which knowledge (or perceived knowledge) can be changed. This may be especially evident in the few published findings of hospital-based health literacy interventions, which primarily address changing behavior by teaching new concepts without addressing previous misconceptions (Berkman et al., 2004; R.E. Rudd, 2002). By finding ways to apply Transformative Learning Theory outside of adult education to deliberately elicit the way that adult learners view the world (similar to Knowles' principle regarding drawing on the previous experiences of adult learners) and challenging those assumptions, health communications work can have a greater and sustained impact on its audience (American Medical Association Council on Scientific Affairs, 1999; Institute of Medicine, 2004; R.E. Rudd, 2002).

In 1986, Brookfield explored how current theories of adult learning were being used in a variety of practice settings (Brookfield, 1986). He built on many of Knowles' principles and also proposed that praxis – reflection on self and on learning activities – is

at the core of effectively facilitating learning. Brookfield also challenged Knowles' idea that adults were inherently self-motivated learners and instead proposed that the goal of facilitating learning is to help adults become empowered and self-directed learners (Brookfield, 1986). To that end, Brookfield proposes the use of Community Action Learning Groups in which adults learn, teach, and reflect collaboratively by setting the direction for their learning as a collective, rather than being solely directed by the instructor (Brookfield, 1986).

Wlodkowski, in 2008, furthered Brookfield's challenge of Knowles' idea that adults are innately motivated to learn, yet he also proposed that the foundation to adult learning is really predicated on motivation (Wlodkowski, 2008). Wlodkowski ultimately combined adult learning theory with a neurocognitive perspective to explain how motivation functions to facilitate learning – beginning with at the level of neurons and ending with specific strategies educators can use to increase motivation and thus maximize learning opportunities (Wlodkowski, 2008). Similar to Brookfield, Wlodkowski strongly recommends the use of collaborative learning techniques to increase motivation and maximize learning (Wlodkowski, 2008).

Adult education as a vehicle for health communication with low literate adults

As reported by a meta-analysis of health literacy interventions by the Association for Healthcare Quality and Research and a further systematic review of health literacy interventions, the majority of health system-based interventions for low literate populations are currently disease-specific (i.e., teaching diabetes self-care), are typically media-constrained (as opposed to instruction-oriented), and tend to measure success

through change in knowledge (Berkman et al., 2004; Pignone, DeWalt, Sheridan, Berkman & Lohr, 2005). Although some of these interventions successfully increased participants' knowledge in disease-specific areas such as sleep apnea or cancer fatigue, none of the reviewed interventions focused on increasing and encouraging the use of broad-based functional health literacy skills (Berkman et al., 2004; Pignone et al., 2005). As the health care system becomes increasingly complex, it is critical that patients are empowered with skills that are broadly applicable and transferable to a wide variety of contexts and tasks, so that they are able to make informed decisions about health care, obtain preventive services, and regularly engage in other health promotion activities (Kickbusch, 2004; Pignone et al., 2005).

True to the essence of adult learning theory, several existing adult education health literacy curricula focus on teaching functional health literacy skills. The Virginia Adult Education Health Literacy Toolkit and the Massachusetts Adult Basic Education Curriculum Framework for Health are resources to help adult educators use health topics as a vehicle for developing critical social and academic skills (Singleton, date unknown). One notable adult education program offering health literacy classes is the Literacy Assistance Center (LAC) in New York City. The LAC offers health literacy curriculum development workshops, called Health Literacy Study Circles+ for local adult educators, using the curriculum of Dr. Rima Rudd, a Harvard researcher and nationally recognized expert in health literacy. The study circles focus on three areas of functional health literacy: health care access and navigation, chronic disease management, and disease prevention and screening. The workshops provide an opportunity for adult educators to identify health-related skills and integrate health literacy into instruction through lessons

that are specific and directly relevant to the needs of adult learners. Additionally, adult literacy programs with educators in the study circles form partnerships with nearby hospitals and health centers, resulting in tours of the health facilities and presentations by health professionals to adult learners. A preliminary evaluation showed that adult learners found the health content to be relevant and immediately useful (Hohn, 1998; MAGI Educational Services, 2004). They increased their ability to fill out forms, read medicine labels, ask health related questions, obtain health insurance, seek preventive services, and communicate with health care personnel. They also felt empowered to manage their health and that of their families, and reported sharing health information and skills with their friends and family (Hohn, 1998; MAGI Educational Services, 2004). Several other adult education curricula, such as The El Paso Collaborative Health Literacy Curriculum, Healthy Smiles Curriculum, and the Heart Health ESL Curriculum report teaching more disease-specific information; however a recent study showed that many adult educators tend not to feel comfortable teaching this kind of information because they are not health content experts (Hohn, 1998). Additionally, despite the availability and variety of adult education programs with a health focus, most have not undergone substantive evaluation. Further, while curricula are easily accessible and widely shared, it is difficult to find the results of any types of evaluations because they are not available publicly (either on websites or in peer-reviewed journals).

The lack of evaluation results is not surprising, given that the typical focus of adult education programs is to provide services to those in need, rather than to function as a research institution and publish papers. Unfortunately, the implication is that others interested in learning more about if and how these programs work are unable to access

this information. Additionally, the primary vehicle for accessing and sharing this information differs greatly between public health researchers, practitioners, and adult educators. While researchers tend to rely on peer-reviewed publications, practitioners and educators may rely more on the use of the Internet or non-peer reviewed conference presentations.

As public health researchers and practitioners routinely develop interventions focused either directly or peripherally on communicating health information, it is important that they are able to draw on the expertise of adult education regarding best practices for facilitating information transmission (Nutbeam, 2008). Additionally, of importance to adult education is the indication that these health topics improve instruction and motivate adults to persist and engage in learning (MAGI Educational Services, 2004). In sum, in order to increase the impact of health communication efforts, it is important to understand how adult learning theories work to address key underlying factors of behavior change, specifically those related to cognition.

Cognitive Psychology Adding Depth to Understanding Health Literacy Skill Adoption

As explained previously, the IOM defines health literacy, in part, as "the degree to which individuals can obtain, process, and understand the basic health information and services needed to make appropriate health decisions" (Institute of Medicine, 2004). While this definition is most frequently operationalized from a behavioral perspective (with a focus on what individuals do or do not do), it is important to consider health literacy from a cognitive perspective as well. In 1998, the World Health Organization

defined health literacy as “the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health.” (World Health Organization, 1998). Much of the current research focuses on relationships between health literacy and certain behavior (for example, medication adherence or glycemic control) (Institute of Medicine, 2004), yet is missing the cognitive aspect explaining factors that contribute to the ability to process and understand information *prior to* engaging in behavior. This is where the intersection of adult learning theory and cognition can be especially useful when applied to health behavior change.

The field of psychology was dominated by behaviorism in the early 1900’s. Behaviorists such as B. F. Skinner felt that because mental processes are not observable, psychologists should not factor them into psychological theories (Kellogg, 1995). Thus, behaviorist theories of the time consisted only of publicly observable processes, such as actions, and disregarded anything related to thinking and feeling (Kellogg, 1995). In 1959, Chomsky challenged B. F. Skinner’s behaviorist approach and began what was known as the cognitive revolution (Kellogg, 1995). Chomsky was focused on understanding the interaction between the way an individual perceives information, processes it, organizes knowledge mentally, then engages in behavior (Chomsky, 1967). Ultimately, the goal of the cognitive revolution became a focus on understanding how people make meaning from their experiences in the world (Bruner, 1990).

As stated by Rogers et. al. in 2001, “The first step in dealing effectively with the problem of health low literacy is to illuminate its nature more adequately” (Rogers, Ratzan, & Payne, 2001). To this end, identifying the cognitive mechanisms that

contribute to an individual's health literacy is an important step in the development of successful health literacy and health communications interventions (Echt, 2010). Thus, a closer examination of the IOM health literacy definition from a cognitive perspective may help to further the understanding of determinants of health literacy in individuals, which may ultimately aid in the development of successful and cost-effective health literacy interventions, even beyond the scope of adult literacy programs (Echt, 2010; Speros, 2005).

Key cognition-related terms from the IOM definition include "obtain," "process," "understand," and "make appropriate decisions." From a cognitive perspective, these terms can be operationalized using the following definitions and examples.

Obtain: Obtaining information involves not only the ability to seek out and find information, but also involves sensory processes, such as visual acuity and auditory functioning. Individuals who have limited ability to see or hear information have reduced capacity to obtain information, which further limits their ability to process and understand information, or use it to make health decisions. The "Effortfulness Hypothesis" postulates that perceptual success comes at the cost of processing resources otherwise available for encoding information into memory (Wingfield, Tun, & McCoy, 2005). Essentially, when an individual is spending cognitive energy trying to see or hear something, he or she is less able to expend cognitive energy on remembering it (thus limiting the subsequent use of the information) (Wingfield et al., 2005).

Example 1: Wells Hospital is sorely in need of new lighting fixtures for its dimly lit post-operative recovery rooms. Mrs. Jones has just received her post surgery care instructions and has been asked to read them over and ask questions before she is discharged from the hospital. Although her visual acuity is generally fine, Mrs. Jones has difficulty distinguishing print in the dimly lit room. Ultimately, she expends more cognitive effort trying to discern the letters rather than processing and remembering the information given to her in the handout.

Example 2: Dr. Smith's high school AIDS/HIV intervention is taught by an energetic woman in a large gymnasium that has echo, combined with background noise from students passing by. Nearly everyone in the class has difficulty understanding everything the instructor is saying, despite her ability to project and enthusiasm for the topic.

Process: Processing abilities involve the speed with which an individual can select and use meaningful information. It also involves working memory, which is the amount of information an individual can remember and manipulate over a short period of time (i.e. "short-term memory") (Hedden, Lautenschlager, & Park, 2005). Before information can be stored in long-term memory, it must be appropriately processed in the short-term memory. Processing abilities, similar to sensory abilities, decline over time, and present significant challenges as people get older (Hedden et al., 2005).

Example 3: Head Start conducts an annual health fair for the community. The health fair is well attended by health educators, local clinics, community resources, and Head Start families. Mrs. Ramos, a new Head Start parent, is excited by the wealth of health information available to her and wants to talk to as many vendors as possible. The health fair is organized alphabetically by vendor rather than by topic, and Mrs. Ramos picks one aisle to start, talking with every vendor along the way. Mrs. Ramos quickly begins to feel overwhelmed by the amount of information communicated to her, because she has difficulty selecting what is useful and meaningful. She leaves the health fair with several brochures, but doesn't remember much from her vendor conversations.

Understand: Understanding health information involves word knowledge and meaning-making abilities. Individuals with smaller vocabularies have limited ability to make meaning from words and put them in a usable context. Previous research demonstrates that adults who process information more slowly are also slower to access word meanings, put them in context, and make meaning from communication (Morrow et al., 2006). Unlike sensory and processing abilities, verbal skills tend to increase through young adulthood, then remain relatively stable over the adult life-span (Morrow et al., 2006).

Example 4: Mrs. Andrews is a young woman with excellent hearing and vision and is quick to process information. She has very few years of formal education and now works as a housekeeper. Mrs. Andrews has always been very healthy

and has had very few encounters with the healthcare system. Recently, she has had to take her elderly father to the doctor to manage his cancer diagnosis. While Mrs. Andrews can hear and process information from the doctors, she is unfamiliar with the language surrounding cancer treatments, and is often left feeling confused regarding her father's care and course of treatment.

Make decisions: This is a complicated cognitive process that involves weighing the benefits and drawbacks of various options, assessing the likelihood of these benefits or drawbacks occurring, considering one's goals and values in relationship to the benefits and consequences, and selecting the "best" option among alternatives (National Cancer Institute, 1989).

Example 5: Mr. Scott is a young, single father with no health insurance who lives very far away from the hospital where his infant son is receiving in-patient treatment. Mr. Scott has perfect hearing and vision, can process information quickly, and is able to understand most of what his doctors tell him about his son's medical condition. The doctors have asked Mr. Scott to choose between two courses of treatment. One option requires the infant's continued stay at the hospital, including more medical intervention at significantly greater costs. The second option allows Mr. Scott to take his son home, yet would require that he provide substantial home care and bring his son to the hospital for out-patient visits each week. Mr. Scott is having a difficult time deciding which option would be best for himself and his young child.

While these different interpretations of health literacy may not yet be fully shared by either the behavioral health or the adult literacy communities, they are still important to understanding the significance of cognitive research in developing effective interventions. This proposal seeks to engage in further exploration of the intersection between behavioral sciences, cognitive science, and adult education as it applies to increasing the motivation of adult learners to adopt and share functional health literacy skills. In addition to reviewing and synthesizing the literature from these fields, another important aspect of this understanding involves determining adult learners' perceptions of functional health literacy skills and explaining how these perceptions contribute to the adoption and sharing of skills with family and friends.

Diffusion of Innovations (DOI): a framework to understand skill adoption

Everett Rogers' theory of Diffusion of Innovations explains that individuals pass through five stages along the way to adopting an innovation:

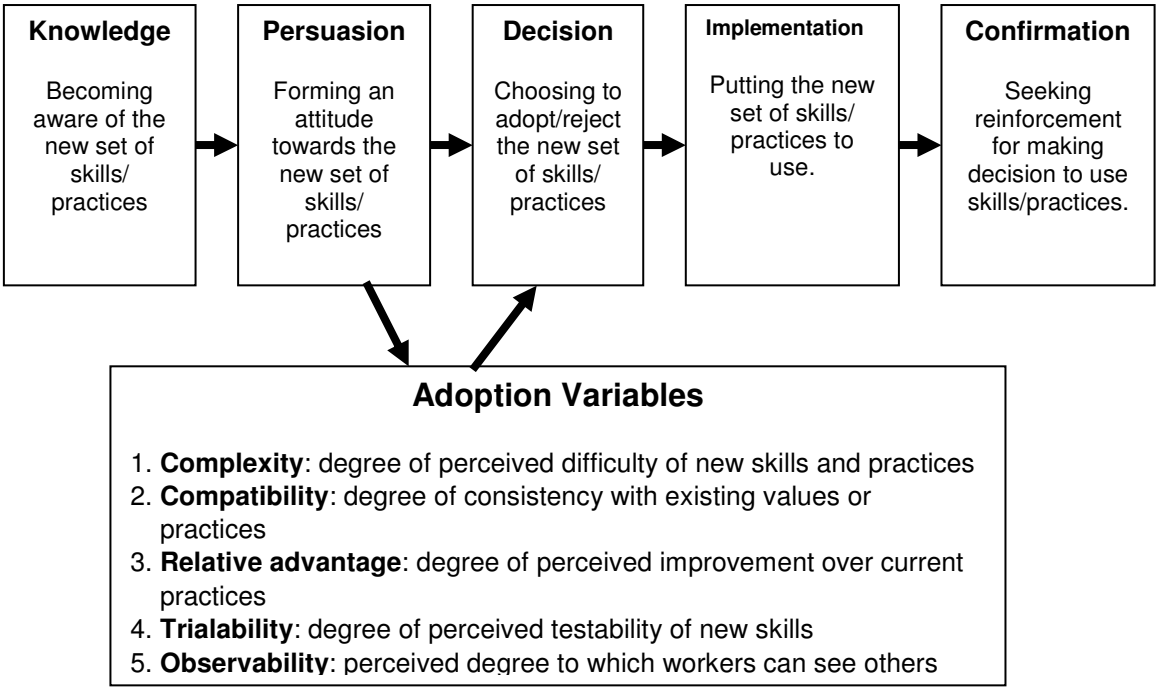
1. Knowledge: becoming aware of the innovation by exposure
2. Persuasion: forming an attitude towards the innovation
3. Decision: choosing to adopt or reject it the innovation
4. Implementation: putting the innovation to use
5. Confirmation: seeking reinforcement for making the decision (Rogers, 2003).

In the context of an adult education health literacy class, the innovation can be considered the functional health literacy skills, and adoption can be defined as gaining awareness of and using functional health literacy skills. Using DOI, it is possible to explore why adult learners may adopt or reject a practice or set of skills learned in class. DOI can also provide information on external barriers or motivators that may influence a learner's decision to adopt or reject a practice, such as socio-demographic characteristics and prior experience with the topic. Other influencing factors may come from the perceived attributes associated with the practice or set of skills:

1. Complexity: degree of perceived difficulty
2. Compatibility: degree of consistency with existing values
3. Relative advantage: degree of perceived improvement
4. Trialability: degree of perceived testability
5. Observability: perceived degree to which others can see the innovation (Rogers, 2003).

Applying DOI to a health literacy curriculum taught in an adult literacy program can help to explain how adults can be motivated to adopt functional health literacy skills. Understanding how perceptions of new ideas can lead to the adoption of new practices can further the needs of the health and public health sectors, because these fields focus on developing programs with behavior change outcomes. Figure 1.1 below illustrates the intersection of DOI constructs with health literacy skill adoption.

Figure 1.1 Five Stages of Innovation Adoption (for Individuals) (Glanz, Rimer, & Lewis, 2002).



Diffusion of information and skills

If adoption can be thought of as occurring on an individual level (one person choosing to adopt or reject a set of skills or practices), diffusion takes place within a group of people. The focus in diffusion is on the spread of new ideas throughout a group. As described by Rogers, "Diffusion is the process through which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2003). Breaking down this definition illustrates the four elements of diffusion:

1. Innovation: an idea or practice that is perceived as new
2. Communication channels: the vehicle through which the innovation is

communicated (i.e., print media, face-to-face communication, television, radio, etc.)

3. Time: how long it takes for the innovation to spread from one person to another and throughout a network
4. The Social System: the group of people through which information is being spread (Rogers, 2003).

Different types of communication channels serve various functions in the diffusion process (National Cancer Institute, 1989). For example, mass media (such as television, radio, or magazines) is generally more effective for helping individuals to become aware of the innovation initially (Rogers, 2002). Conversely, interpersonal channels (such as face-to-face communication or, potentially, classroom education) are typically more effective for helping individuals to form and change attitudes towards an innovation (Rogers, 2002). This is because most people tend to rely on the subjective evaluation of friends, family, and trusted others to make a decision, rather than using scientific evidence to form an opinion about something (Rogers, 2002). This is especially evident in low literate and minority communities, where individuals are more likely to seek advice from friends and family than from trained health care providers or peer-reviewed journals (Earp & Flax, 1999).

While this disconnect can be seen as a communication problem between the health care community and the individuals it is designed to serve, it can be useful to focus instead on the communication strengths within these existing social networks. As diffusion is the social process through which people share an innovation with others, it is

important to know what perceived characteristics of an innovation make an individual more likely to want to share the innovation with others, and what channels are most effective for fostering these perceptions (National Cancer Institute, 1989). In the context of an adult education health literacy class, this involves understanding how the adult education environment fosters certain perceptions of health literacy skills, and in turn, how these perceptions lead adult learners to share information with family and friends.

Description of case study context and participants

Literacy Action, located in downtown Atlanta, Georgia, is currently a delivery site for a health literacy curriculum that was developed by University of Illinois, Chicago, and the National Institute for Literacy. Literacy Action was founded in 1968, and its mission is to build better futures for Atlanta's functionally illiterate population by teaching adults life, literacy, and work skills that empower them to reach their potential as self-sufficient individuals, parents, and employees. Literacy Action is the largest, private adult basic education provider in Georgia. In 2008, Literacy Action delivered 75 adult education classes, ranging from basic skills to GED preparation, computer training, and employment readiness skills. These classes meet twice a week for two hours at a time, spanning a 12-week period, and served over 500 adult learners. Approximately 80 of these 500 students were enrolled in health literacy and exercise classes or health and nutrition workshops during the year. For the 2009-2010 program year, Literacy Action received a grant from Kaiser Permanente to continue offering Health Literacy classes. The full curriculum covers the following topics: obtaining preventive care, getting physical activity, and ensuring proper nutrition; understanding food labels and daily

intake needs; talking to health care professionals; filling out medical and family history forms; and understanding medication information, including medication warnings, side effects, and correct dosing and timing. The primary objectives of the 2009-2010 health literacy program at Literacy Action are to:

1. Increase the overall literacy level of undereducated, low-income adults
2. Equip these adults with the knowledge and resources necessary to:
    a. Communicate effectively with health professionals
    b. Comprehend written instructions/labels related to medicine, nutrition, and preventive care
    c. Better manage their own health status, as well as that of children in their care

A typical class contains 15 adult learners whose reading and math levels are in the 3rd-6th grade range. Classes are ongoing, and between March 2009 and March 2010, Literacy Action will deliver at least three 12-week general health literacy classes. It is anticipated that at least 45 adult learners will attend the health literacy classes at Literacy Action during this time. Based on demographic information from previous health literacy classes, it is anticipated that 100% of adult learners in the 2009-2010 classes will come from low socio-economic status, 55% will be women, and 93% will be Black or African-American.

Literacy Action was selected as a study site because it has a history of successfully implementing health literacy classes for adult learners. Additionally, the population of adult learners is relatively homogenous (primarily African-American and

native English speakers) and roughly the same curriculum is used in all health literacy classes. Literacy Action leadership has also demonstrated interest in partnering with academic institutions, and adult learners at Literacy Action have previously participated in research projects and have reported positive experiences. Finally, Literacy Action's receipt of a Kaiser grant ensures funding for a full year of health literacy classes, which will help to ensure stability of the program and the study population.

Aims of Current Research

Adult educators know how to effectively communicate health information and skills to students, but often lack knowledge of the specific skills needed and the context in which students will need to use these skills (Rudd, 2004). Similarly, public health researchers and health care professionals know what skills are needed to interact successfully with the health care system, but often lack opportunities or skills to reach low-literate populations. As the field of health literacy comes from these two distinct fields – the Freirean model of empowerment in adult education and concern over poor health literacy in the health care system (Kickbusch, 2001). it is important to find ways to bring together the expertise from each field in order to remove low literacy as a barrier to health communication. Additionally, the field of cognition can add depth to understanding how individuals learn and can be further motivated to adopt functional health literacy skills.

The classes delivered adult educators at Literacy Action to teach functional health literacy skills embody many of the most important aspects of communication:

- Availability: adult learners feel comfortable in the adult education environment.
- Cultural competence: adult educators are trained to create lesson plans that are specific and directly relevant to adult learners' beliefs and needs.
- Repetition: adult educators ensure that concepts are reinforced through repeated activities.
- Timeliness: adult educators are trained to identify and target adult learners' immediate health-related skill needs.
- Understandability: adult educators are trained to assess reading proficiency and tailor materials to the appropriate level (Healthy People 2010, 2001).

As the health literacy classes delivered by adult educators in other contexts have demonstrated that they can be a successful vehicle for improving health communication with low literate populations (US Department of Health and Human Services, 2003), an important next step in replicating this success in other localities is to determine how adult learning theory addresses the cognitive aspect of this process, and how adult learners perceive, adopt, and share functional health literacy skills. Additionally, in order to further communication between public health, the health field, and adult education, it is important to publish these findings in journals and other formats accessible to all professional groups. To address these needs, this qualitative study proposes to explore the following aims in the context of the health literacy classes at Literacy Action:

1. Review and critique relevant literature from the fields of cognition, adult learning theory, and health literacy in order to synthesize key concepts and generate avenues for further exploration and health literacy intervention development.
2. Describe the ways in which adult educators use adult learning theory and cognitive psychology to increase motivation of adult learners to adopt functional health literacy skills and share them with family and friends.
3. Use constructs from DOI theory to explore adult learners' perceptions of functional health literacy skills and explain how these perceptions contribute to the adoption and sharing of skills with family and friends.

Implications and Innovations of Proposed Research

Pedagogy, the science of education, is often absent from public health intervention development because many public health professionals are trained in behavioral methods, rather than cognitive methods. Thus, the majority of theory-based interventions rely on theories of behavior change, rather than being grounded in a solid understanding of the way in which individuals process information and are motivated to use it *prior to* engaging in behavior change. As a result, many interventions carry important messages, but may not use an instructional foundation or a communication vehicle that can initiate or sustain long-term change. Conversely, core to adult education is the teaching of functional skills that can be sustained over time, in addition to using strategies that specifically motivate adults to use these skills (US Department of Health and Human Services, 2003). Further, as demonstrated by previous evaluations, adult

learners also share this information with their friends and family, offering the potential to reach a wider audience by initially reaching out to only a small group (MAGI Educational Services, 2004).

By studying adult learning theory through the lens of DOI, this proposal will link the science of health communication with the sciences of adult education and cognitive psychology in order to advance both the science and art of health communications. Through in-depth analysis of adult education classes as a vehicle for communicating health information, public health researchers and adult educators can gain a better understanding of how to increase the adoption and sharing of functional health literacy skills, contributing to Health People 2010's Goal 11-2: Improve the health literacy of persons with inadequate or marginal literacy skills (U.S. Department of Health and Human Services, 2000). Findings from this study will also contribute to CDC's Goal 1: Healthy People in Every Stage of Life, objectives 7, 14, 17, and 24: Promote access to and receipt of recommended quality, effective, and evidence-based preventative and healthcare services, including dental and mental health care, for infants, toddlers, children, adolescents, and adults.

Connection Between Subsequent Chapters

Chapter 1 has laid the foundation for a focus on functional health literacy skill acquisition and diffusion in the context of adult education. Chapter 2 is a synthesis of literatures on cognitive psychology and adult learning theory as applied to the acquisition of functional health literacy skills in health behavior change interventions. Chapter 3 applies the synthesis of literatures from Chapter 2 using a case study example from an

adult literacy center's health literacy class. This chapter provides practical examples of how the integration of cognitive psychology and adult learning theory inform environmental factors and instructional strategies in health education and behavior change interventions. Chapter 4 draws on the same case study to explore the efficacy of using adult education courses to teach functional health literacy skills to low literate populations both in and beyond the walls of the classroom. Chapter 5 discusses strengths and limitations, provides an integrative summary of findings, and then provides directions for research and implications for practice. Together, these chapters demonstrate the importance of drawing on other disciplines outside of public health (cognitive psychology and adult learning theory) in order to increase the effectiveness of health education and behavior change interventions. Additionally, these chapters demonstrate how adult education students themselves can become powerful vehicles for communication to friends and family outside the classroom. In sum, these chapters illustrate how partnering with adult education and learning from the strategies of adult educators can greatly increase the use and diffusion of functional health literacy skills in low literate populations.

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CHAPTER TWO:

Health Education is Health Literacy: Maximizing the impact of health education interventions by focusing on how individuals acquire skills for behavior change

ABSTRACT:

Health literacy is rapidly gaining attention as an important consideration for health education interventions, yet most intervention developers do not consider the relationship between functional health literacy skill acquisition and behavior change. Health behavior theories are useful for developing psychosocial targets of health promotion, but they do not address the mechanisms by which individuals learn information and acquire skills. Without attention to the process of knowledge and skill acquisition, the potential impact of health behavior interventions is sharply limited. This article proposes a model called the Integrated Approach to Behavior Change Interventions (I-ABC Model) to integrate cognitive psychology and adult learning theory to explain how individuals acquire functional health literacy skills. The integration of these disciplines focuses on the importance of classroom environment and educational strategies to fostering behavior change.

INTRODUCTION:

"Educational practice can be improved when it is informed by an understanding of how the human mind works." (Mayer, 2003)

Health literacy, defined in part by the Institute of Medicine as "the degree to which individuals can obtain, process, and understand the basic health information and services needed to make appropriate health decisions" is rapidly gaining attention as an important consideration for health education interventions (Institute of Medicine, 2004). Despite this recent recognition, most in the health field still consider health literacy to be an issue only for people with difficulty reading. Instead, health literacy should be seen as the dynamic intersection of several factors, drawn from a framework for understanding medication adherence (Culos-Reed, Rejeski, McAuley, Ockene, & Roter, 2000; Kerka, 2003): the individual (skills, emotional state, etc.), environment (physical and social environment), and the demands of the task (necessary functional skills). Through this lens, everyone may experience challenges with health literacy at some point, especially when learning new information or skills, experiencing stress, or in an unfamiliar environment. Thus, all health education, whether in a school, faith-based institution, community center, or hospital, can be seen as a health literacy intervention.

The goal of health education and behavior change interventions is generally not just to impart knowledge, but also to teach skills that participants can use. In the language of health literacy, these are called functional health literacy skills – the basic health-related skills needed for daily living activities in order to ensure personal health (Parker, Baker, Williams, & Nurss, 1995). Considering the prevention-based nature of public

health, most health education interventions ultimately touch on some aspect of functional health literacy skills, even if they do not specifically use the word "literacy." Further, given the amount and complexity of skills required to prevent and manage chronic disease and other conditions, it can be helpful to make functional health literacy skill acquisition an explicit focus of health education and behavior change interventions.

The field of health education and behavior change has come a long way in the last several decades, with the expansion of several major theories applied to numerous health issues and populations (Glanz, Rimer, & Viswanath, 2008; Painter, Borba, Hynes, Mays, & Glanz, 2008). Despite this significant progress, recent literature in the field suggests that most interventions could increase their effectiveness by incorporating theories from other disciplines, such as theories on learning or communication (Jeffery, 2004; Rothman, 2004). Health behavior theories are useful for developing psychosocial targets of health promotion (i.e., perceived susceptibility or self-efficacy) (Glanz et al., 2008), but they do not address the mechanisms by which individuals learn information and acquire skills (i.e., strategies used to impart information, importance of classroom environment to learning, etc.). Essentially, while a scientific approach is taken with intervention development, the same scientific considerations are not applied to the instructional approach. Without attention to the process of knowledge and skill acquisition, the potential impact of health behavior interventions is sharply limited.

Similarly, Resnicow and Vaughn have proposed that behavior change should be considered not as a linear process like most behavior change theories (i.e., change in x leads to change in y, which ultimately changes z), but rather as a "quantum leap" – a more complex process in which the factors contributing to behavior change suddenly

coalesce and foster the change (Resnicow & Vaughn, 2006). This experience of information or skills finally becoming clear may also be called an "Aha! moment" (Baranowski, 2006; Resnicow & Vaughn, 2006). To that end, we propose a novel integrated approach of cognitive psychology and adult learning theory to foster the acquisition of functional health literacy skills in health education and behavior change interventions.

We first provide an orientation to key terms and concepts of health literacy in the context of health education and behavior. We then provide a brief primer on cognitive psychology and adult learning theory as related to health behavior change. Ultimately, we demonstrate how the integration of cognitive psychology and adult learning theory in relation to classroom environment and educational strategies can lead to the acquisition of functional health literacy skills.

[Note: The ideas in this manuscript are intended for application to educators and learners in a variety of contexts including health behavior change interventions, adult education classrooms, hospital-based learning environments, and others. For consistency of terms throughout the manuscript, we use "facilitators" to represent teachers and educators and "participants" for students and learners.]

HEALTH LITERACY

Health literacy is an emerging field comprised of health care providers, adult educators, health educators, administrators, policy makers, communications experts, librarians, researchers, practitioners, and many others. Given the diversity of experience and expertise in the field, the definition and focus of health literacy work varies from one

context to another. Most relevant to the breadth of health education and behavior change interventions are the definitions of the IOM (given previously), the National Assessment of Adult Literacy (NAAL), and the World Health Organization (WHO).

The 2003 NAAL classified health literacy skills into three domains: clinical, prevention, and navigation of the health care system (Kutner, Greenberg, Jin, & Paulsen, 2006). The clinical domain includes activities associated with patient-provider interactions, such as completing patient information forms and dosing and taking medication correctly. The prevention domain includes activities regarding disease prevention, early detection and intervention, and self-care and management; for example, getting recommended screenings and vaccinations, identifying symptoms of a health problem, and consulting a health care professional. Navigation of the health care system includes activities pertaining to individual health care rights and responsibilities, such as giving informed consent for health care, understanding the scope of health insurance plans and required co-payments, and accessing primary care instead of the Emergency Department (Kutner et al., 2006). Taking these three domains together, these functional health literacy skills form the basis of most health education and behavior change interventions.

While these definitions are most frequently operationalized from a behavioral perspective (with a focus on what individuals do or do not do), it is also important to consider health literacy from a cognitive perspective (what happens with information in people's minds before they can do something with it). In 1998, the WHO defined health literacy as "the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and

maintain good health" (WHO, 1998) Current health literacy research is missing the cognitive aspect explaining factors that contribute to the ability to process and understand information *prior to* engaging in behavior. The following section explains cognitive psychology in greater detail.

COGNITIVE PSYCHOLOGY

The field of psychology was dominated by behaviorism in the early 1900's (Kellogg, 1995). Behaviorists felt that because mental events or processes (such as thoughts or feelings) are not observable, psychologists should not study them or factor them into psychological theories (Kellogg, 1995). The behaviorist approach was challenged in the late 1950's with a new focus on cognitive psychology – a quest to understand the interaction between the way an individual perceives external stimulation (i.e., information), processes it, organizes knowledge in the mind, and engages in behavior (Bruner, 1990; Chomsky, 1967).

Cognitive psychology sees information acquisition as a series of steps. At any point in the process, an individual can face a challenge in one of those steps that may prevent that individual from acquiring knowledge (Kellogg, 1995). Several of these key concepts are explained below, however, it should first be noted that cognitive psychology is a complex field comprised of significant research, literature, and areas of expertise. This manuscript is not meant to provide an overview of all of these areas. Rather, it is meant to be a brief, introductory list of concepts to serve as a foundation for understanding the intersection of cognitive psychology and adult learning theory as applied to health education and behavior change interventions.

Sensory Input: Information acquisition begins with sensory input from the environment, including information that is seen, heard, smelled, tasted, or touched (Kellogg, 1995). Individuals with limited ability to see or hear information have reduced capacity to obtain information, which further limits their ability to process and understand information or use it to engage in behavior change (Wingfield, Tun, & McCoy, 2005). The "Effortfulness Hypothesis" explains that individuals have limited cognitive resources to expend at any given time (Wingfield et al., 2005). Essentially, when an individual is allocating cognitive energy trying to see or hear something that is difficult to perceive, he or she is less able to expend cognitive energy on learning or remembering it (thus limiting the subsequent use of the information) (Wingfield et al., 2005).

Information processing: Once information uptake has occurred through sensory input, the information must be processed. Processing abilities involve the speed with which an individual can select and use meaningful information gained through the senses (Kellogg, 1995). Information processing also involves working memory, which is the amount of information an individual can remember and manipulate over a short period of time (also called "short-term memory") (Hedden, Lautenschlager, & Park, 2005). Before information can be stored in long-term memory, it must be effectively processed in short-term memory (Kellogg, 1995). Individuals process information at different speeds, and older adults or those with sensory impairments often process information more slowly (Hedden et al., 2005; Kellogg, 1995).

Depth of Processing: Ability to recall information is affected by depth of processing, which exists on a continuum ranging from shallow to deep (Byrnes, 1996)

The deeper the processing, the more likely the information is to become part of long-term memory and subsequently, the more likely it is that the information will be recalled for later use (Byrnes, 1996). Depth of processing is determined by several factors: how information was obtained (e.g., sight, sound, etc.), how connected new information is to existing information in the brain (see "schema theory" below), how much time is spent processing (working with) the information, and how relevant information the learner perceives the information to be (Kellogg, 1995).

Comprehension: Comprehension of health information involves word knowledge and meaning-making abilities (Byrnes, 1996). Individuals with smaller vocabularies, such as poorer readers or non-native English speakers, have limited ability to make meaning from words and put them in a usable context (Kellogg, 1995). Adults who process information more slowly are also slower to access word meanings, put them in context, and make meaning from communication (Morrow et al., 2006). Unlike more fluid aspects of information processing such as processing speed and working memory, verbal ability tends to *increase* throughout adulthood (Morrow et al., 2006).

Schema Theory: Schema theory is useful for explaining how individuals view the workings of the world and how things in the world relate to each other (Byrnes, 1996). The word "schema" comes from the Greek, meaning "map," "shape," or "plan" (Byrnes, 1996). The shape of an individual's mental map comes from the way that person organizes or categorizes information, which is influenced by an individual's education and other life experiences (Byrnes, 1996; Kellogg, 1995). When new information resonates with an individual's schema, it requires less effort to process and can be more quickly incorporated into the individual's schema (Byrnes, 1996). To this end, it is

important for instructors to consider ways to tap into participants' schemata (plural for schema), which can help participants link new information to existing information (Byrnes, 1996). When an individual perceives information that does not fit within existing schemata, the information may be either forgotten or the schema must be changed to accommodate the new information (Kellogg, 1995). The act of changing existing schemata is important and can become a key part of educational activities in an intervention.

Types of Knowledge: Knowledge can be categorized many ways; however, this article focuses on two basic categories that specifically relate to health literacy: declarative and procedural (Kellogg, 1995). Declarative knowledge is fact-based, such as "olive oil is an unsaturated fat" or "being overweight is a risk factor for heart attack and stroke" (Byrnes, 1996). Procedural knowledge is knowing *how* to do something, such as how to ride a bike or bake a cake (Byrnes, 1996). Functional health literacy skills (such as reading a food label) are considered procedural knowledge, although they often require declarative knowledge to provide context to be more useful. These distinctions are important to consider when developing an educational intervention, because the teaching strategies vary by the type of knowledge (also called learning objectives) that facilitators want participants to gain.

The following section describes key principles of adult learning theory. Although cognitive psychology and adult learning theory are two distinct fields with different terminology, there are many overlapping concepts, particularly coming from the field of educational psychology.

ADULT LEARNING THEORY

Adults learn differently from children, and educators teaching adults draw on a different set of principles to inform their practice (Merriam, 2008). The field of adult education is guided by adult learning theory, which is actually a collection of theories about how adults learn and make meaning from knowledge (Merriam, 2008). These theories rely heavily on placing learning in the context of real life situations, making learning immediately relevant, and empowering learners to take an active role in posing questions and developing solutions. (Candy, 1991; Knowles, 1973; Freire, 2000). Malcolm Knowles is considered the father of adult learning theory, defined as "the art and science of helping adults learn" (Brookfield, 1986; Knowles, 1980). Knowles' principles of adult learning consist of the following and lay the foundation upon which most adult education programs are built:

1. Adults are autonomous and self-directed.
2. Adults have a great deal of previous experience and knowledge that must be incorporated into learning experiences.
3. Adults are goal-oriented.
4. Adults are practical, relevancy-oriented, and must see utility in learning something.
5. Adults need to be shown respect and prefer to be treated as equals in the learning experience (Knowles, 1980).

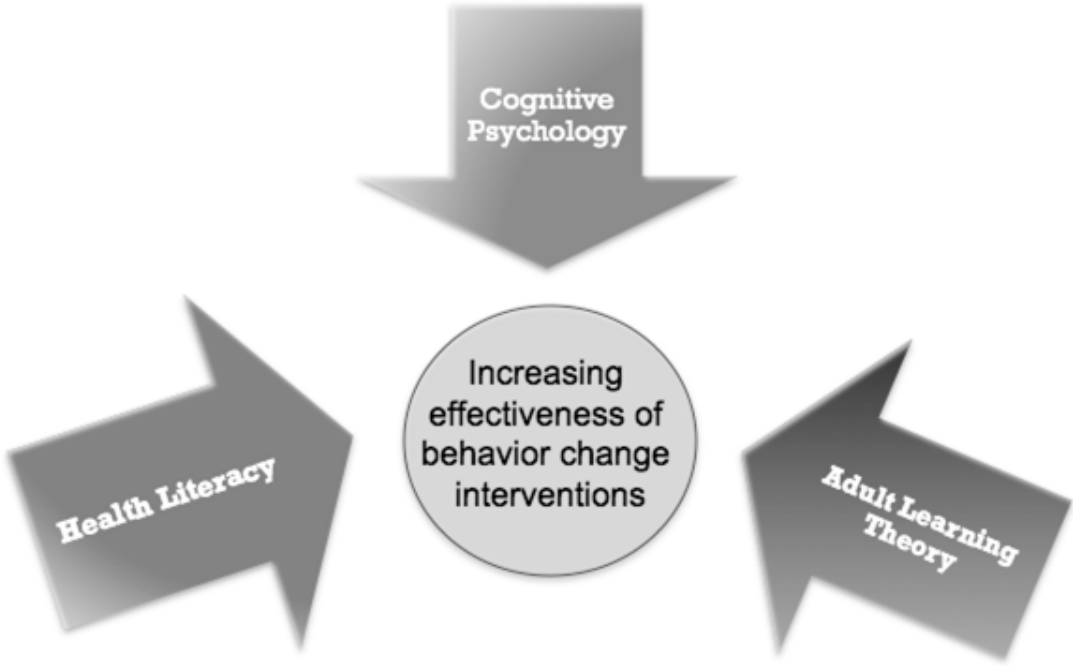
Transformative Learning Theory was introduced in 1970 and helps to explain the processes through which adults change the ways in which they view the world, similar to schema theory in cognitive psychology (Mezirow, 1996; Taylor, 1998). Perspective transformation stems from some type of crisis or confrontation, such as when a facilitator challenges a participant to consider an alternate way of viewing disease acquisition or prevention. Effectively fostering perspective transformation can ultimately play a critical role in how participants begin to change their understanding of health and consider changing their behavior (Taylor, 1998).

Later theories of adult learning promote collaboration, empowerment, and reflection at the core of facilitating learning and increasing motivation to learn (Brookfield, 1986; Wlodkowski, 2008). These principles may be exemplified by using a participatory model in which adults learn, teach, and reflect collaboratively by setting the direction for their learning as a collective, rather than by sole direction of the instructor (Brookfield, 1986).

Integration of Cognitive Psychology and Adult Learning Theory in Health Education and Behavior Change Interventions

The Integrated Approach to Behavior Change Interventions Model, the I-ABC Model, (Figure 2.1) demonstrates how health behavior change interventions may increase effectiveness by integrating concepts from cognitive psychology, adult learning theory, and health literacy. From this integration comes the focus on functional health literacy skill acquisition currently missing from many health education and behavior interventions.

FIGURE 2.1 Integrated Approach to Behavior Change Interventions Model (I-ABC Model)



The remainder of the article provides description and explanation of this synthesis in an educational setting. We focus specifically on characteristics of the learning environment and the use of targeted instructional strategies to maximize acquisition of functional health literacy skills.

Why Does Environment Matter and What Matters in the Environment?

As explained previously, cognitive psychology places emphasis on the *process* of acquiring knowledge, beginning with sensory input and information processing

(Wingfield et al., 2005). Environments with poor lighting, too much outside noise, too great a distance between participants and facilitators (making it difficult to see or hear), are poorly organized, or have too much stimulation can serve as a barrier for individuals to acquire and process information (Wingfield et al., 2005). Similarly, by looking at environment from the perspective of adult education, one can begin to understand the importance of both the physical layout and also the social environment.

Classroom Layout: A typical *instructor-centered* classroom is one in which the instructor directs the content and flow of the course and is almost solely responsible for imparting knowledge to participants (McCombs & Whisler, 1997). This type of classroom is typically organized by parallel rows of seats facing the instructor at the front of the room (McCombs & Whisler, 1997). Conversely, a *learner-centered* classroom is one in which participants may share the responsibility for determining course content with the instructor, but are also responsible for being facilitators themselves while they are learning (McCombs & Whisler, 1997). Learner-centered classrooms may be physically organized in a circle or U-shape and emphasize the role that participants play in teaching each other throughout the learning experience (Davis, 1993; McCombs & Whisler, 1997). This circular type of layout may be especially beneficial when working with women, low-income, and low-literate populations, all of whom who tend to rely heavily on peers for knowledge (Magolda, 1992).

The emphasis placed on appropriate organization of a facilitative physical learning environment cannot be overstated, yet classroom organization alone cannot create an environment in which participants will automatically participate or work collaboratively. Facilitators play an important role in creating a social environment that

helps participants see themselves as educators, such as sharing similar experiences or knowledge of resources (McCombs & Whisler, 1997).

The Social Environment: Participants need to feel that they are in an emotionally safe and supportive space before they are ready to share information and be open to learning from others (McCombs & Whisler, 1997). A socially supportive environment is one in which participants may provide advice, recommendations, empathy, concern, or even tangible resources, such as food (McCombs & Whisler, 1997). Facilitators can foster social support by providing opportunities for participants to share questions, concerns, experiences, and other thoughts during discussions.

What strategies can facilitators use to enhance learning?

Prior to developing and implementing curriculum, intervention developers and facilitators must have clearly defined learning objectives and a thorough understanding of how individuals come to acquire and use information. The following section draws on cognitive psychology and adult learning theory to provide facilitator strategies to help participants undergo perspective transformation, retain new information, and increase motivation to learn and change behavior.

Perspective Transformation: Many behaviors, particularly those related to diet and disease, are connected to deeply held values and the ways in which individuals have seen the world for most of their lives (i.e., their schemata) (White & Maloney, 1990). Interventions designed to challenge perspectives will find that people accept change differently – some may become anxious and try to hold on to previous ways of thinking (i.e., familiar schemata), while others may accept new ways of thinking more readily

(Wlodkowski, 2008). This process can be eased by providing opportunities for learners to try out new skills or behaviors in a comfortable environment, rather than simply telling participants what they need to do differently (Mezirow, 1996). Facilitators can also focus on building vocabulary, putting vocabulary in context, and assisting with the development of "mental maps" to mentally organize and categorize new information and relate it to existing information (Kellogg, 1995). All of these strategies speak to the importance of activating prior knowledge before teaching new information, which can help participants relate new information to what is already known. Considering the importance of processing depth, the act of connecting new information to previously known information increases the likelihood that information will be retained for later use (Wlodkowski, 2008).

Information Retention: Bloom was an educational psychologist of the 1950's who developed a classification system for organizing levels of learning, now called Bloom's Taxonomy (Bloom, 1956). Educators use Bloom's Taxonomy to create learning objectives and related activities for the classroom. The taxonomy was revised in the 1990's, which is shown in Figure 2.2 and explained in Table 2.1 (Anderson et al., 2001). As demonstrated below, learning at higher levels of the pyramid is dependent on mastery of concepts at the lower level of the pyramid, since each level draws on an increasingly complex set of skills. Processing information at higher levels of the pyramid leads to deeper processing and integration of information into existing schemata, both of which lead to a greater likelihood the information will be retained and used.

At the bottom of the pyramid are more basic kind of knowledge demonstration, such repeating back memorized information or labeling images; for example, "HDL is

bad cholesterol." Understanding involves skills such as being able to take information and explain it in one's own words; for example, "There are two kinds of cholesterol, and HDL is the one you want to keep low." Application involves taking information from one context and applying it in another, such as learning about cooking low-fat foods in a class, then actually cooking low-fat foods at home. Analysis involves the ability to look at component parts and make comparisons; for example, looking at the ingredients in a recipe and identifying what makes each of them healthy or unhealthy. Evaluation involves making value decisions; for example, determining whether is it more financially responsible to eat expensive foods that are lower in fat, or eat high fat foods and spend more money on healthcare. Synthesis involves putting information together from different sources, such as creating a new recipe for a healthier birthday cake.

Figure 2.2 Bloom's Revised Taxonomy (Anderson et al., 2001).

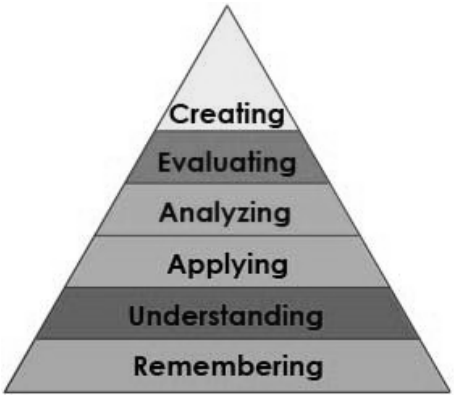


Table 2.1 Example Verbs from Bloom's Taxonomy (Anderson et al., 2001).

Level	Definition	Example Verbs
Remembering	Ability to recall information	arrange, label, list, memorize, name, order, recognize, relate, recall, repeat
Understanding	Ability to explain ideas	classify, describe, discuss, explain, locate, recognize, report, restate

Applying	Using information in a new way	apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate
Analyzing	Differentiating between parts	analyze, calculate, categorize, compare, contrast, criticize, differentiate
Evaluating	Judging or justifying a decision	appraise, argue, assess, defend, predict
Creating	Developing something new	compose, construct, create, design, develop, formulate, manage, organize

Motivation: "Every instructional plan also needs to be a motivational plan." (Wlodkowski, 2008). While the majority of training on curriculum development focuses on scope and sequence of material, there is typically little attention paid to the curricular components that enhance motivation (Green & Kreuter, 1999). In addition to focusing on constructs from health behavior theories, such as perceived susceptibility or subjective norms, facilitators can also motivate participants by helping them set goals and foster community in the classroom environment.

Setting goals and celebrating successes: Goal-setting is an often-misused strategy because it is employed on a very surface level, rather than with an in-depth understanding of specifically what participants need to realize their goals. To give participants the best chance for success, goals must be SMART: specific, measurable, achievable, relevant, and time-framed. Participants in a nutrition class may have a vague goal of wanting to lose weight; however a specific, measurable, and time-framed goal will delineate exactly what is desired: for example, lose 10 pounds in one month. This goal may not actually be achievable in the given time frame, so facilitators must work with participants to ensure attainability (Wlodkowski, 2008). Goals that are not realistic can set participants up to fail, which is a strong de-motivator (Wlodkowski, 2008). Finally, selecting an overall topic, then letting participants set their own goals (drawing

on adult learning theory) ensures that they are relevant to each participant (Wlodkowski, 2008).

The next three strategies related to goal-setting are especially important for working with low literate populations, who may have difficult thinking through the specific steps needed to change behavior: identify needed resources, plan ahead, and celebrate progress.

Identify Needed Resources and Social Supports: During goal-setting activities, facilitators can help participants plan for success by encouraging them to make a list of all the tangible resources and social supports needed to help them succeed. (Wlodkowski, 2008). For example, a participant trying to lose weight by eating healthier foods may need the support of a spouse and children, certain foods in the kitchen, and sufficient kitchen resources to prepare foods. This balance may be challenging for students with limited financial resources, thus making the subsequent planning process extremely valuable.

Planning Ahead: Facilitators can also help participants think through time specific activities that need to be scheduled in a planner, such as time for grocery shopping and preparing foods. Participants should think through how much time they anticipate each activity taking, and schedule accordingly (Wlodkowski, 2008). Many individuals have difficulty envisioning activities on a calendar or daily and weekly schedules, so helping participants to think through planning can be a particularly helpful activity.

Identifying and celebrating progress: To participants learning new skills or embarking on behavior change, there is nothing more reinforcing and motivating than seeing clear progress. Facilitators can work with participants to identify milestones (e.g., acquiring all necessary resources, losing two pounds, etc.) and find meaningful ways to celebrate progress.

Fostering community: As explained previously, the social environment plays an important role in learning. Participants are often motivated to return to each session by feeling a sense of community and responsibility towards the group (McCombs & Whisler, 1997). Facilitators can help develop community by asking participants to share something interesting about their week, checking in with the group on intervention progress, or creating small group competitions around learning objectives. These and other activities can help motivate participants to return to class and continue learning over many sessions.

Putting it All Together

Table 2.1 provides a summary of the key concepts from cognitive psychology and adult learning theory that can work together to foster the acquisition of functional health literacy skills to make health education and behavior change interventions more effective. While each of these concepts can be used in isolation, we propose that it is the *integration and application* of all of these concepts working together to foster acquisition of both knowledge and functional health literacy skills.

Table 2.1 Fostering Skill Acquisition with Behavior Change Interventions – An Integration of Cognitive Psychology and Adult Learning Theory

Name	Origin	Application to Intervention Development
Effortfulness Hypothesis	CP	Make it easy for participants to see, hear, and concentrate: - Conduct intervention in a quiet room - Use clear handouts with sufficiently large and dark print on a light background - Write clearly on the board - Speak loudly and clearly, using the preferred language and terminology of participants
Depth of Information Processing	CP	Spend minimal time talking "at" participants. Instead, use activities that help process information deeply: - Connect information to prior knowledge - Use activities from each level of Bloom's taxonomy
Declarative vs. Procedural Knowledge and Functional Health Literacy Skills	CP/HL	Consider the acquisition and use of functional health literacy skills as the foundation for intervention development. - Develop clear learning objectives that describe what participants should be able to do after intervention completion - Determine what types of declarative knowledge are needed for skill acquisition and use
Schemata and Perspective Transformation	CP/ ALT	Find ways to access prior knowledge and tie in new information to existing ways of thinking. - Find ways to motivate participants to learn by asking what they know or want to know about a new topic before beginning instruction - Provide opportunities for participants to practice new skills or observe others before expecting perspective transformation or behavior change
Autonomy and Purposeful Learning	ALT	Encourage participants to find ways to ways to make learning relevant to their lives. - Develop opportunities for goal-setting - Get to know participants as individuals and understand what kind of knowledge and skills are relevant to them
Collaborative Learning and Supportive Social	ALT	Foster an environment that allows participants to feel comfortable sharing and learning together: - Provide opportunities for participants to work together

Environment		or help others - Emphasize that everyone has expertise and knowledge to share - Provide opportunities for participants to reflect on experiences and give feedback

Note: CP = Cognitive Psychology, HL = Health Literacy, ALT = Adult Learning Theory

CONCLUSION

Public health is, at its roots, an amalgamation of disciplines: psychology, anthropology, sociology, statistics, law, management, basic sciences, and other fields. Similarly, health education and behavior change stems from multiple disciplines but now stands alone as a unique field of study. Yet despite the field seeming "complete" by having arrived at a standard set of theories and methods taught in every school of public health across the country, we have not yet perfected the art of intervention development, in part because we lack the foundation in instructional science from other disciplines to do so.

This synthesis of literatures was written to help move forward the field of health education and behavior change by considering it through the lens of health literacy. In isolation, none of these disciplines would be able to solve the complexity of today's health problems, yet the host of multi-faceted behavioral health challenges demand that we look to other disciplines for strategies and solutions. Drawing on the expertise from health literacy, cognitive psychology *and* adult education, it may be possible to maximize the learning opportunities and subsequent behavior change in health education interventions.

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CHAPTER THREE:

Better Learning Through Instructional Science:

A health literacy case study in "how to teach so learners can learn"

ABSTRACT:

Health education and behavior change interventions typically pay little attention to the intervention's instructional foundation. Combining the fields of health literacy, cognitive psychology, and adult learning theory, this article provides an integrative scientific approach to creating an instructional foundation based on how individuals acquire knowledge and skills. The article uses a case study example from an adult literacy center's health literacy class to explore how environmental factors and instructional strategies can be applied to health education and behavior change interventions. Data for this case study was derived through 20 hours of classroom observation and qualitative interviews with 21 adult education students and 3 instructors. Results provide practical examples of environmental factors and instructional strategies designed to facilitate learning, then describe the resulting health behavior changes of students attending the health literacy class.

INTRODUCTION:

"I don't like theoretical crap, okay? I don't like it. Tell me something I can understand, all right? Tell me something I can use in my life." – Health literacy participant/educator

Pedagogy, the science of education, is often absent from public health intervention development because most public health professionals are trained in theories of behavior change and have no training in how individuals learn (Institute of Medicine, 2004). Thus, many interventions are developed with attention to the selection and use of behavior change theories, with little attention to the instructional foundation of how individuals learn information and acquire skills (Glanz, Rimer, & Viswanath, 2008; Jeffery, 2004; Rothman, 2004). Recent challenges to the field of health education and behavior recommend looking to other disciplines for the expertise currently missing from the field in order to increase the effectiveness of future interventions (Bosworth & Voils, 2005; Institute of Medicine, 2004; Resnicow & Vaughn, 2006). To that end, the integration of two additional disciplines, cognitive psychology and adult learning theory, may provide the instructional foundation missing from current interventions.

Most health education and behavior change interventions seek to impart skills, not just teach content knowledge. In the language of health literacy, these are called functional health literacy skills – the basic health-related skills needed for daily living activities in order to ensure personal health (Parker, Baker, Williams, & Nurss, 1995). Given the amount and complexity of skills required to prevent and manage chronic disease, it can be helpful to consider a focus on functional health literacy skill acquisition

as part of health education and behavior interventions. Previous studies in the hospital setting have demonstrated success in helping low literate patients improve self-care behaviors when focusing on functional health literacy skills, yet more research is needed to improve effectiveness of educational interventions (Baker et al., 2010; Kandula et al., 2009). To meet this challenge, the Institute of Medicine has recommended the use of adult education programs as a vehicle to teach functional health literacy skills (Institute of Medicine, 2004).

The field of cognitive psychology can provide an explanation of how individuals perceive, process, and organize information so as to later recall and apply this information appropriately (Bruner, 1990; Chomsky, 1967; Merriam, 2008). Similarly, the field of adult education focuses specifically on using strategies that can motivate adults to learn information and acquire functional daily living skills (Services, 2003). In this article, we first provide a brief summary of key concepts from cognitive psychology and adult learning theory as related to health education and behavior change interventions. Next, we use a case study example from an adult literacy center's health literacy class to demonstrate how these key concepts may be applied in a health education setting.

Cognitive Psychology: Cognitive psychology sees information acquisition as a series of steps, beginning with perceiving and processing sensory information (Kellogg, 1995). The environment is important because when an individual spends cognitive energy trying to see or hear something (in an environment that is loud or dimly lit, for example), he or she is less able to remember it, thus limiting the subsequent use of the information (Wingfield, Tun, & McCoy, 2005). According to one perspective, processing abilities involve the speed with which an individual can select and use meaningful sensory

information (Kellogg, 1995). Ability to recall information is affected by how deeply information is processed, which is determined by how information was obtained (i.e., visually, aurally, etc.), how connected new information is to existing information in the brain, and how much time is spent processing the information (Byrnes, 1996; Kellogg, 1995). Deeply processed information is ultimately more likely to be remembered and used (Kellogg, 1995). Interventions that focus on creating environments conducive to learning *and* employ strategies that promote retention of information and skills may ultimately be more successful in promoting behavior change (Byrnes, 1996; Culos-Reed, Rejeski, McAuley, Ockene, & Roter, 2000).

Theories of Adult Learning: Adults learn differently from children, so adult educators draw on a different set of principles to inform practice (Merriam, 2008). Most theories of adult learning rely heavily on placing learning in the context of real life situations, making learning immediately relevant, and empowering learners to take an active role in posing questions and developing solutions (Candy, 1991; Knowles, 1973, 1980; Freire, 2000). Newer theories of adult learning also focus on the process of perspective change (Mezirow, 1996; Taylor, 1998), methods to increase motivation (Wlodkowski, 2008) and collaboration (Brookfield, 1986) – all with a focus on increasing knowledge and skill acquisition. Together, these theories on adult learning provide guidance on environmental factors and instructional strategies that facilitate knowledge and skill acquisition in adult learners.

Figure 3.1, the BEAN Model (Better Education and iNnovation), derived from the health literacy case study described in this article, demonstrates how integrating cognitive psychology with theories of adult learning can influence environmental factors and

instructional strategies. These factors and strategies can then be used together to increase acquisition of functional health literacy skills and promote behavior change. The model also shows that sharing knowledge and skills can be an important aspect of acquiring skills and using them. Table 3.1 provides definitions for each of the concepts listed in the model, two of which are described in greater detail below.

Figure 3.1 The BEAN Model: Better Education and iNnovation

An Instructional Foundation for Increasing Acquisition, Use, and Sharing of Functional Health Literacy Skills

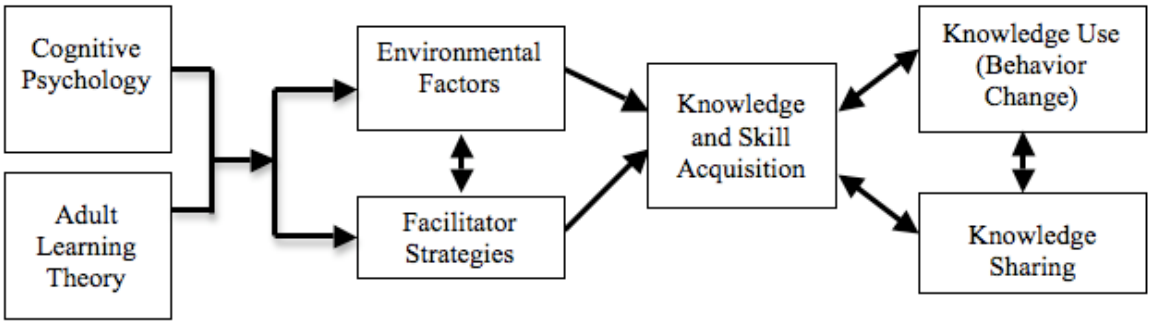

Table 3.1 Definitions of Key Constructs from the BEAN Model

Name	Definition
Cognitive Psychology	Scientifically-based principles of psychology describing the mechanisms by which individuals acquire knowledge and skills
Adult Learning Theory	Research-based theories from the field of adult education that describe the process of information and skill acquisition
Environmental Factors	Characteristics of physical classroom environment (such as layout), and social environment (such as openness to asking questions)
Instructional Strategies	Strategies used by educators that assist students in acquiring knowledge (for example, repetition, multi-modal presentation).

Environmental Factors

Physical Layout: Theories of adult learning propose that classrooms become learner-centered, placing value on the role that students play in teaching each other (Davis, 1993; McCombs & Whisler, 1997). These classrooms are generally organized in a circle or U-shape to foster greater communication between students (McCombs & Whisler, 1997).

Social Environment: Theories of adult learning also emphasize that learners must feel that they are in an emotionally safe and supportive space before they are ready to share and learn from others (McCombs & Whisler, 1997). Educators can foster social support by providing opportunities for students to share questions, concerns, and experiences.

Instructional strategies

Drawing on cognitive psychology and theories of adult learning, educators must learn how to identify what participants already know and find ways to add new information into what is already known. This process of putting new information into a familiar context can be especially helpful to increase vocabulary and teach new skills. Similarly, the process of challenging incorrect information (called perspective transformation) can be key to helping participants remember new information. The following examples of how environmental factors and instructional strategies can be applied are taken from the case study of an adult education health literacy class described below.

Case Study Background

This study was conducted with students from an adult literacy center in the Atlanta area attending a health literacy class. The course was based on the National Institute for Literacy's Health Literacy Curriculum, which includes the following topics: preventive care, physical activity, nutrition, communication with health care professionals, and other health topics. Classes met twice a week for two hours at a time, spanning a 12-week period. This study sought to explore the types of environmental factors and instructional strategies that helped students acquire these broad-based functional health literacy skills (Kutner, Greenberg, Jin, & Paulsen, 2006). Results describe these factors and strategies through the integrated lenses of cognitive psychology and adult learning theory, then describe participants' resulting changes in health behavior.

METHODS:

This qualitative study consisted of a series of classroom observations, interviews with adult literacy students, interviews with instructors, and a final focus group with students and interview with one teacher for the purpose of increasing interpretive validity. A total of ten 2-hour classroom observations were conducted over the Fall 2009 and Spring 2010 semesters. The researcher developed an observation guide to help capture educator strategies, student responses to strategies, and general classroom conversation and flow. Interviews were conducted with adult learners to explore the following domains: attributes of the class environment that facilitated learning, perceptions and use of skills taught in class, and opportunities for sharing information

and skills. Interviews were also conducted with each of the three health literacy adult educators, one who was currently teaching the class and two who had taught it previously. The interview guide explored each educator's philosophy of teaching and learning, strategies used in the classroom to facilitate learning, and overall perspective on teaching health literacy skills. Most interviews lasted approximately 60 minutes.

To be eligible, potential student participants must have attended at least 12 hours of the health literacy classes during the 2009-2010 program year and be sufficiently fluent in English to complete the consent process and engage fully in the interview. Participant variation was sought in both age and gender. In qualitative research, the sample size is typically driven by theoretical saturation, rather than statistical power (Strauss & Corbin, 1998). Sufficient sample size (called "saturation") is reached when the interviewer hears similar themes and issues emerging from participant stories (Strauss & Corbin, 1998). Interviews were conducted until theoretical saturation was reached at 24 interviews (21 students and 3 educators).

Interviews took place in a private room at the literacy center after completion of the consent process. All participants, including educators, were given $20 as compensation for their participation in the interview. An additional $20 was given to those participating in subsequent member checks. Interview transcriptions were anonymous, with a unique study ID number used to identify individual interviews. Observational data was recorded in the form of field notes during classroom sessions. The Emory University IRB approved all study procedures.

Data Analysis: Descriptive statistics were calculated to summarize participant demographic information including gender, age, race/ethnicity, employment status, and

frequency of class attendance. Transcripts and field notes were analyzed using a combination of Thematic Analysis, a data-driven method used for identifying, analyzing, and reporting patterns in the data, and Content Analysis, a theory-driven process designed to find previously identified themes in the data (Braun & Clarke, 2006; Maxwell, 2002; Weber, 1990). These processes resulted in themes derived from both the data and theory that explain the manner in which adult students acquire and use functional health literacy skills (Yin, 1989). NVIVO software was used for data management.

Validity: Primary descriptive validity was enhanced by digitally audio taping interviews and ensuring verbatim transcription by using a professional transcription service (Maxwell, 2002). To increase interpretive validity, the researcher conducted member checks in the form of a focus group, which involved discussing preliminary findings with nine adult learners in the health literacy classes and soliciting feedback on the accuracy of interpretations (Maxwell, 2002). The researcher also conducted a member check with the primary health literacy educator.

RESULTS:

Demographics: The majority of students (76%) were female and all were African or African-American. The average age was 42, ranging from early 20's to mid 60's. Most students read between a 4^{th} and 6^{th} grade reading level, although most had completed the 10^{th} or 11^{th} grade. Average individual income was low, ranging from $0 to $3,000 per year. Approximately 1/3 of students were employed part or full time, another third were looking for employment, and another third were retired, on disability, or otherwise not looking for employment. Average number of classroom contact hours varied, with a

mean of 37.5 hours and a median of 32 hours. Six students had taken the class multiple times, while other students had only recently taken the class for the first time. Table 3.2 summarizes demographic characteristics of student participants.

All three instructors were female. They ranged from having little formal education on teaching adults to having an advanced degree in adult education. None of the instructors had any formal training in the health or medical fields.

Table 3.2. Demographics of Student Participants

Student Characteristics	Total (n=21) %	(n)
Gender		
Female	76%	(16)
Male	24%	(5)
Age		
20-29	19%	(4)
30-39	19%	(4)
40-49	24%	(5)
Over 50	38%	(8)
Race/Ethnicity		
African	5%	(1)
African-American	95%	(20)
Educational Attainment		
High School Diploma/GED	24%	(5)
$10^{th}/11^{th}$ grade	52%	(11)
9^{th} grade or below	24%	(5)
Employment Status		
Employed full-time	5%	(1)
Employed part-time	24%	(5)
Unemployed, looking for work	33%	(7)
Unemployed, not looking for work	38%	(8)

Classroom Contact Hours		
12-20 hours	33%	(7)
28-46 hours	43%	(9)
64-118 hours	24%	(5)

Results from this study describe the environmental factors and types of instructional strategies used by educators to help students acquire functional health literacy skills. Table 3.3 provides a summary of these strategies and examples of their application in the health literacy class case study.

Table 3.3 Summary of Environmental Factor and Instructional Strategy Examples

Name	Origin	Application in Health Literacy Class Case Study
Environmental Factors		
Physical Layout	CP/ ALT	Classroom set up in "U" shape to facilitate discussion and collaboration among students.
Social Environment	ALT	Students comfortable to ask questions, share experiences, use humor, and work collaboratively. Students feeling supported and encouraged by instructor and other students.
Instructional Strategies		
Attending to goals & interests	ALT	Instructors assessed students' goals and reasons for learning, then incorporated these areas into classroom activities.
Empowering students/fostering autonomy	CP/ ALT	Students kept daily log on nutrition, physical activity, and mood, then reflected on impact on sleep, emotions, etc.
Using repetition to aid memory	CP/ ALT	Instructor frequently repeated words, concepts, and ideas per student requests or when sensing confusion.
Presenting information multimodally	CP/ ALT	Instructors provided information in multiple ways: in writing on the board, using flashcards, or on a handout; visually with a picture or video; or spoken aloud.
Building vocabulary	CP/ ALT	Instructors thematically organized vocabulary words, then helped students count and pronounce syllables, identify root words and meanings, and read vocabulary words aloud.

Attending to levels of processing	CP	Instructors provided specific questions for students to ask themselves while listening to new information to help them determine whether or not they understood it.
Activating prior knowledge	CP/ ALT	Instructor asked students to describe current eating habits as part of a lesson designed to teach about healthy eating.
Fostering perspective change	CP/ ALT	Instructor demonstrated ways students could impact their own health and explained *how/why* making healthier choices can impact the body.

Note: CP = Cognitive Psychology, ALT = Adult Learning Theory

Environmental factors influencing knowledge acquisition

Physical Layout: Observations took place in two classrooms. Both classrooms had a general "U" shape, with the educator at the front near the white board. Students were easily able to see each other and the instructor across the room, which helped to facilitate classroom discussions.

Social environment: As evidenced by observations and interviews, the classroom environment was very comfortable for students. Students described feeling able to be themselves, ask questions, use humor, and share personal experiences during class sessions. The classroom also embodied a spirit of collaborative learning – a place in which students were excited to be learning with and from each other, without a sense of competition or rivalry. For students dealing with shame and embarrassment from poor reading skills, this type of supportive social environment can be very beneficial, as explained by this older female student:

"When you don't know how to read… people sit there and laugh at you like you're a little ant. Here, I don't feel that way because they bring my spirit up."

Ultimately, one of the strengths of the class was the supportive environment. Students felt encouraged and welcomed by the educator and other students in the classroom. These characteristics were key to providing a space where students felt comfortable to ask questions and be open to learning.

Instructional strategies

Educators have a myriad of strategies to use to help students learn, but they must know their students well enough to know which strategies will be the most effective. While each of the educators interviewed had a different philosophy towards teaching and learning, there were many commonalities in the ways they helped students learn. These common strategies included attending to individual goals, needs, and interests; empowering students and fostering autonomy; using repetition to aid memory; presenting information multimodally; building vocabulary; attending to levels of processing; activating prior knowledge; and fostering perspective change.

Attending to individual goals, needs and interests: All educators interviewed mentioned the importance of getting to know students as individuals and being responsive to their needs. This strategy stems from theories of adult learning and cognitive psychology, both of which focus on putting new information into existing and immediately useful contexts for learners. For most educators, this process begins at the start of the class by getting to know students' goals and motivations for learning:

> *"I approach teaching adults with trying to reach their goals. I know that a lot of them come in here to learn how to read better, but I really try to get them to tap into what their specific goals are."*

Educators sought to ensure relevance of classroom activities to students' lives, and students noticed, as explained by this middle-aged male student:

> *"Everything that was touched bases on in that class was about saving your life or saving someone that you love."*

Another example of relevance to real life was from class observations during a discussion surrounding President Obama's healthcare plan. The educator shared an article with the class about important content in the plan, and then asked the students how the plan would affect them. This activity resulted in students' questions about the plan and interest in finding ways to gain more information. The lesson then turned into a discussion about reputable places to seek out information. Students learned how to create keyword searches and determine the validity of the information source. Students then shared their new information with the class with the group, creating subsequent questions and discussions on the topic. Most students described that the process of doing research was new for them, yet they were motivated to do it again because they recognized its importance to their lives.

Empowering students and fostering autonomy: All educators interviewed emphasized that their adult students are independent learners. As such, educators sought

to create activities that foster independence, goal-setting, self-sufficiency, and a sense of responsibility. For example, during the health literacy class, students created a diet and exercise log detailing food intake, daily activities, and emotions. Students kept this log for several weeks and reflected on how their dietary habits, daily activities, and emotions affected each other and impacted their daily lives. All three instructors also mentioned that teaching students how to ask good questions when they are confused is key to fostering autonomy.

Using repetition to aid memory: This instructional strategy involves repeating information to reinforce new concepts. Many students, especially older students, described the importance of having an educator willing to explain new concepts more than once, as described by this older female student:

> *"In a doctor's office they just tell you once and let it be. But in class, you renew it over and over until the teacher thinks you got it… So you know, patience and time. It makes a lot of difference."*

During classroom observations, the instructor often repeated new information multiple times and in different ways to help those needing more time to process it.

Presenting information multimodally: Similar to repetition, many learners do best when being presenting with information in more than one modality, such as orally, in writing, or by video. One educator explains her approach to multimodal teaching:

> *"Some people learn visually, some learn hands on, some learn just by listening, some learn by reading. You have to incorporate all that into your classroom because you have all those different types of learners."*

In the classroom, information was often presented initially in writing, and then students took turns reading the information aloud from their handouts. At times, the educator would read through the passage aloud again to ensure comprehension based on a fluid reading. Other times, the educator used note cards to present information, and then also read the words aloud. These techniques for presenting information in multiple ways are especially useful when teaching vocabulary.

Building vocabulary: This is a process involving exercises and activities that increase students' knowledge of word meanings and pronunciation. Here, one educator describes the practical significance of increasing students' vocabularies:

> *"Right now we are talking about kidney disease. We need to know how to pronounce [the words] and break them up because some of the students are afraid to read those words because they're so long."*

Students unsure of how to pronounce a word may be less likely to use it or ask about it when talking with a health care provider. Ultimately, ensuring comfort in pronouncing and using medical terminology can foster a sense of autonomy and independence in learners. To increase vocabulary, instructors took time to help students count out the number of syllables (often a challenge with low literate adults), pronounce each syllable,

identify root words and meanings, and practice reading vocabulary words with flash cards. Vocabulary words were typically organized *a priori* around a theme, but also emerged from other readings during class time.

Attention to levels of processing: Educators discussed using activities that facilitate deeper levels of processing, which increases the likelihood that students will retain information. One important way to help students process information more deeply is to provide practical application while teaching. This educator explains her strategy for helping students listen actively and process information:

> *"I tell students, 'Listen like you're going to have to teach this to somebody,' because it's a different way of listening."*

In this second quote, the same educator explains how she gives students an additional task while listening: asking themselves questions to help organize new information.

> *"When going to the doctor, remember, 'What is wrong with me? What do I need to do? How often do I need to do it?' For some people, they don't even have that sort of structure in their head of the who, what, when, where, and why."*

These quotes demonstrate the importance of using strategies that help students process information by teaching them how to mentally organize new information.

Activating prior knowledge: According to cognitive psychology and theories of adult learning, tying in new concepts to previously known information can assist with memory, recall, and subsequent use of information. This strategy was used during a nutrition lesson when the educator began class by asking students to recount what they had eaten over the weekend. The subsequent lesson focused on making healthy food choices during meals. By using the students' experiences as examples throughout the lesson, the educator was able to connect prior knowledge and experiences to new information and skills. This activity helped students make a concrete connection between unhealthy food options that they were currently eating and healthier options that they might choose in the future.

Fostering perspective transformation: Many students were surprised to learn that their current behaviors, particularly surrounding diet and exercise, were unhealthy for them. Additionally, many students didn't realize that they had control over their health and options for prevention and treatment, as explained by this middle-aged man:

> *"That's what I think the health class is really about, learning your options… And with a health issue, you probably don't know your options."*

This realization was often very empowering for students and motivated them to learn more about health topics that interested them. For other students who had previously been exposed to messages on health promotion, the class provided them an opportunity to understand the "why" behind the "what" as illustrated by this older woman:

> *"Somebody can tell you all day you know you're not supposed to eat that… but [it's different when] you can understand and know the damage and what happens when you eat bad foods."*

The explanation of why it was important to engage in a particular health-related behavior addressed students' prior misunderstandings about the causes and outcomes of disease. Similarly, the middle-aged women below had seen diabetes-related complications take the lives of several family members, yet her changed perspective on disease gave her a newfound sense of control in her life:

> *"I thank god for taking this class learning about diabetes, learning about chronic diseases, what effect they have on you, what you can do to prevent it before it gets this far… Even though you have it, you don't have to let it take you out."*

The collected use of these strategies from theories of adult learning and cognitive psychology helped students acquire new knowledge and skills, but also motivated them to change their behavior, as illustrated next.

Behavior Change Following Acquisition of Functional Health Literacy Skills

In addition to learning new information and skills, most students also described using them to engage in some type of health-related behavior change. The most frequent types of behavior change related to diet and physical activity, but students also described

asking questions of healthcare providers, conducting research, and increasing medication adherence.

Nutrition and Physical Activity: Eating healthfully is a complex process involving many skills, and the primary educator was careful to provide specific actions for students to take towards this goal. One younger female student describes below how learning to read food labels helped her become a more informed and deliberate grocery shopper:

> *"I'm looking at the nutrition labels now. I look at how much calories it's got and the sodium in it. [Before] I would just pick whatever and put it in my cart."*

Another student began to walk more after the educator suggested getting off the bus early and walking the rest of the way to increase physical activity each day. This young woman also noted that it lifted her mood and helped with her depression, both of which motivated her to continue walking.

Most of the students reporting a change in eating behaviors were female, which was discussed during member checks. Both men and women felt that this difference may exist because women tended to be caretakers and felt responsible to be good role models.

Asking questions at the doctor's office: Many students described that they used to be uncomfortable during doctor visits because they felt intimidated and unable to admit confusion or ask questions. An important part of the class for most students was being "given permission" to ask questions. As many students felt that they should not question

someone with so much education, the lessons on question-asking were empowering and motivating.

Conducting research independently: The majority of older students did not use the Internet and it did not occur to them to use it to find health information. Several students noted that the health class was the first time they had ever done any research. Younger students tended to be more familiar with the Internet, but even these students were surprised to learn that they could use the Internet to find health information. For many students, doing research was a valuable skill transferable to other areas of their lives.

Medication adherence: Several students mentioned that they were unsure of whether or not they were taking their medications correctly until they learned how to read medication labels in class. One woman described how she had breakthrough seizures until learning in class that her medication label directed her to take one pill in the morning and one in the evening, not just two pills at any time. She began taking her medication as directed and subsequently stopped having seizures.

Other students may have been able to read the medication labels, but did not understand the consequences of taking medication haphazardly until the topic was discussed in class. One young diabetic woman made the connection during this lesson that her worsening diabetes-related symptoms were related to not adhering to her medication regimen. As she began to take her medication as directed, the symptoms disappeared. Another student described how her classmates helped her realize that her mood was negatively affected when she did not take her bipolar depression medication correctly. This realization ultimately motivated her to adhere to her prescribed regimen.

The impact of these behavior changes on students' lives was significant, ranging from weight loss to mood improvement to cessation of seizures. While the original goal of the health literacy curriculum was not a focus on health these types of outcomes, it is clear that educators able to impart knowledge and skills can have a wide-reaching impact on their students' lives.

DISCUSSION

Results from this study demonstrate how careful attention to environmental factors and instructional strategies can greatly impact how students learn. In this adult education classroom with a health literacy focus, a social supportive environment served as a valuable motivator for students to attend class and participate in classroom sessions. Additionally, students felt that the information and skills learned in class were directly relevant to their lives. Many students also reported improving their eating habits, beginning to exercise, asking questions of their health care provider, conducting research independently, and increasing medication adherence.

These results have several limitations, specifically that these changes in behavior were assessed qualitatively and were not directly measured or observed. As such, it is possible that students may have exaggerated the extent to which they engaged in behavior change. Additionally, this study was conducted with a relatively homogenous, primarily English-speaking population in the urban south. Results may differ when conducted with rural populations, non-native English speakers, or in other parts of the country.

Conducting research in the adult education setting can be difficult, due to students' competing priorities of school, family, work, health, transportation or other

financial considerations (Comings & Soricone, 2007). Despite these challenges, there is a wealth of expertise in this setting regarding acquisition of functional health literacy skills that can be extremely valuable when applied to health behavior change interventions. Educators in other contexts may find it challenging to balance content with flexibility and receptiveness to student interests; however, this is often a strength in the adult education classroom. Some of the success in the health literacy classes may be due to the way in which adult educators adapted instructional strategies to meet student needs, interests, and learning styles. By approaching teaching in this way, educators in any context can become more effective at imparting knowledge and skills, and ultimately in changing behavior.

As demonstrated by this case study, educators must seek to provide concrete examples over general suggestions. For example, “steam sweet potatoes rather than fry them” is a specific way to “eat less fat”. Many students simply do not know what specific behaviors they need to change, so it is important to provide real examples throughout lessons. Similarly, the health literacy class in this study may have been able to facilitate even greater change by focusing more on goal-setting as a means to motivate students and monitor progress towards health-related goals. Revisiting these goals on a weekly basis and addressing challenges and facilitators could help students keep on track by working together. Additionally, the class may have considered engaging students in role-play activities, as practicing desired behaviors can help students process them more deeply, aiding with memory and subsequent use.

This article serves as a first step to encouraging researchers and educators to consider the importance of drawing on cognitive psychology and theories of adult

learning to create a scientifically-based instructional foundation for health behavior change programs. Future studies on health education interventions should consider a mixed-methods approach to data collection and analysis with a focus on measuring the methods by which individuals acquire knowledge and skills. Additionally, by drawing on the expertise of adult educators well-versed in the science of instructional design, this article also demonstrates that the adult education classroom is an excellent setting for conducting health education and behavior change interventions.

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CHAPTER FOUR:

Amplifying Diffusion of Health Information in Low Literate Populations Through Adult Education Health Literacy Classes

ABSTRACT:

Over the next decade, as literacy rates are predicted to decline, the health care sector faces increasing challenges to effectively communicating with low literate groups. Considering the rising costs of healthcare and the forthcoming changes in the American healthcare system, it is imperative to find non-traditional avenues to impart health knowledge and functional skills. This article draws on classroom observations and qualitative interviews with 21 students and 3 teachers in an adult education health literacy class to explore the efficacy of using adult education courses to teach functional health literacy skills to low literate populations. Data were analyzed using a combination of thematic and content analyses. Results describe the motivation of students to share information within the classroom and with friends and family outside the classroom. This article also provides several recommendations to help ensure accuracy of diffused information both within and outside the classroom. Ultimately, this study suggests that the adult education system is in a prime position to impart functional health literacy skills to low literate populations in the classroom. More significantly, this study demonstrates that adult education students themselves may be a powerful vehicle for health communication beyond the walls of the classroom.

INTRODUCTION:

"I'm learning something, and not only am I learning something, but I'm putting it in action. Not only that, but I'm sharing the information with people I run across."

- Adult education health literacy student

Over the next decade, as literacy rates are predicted to decline, the health care sector faces increasing challenges to effectively communicating with low literate populations (Kirsch, Braun, Yamamoto, & Sum, 2007; Parker, Wolf, & Kirsch, 2008). Individuals with limited literacy skills are less likely to obtain preventive services (Scott, Gazmararian, Williams, & Baker, 2002), are at greater risk for having chronic conditions (DeWalt, Berkman, & Sheridan, 2004; Schillinger et al., 2002; Schillinger et al., 2003; Williams, Baker, Honig, Lee, & Nowlan, 1998; Williams, Baker, Parker, & Nurss, 1998), and have poorer disease self-management skills (DeWalt et al., 2004; Schillinger et al., 2002; Schillinger et al., 2003; Williams, Baker, Honig et al., 1998; Williams, Baker, Parker et al., 1998). This population also experiences greater challenges asking questions of healthcare providers (Katz, Jacobson, Veledar, & Kripalani, 2007), completing health history forms, and understanding printed directions, such as instructional brochures, preoperative instructions, and medication labels (Baker et al., 1996; Koo, Krass, & Aslani, 2006; Schillinger et al., 2003; Shrank & Avorn, 2007). Chronic disease prevention and management involve mastery of a complex set of skills (Clark et al., 1991). When disease management skills are taught in the healthcare setting, they are often taught didactically and over a short duration of time, neither of which are conducive to helping low literate individuals learn critical skills and information (Brodenheimer,

Lorig, Holman, & Grumbach). Additionally, most health care professionals are expertly trained in medical terminology; however they are often not trained to break down complex concepts and explain them using clear language (Doak, Doak, Friedell, & Meade, 1998; Leonard, Graham, & Bonacum, 2004).

The potential social and economic impact of declining literacy rates requires the use of the most effective methods to impart functional health skills to low literate populations. As with many public health issues, this requires looking to other disciplines for expertise (Institute of Medicine, 2004). Among other recommendations to remove low literacy as a barrier to healthcare, the Institute of Medicine recommends using adult education programs as a vehicle to teach functional health literacy skills (Institute of Medicine, 2004). Infusing functional health skills into adult education courses is a natural extension of the types of skills already being taught to help break the cycle of low literacy in families and assist with employment readiness (American Medical Association Council on Scientific Affairs, 1999; Institute of Medicine, 2004; Kirsch et al., 2007). These programs provide classes to over 4 million adults every year on topics related to health literacy, such as basic reading, writing, and mathematical skills (Institute of Medicine, 2004). Adult educators focus specifically on using strategies that can motivate adults to learn information and acquire functional daily living skills (US Department of Health and Human Services, 2003). The strength of these classes is that instructors place learning in the context of real life situations, make learning immediately relevant, and empower learners to take an active role in posing questions and developing solutions (Candy, 1991; Knowles, 1973; Freire, 2000).

As Healthy People 2010 indicates, one of the main challenges in designing effective health communication programs is identifying the optimal contexts, channels, content, and reasons that motivate people to pay attention to and use health information (Healthy People 2010, 2001). Adult educators are particularly adept at knowing how to reach low literate adults (Institute of Medicine, 2004), yet low literate adults may be even better at knowing how to reach each other. Most intervention developers assume that the information delivered is received only by participants themselves; however, a preliminary evaluation of an adult education health literacy program found that learners shared information with family friends outside the class (Hohn, 1998; MAGI Educational Services, 2004). This evaluation did not explore what types of information were shared, for what purpose, and how sharing of information influenced those with whom information was shared.

The focus in diffusion is on the spread of new ideas throughout a group. As described by Rogers in the theory of Diffusion of Innovations, "Diffusion is the process through which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2003). Interpersonal channels (such as face-to-face communication or, potentially, classroom education) are typically more effective for helping individuals to form and change attitudes towards an innovation (Rogers, 2002). This is because most people tend to rely on the subjective evaluation of friends, family, and trusted others to make a decision, rather than using scientific evidence to form an opinion about something (Rogers, 2002). This process is especially evident in low literate and minority communities, where individuals are more likely to seek advice from friends and family than from trained health care providers or peer-reviewed journals (Earp &

Flax, 1999).

There are two aspects of adult education that provide a unique opportunity for diffusion of knowledge and skills: social support and a similarity to lay health advisor models. Social support has been demonstrated to help chronic disease patients with self-management skills (Gallant, 2003) and may serve to help students in adult education acquire knowledge and skills and motivate them to share with others. Social support involves several domains, including informational and emotional support (Brown, Nesse, Vinokur, & Smith, 2003). Informational support involves giving advice or sharing informational resources, while emotional support involves providing encouragement, reassurance, or empathy (Brown et al., 2003). As an extension of social support, many adult literacy centers function similarly to lay health advisors by placing emphasis on information shared among peers. Lay health advisors are trusted individuals within a group or community known to be a source of accurate information and able to explain it in understandable terms (Earp & Flax, 1999). The teachers in adult education courses typically serve in this capacity, but other students may as well.

This study draws on core concepts from several disciplines – communications, adult education, health education, and sociology – to explore how adult education centers function as a vehicle for communicating health information to low literate adults in the classroom and beyond. This article also provides recommendations to increase accuracy and further diffusion of information within low literate populations.

METHODS:

This qualitative case study was conducted with students from an adult literacy center in the urban south who attended a health literacy class covering preventive care, disease management, communication with health care professionals, and other health topics. Classes met twice a week for two hours at a time over a 12-week period.

Data collection included 20 hours of classroom observations, interviews with 21 adult literacy students and 3 instructors, and a final focus group with 9 students to increase interpretive validity (Maxwell, 2002). Interviews with adult learners explored the types of information shared and motivation for sharing information with friends and family outside the class. Interviews with instructors explored instructional strategies used to facilitate collaborative learning and overall perspective on teaching health literacy skills.

Student participants must have attended at least 12 hours of the health literacy classes and be sufficiently fluent in English to engage fully in the interview. Participant variation was sought in both age and gender. Twenty-one students and 3 educators were interviewed. All participants were given $20 for their participation. Interview transcriptions were anonymous, with a unique study ID number used to identify individual interviews. Observational data was recorded in the form of field notes during classroom sessions. The Emory University IRB approved all study procedures.

Data Analysis: Descriptive statistics were calculated on student participant gender, age, race/ethnicity, employment status, and frequency of class attendance. Transcripts and field notes were analyzed using a combination of Thematic Analysis and Content Analysis (Braun & Clarke, 2006; Maxwell, 2002; Weber, 1990). These processes

resulted themes derived from both the data and theory that explore how adult education centers function as a vehicle for diffusion of health information to those in and beyond the classroom (Yin, 1989).

RESULTS:

Demographics: The majority of students (76%) were female and all were of African or African-American descent. Most students read between a 4th and 6th grade reading level, although most had completed through the 10th or 11th grade. Average number of classroom contact hours varied, with a mean of 37.5 hours and a median of 32 hours. Six students had taken the class multiple times, while other students had only recently taken the class once. Table 4.1 summarizes demographic characteristics of student participants.

All three instructors were female. They ranged from having little formal education on teaching adults to having an advanced degree in adult education. None of the instructors had any formal training in the health or medical fields.

Table 4.1. Demographics of Student Participants

Student Characteristics	Total (n=21) %	(N)
Gender		
Female	76%	(16)
Male	24%	(5)

Age		
20-29	19%	(4)
30-39	19%	(4)
40-49	24%	(5)
Over 50	38%	(8)
Race/Ethnicity		
African	5%	(1)
African-American	95%	(20)
Educational Attainment		
High School Diploma/GED	24%	(5)
$10^{th}/11^{th}$ grade	52%	(11)
9^{th} grade or below	24%	(5)
Employment Status		
Employed full-time	5%	(1)
Employed part-time	24%	(5)
Unemployed, looking for work	33%	(7)
Unemployed, not looking for work	38%	(8)
Classroom Contact Hours		
12-20 hours	33%	(7)
28-46 hours	43%	(9)
64-118 hours	24%	(5)

Importance of Sharing Within the Class

Many health education classes focus on using didactic methods in which the instructor imparts knowledge to the students. Conversely, central to this adult education course was a focus on empowering students to share their knowledge and experiences during class. Table 4.2 summarizes the importance of sharing information within the classroom environment, described in greater detail below.

Table 4.2. Importance of students sharing information during class

Value of Sharing	Implication
Instructors and students planned course together content based on interest and need.	Students are more motivated to use information and skills acquired in class when they help select topics.
Instructors learned information from students.	Instructors continued learning throughout the class and gathered information to aid in subsequent courses.
Students are often more knowledgeable of community resources than instructors.	Students can become valuable resources for each other.
Students use similar terminology and plain language.	Students can "translate" complicated health information for each other using familiar terms.
Provides opportunities for learning new perspectives from other students.	Students are engaged and interested which motivates them to attend class and participate.
Provides opportunities for hearing personal experiences from other students (perceived to be similar to themselves).	Students recognize their own susceptibility to health problems and are motivated to change behavior.

Collaborative planning of course content: The health literacy class relied heavily on student input into the content and direction of the course. Many students discussed feeling very motivated by having the opportunity to learn about topics of their choosing. A middle-aged male student described the process of planning collaboratively:

> *"We discussed everything together. It wasn't all just talking to the teacher or waiting on her to bring it to the table…. One person might want to bring this to the table or another one."*

Instructors learn from students: Information was passed among students and also from students to teachers. Teachers found this type of sharing to be both interesting and professionally useful, as explained by one of the teachers:

> *"It's kind of like a cycle: they teach me, I teach them and it's going around… the more I learn, the more I can teach."*

Students share knowledge of community resources: Discussions were often informal, focusing more on the students sharing personal experiences and knowledge. For example, during one class session several students were instrumental in helping other students identify reputable and affordable dental clinics, then gave suggestions on how to make a timely appointment. This discussion also served to raise and clarify misunderstandings about the necessary frequency of dental visits.

Students explain information to each other using common terminology: Students placed great emphasis on other students as a valuable resource for trusted health information using plain language, similar to the lay health advisor model:

> *"[Other students] can talk to you on the level you're on… The good thing about it is that you can always ask them questions: What did you do when your husband blanked out? What did you do when you needed CPR or needed to do some? It's good because they can explain."*

Students challenge each other's perspectives: Both students and teachers valued the input of others in the class and felt that these contributions added meaning to their experience in the class, as explained by a middle-aged female student:

> *"You have different people who come from different backgrounds who explain different things, or their point of view about it, and it all just fits into one decent conversation where I learned a lot from the class."*

The teacher also empowered students to become experts in content knowledge by encouraging them to do research on topics relevant to them, then presenting this information to the class. During one session, students took turns presenting on different kinds of doctors, including a description of the types of conditions treated and indications for needing to see that type of doctor.

Students are motivated by hearing stories from others seen as similar: Students were often motivated to change their behavior by hearing the stories and experiences of other students in the class. One young woman described how she was very motivated to change her eating behavior after hearing the stories of older diabetic women in the class and realizing that she could have the same future:

> *"Listening to other people's problems when everybody sit around the room. And one lady… she's a diabetic, high blood pressure, heart problems… I ask a lot of questions on how often she go to the doctor to prevent me from being in her situation… So it forced me, just my way of thinking and eating…"*

Diffusion of Information Beyond Classroom Environment

Students were motivated to share information learned in class with a range of people from specific loved ones to the community in general. The types of information varied based on perceived need of the person with whom information was shared. Sharing of information and skills learned in class helped many students' friends and loved ones to exercise, eat healthier foods, and engage in other healthful behaviors. Table 4.3 summarizes the key findings regarding sharing of information outside the classroom environment.

Table 4.3. Key Findings on Diffusion of Information and Skills Beyond Classroom

Domain of Sharing	Examples
Views of Self as Lay Health Advisor	- Family Caretakers - Community Caretakers
Types of Information Shared	- Medical Knowledge - Functional health literacy skills - Nutrition-related knowledge and skills
Effects of Sharing	- Encouraged others to exercise - Helped loved ones to eat healthier foods - Loved ones shared health information and skills with other friends and family

Views of Self as "Lay Health Advisor": Students found the information they learned in class to be highly relevant to their lives, but also to the lives of their loved ones or to their larger communities. Relevance to others was a strong motivator for students to pay attention during class, as explained by one middle aged woman responsible for taking care of her children in addition to her aging parents:

"I learned a lot by hearing others talking in class… If it didn't relate to something I was going through, somebody in my family I've heard was going through it, so… my ears were like all over the room."

Beyond learning information to know about a loved one's condition for *themselves*, students tended to fall into two main lay health advisor type categories regarding what motivated them to share this information with others: family caretakers or community caretakers. Family caretakers felt strongly that it was their responsibility to learn information in order to improve the health of specific loved ones, such as children, parents, or grandparents:

"My family is down [south]. If anyone was to kick the bucket before I get down there, it would just eat me up. I need to know these things to share with my folks because I love them. I just want everyone to live."

Community caretakers felt that their duty was to learn information to share with a larger community, rather than with specific individuals. Typically, women saw themselves as family caretakers, while men saw themselves more as community caretakers. This difference may have been due to the fact that most men in the class were not actually caretakers of specific individuals themselves, as they did not have children at home or provide direct care to aging family members. Regardless, both types of caretakers saw themselves in a position of lay health advisors, feeling strongly that it was

important for them to help others by sharing health information, whether it was intended more for a community than specific individuals.

Types of Information Shared: Students shared a variety of information and skills with family and friends. Information most often shared was based on an identified need, although information was also shared at times because it was interesting to the student. One type of information shared was medical knowledge, particularly regarding anatomy, physiology, or specific diseases. The quote below illustrates one student's desire to explain a family member's condition to her children:

> *"[My ex] is waitin' for a kidney… He's the type that don't tell me or our children much information so all we know is daddy need a kidney. He takes dialysis, but I wanna be able to tell my kids more than just your daddy needs a kidney and he's on dialysis… like what caused this."*

Students also shared new skills with family members, such as reading medication labels and food labels. One middle-aged woman described how she taught her mother about reading nutrition labels:

> *"In class we learned about reading the [nutrition] label, the fats and all the ingredients in the different items, the calories and all this. I told my mom, 'Read it. It's on the back… We've got to see what it says.'"*

Skills related to nutrition, such as healthy cooking techniques or food substitutions, were among the most commonly shared. The same woman described how she taught her grandmother about eating healthier foods:

> *"My grandmother is 90 years old and her body is deteriorating, but she's still here. There's certain things she cannot eat now, and I would share it with her from my class… My grandma loves sweets, and I was sharing that instead of having sweets around she should have fruit instead."*

Effects of Sharing: In addition to sharing health information with loved ones, students also were able to help them make positive changes in their lives. One woman described the process of encouraging her father to exercise:

> *"I actually took a lot that I learned [in class] about diabetes and gave it to my dad… Two weeks ago I started him to go to the exercise room where they stay. I told him, 'Daddy, just do what you can.' Next day he was back and forth across the street walking…. He seen a difference too and he liked it."*

Further, several students reported that the loved ones benefitting from health information went on to share that same health information with others. One woman described how she helped her mother begin to exercise, and then her mother encouraged another family member to exercise as well:

> *"I shared with my mom about getting outside, doing a little walking, not just sitting… My mom started walking, and now my mom says she can sleep a whole lot better at night… My mom also shared that with my aunt and that aunt says she's going to start walking."*

In these types of situations, the sharing of information extended beyond the reach of the health literacy class to an additional tier beyond the student, making the health literacy class a very powerful vector for reaching a much larger audience than just the students alone. Students seemed to have an inherent ability to recognize the needs of others and desired to share what they knew. Seeing themselves as a "lay health advisor," even without the formal title, gave students a sense of pride that, in turn, motivated them to continue learning during class and sharing with others.

Addressing the Challenge of Lay-Health "Experts"

Despite the many benefits of health literacy students seeing themselves as lay health advisors, it can be challenging to help students recognize the limitations of their expertise and subsequently ensure the diffusion of accurate information to others. Two specific challenges in this case study were the lack of formal teacher training on health content and the mismatch of print materials to students' reading abilities.

Challenges of Seeing Adult Educators as Health Experts: While students considered their teachers to be health experts, the teachers recognized their lack of expertise in the field and often felt uneasy when discussing topics out of their comfort zone. One teacher explained her concern in being seen as a health expert:

> *"What makes me uncomfortable, more than just my lack of expertise, is that something happens when someone stands up in front of the room and they're called the teacher. You believe whatever comes out of their mouth… We have to be very careful with our students about what we're experts in and what we're just learning along with them."*

Students also expressed interest in having a medical professional visit their class to answer questions about anatomy, physiology, or certain diseases. As explained by one teacher:

> *"Sometimes you do wish you had a doctor in class… it would be nice to have when the students start asking questions. It would be a good learning and teaching experience for the doctors as well."*

As demonstrated by the teacher's quote above, these types of informal interactions between adult education students and health care professionals could also serve to assist healthcare providers in communicating more clearly with their patients.

Matching Reading Abilities of Students with Reading Level of Print Materials: This health literacy class served students of all reading levels, which made it a challenge to provide materials at an appropriate reading level for everyone simultaneously. One of the teachers explained this delicate balance:

> *"You have students who are at all different levels in this class…. Sometimes you get students who don't know how to read at all, so you have to try to balance it out where those who can read a little bit better don't get bored and don't get impatient with those who are learning."*

Teachers reported that the curriculum provided materials at an appropriate reading level for students, but often at too basic a level regarding content. As a result, teachers often turned to the Internet to find additional course materials, yet these were often too challenging for basic readers. These students reported feeling frustrated because they did not understand the information well enough to remember it or share it with others, as explained by one older female student:

> *"I'm trying to read it and tell my husband about it when I get home and I'm missing so many words. I'm not saying use all kindergarten level. Just break it down so I can read it… I just want to be able to take this information somewhere else and emphasize on it myself."*

Students felt strongly that it was their responsibility to understand information thoroughly if the information were to be helpful to others. The quote below came from an older woman who attended a weekly church group immediately following her health literacy class. She described how she always enjoyed sharing what she'd learned from her health literacy class with her church group, but wanted to make sure she was explaining everything correctly:

"If I don't have my facts right, ain't no sense in me sharing it with them, because they go back and share it with someone else and it's not right."

Students reading at lower levels still benefitted from the conversation surrounding the print material, yet felt frustrated when wanting to share the information with others because they could not read it. Students reading at higher levels did not report as many challenges with being able to read class materials or in sharing them with others.

Student Recommendations to Increase Diffusion of Accurate Health Information: Several students discussed the benefit of participating in the development of a newsletter on H1N1 (Swine Flu) and distributing it to other students. Students described that having to research a topic, then working together to present information to other students in writing helped them remember information better and motivated them to ensure its accuracy. Students felt that the newsletter would be a good activity to continue in the future. One student even recommended taking time to present this information to all students at the literacy center.

In sum, results from this study illustrate the power of the adult education health literacy classroom to reach not only students, but also the friends and families of students (and possibly the friends and family of those individuals). While the potential reach of the health literacy class is significant, so too is the importance of ensuring accuracy of diffused information if it is to be considered a viable method for widespread communication with low literate individuals.

DISCUSSION:

The underlying assumption of most interventions is that at best, only those participating in the intervention acquire information and skills. This study demonstrated the high likelihood of diffusion of information and skills within the classroom and outside the classroom to friends and family of students. Within the classroom, social support was key to helping students share information and experiences with each other. This environmental openness served to facilitate greater learning from peers. Outside the classroom, students were highly motivated to share information with friends and family, essentially functioning as lay health advisors. While this diffusion of knowledge and skills make adult education courses a powerful vehicle for health communication, it is important to find ways to maximize potential reach while simultaneously ensuring accuracy of shared information.

These results have several limitations, specifically that changes in behavior of family and friends were not observed directly and may have been exaggerated by students, given their enthusiasm for sharing health information. This study was also conducted with a primarily homogenous population in the urban south who were nearly all native English-speakers. Heterogeneous cohorts, English language learners and those in rural parts of the country may have varying levels of comfort to share information in class or different motivations to share with others.

Results from this study indicate several focus areas to help ensure accuracy of information transfer both within and outside the classroom: focusing on teaching health skills over content, ensuring readability of course materials, and properly equipping students as would be done for lay health advisors. First, adult educators teaching health

literacy classes seem to be most comfortable and skilled in teaching functional or procedural skills (i.e., "how to") rather than discussing higher-level medical content information (Hohn, 1998). While basic content may be necessary to teach functional skills, results from this study and previous studies (Brodenheimer et al., 2002) suggest that the curriculum may be most useful to students when it is organized around building health-related skills, rather than around content knowledge. Instructors would be able to determine and teach skills most needed and applicable to students, thus ensuring relevance of materials.

Additionally, it may be useful for the curriculum to include a primer on anatomy, physiology, and basic disease mechanisms as a reference for instructors when questions arise. Including this type of reference in the curriculum may be more helpful than a series of links for more information online, because it would be presented briefly and instructors could access it as needed during class, rather than waiting to follow up during might also invite in a medical professional to answer students' questions.

Teachers noted that while the reading level of curricular materials was generally appropriate, the information presented was often too basic. Teachers often turned to the Internet to find more detailed information, yet this material was often at too high a reading level (Echt & Burridge, in press). Students reading at lower levels often failed to comprehend the supplemental information during class, thus making it more difficult and less likely for them to share the information with others after class. In a class with mixed reading abilities, it may be difficult to find information written at the appropriate reading level for everyone; however, there are several health literacy websites that may serve as a good resource for teachers seeking handouts for students, such Health Literacy Missouri

(www.healthliteracymissouri.org/library) and Oregon Health Sciences (www.ohsu.edu/library/patiented/links).

Students also discussed the benefit of working in a group to prepare a newsletter on a current health topic. These types of activities can serve to reinforce acquired knowledge, but can also be an excellent method of health communication, as students can write information in a way their peers can comprehend. This type of activity also empowers students to seek information independently, a skill that can easily be transferred to other aspects of their lives.

Last, since students often use print materials as a means to share information with others, it may be helpful to provide extra copies of materials during class for students to bring home. Teachers might even challenge students to share the information with others in order to help facilitate diffusion of health knowledge and skills. Providing additional copies of clearly written materials can help to ensure accuracy of diffused information, but can also further amplify the diffusion of information to others outside the class.

While these suggestions are directly relevant to adult education courses, they are also relevant to those developing health behavior change interventions and materials, particularly for low literate populations. Rather than assuming that information and skills provided are only for participants, sharing of information can instead become an integral part of interventions. Intervention developers can encourage participants to share information with others by providing additional materials and by providing time during the intervention for participants to practice sharing information (thus providing an opportunity to assess comprehension and accuracy). Further, sharing information can also help participants remember information and take ownership of it, thus increasing the

likelihood of later use. Finally, encouraging participants to share information with friends and family is a natural way to informally access existing channels of communication via established trusting relationships, as in the lay health advisor model. These relationships may be especially powerful communication vehicles for non-native English speakers, low literate populations, and communities with low trust in the medical system.

Considering the rising costs of healthcare and the forthcoming changes in American healthcare system, it is imperative that the medical and public health communities begin to find non-traditional avenues to impart health knowledge and functional skills. The significance of this study is that it demonstrates the strength of a non-traditional partner – the adult education system – as a very powerful vehicle for health communication beyond the walls of the classroom. Results demonstrate that the adult education system is in a prime position to help low-literate Americans become better prepared to manage their health, especially considering the complex sets of skills needed to navigate the healthcare system and prevent and manage disease.

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CHAPTER FIVE:

Integrative Summary of Findings

Summary

Chapter 1 lays the foundation for a focus on functional health literacy skill acquisition and diffusion in the context of adult education. Chapter 2 is a theoretical synthesis of literatures on cognitive psychology and adult learning theory as applied to the acquisition of functional health literacy skills and fostering health behavior change. This chapter provides a primer on key terms and concepts from cognitive psychology and adult learning theory, with a focus on classroom environment and educational strategies that can lead to the acquisition of functional health literacy skills. From this integration of literatures comes the focus on functional health literacy skills acquisition currently missing from many health education and behavior interventions.

Chapter 3 presents a case study from an adult literacy center's health literacy class. This chapter provides practical examples of how the integration of cognitive psychology and adult learning theory inform environmental factors and instructional strategies in educational settings. Environmental factors consist of the physical layout and the social environment. Instructional strategies consist of attending to students' goals and interests, empowering students and fostering autonomy, using repetition to aid memory, presenting information multimodally, building vocabulary, attending to levels of processing, activating prior knowledge, and fostering perspective change. Results also describe the subsequent changes in health behaviors of students, including increasing physical activity, improving nutrition, asking questions of healthcare providers,

conducting independent research on health topics, and increasing medication adherence. This chapter describes how a socially supportive environment serves as a valuable motivator for students to attend class and participate in classroom sessions. Additionally, this chapter also describes how the daily relevance of information learned in class also motivated students to acquire and use functional health literacy skills.

Chapter 4 draws on the same case study to explore the motivation of students to share health information and skills within the classroom and with friends and family outside the classroom. This chapter also describes the challenges of teaching health topics in adult education and ensuring accuracy of information and skills shared with loved ones. Several recommendations are also provided to help ensure accuracy of diffused information both within and outside the classroom. This chapter ultimately suggests that the adult education system is in a prime position to impart functional health literacy skills to low literate populations in the classroom. More significantly, this chapter demonstrates that adult education students themselves may be a powerful vehicle for health communication with friends and family beyond the walls of the classroom.

Limitations

As with all studies, there are limitations to this study. First, this study is cross-sectional in design, making it difficult to assess temporality. Second, the study relies on adult learners' self-reports of use and diffusion of functional health literacy skills. Changes in behavior of students and their loved ones were not observed directly and may have been exaggerated by students, given their enthusiasm for sharing health information. Conversely, behavior may also have been under-reported, as students may not have seen

the behavior change as important. This study was also conducted with a primarily homogenous population in the urban south who were nearly all native English speakers. Heterogeneous cohorts, English language learners and those in rural parts of the country may have varying levels of comfort in sharing information in class or have different levels of motivation to share with others. Additionally, individuals consenting to participate in the study may also have higher than average skills or more positive perceptions of functional health literacy skills, which could potentially bias findings.

Strengths

Conducting research in the adult education setting can be difficult, due to students' competing priorities of school, family, work, health, transportation or other financial considerations (Comings & Soricone, 2007). As such, adult literacy students may have inconsistent attendance, drop out of programs unexpectedly, and be difficult to reach for additional follow-up (Comings & Soricone, 2007). Attendance problems can lead to incomplete data and bias results. Despite these challenges, there is a wealth of expertise in the adult education setting regarding the acquisition of functional health literacy skills that can be extremely valuable when applied to health behavior change interventions. To meet these challenges, this study involved collecting attendance records to determine the number of classroom contact hours for each student completing an interview. Study inclusion criteria ensured that interview participants had completed a minimum number of classroom contact hours to be exposed to functional health literacy skills.

Rather than avoiding the potential challenges of the adult education environment to conducting meaningful research, this study also employed the use of rigorous research methods, including triangulation of data (classroom observations, interviews with students, and interviews with instructors) and member checks to increase interpretive validity of findings. This study also used a combination of inductive and deductive coding methods, thus making the analysis process driven both by theory and by data.

Implications for Research and Practice

The goal of health education and behavior change interventions is generally not just to impart knowledge, but also to teach skills that participants can use, also called functional health literacy skills. Considering the prevention-based nature of public health, most health education interventions ultimately touch on some aspect of functional health literacy skills, even if they do not specifically use the word "literacy." To increase effectiveness, future interventions may want to consider approaching focusing specifically on teaching functional health literacy skills rather than just transmitting information from facilitators to participants. Additionally, health education and behavior change interventions typically use health behavior theories to develop psychosocial targets of health promotion (Glanz, Rimer, & Viswanath, 2008), but they do not address the mechanisms by which individuals learn information and acquire skills. The lack of a scientific approach to instructional design also limits the potential impact of health behavior interventions.

Drawing on the strengths of adult education to impart functional skills, both in environmental factors and in instructional strategies, health educators and intervention

developers can learn valuable lessons to increase the effectiveness of future interventions. Educators in other contexts may find it challenging to balance content with flexibility and receptiveness to student interests; however, this balance is often a strength in the adult education classroom. Some of the success in the health literacy classes may be due to the way in which adult educators adapt instructional strategies to meet students' needs, interests, and learning styles. Additionally, adult educators are adept at using clear communication with students and breaking down complex concepts into meaningful ideas students can understand and use. By approaching teaching in this way, educators in any context may become more effective at imparting knowledge and skills, and ultimately in changing behavior.

Finally, most intervention developers assume that only those participating in the intervention acquire information and skills, yet this case study demonstrated the high likelihood of diffusion of information and skills to loved ones outside the classroom. While this diffusion of knowledge and skills make adult education courses a powerful vehicle for health communication, it is important to find ways to maximize potential reach while simultaneously ensuring accuracy of shared information. Results from this case study indicate several focus areas to help ensure accuracy of information transfer both within and outside the classroom: focusing on teaching health skills rather than specific content, ensuring readability of course materials, and considering students as lay health advisors by giving sufficient training and materials to reach out to others.

Future studies on health education interventions should consider a mixed-methods approach to data collection and analysis with a focus on measuring the methods by which individuals acquire knowledge and skills. Additionally, future longitudinal research using

objective data such as health records or social network analysis is necessary to examine behavior change and information spread over time.

The ultimate significance of this study is that it demonstrates the strength of a non-traditional partner (the adult education system, including both teachers and students) as a very powerful vehicle for health communication that can reach far beyond the walls of the classroom. The ability of a single system to reach those beyond the initial educational investment makes adult education an ideal partner for future health literacy work.

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