ATHABASCA UNIVERSITY

EXPLORING THE USE OF DISTANCE EDUCATION

TECHNOLOGIES FOR LIFESTYLE CHANGE

BY

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Abstract

Obesity affects over 100 million men, women, and children in North America alone and has reached what health professionals deem to be epidemic proportions. Being overweight can contribute to or cause chronic conditions such as diabetes, cardiovascular disease and cancer. Left unabated, it will lead to the premature death of millions. Clinical practice relies primarily on individual interventions to bring about lifestyle change. However, this may not be sufficient to reverse the trend on a population scale. Distance education is one area that is seen by some as one of the tools that is capable of reaching such a large audience. This mixed methods case study examined the perceived utility of a number of distance education tools and technologies and the likelihood of overweight and obese individuals adopting and using them. A number of distance education tools and technologies were found to be very useful, some that could be promising but will require further study, and still others that don't offer value and won't for the foreseeable future.

Dedication

The research conducted for this study is dedicated the men, women and children who struggle every day with their weight and the physical, medical, and emotional issues surrounding their condition. It is the sincere hope of this researcher that this work will contribute, in some small way, to their improved well-being, and, longer and healthier lives.

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Chapter I

INTRODUCTION

Obesity affects over 100 million individuals in North America alone, and its prevalence in youth is increasing. It is a significant factor contributing to diabetes, heart disease, degenerative joint disease, and premature death (Heetebry & Hatcher, 2009). While popular approaches to weight loss such as Weight Watchers International, Jenny Craig, and the South Beach and Atkins diets all have well publicized success stories, the obesity epidemic continues unabated. David Kessler (2009), former head of the U.S. Food and Drug Administration points out that without major material changes in multiple domains, the average North American has little or no chance of healthy weight attainment and management on their own. It would be easy to say the problem is that overweight and obese people eat too much and that they should just curtail their food consumption, the solution is far more complex.

Primary prevention, considered the best strategy for achieving positive outcomes, encompasses life style factors that involve weight management, healthy eating, and regular physical activity. Mental health and well-being is also involved as a range of social and psychological constructs such as self-efficacy, self-regulation, and locus of control appear to play a role in establishing and maintaining healthy behaviors. Current clinical approaches to obesity treatment include surgery, meal replacement, and lifestyle education. Often multiple interventions are used, combining surgery or meal replacement with education on achieving and maintaining a healthy lifestyle.

Since 2008, the Bariatric Clinic of a general hospital in southern Ontario has

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provided a program with the mandate to assist obese adults to modify their behaviors and make lifestyle changes that include healthful dietary choices and physical exercise. A major component of the program is the Lifestyle Modification Course (LMC), which addresses topics such as weight management, nutrition education, and physical training, and includes strategies for improving self-image, understanding and resisting food cravings, and identifying underlying causes of overeating.

To date, the program has been limited to a face-to-face mode, requiring participants to attend sessions at a local hospital for 26 consecutive weeks. Class size is limited to about 10 individuals. With such limited enrollment, the program is only addressing a small fraction of the obese individuals that such education and behavioral support would benefit in addressing their weight problems and live longer, healthier lives.

Dr. James O. Prochaska, a professor at the University of Rhode Island, Director of their Cancer Prevention Research Center, and co-developer of the transtheoretical model, also known as the Stages of Change framework, has estimated that the largest clinic-based delivery systems in the United States reach less than 5% of the overweight and obese populations (Prochaska, 2006, p.243). He suggests the settings in which the programs are delivered are themselves barriers and that marketing research has revealed that 5% of Americans want clinic-based weight-management programs, but 50% want home-based programs. He suggests that home-based programs can increase not only participation, but also efficacy: even when people attend clinics, they spend 99% of their waking week outside of therapy. Treatment needs to be home based as well as clinic based.

Prochaska (2006, p. 243) states that "individualized and interactive interventions have the greatest efficacy. Delivering treatments at home requires using computers to complement a traditional clinician paradigm. Computers can provide individualized and interactive interventions that model the efforts of expert clinicians". These treatments, whether clinic or home based, include a substantial education component. The learning process begins with convincing patients they do indeed need to change. It is followed by teaching the multitude of skills and modified behaviors that will be needed to effect a lifestyle change. Ongoing learning support must also be provided for individuals who are actively making healthful lifestyle choices, and losing and maintaining weight.

Treatment resources using distance education processes and technologies may provide a valuable tool for addressing the North American obesity epidemic on a population scale. Since 2000, several studies have demonstrated the effectiveness of specific online and/or computer-based technologies for the treatment of obesity (Heetebry & Hatcher, 2009; McCormack & Coulson, 2009; White & Dorman, 2001; Hwang et al., 2010; Micco et al., 2007; Tate, Jackvony & Wing, 2003; Tate, Wing & Winett, 2001; Prochaska, 2004; Kreuter, Strecher, & Glassman, 1999). These technologies included the following: discussion forums for social support; well-designed, interactive content; e-mail counseling; websites for information distribution; spreadsheets that provided feedback on maintaining weight following the active weight loss period. The use of distance education technologies may support the knowledge, skills, and attitudes that contribute to a healthy lifestyle, such as making appropriate dietary and physical exercise choices.

PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

The study explored the use of selected distance education technologies for lifestyle change for overweight and obese individuals. Participants were asked to complete a survey on technology adoption. Some were also provided with a set of online tools, resources, and instructional modules to use and evaluate; semi-structured interviews were then used to assess the usefulness of the course materials. The study addressed the following research questions:

1. What are the major barriers and facilitating factors influencing the adoption and use of online technology in lifestyle change related to weight loss and management?

2. Have users adopted the following tools or resources often used in distance education, and what is the nature of that use? a) information and communication technologies; b) discussion forums; c) online communities; d) digital media; e) mobile devices.

3. How useful do users perceive the following online tools or resources in supporting weight loss-related lifestyle change, and how likely are they to use these tools and resources? a) multimedia tutorials; (b) videos presenting weight loss-related content and role models; c) self-monitoring tools, such as diet and exercise journals; d) social support tools, such as discussion forums and online communities.

LIMITATIONS OF THE STUDY

Limitations are factors that may affect the study, but that are not under the control of the researcher (Mauch & Park, 2003, p.114). The results of this study cannot be generalized to other settings for obesity-related lifestyle change due to the limitations of case study design. Case studies are not representative of entire populations, and their findings are not considered to be generalizable (Yin, 1999, p. 1212).

The questionnaire-only participants for the study were limited to current patients in the Bariatric Clinic. They differed from the general population, as the majority of obese adults do not have access to hospital- or clinic-based programs. The constrained nature of the participants does not permit generalization of the study's results to a larger segment of the general population in any way.

The hospital's Research Ethics Board did not allow any direct contact with the Bariatric Clinic patients. The researcher was only allowed to interact with the medical director and the lifestyle modification course facilitator, who was also the dietitian for the clinic. The survey responses were self-reported.

DELIMITATIONS OF THE STUDY

Delimitations are factors that may affect the study, but that are under the control of the researcher (Mauch & Park, 2003, p.114). The study did not engage in a comparison of various obesity management approaches. Current clinical practice has well established approaches with many commonalities amongst them. The distance education tools and technologies examined in this study were developed to support the commonalities

amongst different weight management strategies.

No medical data were collected from the study participants. Due to confidentiality and informed consent considerations, all data were obtained directly from participants at the time of the study.

The study website included several videos demonstrating physical exercise, which involved learning psychomotor skills. The objective was only to evaluate subjects' reactions to and impressions of the videos. Therefore, the study did not examine the instructional design concepts for psychomotor skills in order to keep the scope of the study within manageable limits.

DEFINITION OF TERMS

The terms defined below are used frequently or have a specific meaning in the study.

Affordance is a characteristic of an object, relating to its potential utility, which can be
  inferred from visual or other perceptual signals.

Bariatrics refers to the branch of medicine that deals with the causes, prevention, and
  treatment of obesity.

Body mass index (BMI) is a measurement of the relative percentages of fat and muscle
  mass in the human body, in which mass in kilograms is divided by height in
  meters squared, and the result used as an index of obesity. The National Heart,
  Lung, and Blood Institute (2011), part of the U.S. National Institutes of Health,
  state that a healthy BMI falls in the range between 18.5 and 24.9.

Broadband Internet access has a high data rate connection to the Internet, typically from

256 kilobits to 4.0 megabits (a bit is derived from "binary digit," having a value

of 0 or 1), in contrast to a dial-up modem, which typically has a data rate of

56 kilobits.

Chat is an Internet technology that allows users to have a text-based, real-time online

conversation via a network.

Cloud Computing provides access via the Internet to processing power, storage, software

and other computing services, often via a web browser. It is based on sharing

computing resources rather than using local servers or personal computers to

handle applications.

Computer-Mediated Communication (CMC) is defined as any communicative transaction

that occurs through the use of two or more networked computers. Traditionally,

CMC technologies were limited to e-mails, instant messages, and discussion

forums. However, with the advancement of mobile technologies and social

software, other applications have emerged such as text messaging and social

networking.

Distance Education refers to learning situations where the teacher and learner are not

physically proximate. Moore and Kearsley (2005) define distance education as

"the family of instructional methods in which the teaching behaviors are executed

apart from the learning behaviors" (p. 221). They further explain that distance

learning is different from contiguous courses beyond the separation of geography

and time, and that a *transactional distance* exists, defined as a "gap of

understanding and communication between teachers and learners caused by [the separation] that must be bridged through distinctive procedures in instructional design and the facilitation of interaction" (p. 223).

Google Docs is a free, web-based word processing, spreadsheet, presentation, and data storage service offered by Google. It allows users to create and edit documents online while collaborating in real-time with other users. Users can store document files, up to 1 GB each, online.

Information and communications technology (ICT) consists of information technology as well as telephony, broadcast media, and all types of audio and video processing and transmission.

Obesity is generally accepted to involve having a body mass index greater than 30. There are three classes of obesity: Class I pertains to individuals with a BMI in between 30 and 35; Class II obesity is defined by a BMI between 35 and 40; Class III, sometimes referred to as morbid obesity, is indicated by a BMI greater than 40.

Overweight is defined as a BMI between 25 and 30. Being overweight is not the same as being obese, however if the lifestyle that contributed to the increased weight is not modified, obesity will usually, in time, occur.

Social Media is the use of web-based and mobile technologies to turn communication into interactive dialogue. It blends technology and social interaction for the co-creation of value.

Social Networking is an online service, platform, or site that focuses on the building and reflecting of social networks or social relations among people, who often share

interests and/or activities.

Twitter is a social media website, owned and operated by Twitter Inc., which offers a

social networking and micro-blogging service, enabling its users to send and read

text-based messages of up to 140 characters displayed on the user's profile page.

These messages are publicly visible by default; however, senders can restrict

message delivery.

SUMMARY

In this first chapter, the reasons for conducting study were described and the

purpose of the study was put forth including questions relating to specific aspects of

distance education and technology. Factors that define the boundaries of the study, some

under the control of the researcher and some not, were elaborated. The balance of this

thesis uses the linear-analytic structure to report the study's findings, as recommended by

Yin (2009, p.176) when the main audience is the members of a thesis committee.

Chapter 2 presents a review of the literature in multiple domains as they pertain to

the study including the following: clinical practices for obesity management; the stages of

change processes; distance education; technology access and adoption; and, learning

outcomes and instructional design. Past research serves to illuminate areas of interest to

this study.

Chapter 3 discusses the methodology of the study. It provides details of the study

participants and describes the manner in which they were recruited. Details of the website

developed for the study are presented, including the intent of each element. The research

procedure is described in detail followed by the ethical considerations that guided every aspect of the research.

Chapter 4 presents the results of the survey and qualitative interviews. A discussion of the results and how they contribute to the research questions is included.

Chapter 5 elaborates upon the conclusions that can be drawn from the research and closes with suggestions for topics of further investigation.

CHAPTER 2

REVIEW OF THE LITERATURE

The study investigated the how selected distance and online technologies may promote lifestyle change associated with weight loss and maintenance. A multitude of domains and underlying processes are interwoven in weight management and lifestyle change strategies. In order to inform the study and to situate it within a context of related theory and research, the literature review traversed several areas, including: distance education technology; diffusion of innovation; obesity management strategies; theoretical framework for change: the transtheoretical model; related psychological constructs (i.e., self-efficacy, locus of control, resilience); and related instructional strategies.

TECHNOLOGY

Technology is the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science. Areas related to technology that are of interest to this study include: access to technology, technology adoption, and technological perceived affordance.

Access to Technology

 Bates (2005) states that "no matter what the quality of teaching with technology, learning will not occur without access to that technology" (p. 50), and offers several techniques, in the form of questions such as the following, to understand the access issues around a given distance learning program: "Who are [the learners] that we want to reach?" and "What is the most appropriate location for study for the intended learners?"

Bates (2005) further states that "home access to technology will often be the most convenient for distance learners and the most economical delivery location for institutions" (p. 52). The same is likely true for the treatment of obesity. In a study pertaining to access of obese individuals to treatment programs and resources, Prochaska (2004, p. 243) found that 50% of overweight and obese adults wanted home-based programs and recommended the use of computer-based treatment. However, his recommendation did not consider the installed base of personal computers, access to broadband Internet connectivity, or the ability of the target audience to use digital technologies. Access to online resources and availability of equipment are likely to be important considerations for assessing the appropriateness of a particular technology for effecting lifestyle changes associated with weight loss. The affordances of the particular technology will also play an important role.

Technological Affordance

The clinical psychologist J.J. Gibson (1977, 1979) coined the term "affordance" to refer to the actionable properties between the world and an actor. Gibson (1979) explained the term as follows:

> The *affordances* of the environment are what it *offers* the animal, what it
> *provides* or *furnishes*, either for good or ill...I mean by it something that
> refers to both the environment and the animal in a way that no existing
> term does. It implies the complementarity of the animal and the
> environment (Gibson, 1979, p.127, italics in original)

A decade later, another definition, which included the addition of perception, was offered

by Norman (1988).

> The term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. A chair affords ("is for") support and, therefore, affords sitting. A chair can also be carried. (Norman, 1988, p. 9)

In a review of the concept of affordances, Norman (1999) stated that "to Gibson, affordances are relationships. They exist naturally: they do not have to be visible, known, or desirable" (p. 39). Essentially, affordances are part of the nature of the object. Norman (1999) further revised his view on affordance, using the term *perceived* affordance. He explained that until an affordance is perceived, it is of no utility or is not useful to the potential user; real affordances are not nearly as important as perceived affordances. It is perceived affordances that determine the actions that can be performed and signal to the user how they may be accomplished.

The difference in the two perspectives can interpreted in terms of technology. Gibson's intent could best be related to the features and functions of a given technology. The features and functions exist whether or not the user is aware of them, much the way that most users use only a fraction of the actual functionality of a typical word processing application. The features and functions the user is aware of can be called "value," which Mello, Mackey, Lasser, and Tait (2006) define as "a solution that removes the frustrations, difficulties, challenges, or impossibilities from the user" (p. 30).

Technology Adoption

In order for a technology-based lifestyle modification program to be successful,

the individual participants must first be willing and interested to do use the online tools and resources involved in the program. This openness to adoption can be predicated on a technology's *perceived* affordance, i.e., the readily apparent or available quality or utility of the technology. The adoption of an online resource for lifestyle change or weight loss is further affected by general attitudes towards technology, which could amount to a substantial impediment or benefit, depending on the individual.

Two technology adoption paradigms are presented here: the Technology Acceptance Model and the Theory of Diffusion of Innovation. The former describes the factors involved in an individual's choice to use a given innovation or technology, while the latter categorizes individuals according to their proclivity to adopt a technology.

Technology Acceptance Model -- The objective of the Technology Acceptance Model is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations" (Davis, Bagozzi, & Warshaw, 1989). The model originally suggested that two beliefs—"perceived usefulness and perceived ease of use— are instrumental in explaining the variance in users' intentions. Perceived usefulness is the degree to which a person believes that using a particular system enhances his or her job performance. Perceived ease of use is the degree to which a person believes that using a particular system will be free of effort. These factors are common in technology-usage settings and can be applied widely to solve the acceptance problem" (Chang & Tung, 2008, pp. 73-74).

Theory of Diffusion of Innovation -- Rogers' (2003) Theory of Diffusion of

Innovation indicates that people will react differently to an innovation, depending on their individual perceptions of that innovation (p.12). An individual's innovation-related decision making process involves a progression through five stages identified by Rogers (2003, p. 169) as follows:

1. *Knowledge* - awareness of the innovation;

2. *Persuasion* - forming favorable or unfavorable attitudes toward the innovation;

3. *Decisions* - choosing to adopt or reject the innovation after engaging with it;

4. *Implementation* - putting the innovation to use;

5. *Confirmation* - seeking reinforcement of the decision to continue, reinvent, or revise the decision.

Recognizing that people adopt innovations at different rates, Rogers (2003) developed the technology adoption lifecycle model based on five types of innovation adopters.

- *Innovators* are venturesome, possessing an obsession for new technological innovations (p. 282).

- *Early adopters* are less motivated by the intrinsic value of an innovation, instead understanding, ahead of the average person, the value of an innovation and how it effects them and enhances their environment;

- The *Early Majority* adopt new ideas just before the average individual; they typically, deliberate for some time before completely adopting a new idea (pp. 283-284);

- The *Late Majority* adopt new ideas just after the average member does, and retain

a great deal of skepticism (p. 284);

- *Laggards* are suspicious of change (p. 284). Moore (1995, p. 17) further notes of this group that they delight in endlessly criticizing technology.

Identifying an individual's technology adoption category could assist clinicians in determining the technological mix that maximizes the success of a technology-based lifestyle change and weight management program.

Diffusion Theory and Technology Adoption Research -- Descriptions of studies in diffusion theory and technology adoption pertinent to this study are provided below.

Chang and Tung (2008) conducted an empirical investigation of students' behavioural intentions to use online learning websites. They proposed a hybrid model based on merging the Technology Acceptance Model and the Theory of Diffusion of Innovation, and adding parameters for perceived system quality and computer self-efficacy. Their quantitative study of 212 participants determined that compatibility -- the degree to which an innovation was perceived to be consistent with the potential user's existing values, previous experiences, and needs -- had a great positive and direct effect on perceived usefulness and the behavioural intention to use online learning websites.

Kahler (2009) proposed a model of technology acceptance and use based on the belief that potential users should be given the time and opportunity to practice with an innovation before deciding whether or not to adopt it. The premise was that such prior exposure may increase the perceived value toward the innovation and lead to higher levels of implementation, as noted in the following statement: "Increasing experience with an innovation provides a more voluntary basis for an intention to use an innovation

versus compliance of use from social influence and affects actual usage" (p. 60).

OBESITY MANAGEMENT STRATEGIES

The clinical management of the obese patient involves multiple treatment strategies, with most focusing on modifying the individual's lifestyle such as dietary and physical activity habits. Effecting changes in eating, exercise, or other behaviors that contribute to obesity involves strategies and techniques such as self-monitoring, stimulus control, cognitive restructuring, stress management, and social support (Poston & Foreyt, 2000). Individuals require knowledge and skills in these various techniques to lose weight and maintain that loss.

Self-Monitoring

Self-monitoring, sometimes referred to as journaling, is the systematic observation and recording of personal target behaviors. Self-monitoring tools for obesity management include food diaries, physical activity logs, weight scales, and body composition devices. The primary purpose of self-monitoring is for individuals to become more aware of their behaviors, the factors that influence those behaviors, and the beneficial and detrimental effect of the behaviours on their weight management efforts. Research has consistently demonstrated that self-monitoring is associated with improved treatment outcomes, and patients report that it is one of the most helpful tools in obesity management (Poston & Foreyt, 2000).

In a study of all-female relapsers, maintainers, and always-average-weight control subjects by Kayman, Bruvold and Stern (1990), 87% of maintainers and 76% of control

subjects regularly weighed themselves on a scale. In the same study, it was also found that 23% of maintainers and 29% of the control subjects used a simple heuristic, the feel of their clothes: if they're tight, lose weight.

Baker and Kirschenbaum (1993), in a study of 56 subjects (48 female, 8 male), demonstrated a relationship between amount of monitoring and subsequent weight loss. Greater percentages of subjects lost weight in the quartiles that reflected greater levels of consistency and completeness of monitoring. Specifically, 41%, 47%, 72%, and 100% lost weight at the respective quartiles at 12 weeks into the study. They concluded that "self-monitoring consistently emerged as a vital component of effective weight control in [their] study" (p. 388).

Self-monitoring of food and drink intake and weight is the cornerstone of behavioral weight management (Levy, 2007, p. 2315). Its purpose is meta-cognitive in nature, i.e., to make individuals more aware of their eating and activity patterns. Tools that can be used for this purpose include food, exercise, and weight logs. Levy, Finch, Crowell, Talley, & Jeffery (2007) found that consistent self-monitoring of diet was highly correlated with successful weight loss. Wing, Tate, Gorin, Raynor, and Fava (2006) reported that regular tracking of body weight contributed substantially to reducing weight regain during maintenance.

In a study involving 213 participants, Jeffery et al. (2009) reported satisfactory results with the Food Frequency Questionnaire (Block et al., 1986) to self-monitor dietary intake and with the Paffenbarger Activity Questionnaire (Paffenbarger, Wing, & Hyde, 1978) to self-monitor physical activity. Although some concern has been expressed over

the effectiveness of self-monitoring logs due to the unreliable nature of self-reported data (Cowburn, Hillsdon & Hankey, 1997), it has been found to produce more positive results compared to not logging at all because it increases self-awareness.

Goal setting

Levy, Finch, Crowell, Talley, and Jeffery (2007) relate that in behavioral weight loss programs, individuals should set goals which are expressed in units specifically pertinent to weight change (e.g., calorie intake of 1,000–2,000 kcal per day, fat gram intake of 20–30% of daily calories). Specificity is key so progress toward or attainment of goals can be easily verified. Goal setting may also pertain to antecedents or "triggers" of episodes of overeating (e.g., reducing the rate of eating, grocery shopping with a list and on a full stomach) or to consequences of overeating (e.g., relapse prevention, cognitive restructuring of maladaptive thoughts of failure).

Cognitive Restructuring

Cognitive restructuring is an important component in weight management programs, because obese patients often have poor self-esteem and a distorted body image (Poston & Foreyt, 2000). Through cognitive restructuring, individuals can become more aware of how they perceive themselves and their weight, and can learn to change internal dialogues that undermine weight management efforts.

Stress management.

Stress is a primary factor in relapse and overeating, therefore stress management techniques to reduce stress and tension are crucial (Kayman et al., 1990). Tension reduction techniques like diaphragmatic breathing, progressive muscle relaxation, and

meditation also reduce tension (Everly, 1989).

Social support.

Individuals with higher levels of social support tend to have more success in achieving and maintaining weight loss (Kayman et al., 1990). Social support can come from numerous sources, such as inclusion of the family in the obesity treatment program, participation in community-based programs, and involvement in outside social activities such as continuing education courses, health clubs, and church-related activities. These groups or programs do not need to be oriented toward weight management. Peer support can be particularly useful for helping individuals to become more self-accepting, develop new norms for interpersonal relationships, and manage stressful situations (Poston & Foreyt, 2000).

Levy et al. (2007) found that patients who perceived they had more social support tended to be more successful at weight loss and maintenance (p. 2316). They also noted modest improvements in success rates when social support stemmed from naturally occurring relationships other than spouses (e.g., from other members of a weight loss group). Similarly, a study of the social support needs of 96 obese and overweight women (Thomas et al., 2009) found that 68% of the participants were interested in receiving support from others focused on the health benefits of weight loss. Behaviors perceived as supportive include co-participating in exercise, providing nutrition education, using positive reinforcement, and avoiding criticism. Participants expressed a preference for supportive communications framed in a discussion of health improvement, rather than enhanced appearance and tangible forms of support (pp. 346-347). Individuals identified

social support as critical for the successful maintenance of weight loss (p. 348).

Rigsby, Gropper, and Gropper (2009) studied a worksite-based weight loss program involving 72 female hospital and nursing home employees. The employees could enroll as individuals or as part of a group. The women who were part of a group lost significantly more weight and body fat than those who participated as individuals (weight, 7.6 lb and 4.2 lb, respectively; body fat, 1.7% and 0.9%, respectively). The higher success of those participating in groups was attributed to the greater level of social support (or peer pressure) found in the group setting (p. 129).

In a study of online social support, McCormack and Coulson (2009) examined the nature and types of social support exchanged among 95 participants in an online anorexia discussion forum. Results of the deductive thematic analysis of 325 messages suggested that the primary functions of the group involved communication of encouragement and esteem, and information support notably in terms of diagnosis, treatment, and interaction with health care specialists.

White and Dorman (2001) conducted a literature review, examining the development of health-related online support groups, analyzing research conducted within these communities, and comparing the utility of online and traditional support groups. In addition to the previously known restrictions of time, space, and geography posed by in-person sessions, they identified the following important differences between face-to-face and online support: membership in online groups was often unlimited; caregivers welcomed the ability to write about problems as care giving responsibilities and the advent of crises allowed; asynchronous communication allowed members to

think carefully and deliberately before sending messages or responding to postings. Gender differences were also reported. Men used computer-mediated support more frequently than they used face-to-face support groups, possibly due to their comfort with using computer technology coupled with the anonymity that the computer provided (p. 702). In addition, men were twice as likely to give or ask for information related to a disorder, whereas women used the group to share personal experiences and provide encouragement and support.

White and Dorman (2001) and McCormack and Coulson (2009) identified a number of advantages and disadvantages of computer-mediated support groups. Advantages included the following: around-the-clock access to the forum; the potential to serve clients who were unable or unwilling to participate in traditional face-to-face support groups; people with stigmatizing disorders or those wishing to discuss sensitive or "taboo" issues may find computer-mediated support groups more welcoming because of the anonymity they provide; the pressure for immediate response is reduced, allowing members to post a comment if and when they want to; shy members can gain support by "lurking" (reading messages without responding) until they feel comfortable with the group norms and can directly request and provide support. Only a few disadvantages were identified: participants must have Internet connections; users had to be sufficiently computer- and Internet-literate; lack of control over who may participate in the group; inaccurate and dangerous information; messages may be easily misinterpreted due to the absence of visual and aural cues.

Hwang et al. (2010) conducted a study to explore the nature and potential benefit

of social support for weight loss shared among participants of SparkPeople, an online weight loss-related community. They used a mixed-methods approach with surveys (n = 193) and interviews of community members (n = 13) along with a content analysis of discussion forum messages (n = 1924 messages). Qualitative data were analyzed for social support themes. The results showed that the participants used forums frequently, with 56.8% reading messages, 36.1% replying to messages, and 18.5% posting messages to start a discussion related to weight loss on a daily or more frequent basis. Major social support themes were as follows: encouragement and motivation, mentioned at least once by 87.6% of survey respondents; information (58.5%); shared experiences (42.5%). Subthemes included the following: testimonies, recognition for success, accountability, friendly competition, and humor. Members valued convenience, anonymity, and the non-judgmental interactions as unique characteristics of Internet-mediated support.

Hwang et al. (2010, p. 12) offered several interesting conclusions with respect to this project. The online weight loss community played a prominent role in participants' weight loss efforts—roles that might not be adequately filled by clinicians or offline family and friends; Internet-mediated support provided similar benefits as face-to-face support, with unique convenience, anonymity, and lack of judgment; participants reported that the support from the SparkPeople community helped them lose weight as well as better cope with being overweight.

Weight Maintenance

Given the difficulty of most individuals to achieve reasonable weight loss goals, it should come as no surprise that weight regain prevention is equally or more important in

a weight management program. Jeffery et al. (2009) described weight maintenance as the "Achilles heel" of all weight loss therapies. Levy et al. (2007) noted that systematic research on weight loss maintenance strategies was in its infancy. Wing et al. (2006), in a study of 304 participants, found that after 18 months, the average weight regain was approximately 4 kg. Nonetheless, their study reported a 50% reduction in weight regain over 18 months.

Kayman et al. (1990, p. 805) in a study involving 74 participants, found that social support or the perception that family or friends are available to discuss troubles and offer help when needed was significantly greater for the maintainers than for the relapsers. They noted that there was some indication that social support played a role in the maintenance of new health behaviors, and that it probably acted to buffer stress and could be used to assist people in making stressful decisions (p. 806), a conclusion also supported by Wiczinski, Döring, von Lengerke and John(2009).

Online Obesity Management Programs

This section focuses on research and experience with online behavior modification education for weight loss. Several studies with varying degrees of online content, social support, and clinician contact are examined.

Heetebry and Hatcher (2009) conducted a literature review of patient health care education to develop a set of guidelines for nurse-facilitated web-based delivery of weight management education. They noted the following: that healthcare providers may not have the necessary background, such as instructional design, to develop or provide health education to a specific population; online active learning for weight management

allows participants to ask questions without the stress, expense, or time commitment of face-to-face contact; facilitators needed to be properly trained in motivational interviewing to encourage participants to resolve barriers that hinder weight management.

Sigrist (2004) studied the effectiveness of an online nutrition and fitness education program for senior military officers. The theoretical framework of the program was based on the Transtheoretical Model and combined cognitive and behavioral change processes to modify behavior. The participants were enrolled in the U.S. Army War College Department of Distance Education. The instruction took the form of a monthly newsletter posted on a dedicated website. The study relied on the participants' own self-discipline to follow the newsletter and integrate it into their lifestyles. The study concluded that the Internet is a viable mode of educational delivery.

Tate et al. (2001) compared the weight loss of participants assigned to a six-month behavior therapy program involving a website and e-mail/discussion group support, compared to those receiving the website only. Each group received an initial face-to-face weight loss session and was then given access to a web site with links to online weight loss resources. Participants in the behavior therapy group also received the following: a) weekly behavioral lessons via e-mail (a total of 24 over the six-month period), b) weekly individualized feedback from a therapist via e-mail commenting on the previous week's self-monitoring diary (submitted electronically), and c) an online discussion forum. At the end of six months, the behavior therapy group had lost significantly more weight than the education-only group (4.1 kg vs. 1.7 kg, p < .005).

Tate et al. (2003) compared two web-based weight loss programs, one with the

addition of a behavioral e-counseling component. After 12 months, those in the e-counseling group lost significantly more weight (4.4 vs. 2.0 kg, p = .04).

In a literature review, Micco et al. (2007) observed that the weight losses in the Tate et al. (2001) and Tate, Jackvony, and Wing (2003) studies were comparable to those achieved in other minimal contact interventions, but were well below the 9 kg losses obtained in face-to-face programs (p. 50). They further noted that despite these differences, the Internet appeared to be a viable medium for conducting weight loss interventions, but that further research was needed to examine the effects of different types of contact and levels of support.

Micco et al. (2007) compared an online behavioral weight-loss treatment program with the same program supplemented with monthly in-person meetings. The 123 participants were randomly assigned to an Internet-only (n = 62) or an Internet plus in-person treatment (n = 61). All participants then participated in a 12-month behavioral weight-loss program conducted over the Internet. The groups met online weekly for the first six months and biweekly for the second half of the program. The Internet plus in-person treatment group had access to the same website as the Internet-only group, but also attended monthly in-person meetings. Assessments at the in-person meetings included body weight, program adherence, and social support measures. The study concluded that supplementing an Internet weight-loss treatment with monthly in-person meetings did not result in greater weight losses over 12 months, noting that dynamic, socially supportive, and interactive elements of the website may have obviated the need for further interpersonal behavioral counseling.

FRAMEWORK FOR LIFESTYLE CHANGE

The Transtheoretical Model (TTM) (Prochaska, Norcross, & DiClemente, 1994) describes an individual's progression through a number of stages on the way to achieving a healthy lifestyle. The TTM is a helpful framework for understanding the process of lifestyle change and weight management. The stages and processes of change in the TTM are described below.

<u>Stages of Change</u>

Five stages are involved in the change process: pre-contemplation, contemplation, preparation, action, and maintenance. Individuals cannot progress to the next stage until the requisite tasks associated with their present stage are completed. Moisey (2001) provides a description of those stages and the tasks – or processes - that must be completed before progressing to the next stage (Table 1). A critical aspect of stage classification is the temporal dimension. An individual's proximity, in time, to a certain stage is a major factor in determining their current stage.

Table 1.

Stages of Readiness for Change: The Transtheoretical Model

Stage	Description	Tasks to Complete
Pre-contemplation	People in the pre-contemplation stage usually have no intention of changing their behavior, and typically deny they have a problem.	The individual must become aware of their behavior (or lack thereof).
Contemplation	The individual acknowledges he or she has a problem and is seriously thinking about solving it; he or she has not yet made a commitment to take action to change the behavior.	The individual must gain information and understanding of their behavior, and to weigh the pros and cons of the problem and its solution.
Preparation	People in the preparation stage are planning to take action. The individual may be committed to action, but still feel ambivalent about making a change.	Develop a plan for change.
Action	Where the individual actually changes the behavior(s).	Demonstrate behavior.
Maintenance	The gains attained during the action and other previous stages are consolidated. The individual typically struggles to prevent lapses and relapses.	Stabilize the behavior and avoid relapse.

Rogers (2003, pp. 198-202) proposes a relationship between this innovation-decision making process, the hierarchy-of-effects model developed by McGuire (1984), and the Transtheoretical Model. Table 2 elaborates upon this relationship. These theories may relate to a common underlying phenomenon, namely, the process that individuals go through when making decisions about changing behaviors or adopting a new technology.

Table 2.

The relationship between the Innovation-Decision process, the Hierarchy-of-Effects and the Stages of Change (Rogers, 2003, p.199)

Stages in the Innovation-Decision Process	Hierarchy-of-Effects	Stages of Change
Knowledge	• Recall of information • Comprehension of messages • Knowledge or skill for effective adoption of innovation	Precontemplation
Persuasion	• Liking the innovation • Discussion of the new behavior with others • Forming a positive image of the innovation	Contemplation
Decision	• Intention to seek additional information about the innovations • Intention to try the innovation.	Preparation
Implementation	• Acquisition of additional information • Use of innovation on a regular basis	Action
Confirmation	• Recognition of benefits of innovation • Integration into one's routine • Promotion of innovation to others	Maintenance

Processes of change

The processes of change are the activities that people use to progress through the stages. These processes provide important guides for intervention programs, as they indicate what people need to apply, or be engaged in, to move from stage to stage. The progression through the stages is based on the individual's "decisional balance," which "involves weighting the importance of the Pros and Cons. A predictable pattern has been observed of how the Pros and Cons relate to the stages" (Velicer, Prochaska, Fava, Norman, & Redding, 1998, p.1).

Velicer et al. (1998) have categorized the various process types and how they are

stage appropriate (Table 3). Essentially, processes that are not appropriate to the

individual's current stage will have little or no effect, similar to the changing conditions

that support Maslow's hierarchy of needs (Bay, 1980). The customization of interventions

as related to an individual's current stage is called TTM tailoring.

Enwald and Huotari (2010) conducted a literature review of tailored health

communication studies aimed at behavior change in nutrition, physical activity, or weight

management. Of the 23 studies examined, 14 used TTM. They determined that tailoring

was more effective in nutrition interventions than in physical activity and weight

management interventions.

Table 3.

Taxonomy of TTM stages and appropriate change processes

TTM Stage	Process	Description
	COGNITIVE CHANGE PROCESSES	
Precontemplation / Contemplation	Consciousness raising	Increasing one's level of knowledge or awareness about self and problem behavior through the use of statistics and personal anecdotes
	Dramatic relief	Experiencing and expressing deep emotions about one's problem behavior; real—life tragedies, dramatic films and stories, and other fear arousal techniques often trigger this process
	Self-reevaluation	Assessing how one feels and thinks about continuing with a problem behavior and how one would think and feel if the behavior was changed
	Environmental reevaluation	Assessing how one's behavior problem affects the physical environment
	Social liberation	Increasing alternatives for non—problem behaviors available in society; increased awareness of social opportunities available for changing the problem behavior
	BEHAVIORAL CHANGE PROCESSES	
Preparation / Action / Maintenance	Self-liberation	Committing to change the problem; accepting personal responsibility for the behavior change
	Counterconditioning	Substituting positive alternative behaviors for problem behaviors
	Stimulus control	Avoiding or countering situations or stimuli that trigger problem behaviors; removing cues in the environment that lead to unhealthy behavior
	Reinforcement management	Rewarding self or being rewarded by others for making changes; often includes self-praise or gifts to recognize reaching a certain goal
	Helping relationships	Trusting and utilizing support from others to help in the change process; eliciting support, understanding and encouragement from others

West (2005, 2006) and Prochaska (2006) debated the merits of TTM in a series of editorials in the journal *Addiction*. Table 4 summarizes West's criticisms and Prochaska's responses. Regardless of the outcome of this debate, the Transtheoretical Model provides a valuable theoretical framework for the Lifestyle Modification course and the tools that

will be studied to effect those lifestyle changes.

Table 4. West and Prochaska's debate of the merits of TTM

West's Criticisms of TTM	Prochaska's Response
The model is flawed in its basic tenet of stages which he calls "arbitrary divisions to differentiate between the stages. [They are] not genuine stages." The TTM approach to classifying individuals "assumes that individuals typically make coherent and stable plans. He cites Larabie that "more than half of reports to quit [smoking] … involved no planning or preparation at all."	Discrete criteria (such as stage) are somewhat arbitrary but in practice they are also necessary. TTM has not had a problem with including both discrete and continuous variables. The fact is only one of the fifteen TTM variables (stage) is discrete. It is only when standardized scores are used, and the individual's more conscious responses are standardized across their peers in all stages that clear patterns of decision making by stage are found across nearly 50 health-related behaviors.
Referring to studies by others, West contends that "the stage definitions represent a mixture of different types of constructs that do not fit coherently." He further declares that "[TTM] is not a statement of 'readiness' to change. Readiness or even preparedness are not actually assessed."	In one study, Biener and Abrams conclude that the contemplation ladder 'was uniquely suited to measuring earlier stages of readiness' and Prochaska was acknowledged for his contributions to this measure.
TTM focuses on conscious decision-making and neglects the role of reward and punishment, especially in the case of addictions like drugs, alcohol and smoking.	Reinforcement and punishment principles from Skinner's Operant Theory have been part of TTM processes of change from the start. Counterconditioning and stimulus control principles based on associative learning have also been an integral part of TTM processes with the recognition that entrenched habits must be countered by healthier behaviors that can become stronger than habits such as addictions.
Proponents of TTM appear to not report findings showing that the model is better at predicting behavior compared to simple questions such as 'Do you want to … ?' or 'Do you have plans to … ?'.	[Studies] found with 2379 smokers in pre-action stages that baseline TTM measures of behavioral change processes, pros of smoking and self-efficacy all predicted progress to action and maintenance at 24 months. Experiential processes did not predict progress. This is what TTM predicts. We do not know of any other theory that would predict this pattern.

RELATED PSYCHOLOGICAL CONSTRUCTS

Social cognitive theory, developed by Julian Rotter (1954), is based on the idea

that personality represents an interaction between individuals with their environment:

personality can neither be independent of the environment, nor an automatic response to

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an objective set of environmental stimuli. Of particular interest to this study is not the breadth of social cognitive theory, but rather a particular subset of psychological constructs: self-efficacy and locus of control.

<u>Self-efficacy</u>

Self-efficacy is a strong source of motivation for learners involving their beliefs about themselves in relation to task difficulty and their ability to achieve a desired outcome (Driscoll, 2005, p.316). According to Bandura (1997), "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p.3). People make judgments about their ability to perform certain actions required to achieve a desirable outcome. Based on those judgments, they choose whether or not to engage in those actions. The self-efficacy construct in TTM, "represents the situation specific confidence that people have that they can cope with high-risk situations without relapsing to their unhealthy or high-risk habit" (Velicer et al., 1998).

Self-efficacy is considered to be a generative capability, not a fixed trait (Bandura, 1997). Driscoll (2005) notes that people can develop self-efficacy beliefs in different areas and to different degrees; she further notes that optimistic self-efficacy appraisals benefit the individual, whereas realistic appraisals can be self-limiting (p. 318), implying that self-efficacy beliefs can be learned.

Bandura (1977b) proposed a framework whereby certain efficacy expectations can be induced or taught. The framework is comprised of categories of major sources of information:

- *Performance accomplishments* – a learner's own previous experience at a task. These experiences are especially influential because they are self-evident proof that the learner can perform the chosen task and achieve desired outcomes (p.195);

- *Vicarious experiences* – the learner's observation of a trusted role model attaining success at a task. Because these experiences rely on inferences from social comparison, they are less dependable than personal experience to induce desired outcomes (p.197);

- *Verbal persuasion* – the process of others persuading the learner that he or she is capable of succeeding. This technique is widely used because of its ease and ready availability. However, efficacy expectations induced in this way are likely to be weaker than personal accomplishments, again because they do not provide an authentic experiential base for them (p.198);

- *Emotional arousal* – learners' physiological state convince them of probable success or failure. Individuals are more likely to expect success when they are not overcome by averse feelings compared to being tense or agitated.

Prochaska (2004) discusses social cognitive theory in its totality, noting that it "specifies factors governing the acquisition of competencies that can profoundly affect physical and emotional well-being as well as the self-regulation of health habits . . . Knowledge creates the precondition for change, but additional self influences are needed to overcome the impediments to adopting new lifestyle habits . . . Efficacy belief is a major basis of action. Unless people believe they can produce desired effects by their actions, they have little incentive to act" (p. 624).

Clark, Abrams, Niaru, Eaton, and Rossi (1991) conducted a study of 382 participants in which they developed and validated the Weight Efficacy Life-Style Questionnaire (WEL). Linde, Rothman, Baldwin, and Jeffery (2006) used the WEL in a study of 349 participants with satisfactory results. The 20-item WEL consists of five situational factors: Negative Emotions, Availability, Social Pressure, Physical Discomfort, and Positive Activities. Results from two separate clinical treatment studies (n = 382) show that the WEL is sensitive to changes in global scores as well as to a subset of the five situational factor scores. One of the online resources developed for this study was a self-assessment tool based on the Weight Efficacy Lifestyle Questionnaire self-assessment so that individuals could monitor changes in their self-efficacy as they progressed through the change process. Clark et al. (1991) recommend a set of cognitive-behavioral strategies to increase self-efficacy, including stimulus control procedures, problem-solving training, stress management skills, goal setting, development of healthy eating habits (e.g., slower eating), assertiveness training, facilitation of social supports, cognitive restructuring (e.g., changing maladaptive thinking regarding dieting), and relapse prevention training. Bandura (1998) advises that the most effective way of creating a strong sense of efficacy is through mastery experiences: successes build a robust belief in one's personal efficacy. The WEL self-assessment is intended to build this sense of mastery.

Locus of Control

Locus of control, developed by Julian Rotter (1966), is "the perceived source of control over one's behavior. People with an internal locus of control believe they control

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their own destiny. They tend to be convinced that their own skill, ability, and efforts determine the bulk of their life experiences. In contrast, people with an external locus of control believe that their lives are determined mainly by sources outside themselves: fate, chance, luck, or powerful others" (Bradshaw et al., 2007). An individual's locus of control can be classified along a continuum from very internal to very external. Rotter's (1966) generalized Locus of Control Scale is obtained through a questionnaire of 29 questions.

Furnham and Steele (1993) conducted a literature review that examined a number locus of control assessments, including several that are health-related and target obesity and dietary beliefs. Several early attempts at developing appropriate assessments of health-related locus of control gave rise to the Multidimensional Health Locus of Control Scale (Wallston, Wallston, & DeVellis., 1978) and the Weight Locus of Control Scale (Saltzer, 1982). The Dieting Beliefs Scale is a comparatively more recent examination of locus of control beliefs as they may affect weight-loss goals/achievement (Furnham & Steele, 1993).

A still more recent self-assessment for weight locus of control, The Weight Control Beliefs Questionnaire (WCBQ) (Laliberte, Newton, McCabe & Mills, 2007) measures an individual's beliefs underlying weight control e.g., "weight can and should be controlled") and non-dieting (e.g., "strive for a healthy lifestyle and accept one's natural weight"). The belief that one should control one's weight was found to be significantly related to disturbed eating, body dissatisfaction, and poor self-esteem; whereas the belief that one should control one's lifestyle and accept the resulting weight

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showed a strong protective relationship (p. 853). Laliberte, McCabe, and Taylor (2009)

offer an interpretation of the results, but caution that the WCBQ has only been studied in

women so the interpretation is more applicable to females. They note that while men can

do the questionnaire, the interpretation may not be the same as for women.

Resilience

Resilience is the ability to absorb high levels of disruptive change while

displaying minimal dysfunctional behavior (Werner, 1995; Kemp, 2001). Bradshaw et al.

(2007) provide additional definitions from the literature: ability to bounce back, rebound,

or recover; the ability to successfully adapt following exposure to stressful life events;

and being flexible and able to adjust, bounce back, cope with, or otherwise respond to

challenges, adversities, change, or stress. They further state there are several qualities that

make up resilience, including self-efficacy, locus of control, social support, interpersonal

relationships, purpose in life, and having goals, direction, and hope for the future.

Ahern, Kiehl, Sole, & Byers (2006) conducted a review of instruments

measuring resilience, evaluating six different resilience measurement scales: Baruth

Protective Factors Inventory; Connor–Davidson Resilience Scale; Resilience Scale for

Adults; Adolescent Resilience Scale; Brief-Resilient Coping Scale; Resilience Scale.

Only the Resilience Scale (25-Point Resilience Scale, 1987; 14-Point Resilience Scale,

2009) was seen to have had sufficient use across many population types, thereby making

it a potential tool for assessing resilience. Wagnild (2010) has suggested a series of

exercises that could be used as the basis of an instructional module to increase and

individual's resilience.

<u>Metacognition</u>

Metacognition refers to one's awareness of thinking and the self-regulatory behavior that accompanies this awareness. Older learners seem to have a better understanding of their memory abilities and limitations than younger learners (Driscoll, p. 107). Dobrovolny (2006) found that metacognition was the most important strategy adult learners used to guide their learning in a self-study regimen, and described it as the process of instigating learning, regulating and modifying cognitive activity, planning and selecting strategies, monitoring the progress of learning, correcting errors, and changing strategies when necessary.

<u>DISTANCE EDUCATION TECHNOLOGY</u>

In its broadest sense, technology can be defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. It combines resources to produce desired products, to solve problems, and to fulfill needs or satisfy wants; technology includes technical methods, skills, processes, techniques, tools and raw materials.

Distance education technologies are the most useful for telecommunications, or communicating at a distance. Educational technology is the combination of equipment, expertise, and services that create, conduct, manage, and support teaching and learning: it is the communications that technology supports in teaching and learning situations that make them educational. Essentially, these technologies are intended to bridge the transactional distance inherent in all distance education. Garrison (1990) identifies the

major role of technology in education as facilitating interaction amongst the three members of the learning triangle: learners, tutors (i.e., instructors), and content. The online resources for this study primarily focused on learner-learner and learner-content interaction.

Forms and types of technology relevant to this study are described below.

<u>Streaming Video</u>

Video streaming is the process of delivering video content to video device for immediate display (Simpson, 2006, p. 253). Although broadcast television could be included in this definition, further discussion will be limited transmission over Internet Protocol (IP) networks. In most cases, streamed video delivery falls into the distribution category of narrowcasting – broadcasting to a narrow audience - and can take several forms (Simpson, 2006, pp. 44-45):

- <u>Live streaming</u> happens when the video content appears on every viewer's display at virtually the same time. When the signal is transmitted over an Internet Protocol network, simultaneity may vary slightly due to server loads and network conditions.

- <u>On-demand streaming</u> happens when users can request that video content be transmitted to them when they want to see it. Content is still streamed to each user, but each user gets to choose when to initiate and terminate the stream. On-demand streaming usually includes added capabilities such as jumping to specific points, rewinding and fast-forwarding.

- <u>Download and play</u> uses storage (memory and / or hard disk) inside a viewer's device to receive a file with audio / video content. Once the file is received, it can be displayed.

In a study examining the use of pre-recorded video podcasts in a university setting, McKinney, Dyck, and Luber (2009) determined streaming content to be very beneficial. Students who used a podcast to supplement their studies scored significantly higher on an exam covering lecture material compared to students who did not. Additional note-taking was also examined. Of the students who used the podcasts, those who took additional notes on hard copies of the lecture materials (PowerPoint slide handouts) or on additional pages of paper scored significantly higher on the aforementioned exam than students who listened to the podcast, but did not take additional notes. This finding suggests that additional note-taking should be encouraged when students view pre-recorded lectures.

<u>Learning Management Systems</u>

A learning management system (LMS) is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content. An LMS mediates the interaction of learners with other learners, learning resources, tutors or instructors, and administrative services.

A LMS is also capable of supporting distance education technologies such content distribution, course e-mail, discussion forums, chat facilities, course timetables. Consolidating these services within a single course simplifies access to these services

compared to doing so with separate applications.

<u>Distance Education Technology for Promoting Lifestyle Change</u>

Prochaska (2004) called for the development of new paradigms in order to effect change on a population scale, stating that only 5% of overweight and obese Americans were being reached by the nation's largest clinic-based delivery system (p. 243). He identified two major aspects of the problem: a) too many programs were based on action-stage only processes, rather than being stage-based; b) the settings in which the programs were offered were themselves barriers, as 55% of clients wanted home-based, not clinic- or hospital-based, programs.

Home-based treatments require using computers to deliver individualized and interactive interventions that model the efforts of clinicians (Prochaska, 2004). A growing consensus holds that computer-generated communications tailored to the individual offer the most promising approach for population-based interventions (Kreuter et al., 1999). Through such technology, Prochaska (2004) states that "participants learn what they are doing right, what mistakes they are making, and what they can concentrate on to progress the most. The system can also tell clinicians about their clients' progress and indicates how they can most help particular clients. In one study, such feedback reduced the percentage of clients who got worse by 50% and doubled positive outcomes" (p. 244). He goes on to say that "computers enhance self-efficacy. . . when interventions end, people can continue progressing through their own efforts based on self-efficacy and self-reliance" (p. 244).

Prochaska (2004, p. 245) contends that the impact can be increased if treatments

broaden their focus and treat multiple rather than single behaviors. In a study of 2360

parents of teenagers enrolled in prevention program for multiple behaviors (e.g.,

smoking, high-fat diet, and sun exposure), Prochaska (2004) applied TTM for the first

time to multiple behaviors using a fully TTM-tailored expert-system. Significant

sustained impacts were produced on target behaviors. He further concludes that "it is

possible to increase impacts by treating multiple behaviors without decreasing efficacy

for the individual behaviors that are targeted" (p. 245).

TTM-tailored materials are assessment based, i.e., a questionnaire or survey is

used to measure a person's status on the factors that would most influence the success of

the intended intervention (Kreuter et al., 1999, p. 280). In the case of obesity, these

factors could include readiness for change, self-efficacy, and locus of control.

The original TTM model suggested that the individual's change process

terminates after a specified time of fulfilling the requirements for the maintenance phase.

However, as Sigrist (2004) suggests, this outcome is not possible with behaviors

associated with food consumption. Unlike smoking or drug abuse where the goal is

complete cessation of the associated behavior, people must eat and, therefore, complete

abstinence from food intake is not possible. In cases of weight-loss, reduced-fat diets, and

other dietary regimens, the individual never proceeds beyond the maintenance stage.

DEVELOPMENT OF LEARNING RESOURCES

Learning Outcomes

Robert M. Gagné developed a theory of instruction that incorporated three major

components: a taxonomy of learning outcomes (1972); specific learning conditions

required for the attainment of each outcome (1985); and nine events of instruction (1972).

His learning outcome categories are verbal information, intellectual skills, cognitive

strategies, attitudes, and motor skills. Table 5 provides further definition of each of the

categories.

      Benjamin Bloom identified that humans' learned capabilities comprise three

domains: cognitive, affective and psychomotor (Driscoll, 2005, p. 356). Table 6 shows

his taxonomy for the cognitive outcomes. The affective outcomes developed by

Krathwohl, Bloom, and Masia (1964), cited in Smith and Ragan (2005, p. 263), are the

most suitable for the attitude learning strategy. Table 7 summarizes learning outcomes in

the affective domain.

Table 5.

Gagné's taxonomy of learning outcomes. Source: Driscoll (2005, p. 359).

Learning Outcomes	Definition	Example
Verbal Information	Stating previously learned material such as facts, concepts, principles and procedures	Listing the seven major symptoms of cancer
	INTELLECTUAL SKILLS	
Discrimination	Distinguishing objects, features, or symbols	Feeling the difference in texture between two fabrics being considered for drapery lining
Concrete concepts	Identifying classes of concrete objects, features, or events	Picking all the wrenches out a toolbox
Defined concepts	Classifying new examples of events or ideas by their definition	Noting the armed conflict between two peoples in a country as a "civil war"
Rules	Applying a single relationship to solve a class of problems	Calculating the earned run averages of the Atlanta Braves
Higher order rules	Applying a new combination of rules to solve a complex problem	Generating a plan to manage major change in a client organization
Cognitive Strategies	Employing personal ways to guide learning, thinking, acting, and feeling	Incorporating visual displays into a presentation for a client
Attitudes	Choosing personal actions based an internal states of understanding and feeling	Choosing to respond to all incoming e-mail within 24 hours
Motor Skills	Executing performances involving the use of muscles	Performing CPR on a person who has stopped breathing

Table 6.

Bloom's taxonomy of cognitive outcomes. Source: Driscoll (2005, p. 357).

Level	Description
Knowledge	Remembering previously learned material, including facts, vocabulary, concepts, and principles
Comprehension	Grasping the meaning of material
Application	Using abstractions, rules, principles, ideas, and other information in concrete situations
Analysis	Breaking down material into its constituent elements or parts
Synthesis	Combining elements, pieces, or parts to form a whale ar constitute a new pattern or structure
Evaluation	Making judgments about the extent to which methods or materials satisfy extant criteria

Table 7.

Taxonomy of affective outcomes. Source: Driscoll (2005, p. 357).

Outcome	Description
Receiving	Becoming sensitized to or willing to receive certain information
Responding	Becoming involved or doing something
Valuing	Displaying a commitment to something because of its inherent worth
Organization	Organizing a set of values and determining their relationships, including which should dominate
Characterization by value	Integrating values into a total philosophy and acting consistently in accord with that philosophy

Attitude Learning

Smith and Ragan (2005, p. 262) describe attitudes as "choosing to do something." They present 22 principles of attitude change based on the work of Fleming and Levie (1993), comprising three fundamental sources for the change: persuasive messages; modeling, often in the form of role models; and, dissonance, the anxiety that results from simultaneously holding contradictory or otherwise incompatible attitudes. Smith and Ragan further state that attitude learning has three components: cognitive – knowing how to do something; affective – knowing why and choosing to do it; and behavior – the opportunity to practice the desired behavior (p. 262).

Guidelines for Development

Harvey-Berino et al. (2010) indicate that online instructional assets must be of high quality or success rates of distance-mode programs will be less than those of face-to-face interventions. These characteristics must be present in any instructional assets and coupled with strong instructional design for a distance environment. Micco et al. (2007, p. 49) indicated that dynamic, socially supportive, and interactive elements obviate the need for further interpersonal behavioral counseling.

Jeffery et al. (2009) found that individuals suffered from boredom due to engagement in the same weight control behaviors over long periods of time. They contended that variety in temporal distribution of treatment sessions and in the content of those sessions would be superior to standard behavior therapy in promoting sustained weight loss. This finding would bode well for distance-based tools that incorporate instructional strategies that include activities, multimedia content, and the opportunity for

social engagement with, and support from, peers.

Moore and Kearsley (2005, p. 117) propose a set of attributes for online learning resources, which include the following:

- Use blank (white) space well.

- Cut out words to express ideas succinctly and efficiently.

- Keep paragraphs short.

- Use the user's vernacular.

- Use bulleted lists.

- Use numbered lists for steps in a procedure.

- Use tables.

- Give lots of examples.

- Use icons or small pictures to enhance words.

- Include pictures and graphics.

Instruction should incorporate content organizers, artifacts based on the concepts of advance organizers. The function of content organizers is to "bridge the gap between what the learner already knows and what he or she needs to know before he or she can meaningfully learn the task at hand" (Driscoll, 2005, p. 138). Basically, they give the learner a preview of what the specific learning task will entail, without detail. The language (vocabulary) of the organizer should generally be already known to the learner and should speak to concepts generally understood to learners.

<u>Interaction</u>

Effective instruction depends on a deep understanding of the nature of interaction and how to facilitate such interaction through ICT (Moore & Kearsley, 2005, p. 140). Three types of interaction have been identified: learner-content, learner-instructor, and learner-learner (Moore & Kearsley, 2005, p. 140-141). This study primarily addressed learner-content interaction.

Interactive technologies are likely to be the most cost-effective means of bringing optimal amounts of treatment to bear on major health problems in entire populations in relatively user-friendly ways (Prochaska, 2004, p.244). Mash et al. (2006) examined the quality of interaction between distance programs using an LMS, which they dubbed a virtual learning environment (VLE) and interactive television (ITV). Interactivity has been determined to be a key component leading to a sense of community (Ouzts, 2006; Roblyer & Ekhami, 2000), which further leads to social support, a critical factor in the success of weight loss and maintenance, particularly among women.

Of particular interest is the use of a rubric designed by Roblyer and Ekhami (2000, pp. 2-3, cited in Moore & Kearsley, 2006, pp. 142-143) to assess the interactivity of a distance education course along four dimensions: social goals, instructional goals, types and uses of technology, and, impact of interactivity changes student behaviors. The rubric is used in the instructional design phase to assist the instructor or facilitator to build the best practices for generating interaction into the course.

SUMMARY

Obesity management is complex and difficult, requiring cognitive and behavioral approaches to induce individuals to adopt healthier behaviors and make lifestyle changes. The Transtheoretical Model offers a helpful theoretical framework for addressing the lifestyle changes required to overcome obesity. The widespread nature of obesity in North America calls for new population-level approaches. Prochaska (2004) advises that to truly have an effect on issues like the obesity epidemic, computer-based approaches should play a prominent role. Research supports the efficacy of online programs to bring about weight loss and maintenance. This study examined how applications of distance education and online technologies may be used to create online tools and resources that contribute to lifestyle change.

Chapter III

METHODOLOGY

This chapter begins with a description of the design of the study, and then provides a description of the participants. This is followed by a description of the website that was built for the study, including a review of the resource materials provided for participants. This is followed by a description of the study instrumentation, the data collection procedures, and the data analysis techniques used. The chapter closes with a description of the ethical considerations as they pertain to participants' privacy, protection, and anonymity.

RESEARCH DESIGN

There are two principal research domains, quantitative and qualitative, each with its own approach. A quantitative approach: measures objective facts; focuses on variables; requires reliability and be value free; separates data and theory; is independent of context; uses many cases or subjects; uses statistical analysis; and, requires that the researcher be detached (Neuman, 2006, p. 13). Qualitative research: constructs social reality and / or cultural meaning; focuses on interactive processes and events; requires authenticity; includes or even encourages that values are present and explicit; is situationally constrained; uses a limited number of cases or subjects; uses thematic analysis; and, involves the researcher (Neuman, 2006, p. 13).

A third domain of research, mixed methods, combines both quantitative and qualitative approaches, utilizing the strengths of both (Creswell, 2009, p. 203). Creswell further states that "the problems addressed by social...researchers are complex, and the use of

either quantitative or qualitative approaches by themselves is inadequate to address this complexity" (p. 203). In this study, a quantitative questionnaire was used to assess individuals' access to and use of technology as well as their attitudes towards technology adoption. However, in order to understand the experiences of individuals using the online resource materials provided for the study and their perceived usefulness of the different artifacts, a qualitative component in the form of semi-structured interviews was required, thus mandating a mixed methods approach.

The purpose of a research study varies depending on what the researcher is trying to accomplish. Exploratory research has as its purpose "the examination of a little understood issue or phenomenon in order to develop preliminary ideas and move toward refined research questions" (Neuman, 2006, p. 33). Explanatory research has as its primary purpose the explanation of why events occur, and to build, elaborate, extend, or test theory (Neuman, 2006, p. 35). Descriptive research has as its primary purpose "to paint a picture" using words or numbers and to present a profile, classification of types, or an outline of steps to answer questions such as who, when, where, and how" (Neuman, 2006, p. 35). This study was classified as exploratory because it attempted to examine the little understood phenomenon of using distance education technologies to support lifestyle change.

Several temporal paradigms are available to the mixed methods researcher (Creswell, 2009, p. 206). Sequential studies collect data in phases, with the order of quantitative or qualitative being a further specialization. Concurrent studies have a single data collection phase, collecting both quantitative and qualitative data in parallel.

The limitations placed on some participants as to their role in the study – some were

only allowed to complete the survey, as described in a subsequent section – made a concurrent model possible. All participants completed the survey, with a limited number also participating in semi-structured interviews.

A further distinction of a concurrent mixed methods approach is the weight of each data type within the analysis. Ideally, both data sets are treated equally, but sometimes priority is given to one and the two data sets are then compared to determine if there is convergence, differences, or some combination (Creswell, 2009, p. 213). An embedded strategy has, from its outset, "a primary method that guides the project, and a secondary [data set] that provides a supporting role" (Creswell, 2009, p. 214). Embedding may mean the secondary method addresses a different question than the primary, or seeks information at a different level of analysis. This study did not fit either category, therefore the two data sets were treated equally. They also addressed different questions. The questionnaire sought to understand access to technology and the adoption of technology of the respondents. The interviews sought to understand the experiences of participants with different distance education tools, their perceived usefulness of those tools, and how the perceptions and experiences may contribute to their adoption.

This unique relationship between the two data sets collected for the study can be considered "mutual" as they contribute to each other. In the context of a concurrent, mixed method research approach, this means that the relationship of the two different data sets, one quantitative and one qualitative, contribute to each other's support. Thus, the strategy for this study was considered to be a "concurrent mutual mixed methods" approach.

A case study research design was selected for the study. Creswell (2007) identifies

five approaches to qualitative research, each with its own focus and type of problem for which it is suited (pp. 78-79). Narrative research explores the life of an individual and is used to tell stories of individual experiences. Phenomenology tries to understand the essence of an experience, describing the essence of a lived phenomenon. Grounded theory builds toward abstract theory by making comparisons of empirical observations (Neuman, 2006, p. 60) when a theory is being based on participants' views (Creswell, 2007, pp. 78-79). Ethnography describes and interprets a culture sharing group based on the shared patterns within. Creswell (2007, p. 73) states that case studies develop an in-depth description and analysis of a case or multiple cases, providing an in-depth understanding of a case or cases within a bounded system (i.e., a setting or a context). Cases can be "individuals, groups, organizations, movements, events, or geographic units" (Neuman, 2006, p. 40).

Yin (2009, p. 13) states that some situations may be appropriate for all approaches and others in which two might be considered equally attractive and that the various approaches are not mutually exclusive. He also says that the researcher should be able to identify some specific method has a distinct advantage. For this study, a review of the research questions suggested that phenomenology and case study designs appeared to have the best fit.

A deeper examination of phenomenology identified some gaps with respect to this study, with its focus based primarily on "understanding a lived experience" (Creswell, 2007, p. 78) where "the researcher...interprets the meaning of the lived experience" (p. 59). However, the qualitative portion of this study was not looking for meaning. Instead the goal was to understand *how* participants perceived the usefulness of different distance education

technologies and *why* they chose to use, or not use, those tools.

Yin (2009, p. 8) recommends that for studies that ask how and why, and that have little or no control of participants' behaviour – resources for this study were made available to participants, but the choice of using those artifacts was left to them – a case study approach is appropriate. However, the parameters of the "case" - the unit of analysis (pp. 29-33) and the boundaries of the problem - were not obvious at first. On further reflection, those parameters did arise. The unit of analysis was identified as "learners undergoing or maintaining a lifestyle change". The context was that learners were limited to only online resources, namely the website built for the study. Hence, a case study approach to the research design was seen as appropriate.

Yin (2009, p. 6) describes the prevailing view of many social scientists on case study design as believing it is only appropriate for the exploratory phase of a project, identifying areas for future research. Although Yin (p. 6) states case studies may be used for other phases of a project, that is a non sequitur for this project: it is, in fact, an exploratory study, making a case study design appropriate.

Creswell (2007, pp. 78-79) indicates that case study research uses multiple forms of data acquisition tools such as questionnaires and surveys, interviews, observations, documents, and artifacts to build the in-depth case. Quantitative data from questionnaires explored the participants' attitudes towards technology, their access to online technology, their ability to use it, and how they integrated it into their daily lives. Qualitative interviews provided data about interviewees' perceptions of the usefulness of specific distance education tools.

STUDY PARTICIPANTS

The pool of study participants was composed of two sub-groups. The first sub-group was a convenience sample of 30 individuals who were participants in a lifestyle modification program at the Bariatric Clinic of a local hospital in Hamilton, Ontario. The clinic was solely responsible for selecting their patients in the program. The minimum requirement for accepting patients into their program was to have a current body mass index (BMI) of 35 or greater. In all cases for the first sub-group, there were accompanying medical conditions, such as diabetes, high blood pressure, cardio-vascular disease, and so forth.

As the hospital limited the participation of the Bariatric Clinic patients to completion of the survey only, a second sub-group was obtained for the interview component of the study. Five participants from the researcher's personal network volunteered to complete the survey and then to participate in the semi-structured interviews. The requirements to qualify for participation for this sub-group were less stringent than those of the hospital: a BMI of 30 or more currently or at some time in their adult life, and participation in at least one weight management program. (As no personal medical data were collected for the study, conformance to these requirements was based on self-report only.)

Participant Recruitment

In addition to the Bariatric Clinic being solely responsible for selecting their patients in the program, they were also responsible for selecting the individuals who would complete the study questionnaire. The protocol with the clinic was for the researcher to drop off blank questionnaires and pick up the completed surveys. A program facilitator employed by the

hospital administered the questionnaires. There was no contact between the researcher and the Bariatric Clinic patients.

The researcher used his personal network to locate and recruit potential interviewees. There was an initial informal discussion with the candidate, either by telephone or e-mail, prior to sending an e-mail to determine their interest in taking part in the research. Upon agreeing to take part, prospective interview candidates were then sent a formal invitation to participate by e-mail (Appendix C). In addition to the invitation letter, they also received informed consent documentation (Appendix C); contained in the letter were login coordinates that been previously set up for them.

RESOURCE MATERIALS

The researcher developed a collection of web-based resources to demonstrate the use of selected distance education technologies and integrated them into an online course entitled "Lifestyle Modification." Concepts from the literature review were used to inform the content and processes of the resources as well as to ensure that each resource contributed toward the goals of weight management and lifestyle change. Although the study was exploring the technologies to support lifestyle change, it was decided to use a obesity and weight-loss theme so as to simulate more closely the types of materials learners might encounter in an online weight-loss program based on cognitive-behavioral strategies.

Website Organization

A course website consisting of 11 modules (Table 8) was constructed using the Moodle (V1.9.7+) learning management system, hosted on a server leased by the researcher.

The site was located at the following URL:

https://lms.knowledgepatch.com/login/index.php . The website used the collapsed topic

format for course organization, displaying the major topics and areas of interest, allowing the

learner to expand individual topics.

Table 8.

Modules on the study website

Module No.	Topic No.	Module Title
1	--	Topic Outline
2	1	Useful Links
3	2	Communicate with your peers
4	3	Videos
5	4	Software Tools
6	5	Initial Self-Assessment
7	6	Changing for Good – The Stages of Change
8	7	Precontemplation – Resistance Is Futile
9	9	Preparation – Getting Ready
10	10	Action – Time To Move
11	11	Maintenance – Staying There

Table 9 to Table19 provide a detailed description of all content. Screenshots of all modules

can be found in Appendix E.

Table 9

Healthy Weight Loss Course Homepage

Content Item	Description	Instructional goal
Welcome Message	A statement welcoming the individual to the website, describing its purpose, and thanking them for participating in the research	Introduce the website to the participant.
How to find the questionnaire (Video)	Link to a "how-to" video which demonstrates how to find the questionnaire, which was setup as a separate course in Moodle.	Teach participants who are not familiar with Moodle how to navigate between courses
Suggested Activity List	A checklist of suggested activities so that visitors may make the best use of their time while visiting the website	Used to track their progress through the site.
Links to Adobe Reader and Adobe Flash Player	Links software required to properly view the site.	N/A
	Link to a"how-to" video which demonstrates how to move around the course website.	Ensure that learners are able to find all the research materials
Posting to a forum (Video)	Link to a"how-to" video which demonstrates how to post a recipe to the study's recipe forum.	Provide instruction on how to access, view and post to a forum. Forums are a form of social support, so it is important that all participants know how to use them.

Table 10

Study Website Topic 1 – Useful Links

Content Item	Description	Instructional goal
Live Strong Calorie Counter	Link to the Live Strong Calorie Counter, an Internet tool for journaling calorie intake. (http://www.livestrong.com/myplate/)	Introduce the participant to an online tool for self-monitoring calorie intake
Recipes	A Moodle-based forum for participants to share recipes	Provide a tool for community building and social support.
Spark Recipes	Link to a free, public website for individuals interested in weight loss and nutrition. (http://www.sparkpeople.com)	Introduce participants to a large, public website dedicated to healthy weight loss, nutrition, and physical activity. Could also be a tool for community building and social support.
Suggest a link	A Moodle forum which allows participants to share useful links, in a controlled manner, with others who are subscribed to the forum	Provide a tool for community building and social support in a safe environment.

Table 11

Study Website Topic 2 – Communicate with your peers

Content Item	Description	Instructional goal
Warning	Notice advising participants that no clinicians access the forums and chats and that if they are experiencing *any* physical, mental or emotional distress, they should contact their physician, get to an emergency room, or call 911 immediately. This notice is required because of the legal liabilities of clinicians when patients report distress, regardless of whether the clinician receives immediate notification or not.	Inform participants that the communication tools are not to be used to contact clinicians for any reason.
Discussion Forums ⚲ Get a little help from your friends Forum ⚲ Maintainers' Forum	Forum to discuss any topic that participants would like to share with others Forum for participants in maintenance phase	Provide tools for community building and social support in a safe environment. Discuss topics that are unique to maintainers. Can be a source of role modeling for people in prior phases
Instant Messaging / Chat	Links to chat tools for synchronous, text-based communication	Provide tools for social support in a safe environment.
Personal Blogs	Link to Blogspot	Introduce learners to a free, public site for creating and maintaining a weblog. Blogs can be used for community building and social support
Social Networking	Link to Facebook, the largest social networking site on the Internet	Introduce learners to social networking which can be used for community building and social support

Table 12

Topic 3 – Videos

Content Item	Description	Instructional goal
Special K Commercial Runtime: 30 sec (approx)	Link to a Special K commercial on YouTube.	An example of role modelling to discourage women / girls from obsessing about body image by showing men commenting about their appearance in language normally used by females (e.g. "Do I look fat in this?" or "I have my mother's thighs.")
Low glycemic diet best for keeping weight off Runtime: 1:47	Link to video from CTV News (CTV.ca)	Inform learners on the benefits of a low glycemic diet and foods to watch for that have a high glycemic index. Intended for individuals in the Preparation stage.
Frontline / Diet Wars (Palfreman, 2004) Runtime: 60 min. (approx.)	Link to the PBS *Frontline* episode Diet Wars	Explore issues related to obesity in North America. Intended for individuals in the Preparation stage.
Super Size Me (Winters & Spurlock, 2004) Runtime: 100 min	Link to the theatrical documentary Super Size Me.	An example of role modelling to demonstrate the effects of fast-food / improper nutrition. Contribute to the cognitive restructuring required in the pre-contemplation and contemplation stages of TTM, and, behavioral modification for preparation and action stages
PBS *NOVA* / Marathon Challenge (McCabe, 2007) Runtime: 60 min. (approx.)	Link to video of the PBS NOVA episode marathon challenge	An example of role modelling showing how even sedentary individuals can train to run in, and complete, the Boston Marathon
Exercise Videos Runtime: 2 videos x 15 min each	Links to videos demonstrating aerobics and elastic tubing exercises suitable for individuals with health issues.	Expose learners to exercise videos. Intended for individuals in the preparation and action stages of TTM

Table 13

Topic 4 – Software Tools

Content Item	Description	Instructional goal
BMI Calculator Tool	Link to a software tool, developed specifically for this study, for calculating an individual's BMI.	Self-assessment tool for determining BMI. Can be used at any time in the lifestyle change process to track BMI change based on current weight. BMI change can provide metacognitive feedback about whether what has been learned to date has been effective.
BMI Calculator Tool Demo (Video)	Link to a video on how to use the BMI Calculator Tool.	Demonstrate the use of BMI Calculator Tool.
Target Weight Calculator	Link to a software tool, developed specifically for this study, for calculating a target weight based on a target BMI.	Establish a goal for the lifestyle change process
Target Weight Calculator Demo (Video)	Link to a video on how to use the Target Weight Tool.	Demonstrate the use of the Target Weight Calculator tool.
Weight Tracker Tool	Link to a software tool, developed specifically for this study, for recording weight measurements.	A metacognitive tool to provide visual clues, both with an X-Y plot and colored indicators, of the individual's weight loss (gain) trends over time.
Weight Tracker Tool Demo (Video)	Link to a video on how to use the Weight Tracker Tool	Demonstrate the use of the Weight Tracker Tool

Table 14

Topic 5 – Initial Self-Assessment

Content Item	Description	Instructional goal
Weight Control Beliefs	Link to assessment to measure an individual's locus of control with respect to their weight (problem)	These assessments were intended to used as metacognitive instruments. As an individual progresses through the lifestyle course, their scores should improve (towards internal locus of control; motivated by healthier lifestyle; able to respond as needed in social situations). Failure to improve would be indicator the individual should redouble their efforts with the instructional materials and other content
Dieting Beliefs Scale	Link to an assessment to determine if an individual's motivations for weight loss are about healthy living or appearance	
Weight Efficacy Lifestyle Questionnaire	Link to an assessment to determine an individual's self-efficacy in four categories of social situations	

Table 15

Topic 6 – Changing for Good – The Stages of Change

Content Item	Description	Instructional goal
Instructional Module on the Stages of Change	Link to a multimedia module introducing the stages of change to the learner	Explain the underlying principles of the transtheoretical model devoid of psychological jargon
Stage self-Assessment	Link to a quiz to establish the learner's current TTM stage	Provide a starting point for the learner

Table 16

Topic 7 – Precontemplation – Resistance Is Futile

Content Item	Description	Instructional goal
Instructional module for pre-contemplators	Link to a multimedia module introducing the pre-comtemplation stage of TTM	Begin the process of making the learner aware they may need to change their lifestyle.
My progress raising my awareness	Links to self-assessments on learners' progress with aspects of moving to the contemplation stage	Metacognitive support for learners as they move through the module.
My progress with helping relationships		
My progress with social situations		
Check out your latest vital sign: waist size	Links to videos relating weight to health	Provide aware of "not changing", influencing the decisional balance
Men's waist size linked to diabetes		

Table 17

Topic 9 – Preparation – Getting Ready

Content Item	Description	Instructional goal
Canada's Food Guide - A Guided Tour Canada's Food Guide - Quick Tips Interactive Nutrition Label and Quiz Canada's Physical Activity Guide	Links to information, tutorials and tools for healthy eating and exercise on Health Canada's website	Introduce the learner to tools available to help them when they are in the action and maintenance stages
Sugary drinks to be labelled with calorie counts Diet pop can be hard on your heart How bad is diet pop for me? Sweetened fruit drinks not a healthy alternative Large bag of movie popcorn has fat equal to two Big Macs	Links to news videos of different problems that might be encountered during the action stage and beyond.	Demonstrate behaviors that could be useful during the action and maintenance stages
Fact or fallacy? 10 weight loss myths	Links to material on the Globe and Mail newspaper's website	Intended to counteract dissonance regarding weight loss and influence decisional balance
Test your nutrition IQ		Metacognitive tool to provide baseline on learners' knowledge about nutrition.

Table 18

Topic 10 – Action – Time To Move

Content Item	Description	Instructional goal
Penn & Teller on Fast Food	Link to a video on marketing practices of fast food and fine dining restaurants	Demonstrate the use of marketing techniques to camouflage actual calorie counts and amounts of fat in what might otherwise be perceived as healthy food.

Table 19

Topic 11 – Maintenance – Staying There

Content Item	Description	Instructional goal
How resilient are you? The Resilience Scale	Link to a resilience self-assessment (https://www.resiliencescale.com/en/rstest/rstest_en.html)	After completing the assessment, methods of improving resilience are offered to the learner.

Content Development

The intent of the resources was to demonstrate the use of various distance education technologies for supporting lifestyle change, without the confounding effects of varying material quality or content utility. Therefore, every attempt was made to create high quality content. Instructional content was developed using OpenOffice Impress to create presentation slides, including animations. Adobe Captivate screen capture software was then used to create full-motion videos complete with narration.

Descriptions of the resources developed for the course web site are provided below, including the methods used to create the resource and the design requirements.

Discussion Forums

Discussion forums play a prominent role in online courses, contributing to a sense of community amongst the learners and reducing the isolation inherent with distance learning (Rovai, 2002). Palloff and Pratt (2007, pp. 148-149) and Moore and Kearsley (2005, p. 148) describe forums as the "heart and soul" of an online course. Social support is a major contributor to lifestyle change for obesity (Kayman et al., 1990; Levy et al., 2007) and McCormack & Coulson (2009) found that using forums contributed to social support.

Table 20 lists the discussion forums that were included in the Lifestyle Modification course. They addressed the following areas:

Table 20

Moodle-based forums

Forum Title	Unit	Description
Recipes	1	Specialized forum for sharing recipes
Suggest a link...	1	Specialized forum enabling learners to quickly publish and disseminate website links they believe might be of interest to other visitors to the site. Some of these links could eventually be integrated into the site.
Get a little help from your friends	2	General discussion area
Maintainers' forum	2	Forum targeted to individuals in the maintenance phase. Learners often face very different issues than those in other stages.

Online Communities

Online communities are also a form of social support. To demonstrate the features of an online community, the course introduced and directed participants to SparkPeople.com, a large online community of over 250,000 members, dedicated to individuals actively engaged in weight loss and maintenance. Specific links were provided to the recipe database and discussion forums of the online community.

"How to" Videos

Orientation videos were developed to demonstrate how to navigate around the website and the use of self-monitoring software tools developed for the study. The videos

How to find the questionnaire, *Guided Tour*, and *Posting to a forum* are described in Table 12. The videos *BMI Calculator Tool Demo*, *Target Weight Calculator Demo*, and *Weight Tracker Tool Demo* are detailed in Table 13. All of these videos were created with high-quality production techniques using full motion screen capture and contained an accompanying audio narration.

Self-Instructional Multimedia Tutorials

Multimedia self-instructional modules presented the concepts and principles associated with the stages of the Transtheoretical Model because it was believed that learners with a good understanding of TTM would be more likely to succeed with their lifestyle change. Two modules were developed: Introduction to the Stages of Change and Precontemplation. Each module was presented as a narrated video, created using OpenOffice Impress slides and screen capture with Adobe Captivate. Appealing backgrounds, animations, and narrations were used to enhance the learner's experience. The materials were written to appeal to a broad audience, using easily understood, vocabulary and simple sentence structure.

The instructional strategy of the modules was based on Smith and Ragan's (2005, pp. 259-270) suggested approach for attitude-related learning and involved cognitive, behavioral, and affective (attitude) components.

Streaming Video

Streaming video was provided for role modeling and as a means of persuasion, i.e., to add to the decisional balance in order to move viewers toward the next phase of the change process. Links to six streaming videos were included in the course web site. The

documentary feature film *Super Size Me* (Winters & Spurlock, 2004) demonstrated ploys merchants use to upsell high-fat, high-caloric food and to illustrate the thought processes involved when making these purchases. A video clip from *Penn & Teller Bull....!* (Bortko et al., 2010) reinforced these concepts. The PBS *NOVA* episode "Marathon Challenge" (McCabe, 2007) demonstrated how 13 ordinary, sedentary, out-of-shape citizens prepared themselves to run the Boston Marathon. The PBS *Frontline* episode Diet Wars (Palfreman, 2004) examined many of the issues related to obesity in North America. Two exercise videos were also included.

Self-Monitoring Tools

Self-monitoring is the systematic observation and recording of personal target behaviours. Self-monitoring tools for obesity management include food diaries, physical activity logs, weight scales, and body composition devices. Their primary purpose is to help individuals become more aware of their behaviours and the factors that influence those behaviours and have beneficial or detrimental impact on their weight management efforts. Metacognitive support is provided by allowing the individual to identify knowledge gaps with respect to, say, diet or exercise: they need to learn about calorie counting, balanced diets, or how the body consumes energy. Research has consistently demonstrated that self-monitoring is associated with improved treatment outcomes, and patients report that it is one of the most helpful tools in obesity management (Poston & Foreyt, 2000).

The course web site provided four self-monitoring tools. The Live Strong Calorie Counter, part of the Live Strong website (http://www.livestrong.com), was made available to study participants. A basic version of the tool is available to the general public at no charge.

Any data generated by course participants in the use of the self-monitoring tools was for their use only and was not recorded. The study participants were only asked if they visited the site and their perceptions of its usefulness and ease of use.

In addition, three self-monitoring tools were developed by the researcher: the BMI Calculator, the Target Weight Calculator, and the Weight Tracker. The Microsoft Visual Studio 2008 integrated development environment was used to develop these tools, using the C++ programming language. All applications required the Microsoft Windows operating system.

The BMI calculator (Figure 1) is a self-monitoring tool that tracks BMI changes based on current weight. The tool also estimates the percentage of body fat using the algorithm developed by Deurenberg, Weststrate, and Seidell (1991).
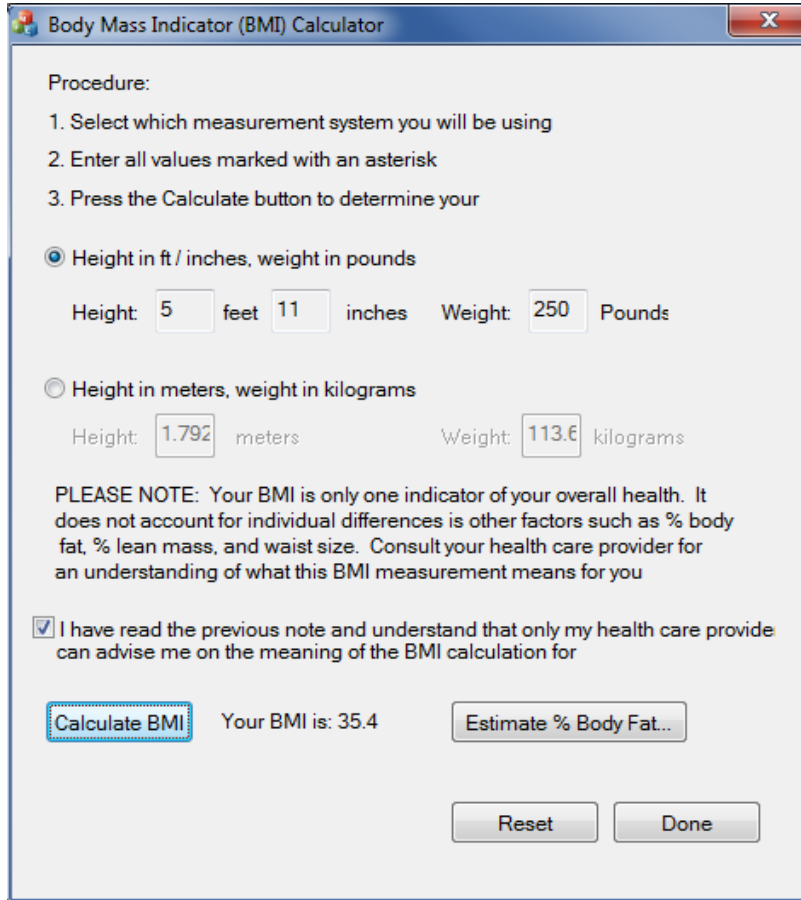
Figure 1. The BMI Calculator tool

based on the BMI. It can be used at any stage in the lifestyle change process. BMI change

can provide feedback about the effectiveness of weight management strategies.

The Target Weight Calculator self-monitoring tool (Figure 2) calculated an

individual's target weight based on a target BMI. The tool can assist individuals in

establishing a goal for the lifestyle change process, an important component in obesity

management. It can also provide feedback on the learner's progress in reaching their goal.
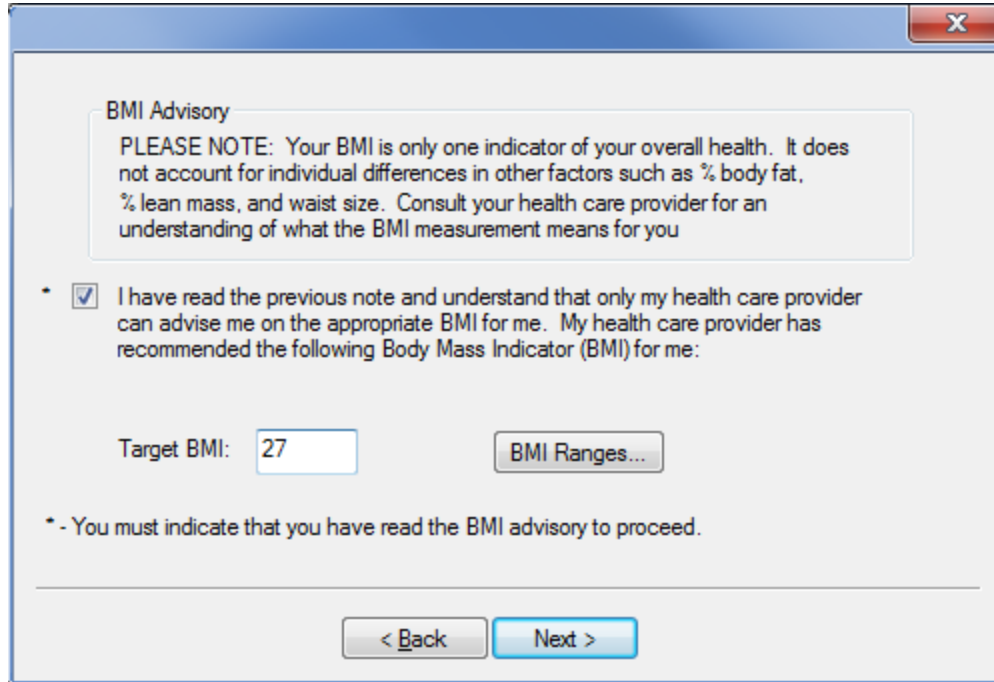
Figure 2 - Target Weight Calculator: Start-up display screen

The tool used a "wizard" format to guide the individual through the steps to arrive at the target weight. Appendix F provides screen shots of all of the application's displays.

The WeightTracker tool was modeled after the procedures used in Wing et al. (2006) for recording weight readings. In addition to recording weight measurements and displaying them in tabular form, the tool provided two functions. The first was a line graph plotting weight over time, using a three-month window. The second provided traffic light-style icons (green, amber and red circles) indicating variations from the target or maintenance weight, based on user-defined thresholds.
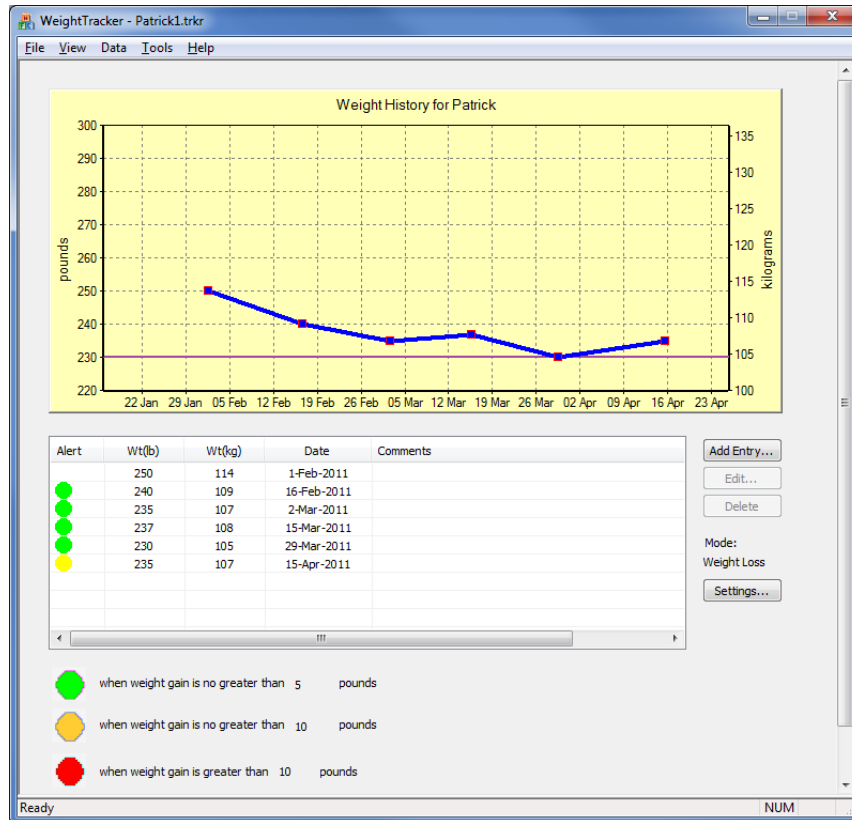
Figure 3. Weight Tracker Tool in weight loss mode

Self-Assessments

Two self-assessment tools, also intended to support metacognition, were made available to study participants. The first provided feedback on the user's progress through the Stages of Change process. Prochaska, Norcross, and DiClemente (1994) provide many self-assessments which individuals can use to assess their progress through the stages of change. These self-assessments were used in two forms: the first form re-phrased the assessment statements so that they formed a checklist for the changer to develop a plan; the second form presented the self-assessment as a quiz with feedback. Samples of the self assessments can be

found in . As a security measure, no weight loss data were collected or saved from these self assessments.

The second assessed the participant's self-efficacy, locus of control, and motivation for change. These characteristics can affect the change process; moreover, as individuals progress through a weight loss program, their scores on these assessments may improve (e.g. greater internal locus of control, higher self-efficacy, motivated more by healthy living and less by body image). Therefore, these self-assessment tools were included to provide participants with additional self-awareness and insight into their lifestyle change processes.

INSTRUMENTATION

Data collection was carried out with two forms of instruments: a questionnaire and semi-structured interviews.

Questionnaire

The goals of the quantitative analysis included: ascertaining the technology adopter category (TAC) of each participant, understanding the level of Internet access available to them, and determining the installed base of computing hardware and software in the home. Further objectives were: developing a profile of computer skills; understanding how participants integrated technology into their daily lives; and, assessing how they communicate using technology.

The study survey was completed by all study participants. An example of the questionnaire can be found in Appendix D. A paper version of the questionnaire was used for the Bariatric Clinic patients. Interviewees completed the survey online on the study website.

The electronic version of the survey was created with and administered by the Questionnaire Module for Moodle. There was no material difference between the two versions of the questionnaire.

The survey asked respondents about aspects of technology adoption, the number of computers available and the type of Internet connection in the home, the activities they used these computers for, their use of mobile communications and entertainment devices, the types of consumer electronics they had in their home, and their impressions on the usefulness of specific tools and technologies and the likelihood they would use them for lifestyle change.

Interviews

The overall purpose of the interviews was to obtain participants' impressions of the distance education tools and technologies provided on the study website. In general, the questions followed the sequence of activities suggested, and asked participants about the reasons they chose to use or not use any of the resources and the reasons for that choice, their impressions on the perceived utility of those resources, and their suitability for inclusion in an online course in lifestyle change. The detailed script that was developed to provide structure to the interviews can be found in Appendix D. In addition to gathering data to provide insight for the research questions, the script re-iterated assurances of privacy and confidentiality, and the participants' ability to stop the interview at any time for whatever reason. All interviews were conducted by the researcher. All interviews were recorded and transcribed.

Three interviews were conducted by speakerphone, with participants situated in their

home or place of work and the researcher located in his home office. Two in-person

interviews were conducted in the researcher's home, under conditions that assured privacy.

Interviews were 90 minutes in duration and all were recorded using a high quality

microphone connected by USB to a notebook computer running the Audacity 1.3.2 software.

<u>DATA COLLECTION PROCEDURES</u>

Two sets of procedures were used to collect data for the study: one for the patients at

the Bariatric Clinic who were only completing the Survey on Attitudes Towards Technology;

the other for interviewees who were also completing the survey. A description of each

follows.

<u>Questionnaires</u>

A supply of 30 paper-based questionnaires was provided to the clinic. Each copy

included a letter of invitation. The clinic also attached their own informed consent

documentation to the survey document. An example of each of these documents can be found

in Appendix B. The facilitator for the clinic's lifestyle management course distributed the

questionnaires during a session, asked each patient to complete them and return them to her.

After four weeks, the researcher picked up the completed questionnaires at the clinic.

The five interview participants also completed the survey. They logged in to the

website and selected the questionnaire, which was set up as a course in Moodle. They then

navigated to and commenced the electronic version of the questionnaire. (A how-to video

was made available to them specifically on logging in to the site and navigating to, and

starting the survey.) Once they were finished, they submitted their results by clicking on the

"Submit" button.

<u>Interviews</u>

After completing the online version of the questionnaire, the interviewees were asked to go to the Lifestyle Modification course website. They were sent a link to a how-to video that described how to find and login to the site. A Suggested Activity List was provided to assist them in organizing and planning their use of the website, but their choice of activities in which to engage and their pace of going through the course were left to their discretion. They were asked to send the researcher an e-mail once they completed their activities so that an interview could be scheduled.

<u>DATA ANALYSIS</u>

The use of complementary quantitative and qualitative data collection procedures (Yin, 2009, p.174), with each type occurring in parallel, mandated a concurrent mixed methods approach to data analysis (Creswell, 2009, pp. 14-15). He states that the temporal relationship between the two complementary components is not an issue: it is the complementarity that is important. Yin suggests that the initial analysis and reports for each inquiry should be done independently "even though a final analysis may merge findings from all the different methods" Yin (2009, p.174).

<u>Questionnaire Analysis</u>

The data set was constructed using the Moodle Questionnaire module. Surveys for the interviewees were administered directly by the LMS. The paper-based questionnaires from the Bariatric Clinic were transferred into Moodle as well. Data from those forms were

entered by the researcher, creating a new electronic instance of a survey for each paper-based one. Once all the data were entered, the Questionnaire module's export function was used to create a data file in the comma separated value (CSV) format and downloaded to the researcher's computer. From that file it was possible to import the data into both spreadsheet software and SPSS.

Descriptive statistics were obtained for the questionnaire data and included standard measures of central tendency, cross-tabulation of demographic data and technology adoption and use, and frequency distributions. SPSS 16 Student Version and OpenOffice Calc 3.2 were used to perform this analysis.

Interviews

Yin (2009, p.174) describes the nature of this study to be one of complementarity as opposed to convergence because of the close coordination between the survey and interview questions. The five interviews were treated as a single case. Qualitative data analysis typically involves a multi-pass coding process: open coding develops codes, which are "tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study (Miles & Huberman, 1994. p. 56)" as cited in Neuman (2005, p. 460); axial coding develops categories by organizing and linking individual codes (Neuman, 2005, p. 462); selective coding identifies data that will support the conceptual categories that were developed (Neuman, 2005, p. 464).

The qualitative data analysis for the study used the IBM SPSS Text Analytics for Surveys V4 (TAS4) tool (http://www.spss.com/software/statistics/text-analytics-for-surveys/) to analyze the interview data. There are two key differences between TAS4 and other

qualitative data analysis tools (e.g., Atlas Ti, Nvivo). First, it does not rely solely on the reasoning and capabilities of the researcher to carry out the analysis. Instead, through the use of internal resources such as dictionaries, thesauruses, templates, and libraries, it uses natural language processing (NLP) to identify keywords within the data, providing results that are more objective than researcher induction alone. Second, there is no defined hierarchy as would be found in codes and their categories: there are only categories. However, the categories are not mutually exclusive, meaning a single data object can be placed in more than one category. When the researcher assigns categories to single quotes or other data objects, TAS4 looks for keywords in other quotes, assigning the same category when a keyword or synonym match are found.

In order to replace the hierarchical nature normally found in codes and categories, a relationship which aids in the identification of themes, a hierarchy based on order of magnitude (i.e. powers of 10) was introduced. A *first order* category had at least 100 (10^2) shared responses with other categories; a *second order* category had from 10 to 99 (10^1) shared responses; a *third order* category had 9 (10^0) or fewer shared responses.

The steps in this analysis of the qualitative interview data collected for this study are listed below.

- Transcripts were created from the audio recordings of the interviews.

- The transcripts were then dissected to identify single concepts. (This processed is described in more detail in Chapter 4.)

- The concepts were entered into a single electronic spreadsheet file, with each concept in its own cell.

- Identifiers – unique codes for each interviewee - and demographic data were added for each entry.

- Once completed, the spreadsheet file was imported into TAS4.

- TAS4 processed the interview data using natural language processing to identify keywords within each quote.

- Categories with names meaningful to the study were created (e.g. role modeling, metacognition, trust, multimedia, etc.)

- Categories were then assigned to individual quotes. Multiple categories were applied if appropriate (e.g. the quote "I am not a Facebook person" was assigned the *facebook*, *social support*, and *perception of others categories*).

- If a category was improperly assigned as a result of the NLP, that quote was removed from the category. An example of this would be as follows:

  ⨯ The natural language processing of the entire data set generated *people* as one of the keywords. The NLP engine uses synonyms, thus it would associate the term *person* with *people.*

  ⨯ The quote "I am not a facebook person" contains the keyword person.

  ⨯ The researcher created the category *perception of others* and linked the quote "I am not a facebook person" to it. As a result, any data that contains the word person would automatically be associated to *perception of others*.

  ⨯ The quote "I am not an 'easy solution' person – anything like that would not interest me" was assigned to *perception of others* because it contained the keyword *person*.

- However, the quote's meaning was not about perception of others, per se, but was closer in meaning to *type of person*.
- The quote was removed from *perception of others* and linked to *type of person*.

- The initial NLP generated several thousand keywords within the data. The researcher identified approximately 40 categories.

- Five first-order categories developed. These categories were the basis of the themes found in the data analysis and will be referred to as "theme categories".

- TAS4 created category graphs, or category webs as they are called in the software, which gave a pictorial representation of each of the first-order categories and their associated second-order categories. These graphs were used to develop and expand each of the themes. Most of the meaning categories in a given graph had a direct relationship to the given first-order categories, hereafter referred to as having one degree of separation. Others only had an indirect relationship to the first-order category, and these were designated as having two degrees of separation. Figure 5a illustrates these concepts. Third order categories and categories with more than one degree of separation were not used in order to reduce the amount of "noise" in the graph. Figure 5b illustrates the difference between the original graph for the category *trust* and when third order categories have been removed. A third graph must be created that removes all categories and links with more than one degree of separation (Figure 5c).

- TAS4 was not able to isolate interview data between a given theme category and just one of its meaning categories. To overcome this limitation, an electronic spreadsheet

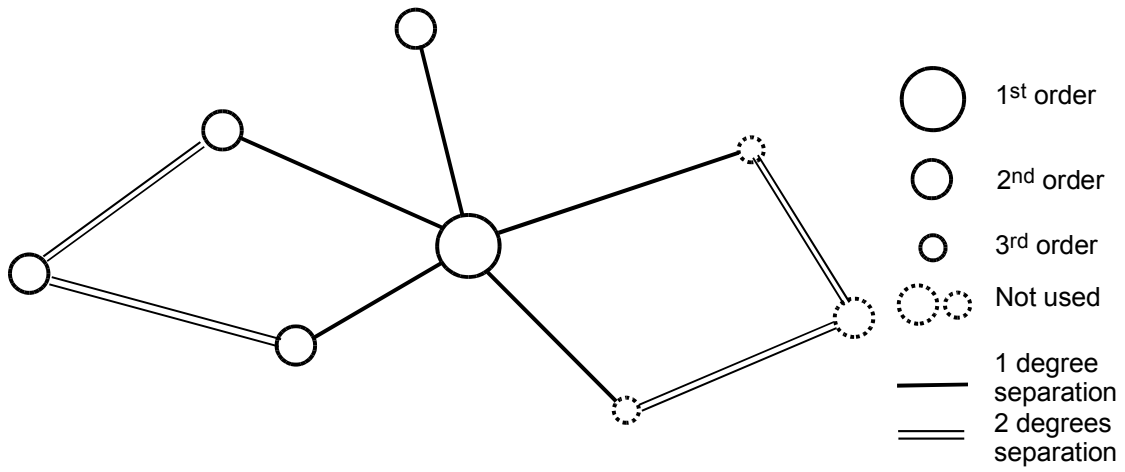file was constructed to allow examining only those data objects that were shared between the two categories.

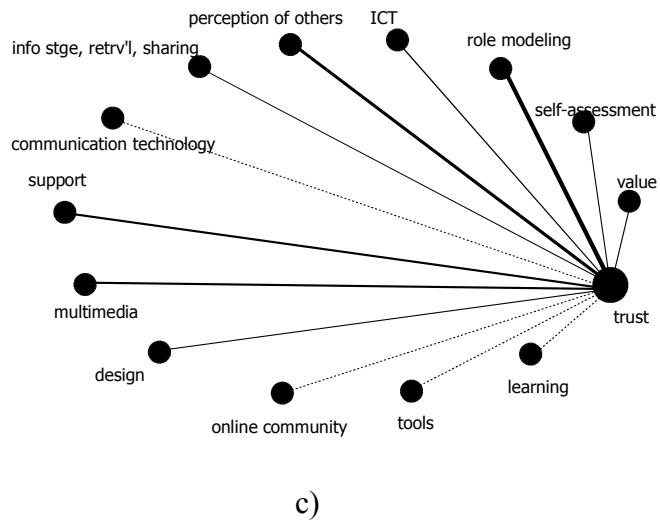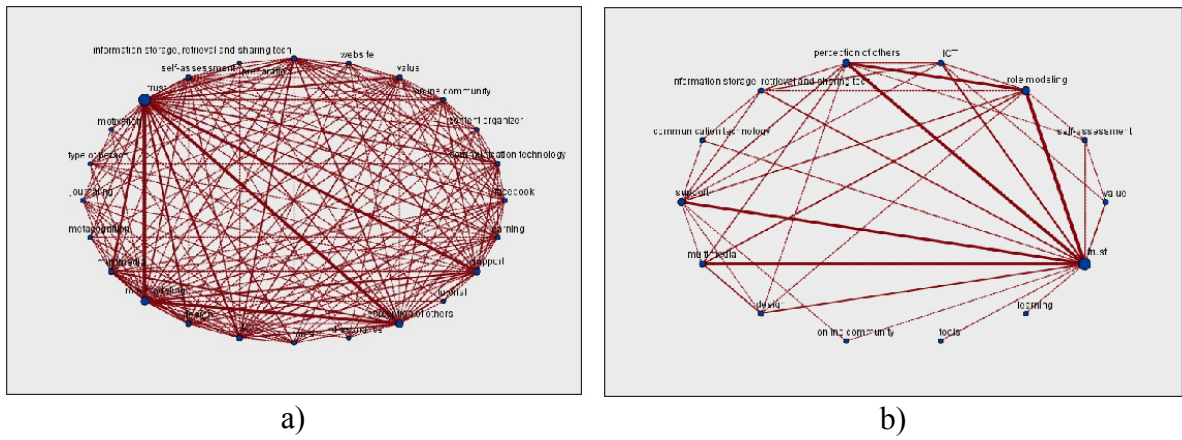Figure 4. Code Category relationships

a)

b)

c)

Figure 5. Shared response graphs for the "trust" category: a) all responses and categories; b) all third order categories removed; c) all remaining second degree categories removed.

ETHICAL CONSIDERATIONS

Due to the nature of this study and its use of human subjects, two approvals were required: one from the Research Ethics Board (REB) of Hamilton Health Sciences; another from the Athabasca University Research Ethics Board. Copies of REB approvals and letters of support are included as Appendix A.

Data Security

All data collected was stored on the researcher's password-protected personal computer. Data from the study website was downloaded using the Secure File Transfer Protocol (SFTP).

Online Digital Security

The Moodle learning management system (LMS) was configured to require SSL 3.0 (HTTPS) secure login. A digital signature certificate was purchased and implemented specifically for the study to ensure that participant privacy and confidentiality was maintained at all times.

Participant Anonymity and Confidentiality

Participation by the Bariatric Clinic patients was entirely voluntary. In order to maintain complete anonymity of the subjects, the researcher never had any contact with these subjects, therefore no personal data was ever collected. This was a condition effectively imposed by the hospital. Interviewee confidentiality was maintained at all times during the study. Their names as well as their responses to the online questionnaire were known to the researcher. However, the details of their interviews and any information about them that might be used to identify them were, and will be, kept in strict confidence. Further, their

names will never appear in any published results of the study.

SUMMARY

This study explored the use of specific distance education technologies and how they may support individuals in lifestyle changes for weight loss and maintenance. All participants completed a questionnaire which had as its purpose to gain a greater understanding of the accessibility of lifestyle change learning materials and the likelihood they might use them.

A major website was constructed to facilitate learner-content interaction. Five interviewees visited and used this site prior to their interview, which had as its goal to understand the manner in which distance education technologies may influence learning, skills, and attitudes that contribute to making healthy diet and physical exercise choices. A number of security measures and protocols were put in place to protect the anonymity and/or confidentiality of study participants.

Quantitative analysis using measures of central tendency, cross-tabulations, and frequency diagrams was performed on the questionnaire data. A case study approach was used to analyze the qualitative data collected from structured interviews.

Chapter IV

RESULTS AND DISCUSSION

This chapter begins with a review of the purpose of the study and a description of

the participants involved in the study. Results from the quantitative survey are presented,

followed by the analysis of the qualitative interviews. Discussion of the study results are

interleaved with the presentation of the data. Trends and themes are presented at the end

of the chapter.

PURPOSE OF THE STUDY

The study explored the use of distance education technologies to support online

lifestyle change learning for overweight and obese individuals.

The following research questions were addressed:

1. What are the major barriers and facilitating factors influencing the adoption and

   use of online technology in lifestyle change related to weight loss and

   management?

2. How have users adopted the following tools or resources, often used in distance

   education, and what is the nature of that use? a) information and communication

   technologies; b) discussion forums; c) online communities; d) digital media; e)

   mobile devices.

3. How do user's perceive the usefulness of, and how likely are they to use the

   following online tools or resources in supporting weight loss-related lifestyle

   change? a) multimedia tutorials and content videos for role modeling; b) mobile

and online diet and exercise journals for self-monitoring; c) discussion forums and online communities for social support; d) journals and self-assessment instruments as metacognitive tools.

<u>STUDY PARTICIPANTS</u>

A total of 19 individuals participated in the study, in two sub-groups. The first sub-group consisted of 14 individuals who were enrolled in a hospital-based lifestyle modification program for overweight adults. Their involvement in the study was limited by the hospital to completion of the survey. Of the 30 questionnaires provided to the Bariatric Clinic, 14 were returned, resulting in a response rate of 46.7%. The second sub-group, which took part in both the survey and the interview portions of the study, consisted of five individuals identified through the researcher's personal network. All of the participants were overweight or obese and had been involved in at least one weight loss treatment program.

<u>Demographic Characteristics</u>

Data on age, gender, and educational attainment were obtained for each participant. Table 21 shows this demographic information for both sub-groups and for the entire group.

Selection of interviewees was done concurrently with the data collection at the bariatric clinic creating the potential for a misalignment of the profiles of each subgroup in terms of gender, age, and level of education. Both sub-groups had a

Table 21

Demographic Characteristics of Study Participants

	Sub-group 1 Bariatric Clinic		Sub-group 2 Interviewees		Total	
	n	%	n	%	n	%
GENDER						
Male	4	29	1	20	5	26
Female	10	71	4	80	14	74
Total	14		5		19	
AGE						
18-24 years	0	0	0	0	0	0
25-34 years	3	21	0	0	3	16
35-44 years	2	14	2	40	4	21
45-54 years	4	29	2	40	4	32
55-64 years	5	36	0	0	5	26
65 years and over					1	5
EDUCATION						
Some high school	0	0	0	0	0	0
High school diploma	3	21	0	0	3	16
Some college or TS	1	7	0	0	1	5
College or TS diploma	7	50	2	40	9	47
Some university	1	7	1	20	2	11
Bachelor's degree	2	14	0	0	2	11
Graduate studies	0	0	2	40	2	11

similarly higher proportion of female participants: there were 4 male and 10 female participants in sub-group 1 (questionnaire only) and 1 and 4 in sub-group 2 (questionnaire and interview).

Rather than reporting the data from both sub-groups separately, the demographic characteristics of the two sub-groups were compared to determine if they were sufficiently similar to make it suitable to combine the data. Weighted averages were calculated for age and education to allow a comparison of these demographics.

As the age data were in the form of ordinal categories, the average age of the participants could not be determined. Therefore, a weighted average age was calculated using the products of the frequency and the median of each age category (Table 22). Using this calculation procedure, the weighted average age for Sub-Groups 1 and 2 were 47.9 years and 50.0 years, respectively.

Table 22

Calculating the weighted average age of participant sub-groups

		Bariatric Clinic		Interviewees	
Participant age	Category Median	Frequency	Weight	Frequency	Weight
18-24 years	21	0	0	0	0
25-34 years	30	3	90	0	0
35-44 years	40	2	80	2	80
45-54 years	50	4	200	2	100
55-64 years	60	5	300	0	0
65 years & up	70	0	0	1	70
Average Age			47.86		50

A similar approach was used for the education data, replacing each level of education with an expected number of years of full-time study for each category (Table 23). This resulted in an average education level of 13.8 years for Sub-Group 1 and 15.6 years for Sub-Group 2.

Overall, the gender distribution, average age, and average education level were quite similar between the two sub-groups. See Table 24. This similarity was considered sufficient to allow the combination of the two sub-groups into a single pool of participants ($n = 19$), which will be used for the balance of the analysis and discussion of

the survey findings.

Table 23

Calculating the weighted average education level of participant sub-groups

		Bariatric Clinic		Interviewees	
Level of Education	Years (Full-time)	Frequency	Weight	Frequency	Weight
Some high school	10	0	0	0	0
High school diploma	12	3	36	0	0
Some college or TS	13	1	13	0	0
College / TS diploma	14	7	98	2	28
Some university	14	1	14	1	14
Bachelor's degree	16	2	32	0	0
Graduate studies	18	0	0	2	36
Average level of education			13.79		15.6

Table 24

Comparison of Sub-group Demographics

Demographic	Combined (n=19)	Bariatric Clinic (n=14)	Interviewees (n=5)
Gender			
• Male	26.3%	29%(+2.7%)*	20%(-6.3%)
• Female	73.7%	71% (-2.7%)	80% (+6.3%)
Average Age (years)	48.92	48.36 (-0.56)	50.5 (+1.58)
Education Attainment (years)	14.27	13.79 (-0.48)	15.6 (+1.33)
* Values in parentheses are the differences between each sub-group and the combined values			

QUANTITATIVE ANALYSIS: SURVEY ON TECHNOLOGY

Bates (2005, p. 50) states that "...no matter what the quality of teaching with technology, learning will not occur without access to that technology...". Distance education's current heavy reliance on information and communication technologies (ICT) necessitates that potential learners meet certain minimal conditions for full access to learning assets. The adoption of any technology is predicated on an individual's pre-disposition to adopt the technology in question. Other conditions include access to a personal computer and a broadband Internet connection and familiarity with the use of other ICTs so as to be able to use online learning content.

The study questionnaire surveyed participants on their accessibility to computer technology and other devices, and level of network/Internet connectivity. The survey also asked respondents about how they used various computing devices and the activities they conducted to integrate technology into their lives (e.g., information retrieval, processing and sharing; communication; learning; entertainment; networking). The participants' responses were considered to provide insight into their ability to access and use the various technologies to support lifestyle change.

Access to Technology

Access was considered to involve availability of personal computers and other digital devices, and the availability of broadband Internet service.

Home-based computers and connectivity

Of the 19 participants, 18 (94.7%) had broadband [high=speed?]Internet service

in their home. This high level of broadband access is in line with the Canadian average where "approximately 95 per cent of Canadian households can access broadband services using land-line facilities" (El Akkad, 2011, p. 1). Participants had an equally high level of access to computers.

The availability of personal computers in the home was surveyed in order to determine whether or not individuals would be able to access home-based ICT for supporting lifestyle change, as recommended by Prochaska (2004). As shown in Table 25, 18 respondents (94.7%) had at least one computer at home; two respondents (11.2%) had three or more. As the findings show, participants had more-than adequate home access to computers, somewhat more than most Canadians. A study by Statistics Canada (2007) determined that, in 2007, 80% of Canadian homes had personal computers, with 26% of the dwellings having two or more computers.

Table 25

Numbers of computers in participants' homes (n=19)

Number of computers in the home	Frequency	%
None	1	5.3
1	10	52.6
2	6	31.6
3	1	5.3
4 or more	1	5.3

As the findings indicate, participants had the basic hardware and connectivity infrastructure to support distance education technology, and that access was not a barrier.

<u>Availability of mobile communications and entertainment devices.</u>

Individuals undergoing lifestyle changes require support or information when they are away from home. Therefore, mobile access can be extremely valuable. The availability of mobile communications devices such as smartphones or cell phones provides insight into the technologies that individuals undergoing lifestyle change may access for social support, information retrieval and sharing, and mobile learning, as well as for basic communication and the ability to transmit and receive text. Mobile communications devices, sometimes called wireless devices (e.g. iPhone, Blackberry, and other smartphones) use Internet protocol-based (IP) technology to transfer data, connecting and interacting through wireless networks (e.g. WiFi (IEEE 802.11x), GSM, G3, and G4). These devices are also capable of creating still image and multimedia artifacts. The use of mobile entertainment devices (e.g. iPods, and MP3 players), which are limited to playback of manually loaded content, can provide an indicator of the ability for individuals to access and consume online multimedia resources away from home.

Portable devices permit the use of ICT beyond the home. Such content could easily be useful for lifestyle change, and not purely for entertainment purposes . Podcasts (i.e, audio files similar to a radio broadcast, which can be downloaded, usually from the internet, and listened to on a computer, MP3 player or other portable device) are a prime example of resources for these devices (McKinney, Dyck, & Luber, 2009).

As shown in Table 26, all respondents had access to some form of mobile communications technology: 5 (26.3%) had an iPhone; 11 (57.9%) had a Blackberry device; 5 (26.3%) had some other type of smartphone; and 14 (73.7%) had mobile

phones. These levels of access to mobile devices indicated that mobile technology is readily available to individuals undergoing lifestyle change. As such, the design and delivery of resources for supporting lifestyle change should consider compatibility with mobile devices as an enhanced means of providing support, information, and education. Moreover, the availability of mobile devices can be considered a facilitating factor.

Table 26 also shows the respondents' use of mobile devices. The activities for smartphones are for how respondents use any of the features afforded by the devices apart from the core telephone functionality. Of the 19 respondents, 4 (21.1%) use their mobile devices for purposes other than communications (i.e. listening to audio, watching video, or playing games).

Table 26

Mobile communications and entertainment devices used by participants (n=19)

Device	Frequency	%
MOBILE COMMUNICATIONS DEVICES		
Mobile phone	14	73.7
Blackberry	11	57.9
iPhone	5	26.3
Other smartphone	5	26.3
Hands-free kit	7	36.8
No mobile device	0	0.0
MOBILE ENTERTAINMENT DEVICES		
iPod (audio, video)	9	47.4
MP3 player	6	31.6
Portable video player	2	10.5
Portable DVD player	10	52.6
OTHER MOBILE DEVICES		
Tablets (e.g. Apple iPad)		
e-Readers (e.g. Amazon Kindle)	5	26.3

The iPad device was the only mass-market mobile tablet device available at the time this study was conducted. These devices are able to connect to both WiFi service and wireless telephone networks, enabling them to obtain content in a wide variety of settings (home, place of work, airports, wireless hotspots, etc.). Four (21.1%) respondents use their iPad to download content to watch video(s), listen to music and other audio content and play games.

The Amazon Kindle, one example of a class of consumer devices called e-readers, is included here because it has the ability to interact with wireless telephone and data networks to download content. It was recently thought that these devices could accelerate the widespread use of electronic textbooks and other content for individuals undergoing lifestyle change. However, at the time of writing this report, tablets were making substantial inroads into this market, probably making e-readers obsolete within a few years.

Availability of fixed consumer electronics

The prevalence of various consumer electronics was also considered to be an indicator of potential forms of technology that might be used to reach individuals involved in lifestyle change. Therefore, the study examined both fixed devices, which are normally used inside the home, and portable devices, which individuals use in locations of their choosing.

Some categories of fixed technologies can offer a range of features. For example, in the case of optical storage, Blu-ray ™ technology has a much higher data capacity and supports more sophisticated interaction when compared to DVD. However, as shown in

Table 27, the newer technology was accessible to comparatively fewer of the

Table 27

Consumer electronics owned by participants (n=19)

Device	Frequency	%
FIXED DEVICES		
Standard television	9	47.4
Flat screen TV	16	84.2
VCR	6	31.6
DVD player	17	89.5
Blu-ray player	7	36.8
Portable sound system	10	52.6
Home theatre sound system	10	52.6
GPS in my car	12	63.2
PORTABLE DEVICES		
iPod (audio, video)	9	47.4
MP3 player	6	31.6
Portable video player	2	10.5
Portable DVD player	10	52.6

respondents: 7 (36.8%) of the respondents had Blu-ray players, whereas 17 (89.5%) had

DVD players. As these findings illustrate, the additional functionality of a technology

must be weighed against its access and availability to potential users. "Bells and

whistles" provide no added value if users cannot access them.

The type of service subscriptions, such as cable or satellite, is not limited to the

provision of television alone. With the advent of digital cable and satellite service, full

interactive capabilities are now possible. For example, digital cable provides televisions

with the capability to conduct Internet searches and send e-mail. Although some of these

technologies are still in their infancy, knowing their availability to potential users may

suggest applications and modes of delivery for distance education technologies and tools

to support lifestyle change.

As shown in Table 28, digital cable and satellite television signals, which are by their nature high-definition signals, were used by 17 (89.5%) of the respondents. Such digital signals permit interactivity with just a remote control. With the addition of Digital Video Recorder (DVR) and timeshifting i.e., acquisition of broadcasts from other time zones), individuals have access to more information and content than might be available from local broadcasts only. Satellite radio now permits the broadcast of hundreds of signals on a continent-wide scale.

Table 28

Service subscriptions (n=19)

Service	Frequency	%
Analog cable	2	10.5
Digital cable	11	57.9
High-definition cable	12	63.2
Satellite	5	26.3
High-definition satellite	3	15.8
Satellite / cable Personal Video recorder (PVR)	6	31.6
Satellite radio (Sirius / XM)	4	21.1
None of the above	2	10.5

Technology Adoption

Study participants were asked about their attitude toward technology. Five choices were provided with each being a description of an adopter category. These descriptions were based on those proposed by Rogers (2003) and Moore (1995). Table 29 shows the descriptions and their associated adopter category.

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Table 29

Technology category descriptors from study questionnaire

Technology Adopter Category	Description
Innovator	I love technology for itself. I want to have the latest and greatest technological innovations.
Early Adopter	The value of new technology is how it improves my daily life and environment.
Early Majority	I usually spend a lot of time evaluating new technology before I decide to get it. All I care about is that it works.
Late Majority	I don't understand the fuss about technology. It usually doesn't do most of what it's supposed to do anyway. I only buy new stuff when I absolutely have to.
Laggard	I don't care at all about technology. We've gotten along fine up until now. Besides, it never works. It makes my life miserable.

Rogers (2003) discusses the strong similarity between the categories of the technology adoption lifecycle and the stages of the Transtheoretical Model (TTM). For example, according to the TTM, one needs to be ready and prepared for change before it can actually take place. Similarly, the technology adoption category (TAC) is based on a set of beliefs or attitudes that are in place *when* (not if) an individual adopts a given technology.

The TAC categories of the study participants, based on the questionnaire, are shown in Table 30. A histogram of the results is shown in Figure 7. There is a sharp contrast between Figure 6, which shows the typical frequency distribution of adopter categories developed by Rogers (2003, p. 281), and Figure 7.

Table 30

Technology adoption categories of study participants (n=19)

Adopter Category	Frequency	%
Innovator	4	21.1
Early Adopter	9	47.3
Early Majority	2	10.5
Late Majority	3	15.8
Laggard	1	5.3
Total	19	100.0

Rogers (2003, p. 280) determined that the distribution of frequencies of the

technology adoption categories is normal (Figure 6). Of particular note is that the

classifications are not symmetrical around the mean (p. 281). *Laggards* were found to be

homogeneous such that there was no evidence of early and late laggards) whereas

innovators and *early adopters* had quite distinct characteristics.

	Early	Early	Late	
Innovators	Adopters	Majority	Majority	Laggards
2.5%	13.5%	34%	34%	16%

$\bar{x}\text{-}2sd$ $\qquad$ $\bar{x}\text{-}sd$ $\qquad$ $\bar{x}$ $\qquad$ $\bar{x}\text{+}sd$
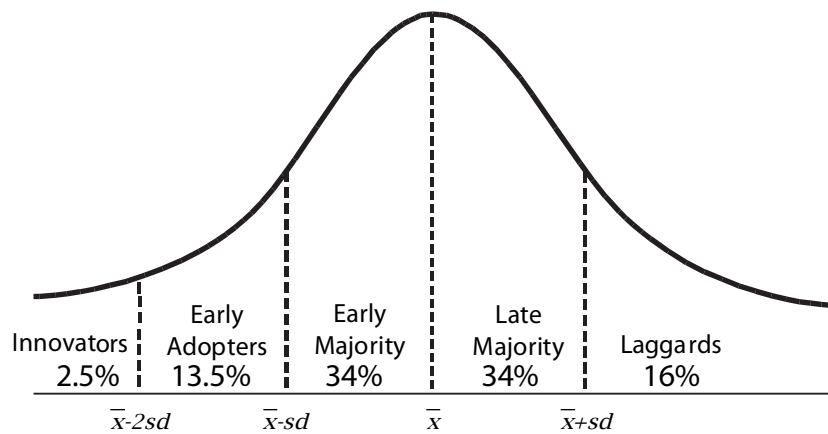
Figure 6 – Adopter categorization on the basis of innovativeness. Source: *From Diffusion of Innovations, 5th Edition* by Everett M. Rogers (p. 281), Copyright © 1995, 2003 by Everett M. Rogers. Copyright © 1962, 1971, 1983 by The Free Press, a Division of Simon & Schuster, Inc. Reprinted with permission of the publisher. All rights reserved.

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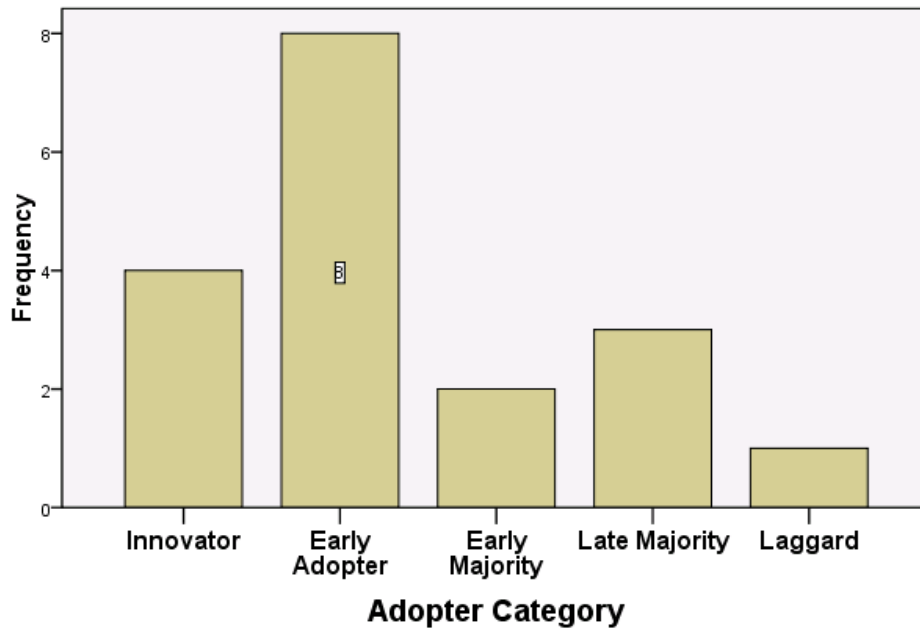
Figure 7 - Distribution of participants' technology adoption categories (n=19)

Table 31 expands Table 30 to show the frequency distribution according to Rogers' expectations. Subtracting the expected frequency from the actual frequency for each TAC indicates that, as a group, the respondents had a higher level of innovativeness when compared to the general population. Comparing the weighted average age of the respondents (48.9 years) to that of the general population (47.7 years; Statistics Canada, 2006) based on the 2006 Census for Canada, the study group is older. Interestingly, the educational attainment for the study participants is higher when compared to the Canadian average (Statistics Canada, 2010). The 2006 Census for Canada reports the following breakdown (the results of this study are shown in parentheses): 33.5% (21%) had a high school diploma; 36.9% (47%) had college or TS diplomas; 5.8% (10.5%) had some university; 15.2% (10.5%) had bachelor degrees; 8.6% (10.5%) had taken graduate

Table 31

Comparison of surveyed and expected technology adoption categories

	Study (n=19)		Rogers Expected (n=19)		
Adopter Category	Frequency	%	Frequency	%	Difference
Innovator	4	21.1	1	2.5	+3
Early Adopter	9	47.3	3	13.5	+6
Early Majority	2	10.5	6	34.0	+4
Late Majority	3	15.8	6	34.0	-3
Laggard	1	5.3	3	16.0	-2
Total	19	100.0	19	100.0	

studies. This increased level of education attainment may explain, at least in part, the greater preponderance of early adopters in the study.

In an attempt to further understand the reasons for the discrepancy in TAC distributions between the study participants and the general population, the number of technology items used or activities performed, as indicated in the questionnaires, was summed with the intent of developing a rudimentary indicator of technology integration. Table 32 shows those results, sorted by adopter category and technology integration.

The study questionnaire asked participants to identify, from a list of specified technologies, which ones they used in their daily lives. Having an understanding of the technologies that potential candidates for lifestyle change already used could assist developers and facilitators of such programs to create appropriate and effective distance education-based tools for them.

Table 32

Interviewees' demographics and technology integration scores sorted by TAC

Participant	Age	Education	Technology Adopter Category	Technology Integration (Max=37)	%
11	25-34 y	College or TS diploma	Innovator	17	45.9
12	45-54 y	College or TS diploma	Innovator	19	51.4
16	45-54 y	Some university	Innovator	21	56.8
10	35-44 y	College or TS diploma	Innovator	26	70.3
7	45-54 y	HS diploma	Early Adopter	15	40.5
14	25-34 y	Bachelor's degree	Early Adopter	17	45.9
18	55-64 y	Bachelor's degree	Early Adopter	19	51.4
17	25-34 y	Some college or TS	Early Adopter	21	56.8
19	55-64 y	HS diploma	Early Adopter	21	56.8
6	35-44 y	College or TS diploma	Early Adopter	22	59.5
5	45-54 y	Graduate studies	Early Adopter	25	67.6
4	45-54 y	Graduate studies	Early Adopter	28	75.7
3	35-44 y	College or TS diploma	Early Adopter	32	86.5
8	45-54 y	College or TS diploma	Early Majority	12	32.4
2	35-44 y	Some university	Early Majority	20	54.1
15	55-64 y	College or TS diploma	Late Majority	1	2.7
1	65 y & up	College or diploma	Late Majority	9	24.3
13	55-64 y	College or TS diploma	Late Majority	17	45.9
9	55-64 y	HS diploma	Laggard	7	18.9

Abbreviations: y – years; HS – High School; TS – TS

Computer-based Information and communication technologies (ICT)

Information technologies are those that facilitate the use of Internet-based information resources and functionality. They involve searching, processing, and sharing of information. The survey results for activities relating to information activities are shown in Table 33.

Information searching, processing, and sharing.

The primary Internet information activities participants were engaging in were e-mail and web-browsing. Of the 19 respondents, 18 (94.7%) used e-mail and 15 (78.9%) did general web browsing. Search-related activities were also common: 16 (84.2%) used the Internet to obtain maps or directions, 13 (68.4%) used it to conduct research on

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Table 33.

Internet-based information retrieval, processing, and sharing (n=19)

Activity	n	%
E-mail	18	94.7
Maps / get directions	16	84.2
General Web browsing	15	78.9
Book travel / vacation	9	47.4
Shopping online	8	42.1
Product / service research prior to purchase	13	68.4
Look for recipes	12	63.2
Reference material (Encyclopedia, dictionary, etc.)	9	47.4
Troubleshooting / repair	7	36.8
Studying, training	7	36.8
Other learning activities	4	21.1
Write a blog	1	5.3

products or services; and 12 (63.2%) looked for recipes.

Respondents were also queried on a variety of activities involving online family banking, e-commerce, and online learning. Results showed that 9 participants (47.4%) booked travel or made vacation plans online, and 8 (42.1%) shopped online. Some respondents were engaged in distance learning activities: 4 (21.1%) studied or trained using computer and online technology and 7 (36.8%) had engaged in other forms of learning activities. Of the 19 respondents, 10 (52.6%) used their home computer for word processing; 8 (42.1%) used their home computer to do family banking and finances.

Communication.

Communication involves using online and computer technology to communicate in written, verbal or visual formats. Table 34 shows respondents' use of various technologies associated with communication. The types of activities include both synchronous and asynchronous technologies.

Table 34.

Communication activities

Activity	n	%
E-mail	18	94.7
Social networking (Facebook, Twitter, etc.)	12	63.2
Audio/video communications (Skype, Yahoo Messenger, etc.)	7	36.8
Instant messaging	8	42.1
Participate in forums or chat rooms	3	15.8
Write blog	1	5.3

Most of the respondents, 18 (94.7%) used e-mail. Findings pertaining to participants' social networking and social media activities were mixed: 12 (63.2%) of the respondents used social networking tools like Facebook or Twitter; 1 (5.3%) wrote a blog; 3 (15.8%) participated in forums or chat. The fact that only one person writes a blog was not surprising given the time commitment required to write a blog on a regular basis, and the creative demand for fresh material for each posting.

Synchronous communication activities, both text- and audio/video-based, were less common than asynchronous activities. Of the 19 respondents, 7 (36.8%) used real-time audio/video tools like Skype or Yahoo Messenger and 8 (42.1%) used instant messaging.

Communication technologies could aid social-support, a critical component of weight loss and weight maintenance, and may remove the need for in-person interventions. Tate, Jackvony, and Wing (2003) compared two web-based weight loss programs, one with the addition of a behavioral e-counseling component. Those in the e-counseling group lost significantly more weight. Micco et al. (2007) compared an online behavioral weight-loss treatment program with the same program supplemented with

monthly in-person meetings and determined that supplementing an Internet weight-loss treatment with monthly in-person meetings did not result in greater weight losses.

In order to better understand the use of communications technologies, the activities were examined in terms of gender (Table 35) and age (Table 36). As shown in Table 35 and Figure 8, the male participants in the study were more likely to participate in social networking (100% of the men compared to 60% of the women) and forum discussions (40% of the men compared with 14.3% of the women). On the other hand, the female participants were more likely to participate in audio/video communications (6 [42.9%] females and 1[20.0%] male) and instant messaging (8 [57.1%] females and 1 [20.0%] male). There were minor gender differences for e-mail (100% for males and 92.0% of females). Overall, the male participants appeared to prefer asynchronous tools and the female participants to prefer synchronous technologies. However, due to the comparatively small number of male participants in the study, the findings pertaining to gender differences are limited and should be considered with caution.

Table 35
Communication activities by gender

	Female (n=14)		Male (n=5)	
Activity	n	%	n	%
E-mail	13	92.9	5	100.0
Social networking	9	64.3	5	100.0
Participate in forums	2	14.3	2	40.0
Audio/video communications	6	42.9	1	20.0
Instant messaging	8	57.1	1	20.0
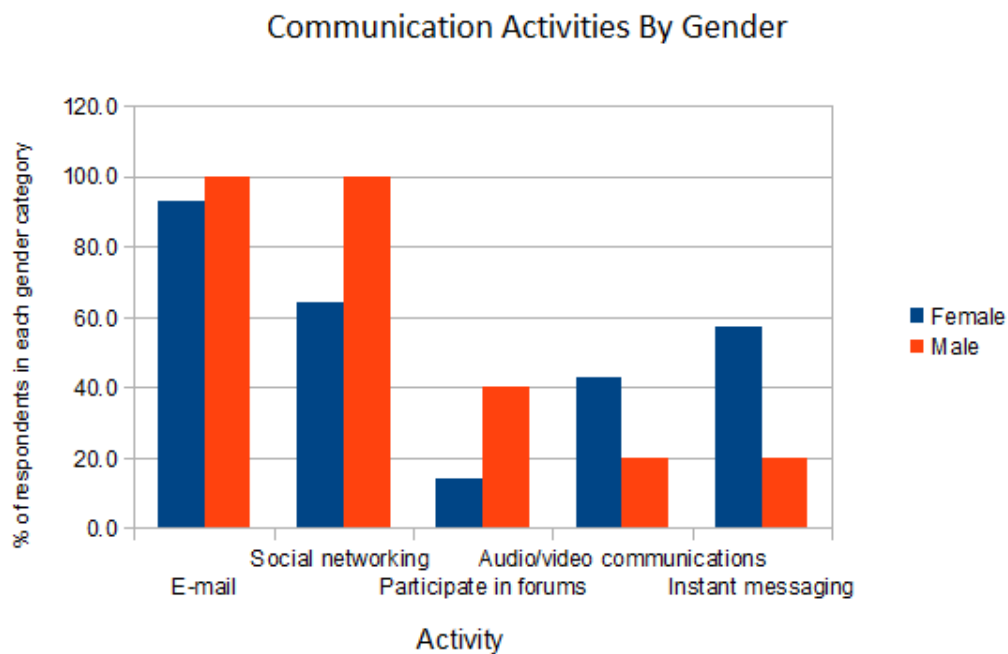
Figure 8. Communication activities by gender

Although the literature review did not identify any lifestyle change or weight management studies where age was a factor, age has been identified as important with regard to the use of digital technology. For example, individuals younger than 30 years of

age are sometimes referred to as "digital natives" as they were born after the advent of

the Internet in 1990 when the Internet became popular. As a result, the analysis examined

the communication activities of different age groups. Most of the respondents were in the

45-54 and 55-64 year age groups. To put this age range in context, these participants were

between the ages of 45 and 64 years.

Table 36

Communication activities by age

	Age (Years)							
	25-34		35-44		45-54		55-64	
Count in each age category	3 (16%)		4 (21%)		6(32%)		6(31%)	
Activity	n	%	n	%	n	%	n	%
E-mail	3	100	4	100	6	100	5	83.3
Social networking	3	100	4	100	5	83	2	33.3
Participate in forums	0	0	2	50	2	33	0	0
Audio/video communications	1	33	2	50	2	33	1	16.7
Instant messaging	3	100	1	25	3	50	2	33.3
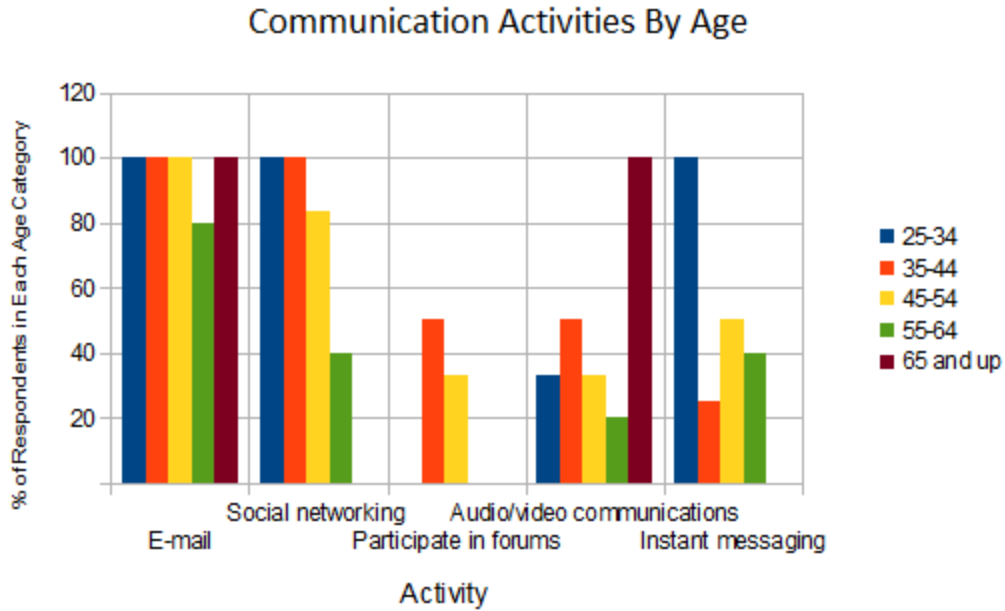
Figure 9. Communication activities by age

As shown in Figure 9 and Table 36, e-mail use was essentially ubiquitous across all age groups – the single non-user was in the oldest age group. Social networking appeared to appeal to younger participants; it was used by all the participants in the 25-44 years group, with the rate declining to 80% of the 45-54 year-olds and 40% of those aged 55 years or older. The use of synchronous audio/video communications (e.g., Skype) showed a uni-modal distribution, with the highest rate of use involving the 35-44 year-old group in which 50% of the members used this form of online communication.

Instant messaging was highly skewed toward the youngest group: it was used by 100% of the 25-34 year-old participants, after which there was a steep decline to 25% of the 35-44 year-olds, 50% of the 45-54 year-olds, and 40% of the 55-64 year-olds.

Discussion forums appeared to be the exclusive domain of 35-54 year-olds,

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despite the fact that all the 25-34 year-olds used Facebook, which includes discussion forums as one of its features. All of the 25-34 year-olds used instant messaging, suggesting a divide exists between the groups.

<u>Digital images and multimedia</u>

Media can be in many forms such as photos, music or other audio, and videos. Of the 19 respondents, 13 (68.4%) store and display photos; 9 (47.4%) listen to music; and, 8 (42.1%) watch videos. Given the ubiquity of online video the frequency of respondents who watch video online appears low. The reasons for this are unknown, but could be as simple as individuals' systems not being configured properly to display video, which could present a barrier. Two types of digital media creation were queried: 17 (89.5%) of the respondents used a digital camera and 7 (36.8%) used a digital video camera.

<u>Mobile communications and entertainment devices</u>

Table 37 shows the respondents' use of mobile communications devices. The activities for smartphones are for how respondents use any of the features afforded by the devices apart from the core telephone functionality. Of the 19 respondents, 4 (21.1%) use their smartphones for listening to music, watching videos, or playing games.

The iPad device was the only mass-market mobile tablet device available at the time this study was conducted. These devices are able to connect to both WiFi service and wireless telephone networks, enabling them to obtain content in a wide variety of settings (home, place of work, airports, wireless hotspots, etc.). Four (21.1%) respondents use their iPad to download content to watch video(s), listen to music and other audio content and play games.

The Amazon Kindle is included here because it has the ability to interact with wireless telephone and data networks to download content. The ability to use these devices may accelerate the widespread use of electronic textbooks and other content for individuals undergoing lifestyle change.

Table 37

Mobile entertainment devices used by participants (n=19)

Device	Frequency	%
iPhone or other smartphone (audio, video, games)	4	21.1
iPad (audio, video, games)	4	21.1
Kindle or other eReader	5	26.3

Utility and Likelihood of Use of Selected Technologies and Tools

The survey explored the perceived utility and the likelihood of use of the following technologies or tools for supporting lifestyle change and weight loss: role modeling with videos posted on YouTube; journaling with mobile communications devices; journaling with Google Docs, a cloud computing website; and social support with social networks, social media, and online communities. Each technology or tool corresponded to a Resource that had been developed to show a selected DE technology. Participants were asked to rate each tool on the following scale:

Usefulness: 1= Not at all useful, 2 = Not useful, 3 = Useful, 4 = Very useful

Likelihood of use: 1= Not at all likely, 2 = Not likely, 3 = Likely, 4 = Very likely

Table 38 shows the average rating for the perceived usefulness and likelihood of use for each tool. For all surveyed tools and technologies, respondents were less likely to use them themselves than they were to perceive them as generally useful.

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Table 38

Utility and likelihood of use of online tools and services

	Mean		
Tool	Perceived Affordance	Likely to Use	Difference
MULTIMEDIA ROLE MODELING			
YouTube videos	2.47	1.89	-0.58
JOURNALING ON MOBILE DEVICES			
Food journals	2.68	2.11	-0.57
Exercise journals	2.37	1.95	-0.42
JOURNALING WITH CLOUD COMPUTING			
Food journals	2.68	2.32	-0.36
Exercise journals	2.63	2.11	-0.52
SOCIAL SUPPORT WITH SOCIAL NETWORKS & ONLINE COMMUNITIES			
Twitter	1.68	1.47	-0.21
Facebook or other social network	2.42	2	-0.42
SparkPeople	2.26	2	-0.26

Multimedia for Role Modeling.

There was one role modeling tool, namely YouTube videos. It was given included for two reasons. Some mobile devices like the iPhone are not for now, nor the foreseeable future, able to play the standard format used on YouTube.com, namely Adobe's Flash Video. Second, as was seen in prior results in this study, only a minority of respondents watched video on mobile devices.

Participants were asked to rate their perceived usefulness of YouTube videos to support lifestyle change, and their likelihood of actually using them for that purpose. Less than half of the respondents saw any utility in this tool for supporting lifestyle change with 9 (47.4%) of the respondents considering it useful or very useful, and 10 (52.6%) considering it not useful or not useful at all. In terms of likelihood of use, 6 respondents

(31.6%) reported they would be likely to use them. No one reported they would be very likely.

Journaling with mobile technology.

Respondents indicated some perceived utility for keeping food journals and exercise journals on mobile devices. Nine (47.4%) indicated they would be likely to use their smartphone for tracking food intake and 10 (52.6%) indicated they would be unlikely or very unlikely to do so. There is evidence here to suggest mobile device food journaling may appeal to individuals in lifestyle change. Physical activity journaling was not perceived to be as useful as food monitoring. 9**(**47.4 %**)**, and is even less likely to be used 7**(**36.8%**)**. No one responded they would be *very likely* to use mobile technology for journaling food intake or physical activity.

Utility and likelihood of using smartphones for journaling food intake and physical exercise based on gender (Table 39) and age (Table 40) were developed. Examining food journaling by gender, 57.4% (8) of females were likely to use mobile technology, compared to just 20% (1) of males. For exercise journaling, 42.9% (6) of females were likely to use mobile technology, compared to just 20% (1) of males. In comparing each gender to the totals for all participants, females are more likely than males to use mobile technology for journaling food intake and physical exercise.

Table 39

Utility and likelihood of using smartphones for journaling food intake and exercise based on gender (n=19)

	Female			Male			Total	
			%			%		
	Count	%*	Difference**	Count	%*	Difference**	Count	%
FOOD JOURNALS ON SMARTPHONE OR PDA								
Utility								
Not useful at all	3	21.4	-4.9	2	40.0	13.7	5	26.3
Not useful	2	14.3	-1.5	1	20.0	4.2	3	15.8
Useful	4	28.6	7.5	0	.0	-21.1	4	21.1
Very useful	5	35.7	-1.1	2	40.0	3.2	7	36.8
Likelihood of Use								
Not likely at all	4	28.6	-8.3	3	60.0	23.2	7	36.8
Not likely	2	14.3	-1.5	1	20.0	4.2	3	15.8
Likely	8	57.1	9.8	1	20.0	-27.4	9	47.4
Very likely	0	0.0	0.0	0	0.0	0.0	0	0.0
EXERCISE JOURNALS ON SMARTPHONE OR PDA								
Utility								
Not useful at all	5	35.7	-1.1	2	40.0	3.2	7	36.8
Not useful	2	14.3	-1.5	1	20.0	4.2	3	15.8
Useful	3	21.4	-4.9	2	40.0	13.7	5	26.3
Very useful	4	28.6	7.5	0	.0	-21.1	4	21.1
Likelihood of Use								
Not likely at all	5	35.7	-6.4	3	60.0	17.9	8	42.1
Not likely	3	21.4	.4	1	20.0	-1.1	4	21.1
Likely	6	42.9	6.0	1	20.0	-16.8	7	36.8
Very likely								

   * % within Gender
  ** Difference from total percent (% Gender - % Total)

The perceived utility and likelihood of use of mobile technology for journaling was cross-tabulated by age. It showed that the only age category with a majority of was 35-44 year olds. The results for that category are as follows: 4(100%) indicated that mobile food journaling to be *very useful* and 3(75%) were likely to use it; 4(100%) indicated mobile exercise journaling would be *useful* or *very useful* and 3(75%) would be likely to keep mobile exercise journals.

Table 40

Utility and likelihood of using smartphones for journaling food intake and exercise based on age (n=19)

	Age							
	25-34		35-44		45-54		55 and up	
	Count	%*	Count	%*	Count	%*	Count	%*
FOOD JOURNALS ON SMARTPHONE OR PDA								
Not useful at all	1	33.3	0	.0	1	16.7	3	50.0
Not useful	0	.0	0	.0	2	33.3	1	16.7
Useful	1	33.3	0	.0	1	16.7	2	33.3
Very useful	1	33.3	4	100.0	2	33.3	0	.0
Not likely at all	1	33.3	1	25.0	1	16.7	4	66.7
Not likely	0	.0	0	.0	2	33.3	1	16.7
Likely	2	66.7	3	75.0	3	50.0	1	16.7
Very likely	0	.0	0	.0	0	.0	0	.0
EXERCISE JOURNALS ON SMARTPHONE OR PDA								
Not useful at all	1	33.3	0	.0	1	16.7	5	83.3
Not useful	0	.0	0	.0	2	33.3	1	16.7
Useful	2	66.7	2	50.0	1	16.7	0	.0
Very useful	0	.0	2	50.0	2	33.3	0	.0
Not likely at all	1	33.3	1	25.0	1	16.7	5	83.3
Not likely	1	33.3	0	.0	2	33.3	1	16.7
Likely	1	33.3	3	75.0	3	50.0	0	.0
Very likely	0	.0	0	.0	0	.0	0	.0

* % within age group

Journaling in the cloud.

Participants were asked about the usefulness of and the likelihood they would use food intake and exercise journals on GoogleDocs to support lifestyle change. Of the 19 respondents, 13 (68.4%) indicated that keeping food journals on Google Docs would be useful (10 / 52.6%) or very useful (3 / 15.8%) and 11 (57.9%) said they would be likely to use it. Exercise journaling was seen to have the same utility as food journaling: 13 (68.4%) indicated that keeping exercise journals on Google Docs would be *useful* (10 / 52.6%) or very *useful* (3 / 15.8%), but only 8 (42.1%) were *likely* to use it for that purpose. No respondents indicated they were *very likely* to use Google Docs for either journaling activity.

Social networks and social media.

Given the importance of social support for weight management, it was believed that social networks and social media could be of interest in supporting individuals' efforts for lifestyle change. However, as with the other technology/platform categories, this did not appear to be the case. Twitter's perceived utility was lowest of all the tools regardless of category: 11 (57.9%) indicated it would be *not useful at all* and 4 (21.1%) said it would be *not useful*. This represents 78.9% of all respondents. Seventeen (89.5%) responded that they would be *not likely* (7 or 36.8% of participants) or *not likely at all* (12 or 63.2% of participants). Social networking (e.g. Facebook) did not fare much better. Although its perceived utility was spread uniformly, with a mean of 2.42, its likelihood of use was lower with a mean of 2.00: 2 respondents (10.5%) responded that they would be *not likely* to use it and 10 (52.6%) indicated they would be *not likely at all* to use it.

The survey asked participants if they would be more likely to use these technologies if they had a "buddy", i.e., someone with whom they could communicate and share their experiences. Of the 19 respondents, 14 (73.7%) replied they would be more likely to use the technologies if they had a buddy; 5 (26.3%) indicated they would not. On the basis of gender, a majority of both females and males (11 of 14 [78.6%] females and 3 of 5 [60%] males) indicated they would be more likely to use the technologies if they had a buddy (Table 40).

Table 41. Likelihood of adopting journaling and communication technologies when paired with a buddy by gender(n=19)

	Female		Male		Total	
	Count	%*	Count	%*	Count	%
No	3	21.4	2	40.0	5	26.3
Yes	11	78.	3	60.0	14	73.7

* - Percentage of gender

The likelihood of using social networking technologies for lifestyle change when the individual shared the experience with a buddy was also analyzed by age (Table 42). A majority of all age categories responded that they would be more likely to use the specified technologies if they had a buddy.

Table 42. Likelihood of adopting journaling and communication technologies when paired with a buddy by age (n=19)

	Age									
	25-34		35-44		45-54		55-64		65 & up	
	Frequency (n=3)	%*	Frequency (n=4)	%*	Frequency (n=6)	%*	Frequency (n=5)	%*	Frequency (n=1)	%*
No	1	33	0	0	2	33	2	40	0	0
Yes	2	67	4	100	4	67	3	60	1	100

* - Percentage of respondents' age category

Clearly, irrespective of age or gender, the majority of respondents would be more likely to use social networking, social media, and other forms of online communication if they had someone with whom they could share their thoughts, feelings, and experiences.

Summary – Survey on Technology Adoption

The Survey on Technology Adoption provided insights into several aspects of the respondents: their technology adoption category (Rogers, 2003); the computing and network access available to them; and their ability to use digital technology.

Given the underlying similarities between the Rogers' technology adoption model and TTM, the study used the TAC to provide insight into participants' pre-disposition towards technology and its use to support lifestyle change. Respondents' technology adoption categories were skewed toward innovation, with 4 (21.1%) identifying themselves as Innovators and 9 (47.3%) stating they are Early Adopters, with a combined total of 13 (68.4%). In contrast, Rogers (2003) determined in his studies that these groups together would be expected to represent 16.0% of the subjects.

Nearly all of the participants (94.7%) had access to computers and broadband

(i.e., high speed) connectivity in their homes. These access rates correspond to, or are greater than, the Canadian average, indicating access to distance education technology for lifestyle change was not a barrier on the basis of computing hardware and Internet access were not a barrier.

Access via smartphones and other mobile devices was not as ubiquitous as home-based access to computers, but was still high. Of the 19 respondents, most had one or more smartphones. Portable media players, such as iPods, iPhones, and MP3 players, were used by about half of the survey respondents. These devices can provide access to resources such as podcasts or videos.

The survey also queried respondents about many activities for which they used their computers and mobile devices in order to understand how they had integrated these technologies into their daily lives. Activities were classified as follows: information retrieval, processing and sharing; computer-based communications; digital media; and mobile communications. Information-related activities were quite high with respondents engaging in e-mail (84.2%) and web browsing (78.9%). Respondents also make substantial use of their home computers. In addition to e-mail, most used at least one other form of Internet-based communication (e.g., instant messaging, synchronous audio-video, social media, and social networking). Male respondents appeared to prefer asynchronous tools such as e-mail, social networking, and forums; whereas, female respondents appeared to prefer synchronous technologies, such as audio/video and instant messaging. The use of discussion forums was limited: all of the users were in the 35-54 year-old group, whereas 100% of the 25-34 year-olds used instant messaging.

Participants were asked about the perceived utility of, and likelihood to use streaming video, smartphone and cloud-based journals, and social networking and social media. For all technologies, the likelihood of use was less than the perceived utility, meaning they thought the technologies would be useful for others, but not necessarily themselves. Additionally, no one responded that they would be *very likely* to use any of them.

However, the study identified distance education tools and technologies that are likely to be very useful, some that are still a work in progress requiring further study, and still others that don't offer value and won't, for the foreseeable future. The next section describes the analysis of the qualitative data based on the interviews and how this studied examined usefulness of distance educations tools to support lifestyle change.

QUALITATIVE ANALYSIS OF INTERVIEW DATA

This sections covers the analysis of the data collected from the qualitative, semi-structured interviews. It begins by presenting a description of each of the five interviewees, including their demographic and other background information. Next, the results from coding the data are presented and the major themes discussed.

<u>THE INTERVIEWEES</u>

A brief description of the five interviewees is provided below, based on information gathered from the interviews, their survey responses, and otherwise known by the researcher. Pseudonyms are used to protect the privacy of the participants. A summary of their demographic data and their technology adopter category appear in Table 43.

<u>Jenny</u>

Jenny is a 67 year-old retired nurse with Type 2 diabetes who has struggled with obesity her entire life. In the last several years she has participated in a hospital-based weight loss control program. It was during that program that she learned her weight issues are genetic, which she found comforting, knowing "it's not my fault." Jenny's Technology Adopter Category (TAC) was Late Majority. Throughout the interview, she often mentioned that she had little confidence in her ability to use technology. Her Technology Integration Score (TIS; the sum of the number of selected home computer activities and the number of mobile communications, mobile entertainment, and digital devices used) was 9 of a possible 37 (24.3%). Reasons for this included a general lack of

interest in technology, and having no need for digital engagement beyond what e-mail and web browsing provided.

Amanda

Amanda is a 37 year-old mother of two young children. She recently underwent two years of treatment for cancer. During that treatment, her weight increased due to the effects of the various medications and long periods of involuntary inactivity. Amanda's TAC was Early Majority and her TIS was 20 (54.1%). She uses Internet technologies such as e-mail and web browsing regularly.

Originally from New Zealand, she also uses Skype video to keep in touch with family and friends. Her hectic lifestyle raising two young children may be preventing her from making more use of technology, as she repeatedly expressed that she would have liked to make better use of communication and other technologies, but just didn't have time. She is also a stay-at-home mother and made less use of mobile communications and entertainment devices in comparison to other interviewees.

Patricia

Patricia is a staff member at a local university. She is approximately 40 years old and is currently participating in a commercial weight-loss program. Patricia's TAC was Early Adopter and her TIS was 32 (86.5%), the highest amongst the interviewees. She made use of technology when there was a need that could not be solved by other means.

Brenda

Brenda is a uniformed senior manager in law enforcement and a mother of two university-aged children. She is in the 45-55 year age group. She has recently undergone treatment for cancer and, as a result of that treatment, gained weight. Brenda has two Master's degrees, giving her the highest education attainment amongst the interviewees. Her TAC was Early Adopter and her TIS was 28 (75.7%).

Arthur

Arthur is on staff at a local university. Prior to taking that position, he worked as a self-employed consultant and also held salaried positions with several employers. He is approximately 50 years old and has Type 2 diabetes. In his youth, he was very athletic. However, the demands of his 30+ year career, working up to 100 hours per week on a sustained basis, over time, caused him to gain weight. He holds a Master's degree in biology. Arthur has never been married and has no children.

Arthur's TAC was Early Adopter and his TIS was 25 (67.6%). He is a self-described "information junkie" and has a long history of using online tools and information similar to those on the study's website.

Table 43.

Interviewee demographic data

Interviewee	Jenny	Amanda	Patricia	Brenda	Arthur
Gender	Female	Female	Female	Female	Male
Age Category	65 and over	35-44 years	35-44 years	45-54 years	45-54 years
Education	College	Some University	College diploma	Graduate studies	Graduate
	diploma				Studies

<u>Interviewee Survey Responses</u>

Details of the interviewees' survey responses are included in Appendix D.

Table 44 presents the Technology Adopter Category and Technology Integration Score for

each of the interviewees.

Table 44.

Technology adopter categories and integration scores

Interviewee	Technology Adopter Category	Technology Integration Score*	%
Jenny	Late majority	9	24.3
Amanda	Early Majority	20	54.1
Patricia	Early Adopter	32	86.5
Brenda	Early Adopter	28	75.7
Arthur	Early Adopter	25	67.6

* Max score = 37

<u>CODE CATEGORIES</u>

In order to prepare the interview data for analysis using the TAS4 software, the

transcripts were broken down into single concept thoughts . The result was a total of 505

concepts, usually a single sentence or several sentences centered around a single idea.

Using the process described in Chapter 3, the interview data were then analyzed by assigning one or more codes to each of the concepts. Tables 45-47 list the categories that were developed, their frequency in the data set, and a description of their meaning. Appendix J is an expansion of these tables that includes examples of interviewee quotes that were assigned to each category. A total of 32 categories arose from the process. The categories are not mutually exclusive in that concepts can appear in more than one category. Some categories had multiple interpretations. For example, *support* could be interpreted as follows: *support,* included technological support which enabled ICT activities; or *support* included information support which increased self-efficacy enabling a behaviour).

Tables 44-46 list the first-, second- and third-order categories developed during the qualitative analysis, their frequencies of shared responses with other categories, and their meaning. The table found in Appendix J includes example quotations from the interview data.

Table 45

First-order categories listed in descending order of frequency of shared responses

Category	Frequency	Description
role modeling	158	⋏ Demonstration of positive behaviour
		⋏ Demonstration of an activity or procedure
		⋏ Demonstration of a process or procedure
multimedia	141	⋏ Learning resources or other content that use audio and/or video
trust	117	⋏ Personal safety
		⋏ Emotional risk
		⋏ Information validity
design	116	⋏ Attributes of learning resources
		⋏ Inclusion or organization of learning resources
support	106	⋏ Social support is the comfort given by family, friends, and others.
		⋏ Technological support enables ICT activities
		⋏ Information support increases self-confidence to enable a behaviour

Table 46

Second-order categories listed in descending order of frequency of shared responses

Category	Frequency	Description
self-assessment	92	Pertaining to the TTM stage assessments
		Pertaining to the assessments for psychological constructs (e.g., self-efficacy, locus of control.)
ICT	90	Any reference to information and communication technology.
		Electronic journaling or self-assessment
perception of others	88	An individual's beliefs about the nature or actions of someone else
journaling	71	Recording activities, occurrences, experiences, observations, food intake.
value	68	A solution that meets a need of an individual
info storage, retrieval and sharing tech	60	Storing, retrieving, or sharing web-based information – usually textual
learning	48	Acquisition of knowledge, skills or understanding
metacognition	45	Awareness and understanding of one's thinking and learning processes.
		Assessing one's learning progress
tools	44	Websites and software applications to assist individuals in lifestyle change
content organizer	38	Design and learning resources to guide learners through instructional materials
preparation	26	Pertaining to the Preparation Stage of the TTM
website	22	Pertaining to the design, construction or use of the study website
type of person	15	Reference to the characteristics or attributes of the individual's own personality, disposition, predilection, etc.
online community	15	Knowledge of, attitudes toward participation in online communities
weight control beliefs	14	Pertaining to the Weight Control Beliefs self-assessment and locus of control.
facebook	12	Anything pertaining to Facebook
motivation	10	Triggers to cause an individual to engage in an activity or behaviour.
		Impetus to sustain a behaviour or activity
tutorial	10	Videos used to teach website navigation, the use of a website feature, or a software tool.

Table 47

Third-order categories listed in descending order of frequency of shared responses

Category	Frequency		Description
communication technology	9	⚳	Technology used to mediate the interaction between individuals
dissonance	9	⚳	Holding contradictory or incompatible attitudes, beliefs
self-aware	8	⚳	Being conscious of one's own feelings, character, etc.
self-efficacy	7	⚳	A person's belief in his or her ability to succeed in a particular situation.
resilience	7	⚳	Pertaining to the Resilience Scale self-assessment (ability to cope with problems and setbacks).
non sequitur	6	⚳	Extraneous comments
contemplation	5	⚳	Pertaining to activities in the Contemplation Stage of the TTM
limited time	3	⚳	Limited time in day-to-day life
		⚳	Lack of time to complete study activities (could be indicator of lifestyle)
content	2	⚳	Comments about specific features or attributes about the learning assets

FIRST-ORDER CATEGORIES

The coding process resulted in the identification of five theme categories : role modeling, multimedia, trust, design, and support. A first-order category was defined as a code that contained at least 100 concepts (Table 48).

Table 48

First-order categories and the number of concepts associated to them

Category	number of concepts
role modeling	158
multimedia	141
trust	118
design	117
support	106

Details of the first-order categories are presented in the following subsections. The shared response frequency tables include both other first- and second-order categories that shared responses with the category under discussion.

<u>Role Modeling</u>

Role modeling in this study had several purposes. First, some resources demonstrated a positive behaviour and provided vicarious experiences, through means such as textual information or audiovisual demonstrations. Second, as a motivator, some resources showed that a task can be accomplished and how it is done. As such, role modeling can enhance individuals' self-efficacy (Driscoll, 2005, p. 319) and help them develop the confidence that they too, with sufficient effort, can adopt the demonstrated behaviour and attain the desired state. Third, several resources demonstrated navigation of the website, and, the use of tools. The goal was to increase participants self-efficacy with regards to interacting with the website.

Individuals undergoing lifestyle change may be unaware of appropriate behaviour or responses in common situations. This lack of awareness could be due to having few appropriate life experiences, being taught incorrect responses, or not having an awareness of what constitutes a proper response, as exemplified by one interviewee who said "common sense isn't always so common." Role modeling can make individuals more aware of how to respond in situations they encounter in their daily lives. An example in weight management would be to learn that it is acceptable to refuse a second helping as a dinner guest, and how to express it in a courteous manner, without offending the host or feeling guilty.

The analysis of the interview data revealed that role modelling constituted the largest category. Of the 505 interview entries, 158 (31.1%) were associated with role modeling and shared among 12 meaning categories (Figure 10; Table 49).
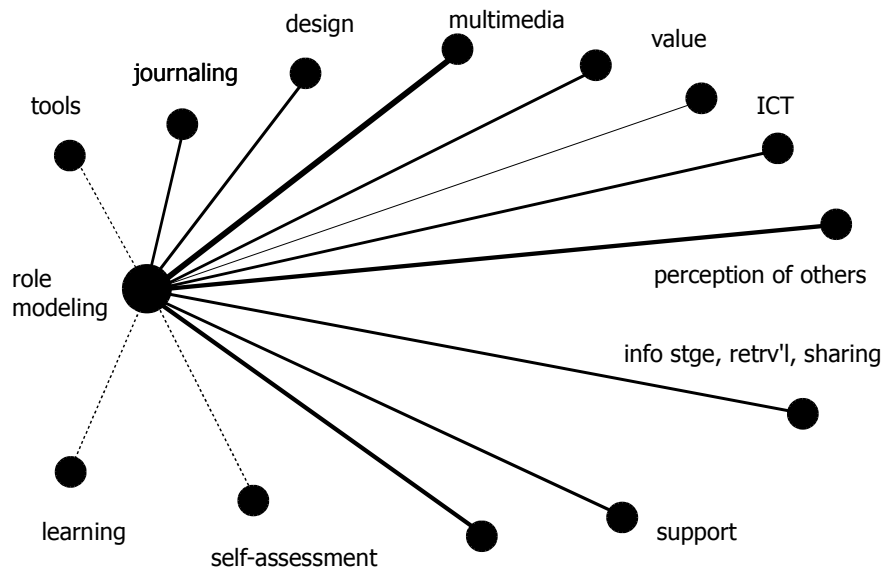
Figure 10. Category Graph for Role Modeling

Table 49

Shared response frequencies for *role modeling*

Category	Frequency
multimedia	74
trust	61
perception of others	57
design	29
ICT	28
journaling	28
support	24
self-assessment	22
value	22
information storage, retrieval and sharing tech	19
learning	15
tools	11

For this study, role modeling was presented in several forms of online technology: multimedia, discussion forums, links to online communities.

Role modeling and Multimedia.

The discussion here centres on multimedia as a role modeling resource. The broader discussion of Multimedia and other functions it provided are found in a subsequent section.

Two physical exercise videos were provided where a kinesiologist demonstrated an aerobics session and a series of elastic tubing exercises. The interviewees did not perceive either video as valuable to their weight loss efforts. Most did not care for the production values; sterile background, music with slower than normal tempo, and the narration. One interviewee remarked that exercise videos do not take into account people with limited mobility and flexibility due to their size, medical and musculoskeletal conditions, or simply being out of shape due to a prolonged sedentary lifestyle.

Three multimedia resources for role modeling of behaviors were provided. The first was a situational dramatization from the *Penn & Teller Bull....!* (Bortko, S, et al., 2010) episode on fast food which demonstrated how the manner in which restaurant types (i.e. gourmet or healthy versus fast food) can influence one's perception of the caloric impact of menu items. The intent of the video was recognized by most interviewees, who appreciated the humour. The second was the documentary *Super Size Me* (Winters & Spurlock, 2004). Interviewees saw the film as a good example of what awaits the individual if they are not attentive or somehow are unable to refuse "supersizing". One interviewee commented that it illustrated the pitfalls of fast-food eating. Most deemed

this to be an appropriate resource for online lifestyle change. The third behavioral role modeling video was the PBS *NOVA* episode Marathon Challenge (McCabe, 2007), which chronicled 13 ordinary, mostly sedentary people, some with chronic health issues such as obesity, diabetes, and being HIV positive, preparing to run in the Boston Marathon. The reaction to it was varied. One interviewee was most interested in individuals' personal stories of why they were trying to do a marathon. Another saw it as a motivator, saying "you know this can and does happen". Yet another did not perceive it as a true motivator, suggesting there was much more support for the individuals in the documentary compared to what ordinary people can expect to receive in their daily lives.

In the same vein, the website provided narrated screen capture clips on using the self-assessment tools. The perceived value of these clips was directly related to the perceived value of the tool being demonstrated. If there was no interest in the tool, then there was no interest in the video.

One link to a newscast on a low glycemic diet was provided, which explained the benefits such diets bring in managing diabetes, and losing and controlling / maintaining weight. All found the information useful. One interviewee commented how she remembered the reporter when she was a health correspondent for another network, and that, you knew you could always trust what the reporter was saying.

Role modeling and Trust.

Overweight and obese individuals frequently have low self-esteem brought about by a poor self-image (Poston & Foreyt, 2000). This vulnerability mandated that example behaviours were readily achievable, as in the case of physical exercise accounting for

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present body size or existing medical conditions. Failure could induce or amplify feelings of low self-esteem (Poston & Foreyt, 2000). For the same reason, it was very important that role modeling provided accurate, helpful information: inaccurate, or wrong modeling which precipitated a regression in the individual's path to their target weight, exacerbating their cycle of low esteem and diminishing their confidence to achieve their goal of a healthy lifestyle. Most importantly, role modeling examples also had to ensure that they did not promote behaviours which might expose the individual to physical or emotional harm.

<u>Role Modeling and Discussion forums, online communities</u>.

The discussion forums on the study website were intended primarily as a support mechanism, but two had ancillary role modeling functions. The Maintainers forum, for individuals who had achieved the weight goal, can share experiences they have had in situations "keeping the weight off", such as moderating diet to restore enjoyment of food they previously didn't eat while in the action stage, but could present a risk over-indulging if they are not careful. Further, by giving read-only access to this forum to active weight loss individuals, new, helpful behaviours may be identified which may assist them in achieving their target weight. It also demonstrates that their weight goal can be achieved and that they can maintain that success.

Individuals in the early stages of their weight loss efforts may simply not know how to prepare healthful meals and what a healthful meal consists of. The role modeling aspect of the recipe forum provides examples of food that can be both healthful and enjoyable. It can also teach cooking methods that reduce the caloric content of meals.

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Interviewees were generally enthusiastic about the concept of a recipe forum. One was excited about the idea of being able to search the forum, similar to the way a database can be searched, to look for methods of cooking and specific foods.

Links were provided to the discussion area and recipe database of the SparkPeople website (www.sparkpeople.com). The role modeling aspect of SparkPeople would be secondary to its main intent of supporting individuals. Only one interviewee was previously aware of the site. No one found the site to be sufficiently engaging that they would want to visit it regularly.

Multimedia

Multimedia is a type of learning resource which combines two or more separate streams of information. The principal form of multimedia resources for this study used audio and video as either live-action sequences from television or theatrical documentaries, or narrated, animated presentations. Specific multimedia content on the website included role modeling demonstrations and instructional material. Figure 11 shows the category graph developed for the *multimedia* category. Table 50 lists the frequencies of shared responses with other theme and meaning categories.

From Table 50, it can be seen that *design* and *role modeling* were the dominant categories that shared responses with *multimedia*. The relationship between *multimedia* and *role modeling* was discussed in the previous section, therefore the balance of the discussion on *multimedia* will focus on its relationship with *design*. A further
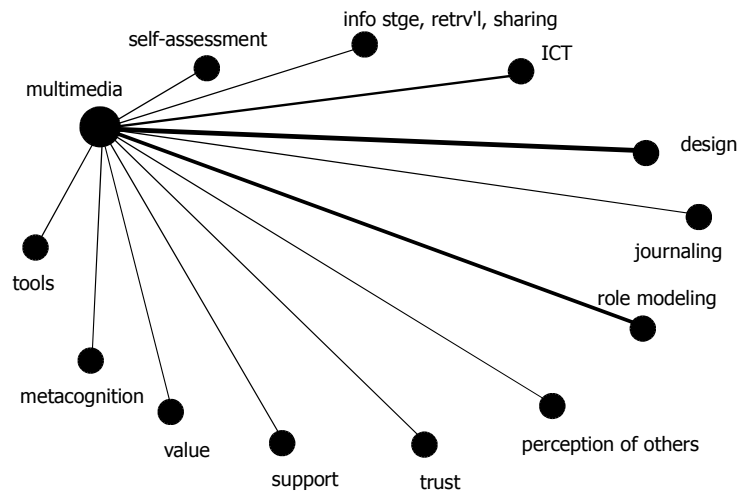
Figure 11. Category graph for the *multimedia* category

Table 50

Shared response frequencies for *multimedia*

Category	Frequency
design	82
role modeling	74
trust	33
perception of others	26
ICT	26
support	20
self-assessment	20
journaling	17
information storage, retrieval and sharing tech	16
value	14
metacognition	13
tools	11

delimitation of the discussion will be to focus exclusively on the instructional modules because these were the only multimedia content designed and developed, apart from resources detailed in role modeling, specifically for the study.

Multimedia and Design.

Vance (1987) investigated the use of humor in the design of instruction, finding that "...current philosophy and practice reveals strong support for the use of humor as a learning tool for various education and training sessions". This study made use of humor in incorporating several broadcast and theatrical release videos. In particular, the Special K commercial, which was intended to demonstrate some women's foibles on body image, was generally interpreted as intended and well received. One individual was confused about the intended target, men or women, despite being accompanied by a statement of intent.

Two multimedia lessons were developed for the study: one was an introduction to the stages of change, the other was on the preparation stage of the Transtheoretical Model (TTM). The presentations made use of high quality production methods. While the presentation was played in slide show mode, a narration was provided. There was a review quiz at the end of each lesson.

The multimedia lessons were well received by users. Most said the presentations had a good sense of flow, although one commented that it was a "a bit slow" due to the quiz at the end of the module. The information presented in the stages of change module was seen as very good, and revealing the "secret" for long lasting behavior modification

and the reason why people who do "fad" diets soon fail. One interviewee saw the stages of change module as an affirmation of the weight control program on which she had just embarked.

The narration played a large part of the positive view of users. They found that listening to the voice and going through the points provided more impact. One user observed that the narrator was not reading word for word, but that the narration was close enough to the information in the visual component that there was not a disconnect between the two.

The female interviewees indicated that the narrator's gender – male -- was not a factor in their appreciation of the instructional material, but one interviewee commented "I don't think credibility would be an issue based on the gender of the narrator - maybe personableness. However, a woman who is softer might come across as more compassionate."

There were some suggestions for improving the multimedia lessons. One was to include more examples to reinforce learning, rather than relying on subsequent modules to provide those examples. Another was to include the aspect of time lest some learners procrastinate their movement between stages. This was a key observation. Using a timetable for completing each stage would give individuals a metacognitive benchmark for their own progress. TTM uses time to assess an individual's current stage, as illustrated in the Transtheoretical Model Stage Self-Assessment in Appendix G.

<u>Trust</u>

For this study, trust had three dimensions: personal safety, emotional security, and information validity. Personal safety involves protecting individuals from physical, emotional, or financial harm. An example of physical injury could be due to improperly teaching physical exercise. Emotional security involved ensuring that individuals did not feel uncomfortable, embarrassed, anxious, or upset -- feelings that might arise when users encountered lifestyle change content, for example in cases of self-assessments, or when participants engaged in forum discussions or other forms of communication with others unfamiliar to them. Information validity entails that information was accurate and current, and provided a positive benefit to the user.

Figure 12 shows the category map developed for *trust*. Table 51 lists the frequencies of shared responses with other themes and meaning categories.
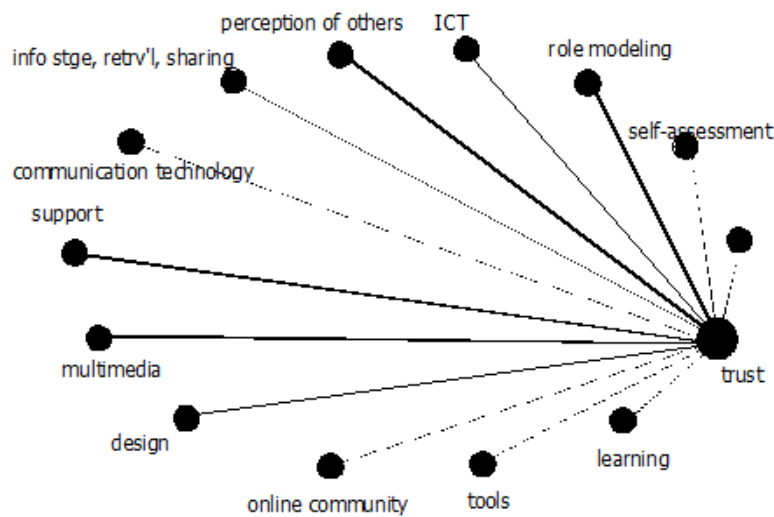
Figure 12. Category graph for *trust*

Table 51

Shared response frequencies for Trust

Category	Frequency
role modeling	61
perception of others	53
support	46
multimedia	33
ICT	28
design	24
information storage, retrieval and sharing tech	22
self-assessment	19
value	19
communication technology	15
tools	12
learning	11
online community	10

Perception of others included how the interviewees perceived other people, and how they were perceived by others. The participants indicated that it was important that role modeling be presented positively, or at least constructively, and not in a way that ridiculed the role model or the viewer, in the case of a video. Through the use of humour, S*uper Size Me* was able to simultaneously evoke feelings of empathy and disdain in one interviewee towards the people in the film. She felt sad for people that think they are getting value by paying just a little more for an oversize serving, exhibiting an empathy for people who don't know better. At the same time, she criticized people who regularly use drive-through restaurants for not taking the time to enjoy their meals.

There was a general reticence amongst the four female interviewees to participate in forums or use online resources where personal information could become public, even

if they were completely anonymous. They did not want such information in a public or semi-private domain.

The self-assessments on the study website were designed to be constructive forms of feedback. None of the interviewees reported feelings of discomfort or embarrassment associated with the use of these resources. The self-assessments were uniformly perceived as helpful in providing honest, objective evaluations of the user's progress toward achieving their weight loss goals.

The requirement that information be accurate was a recurring theme throughout the interviews. Most of the interviewees were suspicious of lesser-known or unknown websites. The accuracy of medical-related information was identified as particularly important and it was suggested that websites offering health and medical information be vetted by professionals. One interviewee, had gone so far as to contact colleagues at the U.S. National Institutes of Health to verify the qualifications of a website operator.

Even the study's recipe forum did not escape the skeptical eye of one user who noted that just because a recipe was posted on a website for healthful living did not mean it was advantageous to one's health or weight loss efforts. She mentioned that she had found a high-in-sugar fudge recipe on a recipe database for diabetics, and suggested such repositories should be vetted by dietitians. A further recommendation was that recipe posts should include nutritional data, with similar information of those found on the nutrition labels of commercial food products.

<u>Design</u>

Design included organization of learning resources, attributes of learning resources, and content inclusion. Figure 13 shows the category graph developed for *design*. Table 52 lists the frequencies of shared responses with other theme and meaning categories. The categories with highest frequencies of shared responses with design were *multimedia*, *role modeling*, and *trust*.

The *design-multimedia* relationship was discussed in the previous section on *multimedia*. The *design-role modeling* and *design-trust* relationships were tightly coupled with each other. Trusted role models are key to the effectiveness of vicarious experiences. Interviewees were unequivocal about the need for resources to accurate, current information, and that support mechanisms promoted emotional security. The design of resources for online lifestyle change must incorporate these attributes to be effective.
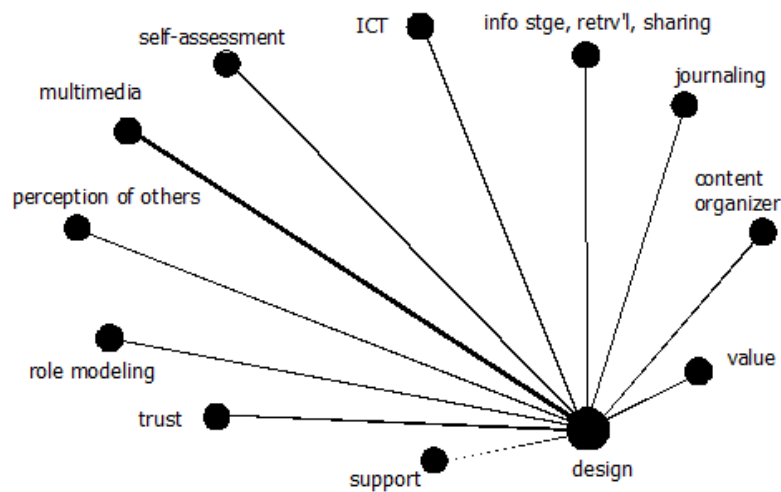
Figure 13. Category graph for *design*.

Table 52

Shared response frequencies for *design*

Category	Frequency	% of Total (n=118 responses)
multimedia	82	70.1
role modeling	29	24.8
trust	24	20.5
ICT	21	17.9
self-assessment	20	17.1
content organizer	17	14.5
value	16	13.7
support	15	12.8
perception of others	13	11.1
journaling	13	11.1
information storage, retrieval and sharing tech	12	10.3
learning	11	9.4
online community	10	8.5

The principal tool for organizing the website was the Moodle learning management system. None of the interviewees had prior experience with Moodle or any other LMS. To reduce amount of time required to use Moodle effectively, two resources were developed. A Guided Tour video was created to provide a narrated demonstration of where to find the various resources on the website. The video was perceived to be very useful, with users finding it a good overall explanation of what the website was about.

The other organizing tool was the Suggested Activity List. (See Appendix F.) The activity list was very effective at providing users with a structure for managing their time on the site, and coupled with the Guided tour video, ensured that they completed all the activities for the study.

In obesity management, the primary purpose of self-monitoring is for individuals to become more aware of their behaviours and the factors that influence those behaviors

and have beneficial or detrimental impact on their weight management efforts (Poston &

Foreyt, 2000). Several forms of self-monitoring were included on the study website.

The Weight Tracker tool allowed users record their weight readings over time and

plotted a line graph to show weight loss/gain over a 3-month period. Although the

interviewees did not see value in a tool that simply kept an electronic version of paper-

and-pencil record keeping, they were very interested in the trend feature of the tool. One

interviewee suggested that a video on how to construct the weight tracker with a

spreadsheet might be helpful in assisting with tracking weight loss.

Other self-assessments included in the website measured psychological aspects of

the individual, such as self-efficacy, self-esteem, locus of control, and resilience, as it was

believed that they might be helpful to users for their lifestyle change process. The

experiences of participants with these self-assessment tools were generally positive. They

found the use simple and straightforward, felt that the results were accurate, and

appreciated the interpretation of their results and the associated behavioral change

suggestion. One interviewee noted that taking assessments on constructs like self-efficacy

and locus of control might be a useful method of monitoring lifestyle change.

Support

Another first-order category was support. The principal form of support was

social support, i.e., the physical and emotional comfort given by family, friends, and

others. Support also included technological support that enabled the learner to engage in

ICT activities and information support that increased the ability of the user to attain

positive behaviours.

The category graph for support is shown in Figure 14. Table 53 lists the
frequencies of shared responses with other theme and meaning categories. The categories
with the highest frequencies of shared responses with support were
trust, *ICT*, *perception of others*, *role modeling*, and *information storage, retrieval, and
sharing technology*.
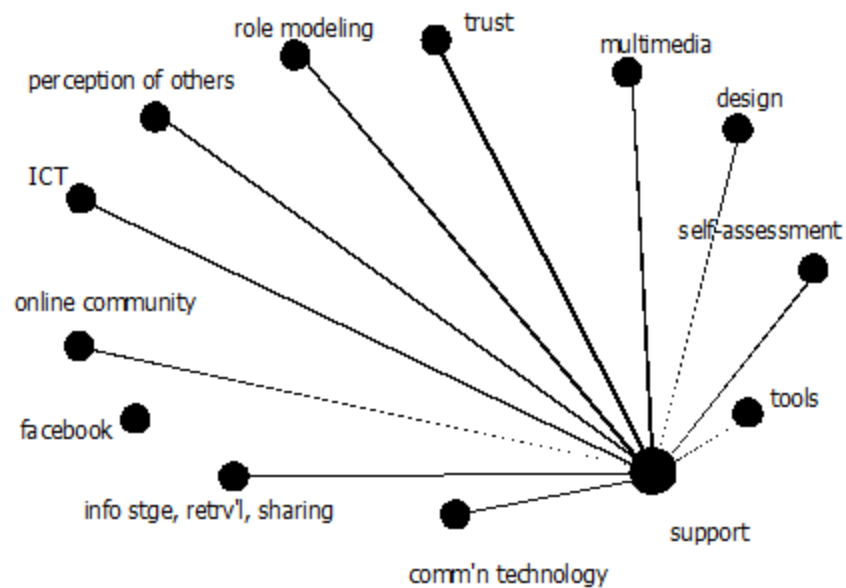
Figure 14. Category graph for *support*

Table 53

Shared response frequencies for *support*

Category	Frequency
trust	46
ICT	26
perception of others	25
role modeling	24
information storage, retrieval and sharing	
tech	24
multimedia	20
online community	15
design	15
communication technology	15
self-assessment	13
facebook	12
tools	10

All the interviewees preferred telephone and e-mail for accessing social support. The telephone was considered easier and faster to use than online forms of communication.

For this study, online resources for social support took the form of two discussion forums, one for individuals in the active stage of the change process and another for those in the maintenance stage, as well as two other forums that were retasked to provide a specific function (i.e., sharing recipes and links to interesting websites).

The interviewees did not actively engage in using the forums, but were asked how they perceived the potential usefulness of these tools for supporting weight loss and lifestyle change. One interviewee stated that the Maintainers forum would be very useful because maintenance and active weight loss were quite different. The recipe-sharing forum generated the most interest, generally positive.

The value of the social networking website Facebook was explored with the interviewees. Most had no interest in participating in Facebook, particularly in posting a running chronicle of the minutiae of their daily lives, and indicated that Facebook "was not for them". One interviewee mentioned that although she had a Facebook account, she only lurked, that she was a "voyeur" and did not post. This reticence to use social networking and other sites for social support or simply sharing experiences was based on a mistrust of such sites. Reasons for this mistrust included: the perception of a probability of wrong information and fear of stalkers or even more malevolent individuals. Safety concerns seem to present a very real barrier to dieters using forums for social support. Interviewees expressed some preconditions which could let them feel more comfortable with forums for social support. They would be inclined to participate in a Facebook group that they themselves setup amongst their friends in a program such as Weight Watchers. Another might participate in a group where a moderator screened postings before they were made public.

THEMES

To aid in the understanding of the theme categories within the qualitative analysis, the first-order (i.e., more than 20 shared responses) relationships among the theme categories were examined (Figure 15). Further analysis revealed three primary relationships, each involving a three-part combination, (Figure 16):

1. role modeling, multimedia, and design;

2. role modeling, multimedia, and trust;

3. role modeling, trust, and support.
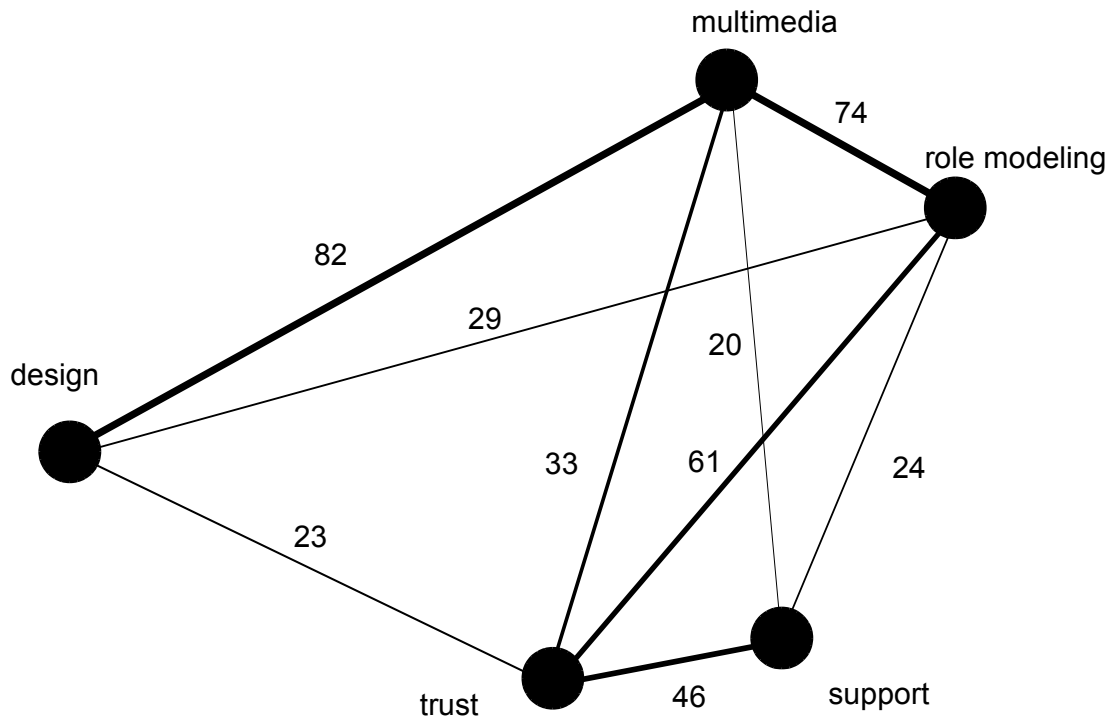
Figure 15. First-order category graph
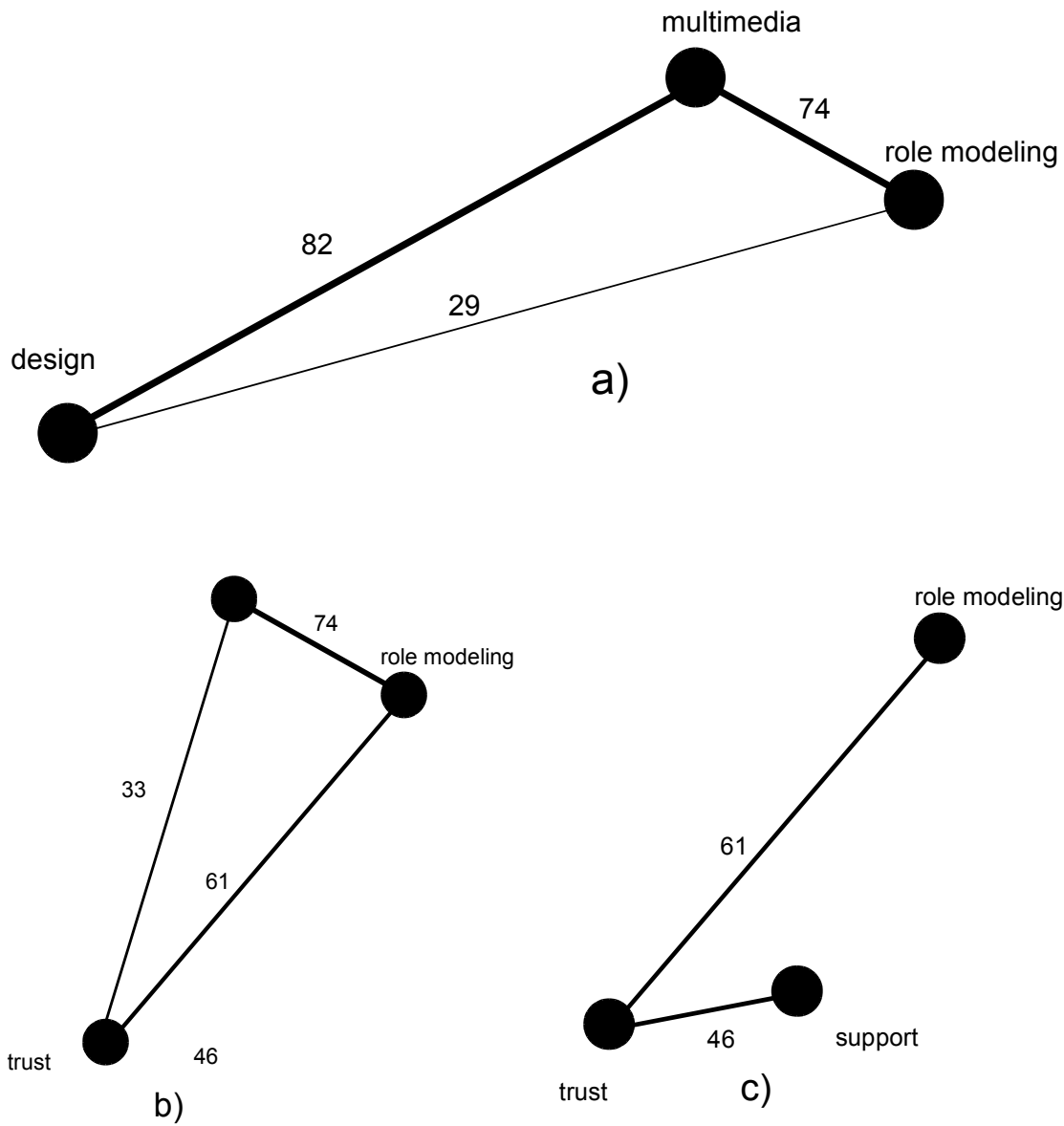
Figure 16. First-order category trinaries

Based on these combination, three themes were developed. These themes and what they mean for distance-based lifestyle change are as follows:

Theme 1: Online multimedia resources for lifestyle change should be designed for role modeling.

The qualitative analysis suggests that distance education technologies are well suited to provide role modeling. Dramatizations from popular culture provided firsthand demonstration of positive behaviors, particularly how to respond to different situations of daily life. Several documentaries provided motivation to undertake difficult tasks. Multimedia segments demonstrated to users how to access and use specific resources and perceive their usefulness, a state that would hopefully lead to their eventual adoption of the tools and technologies in their lifestyle change process.

Theme 2: Online multimedia for the purpose of role modelling should promote a sense of safety and security, avoid risk of physical or emotional harm, and ensure that only accurate up-to-date information is provided.

Online multimedia for role modeling should never encourage individuals to engage in behaviours that could expose them to physical, emotional, or financial harm. Any information that is provided in such resources must be accurate and up to date. The study participants were quite mindful of the veracity of online content and would not use an online resource if they believed the information was suspect.

Theme 3: Social support for lifestyle change should involve trusted role models.

Obese individuals appear uncomfortable with the idea of obtaining support from strangers and rely on social support from family and friends. Participants would only use

online social networking tools like Facebook if they could do so within groups they had set up themselves and had control over the membership. The key is to find social support mechanisms that are comfortable to participants engaging in a lifestyle change process.

A synthesis of these themes provided the essential finding of the qualitative portion of this study which is that in order to support lifestyle change, the design of online multimedia resources should incorporate trusted role models, ensure emotional security and physical safety, and provide high quality information.

Summary of Qualitative Analysis

Five semi-structured interviews were conducted in order to gain an understanding of the use of distance education technology for lifestyle change. The interviewees examined the study website which demonstrated a number of DE technologies, including discussion forums and online communities, multimedia instructional modules, self-assessment tools, and links to documentaries.

More than seven hours of interviews were recorded and transcribed. In order to prepare the data for use with the IBM SPSS Text Analytics for Surveys V4 (TAS4), the transcripts were broken down into 505 single concepts. The TAS4 software used natural language processing (NLP) to identify keywords within the concepts. Following this, categories, the basic organizational unit for TAS4, were created and codes were assigned to them. A total of 32 codes were created. The categories were not mutually exclusive, i.e., a single quote could be assigned to more than one category.

TAS4 provides a graphical representation of the relationships among categories using Graph Theory, where categories are represented by nodes. The graph's edges – the lines that connect individual nodes - indicate there were shared responses between the two categories. The number of shared responses between two connected nodes was assigned as that edge's weight.

In order to facilitate the analysis of the data, several forms of nomenclature were developed. First-order categories had more than 100 shared responses with all other categories. Second order categories had between 10 and 99 shared responses, and third order categories had 9 or fewer shared responses. The number of nodes between a chosen node and another in category graphs was designated degrees of separation. Adjacent nodes had one degree of separation. First order nodes were used to assist with theme development. For the analysis, only first and second order categories were used, and only those with shared response relationships that had one degree of separation between them. Five first-order categories developed from the analysis:

1. Role modeling -- demonstrated that a task can be accomplished and showed the individual how it is done.

2. Multimedia -- a type of learning resource which combined two or more separate streams of information, usually audio and video.

3. Trust -- personal safety, emotional risk, and information validity.

4. Design -- the resources included in the study website and the organization of those resources.

5. Support which was primarily in the form of social support; physical and

emotional comfort given by family, friends, and others. Support also included

technical and information support.

A category graph was created with only the first-order categories, which resulted in

three trinary sets of categories: role modeling-multimedia-design;

role modeling-multimedia-trust; role modeling-trust-support. These trinaries were then

used to assist in visualizing and formulating the themes that arose from the data. Those

themes were:

1. Online multimedia resources for lifestyle change should be designed for role
   modeling.

2. Online multimedia for the purpose of role modeling should promote a sense of
   safety and security, avoid risk of physical or emotional harm, and ensure that only
   accurate up-to-date information is provided.

3. Social support for lifestyle change should involve trusted role models.

A synthesis of these themes provided the essential finding of this study which is that in

order to support lifestyle change, the design of online multimedia resources should

incorporate trusted role models, ensure emotional security and physical safety, and

provide high quality information.

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Chapter V

CONCLUSIONS AND RECOMMENDATIONS

<u>CONCLUSIONS</u>

Although obesity and being overweight is a significant and growing health problem, the availability of clinical treatment resources falls far short of the need. Prochaska (2004, p. 243) determined that only 5% of overweight and obese Americans were being reached by clinic-based programs. Moreover, he noted that not only were treatment resources scarce, they were also inappropriate, based on his findings that 55% of clients wanted home-based, not clinic- or hospital-based, programs. He recommended the use of computer and online technology in order to provide more accessible, appropriate treatment resources, stating that "individualized and interactive interventions have the greatest efficacy (p. 244). Delivering treatments at home requires using computers to complement a traditional clinician paradigm. Computers can provide individualized and interactive interventions that model the efforts of expert clinicians" (Prochaska, 2004, p. 243). The thesis research reported herein was motivated by this recommendation.

This exploratory mixed methods case study examined the use of distance education technology for lifestyle change within the context of obesity treatment and weight management. In the quantitative phase of the study, 19 adults, who were involved in an obesity-related lifestyle change program or change process, completed a questionnaire that determined their attitude toward technology adoption, access to various types of information and communication technology and level of connectivity, and the

extent to which they used technologies in their daily lives. The questionnaire also asked participants for their perceptions of the utility of various forms of online tools or resources to assist with the lifestyle change associated with weight loss or maintenance, and to indicate the likelihood they would use them.

The qualitative phase of the study consisted of semi-structured interviews with five individuals who were currently or had been obese and involved in a weight management program. The participants were provided with a website specially constructed for the study, which contained a set of online tools and resources believed to assist with weight loss and lifestyle change. After participants had spent time perusing the website, semi-structured interviews were conducted to obtain each participant's perceptions of and reactions to the various tools and resources.

Three aspects of online technology for lifestyle change were elaborated . The quantitative analysis provided insight technology access and the affordance of several social networking and social media tools. The qualitative analysis provided a deeper understanding of the affordance of various online technologies and the attributes they must have so that learners are comfortable using them. These aspects gave rise to a framework that defined the relationships among those dimensions, which was informally dubbed the "A-framework.". Figure 17 provides a graphical representation of the A-framework.
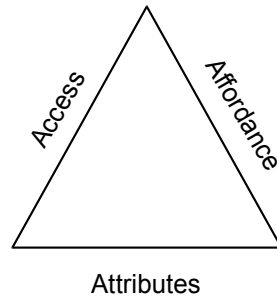
Figure 17. The A-framework showing the interdependence of access, affordance, and attributes

Based on both the quantitative and qualitative studies, the researcher drew three sets of conclusions on using distance education technology for lifestyle change:

1. *Access* – The study found that the participants have access to various forms of technologies and skills to use them, therefore the use of distance education technologies for lifestyle change should be included in treatment programs for obesity management.

2. *Affordance* – The use of distance technologies should offer benefits to participants undergoing lifestyle change that are not already available to them through other means.

3. *Attributes* – Distance resources should incorporate trusted role models, ensure emotional security and physical safety, and provide high quality information.

These conclusions are described in further detail below. It is important to note that they cannot be generalized to other settings for obesity-related lifestyle change due to the limitations of the case study design. Case studies are not representative of entire populations, and their findings are not considered to be generalizable (Yin, 1999, p. 1212).

<u>Access</u>

As Bates (2005) notes, "no matter what the quality of teaching with technology, learning will not occur without access to that technology" (p. 50). The aspects of access examined in this study were: the availability of personal computers and the types of computing devices that were available in the home; the activities undertaken by the study participants with those computers and devices; the Internet connectivity available to the survey respondents; and the availability and use of mobile communications and entertainment devices.

Nearly all of the participants had access to computers and broadband connectivity in their homes. The access rates of the study participants were slightly greater than the Canadian average, indicating that online technology for home-based resources for lifestyle change was readily accessible. As such, it was concluded that access to computers and connectivity was a facilitating factor supporting the participants' use of online tools and resources for lifestyle change,.

Although access via mobile devices was not as ubiquitous as home-based access to computers, it was still high. Most of the participants had a smartphone. Portable media players, such as iPods, iPhones, and MP3 players, were used by about half of the participants. These devices can provide access to online resources such as podcasts, videos, and text-based information when the individual is away from their home. The level of access to mobile devices was also considered a facilitating factor supporting the use of online tools for lifestyle change.

Another aspect of access is the ability to use the technology as intended. Most of

the participants used their computers or mobile devices for general web browsing and communicating with e-mail. A number of activities commonly required for online learning were less prevalent, usually engaged in by fewer than half of the participants. These activities included the following: information retrieval, processing, and sharing; online or computer-based education and training; and interactions using asynchronous forums or blogs. None of the interviewees had previously used a learning management system. However, with the availability of videos, which gave an overview of the study website and demonstrated the use of the many resources, all were able to access and use the website resources. These videos were seen to facilitate their ability to use of the website and without which some participants may not have been able to access the website resources.

Yet another aspect of access is attitude toward technology. Rogers' (2003) technology adoption categories (TAC) reflect an individual's degree of innovation and the likelihood of adopting a given technology. An individual's TAC can affect the manner in which a technology's affordances will be perceived and may influence the eventuality of the individual adopting a technology.

The participants in the study showed a high proportion of early adopters, nearly three times as many as predicted by Rogers (2003). Several reasons were proposed for this unexpected finding, including educational level and age. The group average educational attainment for the study participants was higher than the Canadian average. This difference may have contributed to the participants' increased ability to perceive the value of technology. The weighted average age of the study group would make them

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"digital immigrants" (Prensky, 2001). They may have believed they more innovative than they actually were when compared to the general population. This difference manifested itself in the survey results on communications tools used by the participants. Recall that instant messaging was used by all of the 25-34 year age category, many of whom would be considered by Prensky to be "digital natives", who grew up with digital technology for most of their lives.

Another explanation may be provided by the obesity itself. Overweight and obese individuals often have reduced mobility, which in turn may cause them to attribute a greater value to technology, use it more frequently, and be more open to its adoption. On the other hand, the reverse may also be true. The increased likelihood of adoption results in more frequent use of technology at the expense of more active pursuits. Weight gain and obesity may be the eventual result of prolonged inactivity.

Affordance

Affordances, or perceived affordances, are the actions the user perceives to be able to be performed by a technology and that signal to the user how these actions may be accomplished (Bower, 2008, p.5). An example from the study would be discussion forums. Interviewees did not perceive the ability of forums to provide social support, but they did see the value in a forum for recipe sharing. The user must be aware that an affordance exists before it can have any value. The study identified several tools and resources that were potentially of high value to the participants to assist with their lifestyle change, but due to a lack of awareness of the affordance of the technology, the

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tool was perceived as having low utility and low likelihood of use.

There was a dichotomy between the features offered by a number of technologies for communications and social networking and the perceived utility of those technologies. For example, the interviewees often found it easier to use the telephone than to engage in computer-mediated or online communications. This was especially true for synchronous communications like Skype or instant messaging. Asynchronous discussion forums have affordances (e.g., the ability to share feelings and experiences through text regardless of spatial or temporal separation) that make them appear well-suited to provide the much needed social support essential in obesity management; however, this technology was not perceived as having value for supporting lifestyle change. In addition to inconvenience as a reason for not using forums, there were concerns about personal and emotional security and issues relating to privacy. These are further discussed in the section on attributes.

Despite the low perceived value of discussion forums for social support, there was unanimous agreement among the female interviewees for specialized discussion boards. The study website provided two such forums: one for sharing recipes and one for posting interesting links to relevant Internet content. Despite some concerns for information validity, the participants believed these online tools would be very useful in supporting lifestyle change.

Self-monitoring or journaling is a core activity in all weight loss programs. However, the online tools provided to support this activity were not perceived as useful. The reason seemed to lie in the affordances of the online tool, in terms of the amount of

effort required for its use. The participants felt that the electronic tool required more effort than the paper-based journal. However, when electronic self-monitoring was able to provide aggregate information and analysis not available from paper-based methods, the interviewees were much more likely to adopt it. Such was the case with the WeightTracker tool, which provided a graph of weight change over time and showed trend indicators that the affordances of the online monitoring tool provided users with much more information than was available with paper-and-pencil methods.

Technologies that did not offer features and capabilities not already provided through other means were usually no seen as useful. For example, participating in forums required too much time which individuals either did not have or were not willing to make time for; it was just easier to pick up the phone. Electronic journaling was not seen as convenient if it acted simply as a repository for information they were already recording in another medium and was not providing additional value.

<u>Attributes</u>

The attributes necessary for online resources for lifestyle change were developed from the qualitative phase of the study. The following required attributes were identified: incorporating trusted role models in multimedia resources; ensuring emotional security and physical safety in social support; and providing high quality information. These attributes appeared to stem from the interviewees' overall impression that the Internet, in general, was a dangerous place, laden with errors or misinformation, and frequented by lurkers, voyeurs, and even stalkers.

In the case of social support, there was some indication that if the participants

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could organize their own online groups, control membership, or even have control over content via a moderator, they would consider using online support tools (e.g., Facebook or similar social networking) for their lifestyle change process. This finding aligned with results from the study questionnaire regarding the availability of a "buddy" when using social support tools. The likelihood of participants' use of social support tools and social networking increased with the idea of having a peer with whom to share feelings and experiences.

SUGGESTIONS FOR FUTURE RESEARCH

This section provides two sets of suggestions for future research into the area of of online lifestyle change. The first describes changes to the study questionnaire. The second set of suggestions proposes future research that could expand and refine the results of this study.

Changes to the Study Questionnaire

The most substantial suggested change to the study would be the way in which the Technology Adoption Category of respondents is determined (see Appendix D). In hindsight, the category descriptor statements relied heavily on the respondents' perception of how closely their use of technology aligned with the provided statements. Having respondents "self-identify" their TAC using descriptive statements should be dropped. A more objective indicator could be their Technology Integration Score, which provides more concrete evidence of the various technologies they have adopted and use. It is

unclear how the time element of Rogers' technology adoption lifecycle might be accommodated, making such an endeavour a future research project in itself.

A second suggested change would be the manner in which the effect of a buddy in adopting a technology would be assessed. The questionnaire asked for a simple yes or no response to the following question: Would you be more likely to use these technologies if you had a "buddy" you could communicate with? A more accurate response would have been elicited if a Likert scale was used for the responses, based on likelihood of use, and if the question had been asked with respect to individual technologies.

Notwithstanding these suggestions, the data obtained from the questionnaire was considered to be an accurate representation of the case.

Modified Methodology

This study used a concurrent model of data collection (Creswell, 2009, pp. 206-207) wherein the quantitative data (i.e. the survey questionnaire) and the qualitative (i.e. semi-structured interviews) were collected in parallel. However, a sequential model may have provided a deeper understanding of some of the phenomena. Assuming the same results would have arisen from the qualitative phase, the questionnaire could have been designed to explore issues surrounding role modeling, trust, and social support more fully. It is understood that this approach could require several rounds of ethics approvals.

Suggestions for Future Studies

As is the nature of exploratory case study investigations, a number of areas for future study have been identified.

E-mail.

For legal and other reasons, clinicians do not use e-mail to communicate with patients. However, e-mail was used by all but one of the study participants. All interviewees spoke of e-mail as an often used tool for maintaining contact with family and friends, as well as a preferred method for seeking emotional support and sharing information. Whenever possible, e-mail should be used for information sharing, maintaining relationships, and social support. Clinicians' reservations notwithstanding, individuals undergoing lifestyle change want to make use of the tools available to them. The medical community needs to find an acceptable alternative to e-mail that provides similar utility and immediacy of communication, yet still enables clinicians to operate within their professional scope of practice.

Discussion forums.

Asynchronous forums are a core technology in distance education and are used to create a sense of community among learners. However, this study was not able to engage participants sufficiently to assess the value forums might have in sustained use. A larger study is warranted, that focuses specifically on use of discussion boards, across a wide spectrum of age groups, in an attempt to discover features that might enhance their perceived value to a wide audience. Social networking tools like Facebook need to be examined more fully to determine how the reticence to use forums might be overcome.

Awareness.

The transtheoretical model does not address how to reach pre-contemplators in order to begin the lifestyle change process. Future studies could investigate different mechanisms for initiating change for the pre-contemplator. Such a study would be

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progressive, first targeting individuals, and then larger and larger groups, and finally on a population scale. Social marketing may provide the underlying framework to promote this awareness.

<u>Tablet devices</u>

At the time of data collection for this study, the iPad was the only mainstream tablet device available. However, several months later, tablet devices were rapidly increasing in popularity for both corporate and personal use. These devices present several opportunities for research in the context of distance education and lifestyle change. Their display size may afford a better experience with video, such as the video resources on the study's website, when compared to smartphones and cellphones. Their WiFi and 3G/LTE connectivity may facilitate the use of forums and other forms of synchronous and asynchronous social support tools in a mobile setting.

<u>CONCLUDING COMMENT</u>

This study has made strides in assessing the suitability of distance education to effect lifestyle change. Some technologies were a good fit, others not so. But Internet-based distance education and social support tools are some of the very few that have the potential to reach entire populations. The North American obesity epidemic continues unabated, presenting the very real possibility of an untimely death for tens of millions. The struggle could take several generations, but that should not deter education and health professionals from embarking on the path to create a healthier future for everyone. It's the least that can be done for our children, and grandchildren.

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APPENDIX A

ATHABASCA UNIVERSITY RESEARCH ETHICS BOARD APPROVAL

MEMORANDUM

Athabasca University

Canada's Open University™

DATE:	April 20, 2011
TO:	Patrick Tierney
COPY:	Dr. Susan Moisey (Supervisor) Janice Green, Secretary, Athabasca University Research Ethics Board
FROM:	Dr. Simon Nuttgens, Chair, Athabasca University Research Ethics Board
SUBJECT:	Ethics Proposal #11-09C: AMENDMENT to Ethics #CDE-10-01: *"Exploring how distance education technologies contribute to lifestyle change"*

Acting under authority of the Athabasca University Research Ethics Board, I have reviewed the documents provided in support of your request for an amendment to the previously approved research project described above.

I am pleased to advise that the above-noted amendment to research has been **APPROVED with minor modifications, as shown below.** *Prior to participant recruitment, please provide a revised application showing:*

1. **Application Form – Question B3-4**: provide the actual description of the participants, as shown in Dr. Moisey's e-mail of March 24, specifically:...to interview five adults from the researchers' personal network e.g. individuals he met in weight management programs and who have stayed in contact, who meet similar criteria to the bariatric program."

2. **Question B3-5**: Clarify if it is possible for someone other than the researcher to conduct the actual recruitment so that prospective participants have full opportunity choose without feeling obligated to the pre-existing personal relationship. [It is understood that the discussion may already taken place casually and the individuals may have volunteered on their own, and if so that can be noted here instead.]

The **approval for the study** "as presented" **is valid for a period of one year from the date of this memo.** If required, an extension must be sought in writing prior to the expiry of the existing approval. A Final Report is to be submitted when the research project is completed. The reporting form can be found online at http://www.athabascau.ca/research/ethics/

As implementation of the proposal progresses, if you need to make any significant changes or modifications, please forward this information immediately to the Research Ethics Board via rebsec@athabascau.ca,

If you have any questions, please do not hesitate to contact Janice Green at rebsec@athabascau.ca

Page 1 of 1

APPENDIX B

LETTER OF INVITATION / ACKNOWLEDGMENT OF INFORMED CONSENT

FOR BARIATRIC CLINIC PATIENTS

AthabascaUniversity

Centre for Distance Education

January 2011

Dear HHS Bariatric Clinic Lifestyle Group Program Participant:

I am a graduate student in the Master of Distance Education program at Athabasca University and am currently working on my thesis. I was also a participant in one of the first groups of the same course you are taking now, having completed it in September 2008. My experience compelled me to think about how to get all of the helpful and valuable information and support from the program to a much wider audience.

The research I am conducting for my thesis explores online education technologies that could assist individuals like yourself to bring about positive lifestyle change: making healthy decisions regarding diet and physical exercise. As part of this research, I have prepared a questionnaire to assess your general attitudes toward technology, and, your thoughts on the potential value of specific tools. Your completion of the questionnaire is completely voluntary. Please be assured that, if you decide not to complete the survey, that choice will not affect your current or future relationship with the Bariatric Clinic in any way.

To protect your privacy, the study questionnaire is entirely anonymous. Consequently, no personally identifiable information will appear in any documents or reports derived from this study. All data collected will be kept strictly confidential and will only be available to myself and my research supervisor, Dr. Susan Moisey, whose contact information is included below.

Thank you for taking the time to read and consider this invitation. We wish you much success in your endeavor for a healthier you.

Patrick Tierney, M. Sc.
Athabasca University
Master of Distance Education Program
Tel: 905-667-8503
Mobile: 905-308-6779
E-mail: patrick.tierney@knowledgepatch.com

Research Supervisor:
Dr. Susan Moisey
Associate Professor, Centre for Distance Education
Athabasca University
Tel: 1-866-403-7426
E-mail: susanh@athabascau.ca

The Athabasca University Research Ethics Board has reviewed this research study and may be reached by e-mailing rebsec@athabascau.ca or calling 1-780-675-6718 if you have questions or comments about your treatment as a participant.

APPENDIX C

LETTER OF INVITATION / ACKNOWLEDGMENT OF INFORMED CONSENT

FOR STUDY INTERVIEWEES

AthabascaUniversity

Centre for Distance Education

January 2011

Dear _____:

I am a graduate student in the Master of Distance Education program at Athabasca University and am currently working on my thesis. I participated in a lifestyle change course to control my weight in 2008. My experience compelled me to think about how to get all of the helpful and valuable information from that program to a much wider audience.

The research I am conducting for my thesis explores online education technologies that could assist individuals like yourself to make a lifestyle change, making healthy decisions regarding diet and physical exercise. I would like to invite you to participate in the study.

Data will be collected in two ways: 1) a general questionnaire that will take about 10-15 minutes to complete; 2) an interview, lasting about 90 minutes, to evaluate components of an online course in lifestyle change. This interview can be conducted in-person, over the telephone or over the Internet.

If you decide you would like to participate in the study, send an e-mail to "**bariatric.study.info@knowledgepatch.com**". You will be sent instructions on how to access the course, complete with a video tutorial on how to login. Before logging in, please review the attached consent form. Logging in indicates that you have read, understood, and accept the conditions of consent. Once logged in, you will be able to access an electronic version of the questionnaire and the lifestyle change course. You may withdraw from the study at any time for any reason.

To protect your privacy, the login system and the course itself do not require any of your personal information, not even your name. Further, your name will not be used in any transcripts of the interview. Consequently, no personally identifiable information will ever appear in any documents or reports derived from this study. All data collected will be kept strictly confidential and will only be available to myself and my research supervisor, Dr. Susan Moisey, whose contact information is included below.

Thank you for taking the time to read and consider this invitation. We wish you much success in your endeavor for a healthier you.

Patrick Tierney, M. Sc.
Athabasca University
Master of Distance Education Program
Tel: 905-667-8503
Mobile: 905-308-6779
E-mail: patrick.tierney@knowledgepatch.com

Research Supervisor:
Dr. Susan Moisey
Associate Professor, Centre for Distance Education
Athabasca University
Tel: 1-866-403-7426
E-mail: susanh@athabascau.ca

The Athabasca University Research Ethics Board has reviewed this research study and may be reached by e-mailing rebsec@athabascau.ca or calling 1-780-675-6718 if you have questions or comments about your treatment as a participant.

**Study to Explore Online Education Technologies
Contribution to Lifestyle Change**

Consent

I understand that:
- The existence of the research will be listed in an abstract posted online at the Athabasca University Library's Digital Thesis and Project Room; and the final research paper will be publicly available.
- The confidentiality of my participation is assured. My name will never appear in any results. Only the researcher and the researcher's supervisor will see my responses.
- I am giving my consent to participate in this study when I return a questionnaire, or, when I login to the website with the Username and Password provided to me by the Bariatric Clinic.
- My participation in a follow-up interview is entirely at my discretion and that choosing to participate or not to participate in an interview will not affect my current or future relationship with the Bariatric Clinic.

I have read and understood the information contained in the accompanying letter, and I agree to participate in the study, on the understanding that I may refuse to answer certain questions, and I may withdraw during the data collection period.

_____   Date: _____2010
Login User Name (Please print)

_____   Date: _____2010
Witness

Please return this form to your course facilitator.

Thank you for your participation in this study.

Study to Explore Online Education Technologies

Contribution to Lifestyle Change

Login Instructions Autoresponder Message

Thank you choosing to participate in this study. To access the website, enter the following address into your web browser:

https://lms.knowledgepatch.com (Don't forget the "s" at the end of https!!)

At the login page, enter the username and password given to you by your facilitator.

Click <here> for a video on accessing the site.

Again, thank you.

APPENDIX D

INSTRUMENTATION

Survey – Attitudes Towards Technology Use

Gender: ○ Female   ○ Male

 Age: ○   18-24   ○ 25-34   ○ 35-44   ○ 45-54   ○ 55-64   ○ 65 and up

Please select your highest education level
○ Prefer not to say   ○   Some university
○ Some high school   ○   Bachelor's degree
○ High school diploma   ○   Graduate studies
○ Some college or trade school
○ College or trade school diploma

Which of the following statements best describes how you generally think about technology? Please select one only.
○ I love technology for itself. I want to have the latest and greatest technological innovations.
○ The value of new technology is how it improves my daily life and environment.
○ I usually spend a lot of time evaluating new technology before I decide to get it. All I care about is that it works.
○ I don't understand the fuss about technology. It usually doesn't do most of what it's supposed to do anyway. I only buy new stuff when I absolutely have to.
○ I don't care at all about technology. We've gotten along fine up until now. Besides, it never works. It makes my life miserable.

How many personal computers do you use at home, including computers supplied by an employer or other institution or organization?
$\frac{a}{b}$ None $\frac{a}{b}$ 1 $\frac{a}{b}$ 2 $\frac{a}{b}$ 3 $\frac{a}{b}$ 4 or more $\frac{a}{b}$ Don't know or prefer not to say

What kind of Internet access do you have at home?
○ Dial-up   ○   High-speed (Cable, DSL ○ No Internet access   ○ Don't know or
                              (phone company), other)   prefer not to say

If you do not have high-speed Internet access at home, do you   ○ Yes ○ No
have high-speed Internet at work that you are allowed to use for   ○ Not applicable
personal business on an occasional basis?

Please select all of the activities for which you use a personal computer.

- ☐ E-mail
- ☐ General Web browsing
- ☐ Product / service research prior to purchase
- ☐ Shopping online
- ☐ Book travel / vacation
- ☐ Reference material (Encyclopedia, dictionary, etc.)
- ☐ Look for recipes
- ☐ Maps / get directions
- ☐ Troubleshooting / repair
- ☐ Social networking (Facebook, Twitter, etc.)
- ☐ Instant messaging
- ☐ Participate in forums or chat rooms
- ☐ Write blog
- ☐ Audio/video communications (Skype, Yahoo Messenger, etc.)
- ☐ Watch videos
- ☐ Listen to music
- ☐ Store and display photos
- ☐ Word processing
- ☐ Family finances
- ☐ Schoolwork (Studying, assignments, research)
- ☐ Other learning activities

- ☐ Other _____
- ☐ Other _____
- ☐ Other _____

Please select all of the devices or services listed below which you use personally, or would use if there were no financial constraints.

Mobile Communications
- ☐ iPhone
- ☐ Blackberry
- ☐ Other smartphone
- ☐ Mobile phone
- ☐ Hands-free kit
- ☐ Pager
- ☐

Mobile Entertainment
- ☐ iPhone (audio, video, games)
- ☐ iPod (audio, video)
- ☐ iPad (audio, video, games)
- ☐ MP3 player
- ☐ Portable video player
- ☐ Portable DVD player
- ☐ Kindle or other eReader

Home Entertainment
- ☐ Standard television
- ☐ Flat screen TV up to 40"
- ☐ Flat screen TV over 40"
- ☐ VCR
- ☐ DVD player
- ☐ Blu-ray player
- ☐ Portable sound system
- ☐ Home theater sound system

Television service
- ☐ Analog cable
- ☐ Digital cable
- ☐ High-definition cable
- ☐ Satellite
- ☐ High-definition satellite
- ☐ Satellite / cable PVR

Other Devices
- ☐ Digital camera
- ☐ Digital video camera
- ☐ GPS in my car

- ☐ Other _____
- ☐ Other _____
- ☐ Other _____

Rate how useful you believe the following technologies would be towards achieving lifestyle change. (1= Not at all useful, 2 = Not useful, 3 = Useful, 4 = Very useful)
- YouTube videos
- Food journals on smartphone or PDA
- Exercise journals on smartphone or PDA
- Food journals on GoogleDocs
- Exercise journals on GoogleDocs
- Twitter
- Facebook (or other social networks)

Rate the likelihood you would use the following technologies in achieving lifestyle change. (1= Not at all likely, 2 = Not likely, 3 = Likely, 4 = Very likely)
- YouTube videos
- Food journals on smartphone or PDA
- Exercise journals on smartphone or PDA
- Food journals on GoogleDocs
- Exercise journals on GoogleDocs
- Twitter
- Facebook (or other social networks)

Would you be more likely to use these technologies if you had a "buddy" you could communicate with?
○ Yes ○ No

Are there any other technologies that you believe would benefit others in this or similar programs? Please list them.

_____

_____

_____

_____

Thank you for contributing to this research.

Distance-based Bariatric Lifestyle Modification Study
Qualitative Interview Script

Intro
Hello. My name is Patrick. I am a graduate student at Athabasca University. It is located in Alberta, but I have done all of studies here in Burlington.

The purpose of this study is to explore the suitability of specific distance education technologies that contribute to lifestyle change for overweight and obese individuals. This interview will give us a better understanding of why you chose to use certain technologies, and, chose not to use others, if any.

Reiteration of privacy, confidentiality, and safety
I would like to assure that:
the interview is completely confidential. Only my advisor and myself will see the details of this interview.
Nothing you say will be attributable to you personally.
You may choose not to answer a question, for whatever reason.
You may stop the interview at any time for any reason.

Consent
Do you understand these rights?
Is it OK to start the interview now?
(If the participant chooses not to proceed, then the interview will be terminated immediately and the participant will be thanked for their contributions so far.)

Banter to help put the subject at ease...the replies may or may not be incorporated into the dataset.

Which of the following statements best describes how you generally think about technology?
$\frac{a}{b}$ I love technology for itself.
$\frac{a}{b}$ The value of new technology is how it improves my daily life and environment.
$\frac{a}{b}$ All I care about is that it works.
$\frac{a}{b}$ I don't understand the fuss about technology. It usually doesn't do most of what it's supposed to do anyway. I only buy new stuff when I absolutely have to.
$\frac{a}{b}$ I don't care at all about technology. It makes my life miserable.

Did you use the suggested activity list?
If yes, was it useful, helpful. Please explain.
If no, why?

Did you watch the "How to find the questionnaire" video?
If yes, was it useful, helpful. Please explain.
If no, why?

Did you watch the "Posting to a Forum" video?
If yes, was it useful, helpful. Please explain.
If no, why?

Did you visit / try any of the following links?
If yes, what are your thoughts on what you found? Would you use any of these tools in a sustained weight-loss endeavor?
If no, why?
Live Strong Calorie Counter
Recipes Forum
Spark Recipes (@http://www.sparkpeople.com)
Low glycemic diet best for keeping weight off (CTV.ca)
Tell us about some interesting links

There were links to some support tools on website. Would you use any of the following tools? Why?
Get a little help from your friends Forum
Maintainers' Forum
Spark People Forums (this will be the most useful of the forums)
Instant messaging
Blogging
Facebook (only if you already use Facebook...look for a weight loss group)

Did you watch any of the following videos?
If yes, please tell me why and what were your impressions of it?
If no, why?
- Special K commercial
- Frontline / Diet Wars
- Super Size Me
- PBS NOVA / Marathon Challenge
- Exercise Video - Aerobics
- Exercise Video – Elastic Tubing

Software Tools
For privacy reasons, web-based forms are not used in this study. Instead, MS-Windows programs have been developed that simulate what web-based tools look like and how they might behave.
- Body Mass Index (BMI) Calculator
- Target Weight Calculator
- Weight Tracker

Initial Self-Assessment
Did you try the these self-assessments? Why, or, why not?
Weight Control Beliefs file
Dieting Beliefs Scale file
Weight Efficacy Lifestyle Questionnaire

Changing for Good – The Stages of Change
Did you watch the Stages of Change video?
If no, why? Then skip the balance of the questions.

Please rate the visual appeal of the learning materials.
Likert Scale (1= Ugly, 2=Unappealing, 3=Satisfactory 4=Very appealing)

What did you like or dislike about the visual appearance of the learning materials?
Text reply.

Please rate the video quality of the learning materials for this module.
Likert Scale (1 = Could not play, 7 = Very good quality)

Please rate the appeal of the audio narration of the instructional material.
Likert scale (1 = Could not hear it, 7 = Excellent)

What did you like or dislike about the audio narration of the learning materials?
Text reply

What was the gender of the narrator of the multimedia learning materials for this module?
Options: Male | female | I don't remember

Do you have a preference for the gender of the narrator in multimedia content of a personal nature, such as the [Module Name] module.
Options: Female | Male | No preference | Don't know | I'd rather not say

Please rate the organization of the Stages of Change module.
Likert scale (1 = Very disorganized | Very well organized)

Was the material in this module interesting?
Options: Not interesting at all | Not interesting | Interesting | Very interesting
Why?

Was the material in this module useful?
Options: Not useful at all | Not useful | Useful | Very useful

Please provide any other comments or additional information you may have.
Text reply

Would you to recommend the Stages of Change Introductory module to someone else?

Did you attempt the Stage Self-Assessment?
If yes, was it accurate?

If no, why?

Lesson: Pre-contemplation – Resistance Is Futile
Please take all of the self-assessments.
Did you watch the Pre-contemplators lesson video? Please comment.
Did you attempt:
- My progress raising my awareness (self-assessment)
- My progress with helping relationships (self-assessment)
- My progress with social situations (self-assessment)

Preparation – Getting Ready
Did you visit any of the following sites? If yes, please comment on their value to you
- Canada's Food Guide - A Guided Tour
- Canada's Food Guide - Quick Tips
- Interactive Nutrition Label and Quiz (Please be sure to visit this website)
- Canada's Physical Activity Guide
- Dietitians of Canada EATracker

Maintenance – Staying There
Did you attempt the Resilience Scale self-assessment?
If no, why?
If yes:
- Please describe your experience.
- Was it accurate?

Thank you for participating in this research.

APPENDIX E

CONTENTS OF STUDY WEBSITE

TOPIC OUTLINE

Topic outline

Welcome to the online lifestyle modification research website. Our goal is to understand the needs of individuals who desire to develop their abilities to make healthy choices regarding their diet and physical exercise in order to develop and enhance an online education program accessible to all who wish to follow the path on which you have chosen to embark.

Thank you for participating in this research.

Survey on Attitudes Toward Technology
If you haven't already done so, please complete the Survey on Attitudes Toward Technology. Click on the link below to watch a video on how to locate the questionnaire.

🎬 How to find the questionnaire (video)

Suggested Activity List
In order to make the best use of your time while visiting this website, a checklist of suggested activities has been prepared. Please download and print this document and use it to track your progress through the site.

📄 Suggested Activity Checklist
🎬 Get Adobe Reader (for Portable Document Format (PDF) documents)

Make sure you have the correct software to play the videos
This site makes extensive use of Adobe Flash for the videos found herein. If you find your browser is unable to play the videos, click on the link below to go to Adobe's website to install / update your Adobe Flash Player. The installation will require you to exit your browser. Once the installation / update process is complete, simply restart your browser and login to this site again.

🎬 Get Adobe Flash Player

Video Tutorials on Using This Site

🎬 Guided Tour
🎬 Posting to a Forum

TOPIC 1 – USEFUL LINKS

Useful Links

1 This section contains many useful links that will enrich your experience in this course. You can also suggest links to your peers.

📄 Live Strong Calorie Counter

Recipes

👤 Recipes

📄 Spark Recipes

Suggest a link...

Many of you know of websites or links to material that would be of interest to other participants in the program. Please use this forum to provide the details of the link and maybe some thoughts on why you find it useful.

👤 Tell us about some interesting links

TOPIC 2 – COMMUNICATE WITH PEERS

Communicate With Your Peers

2

NOTE: These tools are for the use of course participants only. No clinicians or other healthcare professionals take part in these discussions. If you are experiencing any physical, mental or emotional distress, call your physician or 911 immediately. If that is not possible, go to the nearest emergency room.

Use the chat tools and forums here to communicate with other participants in your course. You can also seek suggestions on specific issues from individuals who have moved into the maintenance phase of the program.

Discussion Forums

- Get a little help from your friends
- Maintainers' Forum
    ...
- Spark People

Instant Messaging / Chat

Instant Messaging / Chat Area 1

Instant Messaging / Chat Area 2

Personal Blogs

- Blogspot

Social Networking

- Facebook

TOPIC 3 – VIDEOS

VIDEOS

3 The videos in this section are intended raise your awareness of weight issues in North America, especially as it impacts diet, physical exercise and health. Some use humor, some are deadly serious.

A Special Special K Commercial
Kellogg's ran this brilliant Special K commercial some years back.
(Note: the audio and video are out of sync, but the lesson is still quite clear.)

🎬 Play the Special K commercial

Diet and Weight Loss in the Media
Many dieters will tell you: losing weight is easy; it's keeping the weight off that's hard. But now researchers in Denmark say they've found the perfect diet for keeping it off -- and it doesn't involve counting calories. The best diet for weight loss maintenance, say researchers at the Faculty of Life Sciences (LIFE) at the University of Copenhagen, is one that is low fat, high in protein and low in food with a high "glycemic index."

🎬 Low glycemic diet best for keeping weight off (CTV.ca)

Frontline / Diet Wars

Is low fat better than low carb? Is Atkins, South Beach or Weight Watchers the answer? And which diet offers long-term health and permanent weight loss? This PBS / Frontline documentary examines the great diet debate and explores many of the issues related to obesity in North America.

🎬 Watch the Frontline - Diet Wars episode online.

Super Size Me

A Film of Epic Portions

Filmmaker Morgan Spurlock unravels the American obesity epidemic by interviewing experts nation-wide and by subjecting himself to a "McDonalds Only" diet for thirty days straight. His Sundance award-winning feature is as entertaining as it is horrifying-diving into corporate responsibility, nutritional education, school lunch programs and how Americans are eating themselves to death.

🎬 Watch Super Size Me

TOPIC 3 – VIDEOS (contd)

PBS NOVA / Marathon Challenge

How do you run 42.4 kilometers if you have trouble making it around the block? With good coaching, discipline, and lots of group support, as NOVA shows when it follows 13 generally sedentary people through a training regimen designed to prepare them for an ultimate test of stamina and endurance. Created in cooperation with the Boston Athletic Association®, which granted NOVA unprecedented access to the 111th Boston Marathon®, and Tufts University, "Marathon Challenge" takes viewers on a unique adventure inside the human body, tracking the physiological changes that exercise can bring about.

🎬 Watch NOVA's Marathon Challenge

Exercise Videos
🎬 Aerobics
🎬 Elastic Tubing Exercises

TOPIC 4 – SOFTWARE TOOLS

🔺 **SOFTWARE TOOLS**   Topic 4

4 These tools can help you set reasonable, healthful goals for your weight loss lifestyle change.

Download a Body Mass Index (BMI) Calculator Tool
Use this tool to calculate your BMI

🎬 BMI Calculator Tool
🎬 BMI Calculator Tool Demo (Video)

Online BMI Calculator
This online BMI calculator from the U.S. National Institutes of Health does not require any downloads. The only data to enter are your height and your weight, either your current weight or your past maximum weight.

🎬 Online BMI Calculator from the U.S. National Institutes of Health

Target Weight Calculator
Use this tool to determine your target weight based on your BMI.

🎬 Target Weight Calculator
🎬 Target Weight Calculator Demo (Video)

Weight Tracker
Track your weight over time, during weight loss and weight maintenance phases.

🎬 Weight Tracker Tool
🎬 Weight Tracker Tool Startup (Video)
🎬 Weight Tracker Tool - Weight Loss Mode (Video)

TOPIC 5 – INITIAL SELF-ASSESSMENT

Initial Self-Assessment

5 Before you begin the course, please take a moment to complete these initial assessments. They measure your beliefs about the causes of obesity, the effects of heredity or fate, your understanding of how your own efforts affect your ability to control your weight. Please respond to the following statements by indicating how well each statement describes your beliefs.

As you progress through the course you will see how your perception of your abilities improves.

VERY IMPORTANT In order to safeguard your privacy, the **results of these assessments are not saved**. When you receive the results, print the page and keep it for comparison at a later date.

- Weight Control Beliefs
- Dieting Beliefs Scale
- Weight Efficacy Lifestyle Questionnaire

TOPIC 6 – CHANGING FOR GOOD – THE STAGES OF CHANGE

Changing for Good - The Stages of Change

6 This module will introduce and explain the principles behind the change process we all go through in developing a healthy lifestyle. You will learn how your awareness of your behavior grows and your attitude to change improves.

- Click here to watch the introductory module on the stages of change.

What stage are you at?
Stage Self-Assessment

Please comment on this module...
Please let us know your thoughts on the Stages of Change module

TOPIC 7 – PRE-CONTEMPLATION – RESISTANCE IS FUTILE

Pre-Contemplation - Resistance Is Futile   Topic 7

7 This module will: identify some attitudes everyone has regarding change; examine the defenses and barriers to change that we create for ourselves; explore some methods to help you overcome these barriers.

▣ Click here to watch the module on pre-contemplators

Self-assessments
For these self-assessments and the ones that follow in subsequent modules, the importance of timing cannot be over-emphasized. When your scores are low, you are advised to spend more time on each recommendations found in the learning materials. It is always better to make certain that you have made full use of each of the suggested tools and techniques than it is to advance to the next stage inadequately prepared.

    My progress raising my awareness

    My progress with helping relationships

    My progress with social situations

Something to Think About
These links demonstrate what might be in store for you if you do nothing about your weight.

▣ Check out your latest vital sign: waist size
▣ Men's waist size linked to diabetes

TOPIC 8 – CONTEMPLATION – CHANGE ON THE HORIZON

Not used.

TOPIC 9 – PREPARATION – GETTING READY

Preparation - Getting Ready   Topic 9

9 This sections provides links to tools that might help you prepare for your active weight-loss phase.

From Health Canada

- Canada's Food Guide - A Guided Tour
- Canada's Food Guide - Quick Tps
- Interactive Nutrition Label and Quiz
- Canada's Physical Activity Guide

Other useful links...

- Dietitians of Canada EATracker

Calorie Counting and Other Things

- Sugary drinks to be labelled with calorie counts
- Diet pop can be hard on your heart
- How bad is diet pop for me?
- Sweetened fruit drinks not a healthy alternative
- Large bag of movie popcorn has fat equal to two Big Macs

Test Yourself ....

- Fact or fallacy? 10 weight loss myths
- Test your nutrition IQ

TOPIC 10 – ACTION – TIME TO MOVE

ACTION - TIME TO MOVE   Topic 10

10 Buyer Beware
Despite all your preparation, diligence and good intentions, there are still many opportunities to unknowingly overindulge. This video excerpt from Penn & Teller's Bull....! episode on fast food illustrates many misconceptions about eating out, including at establishments considered "gourmet" or even "healthy".

VIEWER ADVISORY: This video contains profanity, particularly the F-word. If this will offend you, don't watch the video.

- Penn & Teller on Fast Food

TOPIC 11 – MAINTENANCE – STAYING THERE

MAINTENANCE - STAYING THERE

11 Resilience Is Key

As anyone who has tried to lose weight, quit smoking or otherwise try to adopt a healthy lifestyle can tell you, they know that they stumble and, to be successful, they must "shake off" such relapses. Resilience is the ability to be flexible and able to adjust, bounce back, cope with, or otherwise respond to challenges, adversities, change, or stress.

You can visit the website below to test your resilience, and learn ways to build it up, to be better prepared to "pick yourself up".

How resilient are you? The Resilience Scale

APPENDIX F

SUGGESTED ACTIVITY LIST FOR INTERVIEWEES

Bariatric Distance Education Study

Suggested Activity Checklist

After you login
- ☐ Update your Adobe Flash Player (if necessary)
- ☐ If you haven't already done the questionnaire, watch the "How to find the questionnaire" video.
- ☐ Watch "Guided Tour" video
- ☐ Watch the "Posting to a Forum" video

Useful Links Section
Visit at least two links. Links marked with asterisk ('*') are of particular interest to the study.
- ☐ Live Strong Calorie Counter
- ☐ Recipes Forum
- ☐ Spark Recipes (@http://www.sparkpeople.com)
- ☐ Tell us about some interesting links

Communicate Wit Your Peers Section

- ☐ Get a little help from your friends Forum
- ☐ Maintainers' Forum
- ☐ Spark People Forums (this will be the most useful of the forums)
- ☐ Instant messaging
- ☐ Blogging
- ☐ Facebook (only if you already use Facebook...look for a weight loss group)

Videos Section
- ☐ Special K commercial
- ☐ Low glycemic diet best for keeping weight off (CTV.ca)
- ☐ Frontline / Diet Wars*
- ☐ Super Size Me*
- ☐ PBS NOVA / Marathon Challenge*

☐   Exercise Video - Aerobics*

☐   Exercise Video – Elastic Tubing*

* - You do not need to watch these videos in their entirety. You may also choose not to watch them at all, but you will be asked why you made the choice.

Software Tools
For privacy reasons, web-based forms are not used in this study. Instead, MS-Windows programs have been developed that simulate what web-based tools look like and how they might behave.

☐   Body Mass Index (BMI) Calculator

☐   Target Weight Calculator

☐   Weight Tracker

Initial Self-Assessment
Please do all of the assessments in this section.

☐   Weight Control Beliefs file

☐   Dieting Beliefs Scale file

☐   Weight Efficacy Lifestyle Questionnaire

Lesson: Changing for Good – The Stages of Change

☐   Stages of Change video

☐   Stage Self-Assessment

Lesson: Pre-contemplation – Resistance Is Futile
Please take all of the self-assessments.

☐   Pre-contemplators lesson video

☐   My progress raising my awareness (self-assessment)

☐   My progress with helping relationships (self-assessment)

☐   My progress with social situations (self-assessment)

Preparation – Getting Ready

☐   Canada's Food Guide - A Guided Tour

☐   Canada's Food Guide - Quick Tips

☐   Interactive Nutrition Label and Quiz (Please be sure to visit this website)

- ☐ Canada's Physical Activity Guide
- ☐ Dietitians of Canada EATracker
- ☐ Sugary drinks to be labelled with calorie counts
- ☐ Diet pop can be hard on your heart
- ☐ How bad is diet pop for me?
- ☐ Sweetened fruit drinks not a healthy alternative

Test yourself

- ☐ Fact or fallacy? 10 weight loss myths
- ☐ Test your nutrition IQ

Action – Time to Move

- ☐ Buyer Beware video

Maintenance – Staying There

- ☐ How resilient are you? The Resilience Scale

APPENDIX G

SELF-ASSESSMENTS

EXPLANATION: the self-assessments herein are part of the learning resources developed for the online instructional materials of the study. They are not intended to be used as data collection materials. The actual implementation has been designed so that the results are not stored. Each participant will record the results for comparison with future attempts of the same assessment.

Transtheoretical Model Stage Self-Assessment

(Source: Prochaska, Norcross and DiClemente, 1994, p. 68)

1. The criteria indicating you may have a dietary / weight problem are:

 * A Body Mass Index (BMI) greater than 30
 * More than 30% of your calories in your diet come from fat.

If either or both of these apply to you, please select the statement that most closely describes your intentions or actions. Choose one answer only.
- a) I solved my dietary problem more than six months ago.
- b) I have taken action regarding my diet within the past six months.
- c) I am intending to take action in the next 1-6 months.
- d) I am intending to action in the next six months.
- e) None of the above.
- f) Does not apply to me.

2. The criteria indicating you may have a sedentary lifestyle are:

 * Optimally, you don't exercise vigorously 3 times weekly
 * Minimally, you don't exercise at least 3 times weekly

If either or both of these apply to you, please select the statement that most closely describes your intentions or actions. Choose one answer only.
- a) I solved my physical exercise problem more than six months ago.
- b) I have taken action regarding my physical exercise within the past six months.
- c) I am intending to take action in the next 1-6 months.
- d) I am intending to action in the next six months.
- e) None of the above
- f) Does not apply to me.

Transtheoretical Model Change Process Self-Assessments

For all questions in all assessments, the standard set of responses is: 1=never, 2=seldom, 3=occasionally, 4=often, 5=repeatedly.

Change Process "Consciousness-raising"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 93)
1. I look for information related to obesity, exercise and weight loss.
2. I think about information from articles and books related to obesity, exercise and weight loss.
3. I read about people who have been successful in making changes related to obesity, exercise and weight loss.
4. I recall information given to me personally by other people related to obesity, exercise and weight loss.

Change process "Helping Relationships"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 100)
1. I have someone who listens when I need to talk about my problem.
2. I can be open with at least one person about experiences related to my problem.
3. I have someone on whom I can count when I'm having problems.
4. I have someone who understands my problems.

Change Process "Social Liberation"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 105)
1. I encounter social situations that are designed to help reduce my problem behavior.
2. I find that society is changing in ways that make it easier for me to change.
3. I notice that people with the same problem I have are asserting their rights.
4. I read about people who have successfully changed themselves.

Change Process "Emotional Arousal"
(Source: Prochaska, Norcross and DiClemente, 1994, pp. 119-120)
1. Dramatic portrayals about my problem affect me emotionally.
2. I react emotionally to warnings about the consequences of my problem.
3. Remembering reports about illnesses caused by problem upsets me.
4. Warnings about hazards of my problem move emotionally.

Change Process "Self-Reevaluation"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 136)
1. I consider that my family and friends would be better off without my problem behavior.
2. My tendency to give in to my problem makes me feel disappointed in myself.
3. I reassess the fact that being content with myself includes changing my problem behavior.
4. I get upset when I think about giving in to my problem.

Change Process "Commitment"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 159)
1. I tell myself that if I try hard enough I can change my problem.
2. I make commitments against giving in to my problem.
3. I use willpower to keep from engaging in my problem behavior.
4. I tell myself I can choose to change or not.

Change Process "Countering"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 185-186)
1. I engage in some physical activity when I am tempted to engage in my problem behavior.
2. When I feel the onset of my problem, I try to relax.
3. I find that other activities are a good substitute for my problem.
4. When I feel my problem behavior coming on, I think about or do something else.

Change Process "Environment Control"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 190)
1. I remove things from my home that remind me of my problem behavior,
2. I leave places where other people are encouraging the problem behavior.
3. I put things around my home or workplace that remind me not to engage in my problem behavior.
4. I relate less often to people who contribute to my problem.

Change Process "Reward"
(Source: Prochaska, Norcross and DiClemente, 1994, p. 195)
1. I do something nice for myself in return for not giving in to my problem.
2. I counter the temptation to punish myself with covert reinforcements.
3. I reward myself for small self-change steps.
4. Other people in my daily life try to make me feel good about changing.

Weight Efficacy Life-style Questionnaire

Uses a 10-point scale ranging from 0 (not confident) to 9 (very confident).

1. I can resist eating when I am anxious or nervous.
2. I can control my eating on the weekends.
3. I can resist eating even when I have to say "no" to others.
4. I can resist eating when I feel physically run down.
5. I can resist eating when I am watching TV.
6. I can resist eating when I am down or depressed.
7. I can resist eating when there are many different kinds of food available.
8. I can resist eating even when I feel it's impolite to refuse a second helping.
9. I can resist eating even when I have a headache.
10. I can resist eating when I am reading.
11. I can resist eating when I am angry or irritable.
12. I can resist eating when I am at a party.
13. I can resist eating even when others are pressuring me to eat.
14. I can resist eating when I am in pain.
15. I can resist eating just before going to bed.
16. I can resist eating when I have experienced failure.
17. I can resist eating even when high-calorie foods are available.
18. I can resist eating even when I think others will be upset if I don't eat.
19. I can resist eating when I feel uncomfortable.
20. I can resist eating when I am happy.

Weight Efficacy Life-style Questionnaire

Results page

Scale	Score
Negative Emotions	Sum(1,6,11,16) / 36
Availability	Sum(2,7,12,17) / 36
Social Pressure	Sum(3,8,13,18) / 36
Physical Discomfort	Sum(4,9,14,19) / 36
Positive Activities	Sum(5,10,15,20) / 36

In order to protect your privacy, the results of this assessment will not be saved. It is strongly recommended that you print this page for comparison with your score on the next module.

Each of the scores is on a total of 36. Your goal should be to have increasingly higher scores each time you take the assessment following a new module. If your scores are not changing, or, are decreasing, examine each assessment question for clues as to where you need to develop a new strategy for dealing with each category of challenges.

Weight Control Beliefs Questionnaire

INSTRUCTIONS
Please read each statement and decide how well each statement describes your beliefs. Be sure to answer every statement.

(Responses: Not true | Slightly true | Moderately true | Very true)

1. I believe I should control my weight
2. I try to live a healthy lifestyle and let my weight go to what is natural me
3. I focus on healthy living rather than on controlling my weight
4. If I work at it, I should be able to keep my weight where I want it.
5. I try to accept the weight that is natural for me and focus on living a healthy lifestyle.
6. If I stick to the right exercise and eating plan, I should be able to achieve the weight and shape I want.
7. If I am living a healthy lifestyle, my body is likely at the weight I am meant to be.
8. It is important to me that I accept the weight that comes with living a healthy lifestyle.
9. The main thing that determines my weight is what I myself do.
10. If I am careful, I can control my weight.
11. I'd rather live healthily and accept that we all come in different shapes and sizes.
12. If my weight is more than I want it to be, then I am at fault.
13. Whether I gain, lose or maintain my weight is within my control.
14. I am comfortable letting my weight fluctuate naturally.
15. I focus on healthy eating rather than trying to control my weight.
16. If I want to be a certain weight, I can make it happen.
17. I focus on healthy exercise rather than trying to control my weight.

SCORE

Weight Control: ## (=sum(1,4,6,9,10,12,13,16))

Lifestyle: ## (=sum(2,3,5,7,8,11,14,15,17))

Source:
Laliberte, M., McCabe, R.E., Taylor, V. (2009) *The Cognitive Behavioral Workbook for Weight Management: A Step-by-Step Program*. Oakland, CA: New Harbinger Publications, Inc.

Results

Weight Control Score. When you first began reading this book, you probably believed that weight was something you could and should control. You simply needed to put the necessary 'effort into controlling your weight and you could reach your goals. This belief is a common one. Research tells us, however, that the more strongly you hold this belief, the more likely you are to be dissatisfied with your body and have poor self-esteem (Laliberte et al. 2007). And, the more strongly you hold this belief, the more likely you are to be a yo-yo dieter and to have had trouble with binge eating (Laliberte et al.. 2007; Stotland and Zuroff 1990). If your weight control score falls between 18 and 25, you are like most people in our culture. A score below 18 suggests that you don't really believe that you can and should'control your weight; a score in this range is associated with better self-esteem and body satisfaction. If your score falls above 25, you are at a higher risk of being dissatisfied with your body and struggling with your eating.

Lifestyle Control Score. After reading chapter 1, you know that weight is strongly influenced by your biology. You may have decided to focus on maintaining a healthy lifestyle and accepting that your body would regulate your weight. Research shows that this belief in striving for a healthy lifestyle and allowing your body to do what's natural for you is strongly related to feeling satisfied with your body (Laliberte et al. 2007). The stronger this belief, the more likely you are to have better self-esteem and fewer struggles with eating. If your lifestyle control score falls between 20 and 27, you are like most people in our culture. If your score falls above 27, you are very likely to have good body satisfaction. If your score falls below 20, you are likely to feel dissatisfied with your body and have greater struggles with eating.

There's nothing wrong with improving your appearance. However, to have lasting satisfaction, you need to have a healthy balance between your willingness to work at self-improvement and your willingness to accept your biological limits and work with realistic expectations.

What if I Chose the Healthy Living Option?

The belief in striving for a healthy lifestyle and accepting the weight that results from it is very consistent with the healthy living option recommended in this book. If you chose this option, you have planned your eating and activity to meet your body's needs and you have allowed your body to find its "natural" weight. Your "natural" weight will have been influenced both by what you have inherited genetically and by your eating and activity patterns over your life. If you have

maintained a higher weight for a sufficiently long period, your body's "natural" weight may be in the overweight or even obese range, as difficult as it can be to accept this. Regardless of what you weigh, believing in a healthy lifestyle and accepting the weight that results leads to better body satisfaction.

What if I Chose the Weight-Loss Option?   .

If you chose the weight-loss option, you may be wondering how all this applies to you. After all, aren't you trying to control your weight? Yes, but we think it's important that you also move away from this belief. If you are following the weight-loss option, you have been given very specific eating and activity recommendations. The goal in following these recommendations is that you will experience a reduction in health risks associated with being overweight or obese. The expectation is that you will somewhere between 5 and 10 percent of your original weight by following this plan. It would be easy get completely focused on the amount of weight you are losing, but we want you to try to approach experience differently. We want you to see your plan as a healthy lifestyle plan chosen for your parti needs. You have a lifestyle goal, not a weight goal. Even though you are asked to monitor your we' this is really to remind you to stick with your plan. You are not expected to alter your plan to increase weight loss; nor are you expected to alter your plan if you find that you are gaining weight. If you gain weight, you are simply encouraged to make certain that you are adhering to your plan. We want your· head in the same place as those who have chosen the healthy living option: You are striving for a health~~ lifestyle (tailored to your needs) and are working to accept the weight that results from this lifestyle.

APPENDIX H

SELF-MONITORING TOOLS

Figure F-1 The BMI Calculator tool

Figure F-2 - Target Weight Calculator: Start-up screen and obesity categories

BMI Advisory

PLEASE NOTE: Your BMI is only one indicator of your overall health. It does not account for individual differences in other factors such as % body fat, % lean mass, and waist size. Consult your health care provider for an understanding of what the BMI measurement means for you

* ☑ I have read the previous note and understand that only my health care provider can advise me on the appropriate BMI for me. My health care provider has recommended the following Body Mass Indicator (BMI) for me:

Target BMI: 27   [BMI Ranges...]

* - You must indicate that you have read the BMI advisory to proceed.

[< Back]   [Next >]

BMI Ranges

Body Mass Indicator (BMI) ranges are typically classified as follows:

BMI Range	Classification	Visit Obesity Classes on Wikipedia
Less than 20	Underweight	
20 to 25	Ideal	
25 to 30	Overweight	
30 to 35	Obese - Class 1	
35 to 40	Obese - Class 2	
Over 40	Obese - Class 3	

☑ I understand that only my health care provider can advise me on the appropriate BMI for me.

[Done]

Figure F-3 - Target Weight Calculator height entry screen.

Figure ## - Target Weight Calculator results display screen.

WeightTracker Tool
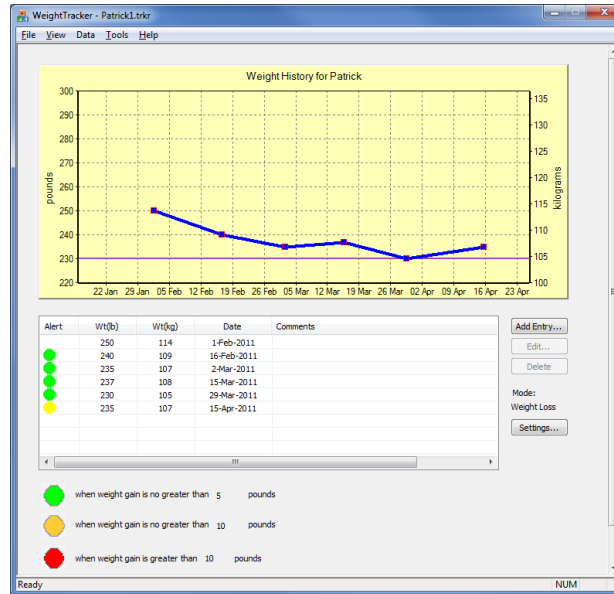
Figure E1 – WeightTracker tool in weight loss mode.

APPENDIX I

INTERVIEWEE SURVEY DATA

Table I1

Interviewees survey responses: Home computer use

Survey Item	Jenny	Amanda	Patricia	Brenda	Arthur
TECHNOLOGY					
Adopter Category	Late Majority	Early Majority	Early Adopter	Early Adopter	Early Adopter
Computers at Home	2	2	2	3	2
Internet Access	Broadband	Broadband	Broadband	Broadband	Broadband
HOME COMPUTER ACTIVITIES					
E-mail	✓	✓	✓	✓	✓
General Web browsing	✓	✓	✓	✓	✓
Product / service research prior to purchase	-	✓	✓	✓	✓
Shopping online	-	-	✓	✓	✓
Book travel / vacation	-	✓	✓	✓	✓
Reference material (Encyclopedia, dictionary, etc.)	-	✓	✓	✓	✓
Look for recipes	✓	✓	✓	✓	✓
Maps / get directions	✓	✓	✓	✓	✓
Troubleshooting / repair	-	✓	✓	✓	✓
Social networking (Facebook, Twitter, etc.)	-	✓	✓	✓	✓
Instant messaging	-	-	✓	✓	-
Participate in forums or chat rooms	-	-	✓	-	-
Write blog	-	-	-	-	-
Audio/video communications (Skype, Yahoo Messenger, etc.)	✓	✓	-	-	✓
Watch videos	-	✓	✓	✓	✓
Listen to music	-	✓	✓	✓	✓
Store and display photos	-	✓	✓	✓	✓
Word processing	-	✓	✓	✓	✓
Family banking / finances	-	✓	✓	✓	✓
Studying, training	-	-	✓	✓	✓
Other learning activities	-	✓	✓	✓	✓

Table I2

Interviewees survey responses: Use of digital, mobile, and entertainment technologies

Survey Item	Jenny	Amanda	Patricia	Brenda	Arthur
MOBILE COMMUNICATIONS DEVICES USED					
iPhone	-	-	✓	✓	-
Blackberry	-	-	✓	✓	✓
Other smartphone	-	-	✓	-	-
Mobile phone	✓	✓	-	-	✓
Hands-free kit	-	-	-	✓	✓
Pager	-	-	-	-	-
MOBILE ENTERTAINMENT DEVICES USED					
iPhone (audio, video, games)	-	-	✓	✓	-
iPod (audio, video)	✓	✓	✓	✓	-
iPad (audio, video, games)	-	-	✓	✓	-
MPLikely player	-	-	✓	-	✓
Portable video player	-	-	✓	-	-
Portable DVD player	-	✓	✓	✓	✓
Kindle or other eReader	-	-	✓	✓	-
MEDIA TECHNOLOGIES					
Standard television	✓	-	✓	✓	✓
Flat screen TV	✓	✓	✓	✓	✓
VCR	-	-	✓	-	✓
DVD player	✓	✓	✓	✓	✓
Blu-ray player	-	-	✓	✓	✓
Portable sound system	-	-	✓	✓	✓
Home theater sound system	-	✓	✓	✓	✓
DIGITAL MEDIA					
Digital camera	✓	✓	✓	✓	✓
Digital video camera	-	✓	✓	-	-
SUBSCRIPTION SERVICES					
Analog cable	-	-	✓	-	-
Digital cable	✓	✓	✓	-	✓
High-definition cable	✓	-	✓	✓	✓
Satellite	-	-	✓	✓	✓
High-definition satellite	-	-	✓	✓	-
Satellite / cable PVR	✓	-	✓	✓	-
Satellite radio	-	-	✓	✓	✓

Table I3

Interviewees survey responses: Perceived affordance and likelihood of adopting online and mobile technologies for lifestyle change

Survey Item	Jenny	Amanda	Patricia	Brenda	Arthur
UTILITY OF TECHNOLOGIES FOR LIFESTYLE CHANGE					
YouTube videos	Useful	Not Useful	Very useful	Not at all	Useful
Food journals on smartphone or PDA	Useful	Very useful	Very useful	Very useful	Not Useful
Exercise journals on smartphone or PDA	Not at all	Very useful	Very useful	Very useful	Not Useful
Weight journal on smartphone or PDA	Not at all	Very useful	Very useful	Very useful	Not Useful
Food journals on GoogleDocs	Useful	Useful	Very useful	Very useful	Useful
Exercise journals on GoogleDocs	Not at all	Useful	Very useful	Very useful	Useful
Weight journal on GoogleDocs	Not at all	Useful	Very useful	Very useful	Useful
Twitter	Not at all	Not at all	Very useful	Not Useful	Not at all
Facebook (or other social networks)	Not at all	Useful	Very useful	Not Useful	Not at all
SparkPeople	Useful	Not at all	Very useful	Not Useful	Not at all
LIKELIHOOD OF USE OF TECHNOLOGIES FOR LIFESTYLE CHANGE					
YouTube videos	Likely	Not at all	Likely	Not at all	Likely
Food journals on smartphone or PDA	Likely	Likely	Likely	Likely	Not likely
Exercise journals on smartphone or PDA	Not at all	Likely	Likely	Likely	Not likely
Weight journal on smartphone or PDA	Not at all	Likely	Likely	Likely	Not likely
Food journals on GoogleDocs	Likely	Likely	Likely	Not likely	Likely
Exercise journals on GoogleDocs	Not at all	Likely	Likely	Not likely	Likely
Weight journal on GoogleDocs	Likely	Likely	Likely	Not likely	Likely
Twitter	Not at all	Not at all	Likely	Not at all	Not at all
Facebook (or other social networks)	Not at all	Not at all	Likely	Not at all	Not at all
SparkPeople	Likely	Not at all	Likely	Not at all	Not at all
Likely to use these technologies when there's a buddy	Yes	Yes	Yes	Yes	No

APPENDIX J

CODE CATEGORIES

Category	Description	Example(s)
communication technology	Technology used to mediate the interaction between individuals	About using a recipe forum, I guess because I mostly share my recipes with friends, or people who I know, I generally email my recipes. We weigh each week and call each other with the results over the phone. I would still be inclined to communicate over the phone. It's just easier and it's "the way I am".
contemplation	Pertaining to activities in the Contemplation Stage of the TTM	Frontline / Diet Wars - it was just about diet wars - watch it? I watched bits and pieces of Frontline - I didn't watch too much of it.
content	Comments about specific features or attributes about the learning assets	The animated [lessons] were sufficient for me the first time through because I have previous experience losing weight,
content organizer	Design and learning resources to guide learners through instructional materials	The "Guided Tour" [video] gave me a good idea of how the website was setup and, in combination with the Suggested Activity List, allowed me to easily navigate around the site.
design	Inclusion or organization of learning resources	I used the suggested activity list. Found it very useful in organizing use of the website
	Attributes of learning resources	It didn't bother me that the narrator was male
dissonance	Holding contradictory or incompatible attitudes, beliefs	Basically it comes down to - I need to - I am not really extremely motivated and I know I should be.
facebook	Anything pertaining to Facebook	I am just a voyeur on Facebook - I just read what people have on Facebook I am an anomaly.
ICT	Electronic journaling or self-assessment	I have seen people do a food journal on their phone.
	Any reference to information and communication technology.	My first instinct would be to do a social support thing on the telephone because I'm not a techie.
info storage, retrieval and sharing tech	Storing, retrieving, or sharing web-based information – usually textual	Use the blog not as a diary, more for just information sharing.

Category	Description	Example(s)
journaling	Recording activities, occurrences, experiences, observations, food intake.	I haven't started the aggressive food discipline, like journaling stage of watching what I eat. I am focusing on my exercise.
learning	Acquisition of knowledge, skills or understanding	I absolutely think the animations enhanced my learning results.
limited time	Lack of time to complete study activities (could be indicator of lifestyle)	It was a time constraint that I didn't watch Frontline - it didn't look too my style
limited time	Limited time in day-to-day life	As a mother of two I am very busy and I found in the past when I did a food journal it was hard to write everything down in a note book let alone to a computer.
metacognition	Assessing one's learning progress	Yes, I would see those self-assessments as learning exercises
metacognition	Awareness and understanding of one's thinking and learning processes.	the wording on the Dietary Beliefs quiz did make me think more about what "they" were trying to get at. It caused me to examine myself and my ideas.
motivation	Impetus to sustain a behaviour or activity	I know that is BMI important for medical reasons but as a motivator - If you're that far off the mark on BMI, it's not a motivator.
	Triggers to cause an individual to engage in an activity or behaviour.	I was most interested in individuals' personal stories of why they were trying to do the marathon.
multimedia	Learning resources or other content that use audio and/or video	The Low glycemic diet video was very useful and informative.
non sequitur	Extraneous comments	I do water aerobics
online community	Knowledge of, attitudes toward participation in online communities	I am not a Facebook person.

No, I was not aware SparkPeople existed. It was new information. |
| perception of others | An individual's beliefs about the nature or actions of someone else | Posting a recipe was simple enough that most people would be able to figure out.

I am not a Facebook person.

I don't think that I care that that person sees the rest of my life as I go along. |

Category	Description	Example(s)
preparation	Pertaining to the Preparation Stage of the TTM	The Canada's Food Guide - A Guided Tour-that is very important to know.
		Canada's Food Guide - Quick Tips were very useful.
resilience	Pertaining to the Resilience Scale self-assessment (ability to cope with problems and setbacks).	Some of them shocked me I didn't know the answer - on the Resilience Scale assessment
role modeling	Demonstration of a process or procedure	I thought it was good how the guided tour went through each section - it was a good overall explanation of what the program and website were all about.
	Demonstration of an activity or procedure	I would watch somebody else's video of a cooking technique
	Demonstration of positive behaviour	I liked the program preparing for the Boston Marathon. I find that kind of thing motivating...if they can do it, I can do it.
self-assessment	Pertaining to the assessments for psychological constructs (self-efficacy, dietary beliefs, locus of control.)	Some of the questions were vague and not easy on the Dietary Beliefs quiz.
	Pertaining to the TTM stage assessments	I did the stage self-assessment. I was at the action stage for exercise and the preparation stage for food.
self-aware	Being conscious of one's own feelings, character, etc.	I'd come in and work 36 hours straight and they'd be shifting off 2-3 shifts -workaholic back then.
self-efficacy	A person's belief in his or her ability to succeed in a particular situation.	I know enough about nutrition that I can make the right choices for ingredients to adjust a recipe.

Category	Description	Example(s)
support	Information support increases self-confidence to enable a behaviour	Yes, I did watch the Posting to a Forum video and was able to post a recipe.
	Technological support enables ICT activities	I have a webcam and use it to communicate with my friends in New Zealand.

Category	Description	Example(s)
	Social support is the comfort given by family, friends, and others.	I would try it something like SparkPeople for social support. I've never done it before.
tools	Websites and software applications to assist individuals in lifestyle change	I did not visit EATracker. Nonetheless, I understand the value and necessity of journaling, particularly food.
trust	Information validity	I recall the stuff she would do with a certain amount of respect or believability, I guess whatever she would be saying I would probably be believing
	Emotional risk	Many morbidly obese people are unable or unwilling to leave the house. A program like this could overcome social isolation.
	Personal safety	Wow, blogging - it's like up there forever - I would have to know exactly who would read it; you get some crazies out there and who knows what?
tutorial	Videos used to instruct the learner on navigating the study website, the use of a website feature, or a software tool.	The "How to find the questionnaire" was very helpful. It allowed me to easily locate the questionnaire
type of person	Reference to the characteristics or attributes of the individual's own personality, disposition, predilection, etc.	I would never be an Atkins [diet] person - I don't care about it. I am a very no-nonsense kind of person.
value	A solution that meets a need of an individual	I need to be able to record data. The graph for the Weight Tracker was a nice touch.
website	Pertaining to the design, construction or use of the study website	Something like this [study] website will turn a light on for somebody - but it depends on the person.
weight control beliefs	Pertaining to the Weight Control Beliefs self-assessment and locus of control.	Sometimes you are not the only one who's in control - sometimes something in your life is playing that role; it did help me to be careful - preaching and because I am on this high right now.

APPENDIX K

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April 29, 2011

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