A study of student engagement with media in online training

Christian B. Rogers
The University of Toledo

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A Dissertation
entitled
A Study of Student Engagement with Media in Online Training
by
Christian B. Rogers
Submitted to the Graduate Faculty as partial fulfillment of the requirements for
The Doctor of Philosophy Degree in Curriculum & Instruction

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The University of Toledo
May 2013
An Abstract of
A Study of Student Engagement with Media in Online Training
Christian B. Rogers

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Many studies have been conducted where a face-to-face training environment is compared to an online training environment. While some research has been conducted on the nature of online training in faith-based not-for-profit organizations, little to no research has been found on engagement. The purpose of this study was to determine if the level of engagement of participants in a training course for new staff and interns with Campus Crusade for Christ would be increased by conducting training online instead of face-to-face and by utilizing multiple forms of media.

The survey that was utilized included questions adapted from the Student Course Engagement Questionnaire (Handelsman et al., 2005) and was analyzed utilizing the Rasch measurement model to understand whether the survey successfully met the requirements for measuring engagement.

The Rasch measurement analysis revealed that the survey was weak and did not measure engagement, thus the results of the survey revealed no significant differences in the level of engagement.

Further research is recommended with new questions being added to the survey that are considered to have a greater level of difficulty as well as research should be conducted that involve qualitative data collection.
This dissertation is dedicated to the memory of my grandmother, Jennie Rogers. She believed in me from a young age that I could do anything that I desire and she would be proud of me in whatever path God takes me.
Acknowledgements

This dissertation would not be possible without the significant contribution of others. My gratitude is beyond measure for their help and dedication.

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Chapter One

Introduction

Not-for-profit organizations are similar in many ways to for-profit organizations. The way the organization is structured, how they obtain funding, and the type of employee they recruit may differ but many of the operations are similar. Similarities may include organizational structure, expectations of employees to understand how that structure works, payroll, and human resources.

In order to sustain the health of a not-for-profit organization, training is often conducted for new staff, existing staff, and interns. One type of organization within the not-for-profit sector is that of a faith-based organization. A faith-based organization may be a church, missions’ agency, or even social justice organization such as the Salvation Army. Just like other not-for-profit organizations, faith-based organizations need to train new staff at an initial and ongoing basis. The purpose of training a person within a faith-based organization may include how to educate someone on his or her role within the organization, how the organizational structure functions, or the skills needed for conducting the job. Other foci might be how to counsel specific types of people, how to relate to others that are within the organization, or ways to grow personally and spiritually.

Faith-based organizations deal with certain obstacles when they develop training for staff and interns. One of the more prominent obstacles is the engagement of participants. If a course does not engage participants, learning may not take place. The way that the materials are presented can have a major effect on participants’ level of engagement. Moreover, the environment that is chosen for the training can dictate the
way that materials are presented. For example, in a face-to-face training format, 
materials may be presented via printed documents. In an online format or a blended 
format (a combination of face-to-face and online), course materials may be presented 
using text-based documents, group discussions using online discussion boards, videos, or 
audio.

Campus Crusade for Christ (Cru), a faith-based organization, considered which 
training environment would result in new staff and interns being more engaged with the 
course materials. Cru recruits over 600 new staff and interns each year. Training is 
required for interns and full-time staff members. Currently, Cru staff and interns are 
trained at specific locations where they are assigned. Upon arriving at that location, each 
trainee is paired with a coach with whom they meet on a weekly basis for two years. 
During each of these training sessions, a coach will teach the materials and engage with 
the trainee in hands-on experiences, as well as discuss readings. Trainees receive these 
materials by downloading Portable Document Format (PDF) files from a wiki and 
printing them to read in preparation for meeting with the coach. Wikis are online 
collaborative editing tools that allow participants to become editors of a topic at any time 
and from any location (Leuf & Cunningham, 2001).

The current curriculum that Cru has developed is based on what is called the five 
E’s of development that include environment, education, exposure, experience, and 
evaluation. Environment is the culture of growth that Cru seeks to create for each intern 
and new staff member. Education is the opportunity that Cru wants to create for each 
new staff member and intern through the use of the training as well as other venues such 
as workshops and retreats. Exposure is provided through extended learning opportunities
such as by offering curriculum by experts in particular fields and mentoring experiences for new staff and interns by senior staff members. Experience is when new staff and interns practice their newly-learned skills. Experiential activities, which are offered within each module, might include having a discussion with five students on a specific topic. Evaluation is when new staff and interns receive constructive feedback within each module. By utilizing the five E’s, Cru promotes a culture of education and self-study, along with skill development on spiritual leadership, personal counseling of students, organizational structure, and procedures.

According to Cru’s national training director, participants of the face-to-face training environment demonstrated a lack of engagement with the materials in the course. With the aim of increasing participant engagement, the director developed a distance education course that provided participants with training through a variety of online media and materials. The study examined whether the online environment and related media increased participant engagement and was limited to training that is offered to staff and interns in Cru’s Great Lakes region, which includes Ohio, Michigan, Indiana and Illinois. The online environment was asynchronous, meaning that participants had the flexibility to access course materials when it was convenient and go through each course module at their own pace with the same deadlines for ending each module as the face-to-face training participants. The online environment utilized a popular course management system, Moodle, which is an open-source management system developed by Martin Dougiamas (Beatty & Ulasewicz, 2006). The course had 18 modules, the same as those used in the face-to-face training environment, and utilized multiple media to present the materials including videos, audio, and discussion boards. The face-to-face training
environment only offered text-based materials through downloadable PDF’s. The intention was that by utilizing a different course environment and by presenting materials with the use of multiple media-related tools, the level of engagement of the participants would increase.

**Statement of the Problem**

Cru did not believe the face-to-face training environment offered a sufficient level of engagement for participants; therefore, they wanted to see if the participants’ level of engagement with the materials would be greater in an online training format. For participants, a lack of engagement may lead to low levels of learning and poor job performance.

**Need for the Study**

Many studies have been conducted where a face-to-face training environment is compared to an online training environment. These studies have been conducted in K-12 school systems, higher education, for-profit organizations, and not-for-profit organizations. While some research has been conducted on the nature of online training in faith-based not-for-profit organizations, little to no research has been found on the outcomes resulting from this kind of training.

**Purpose and Importance of the Study**

The purpose of this study was to determine if the level of engagement of participants in a training course for new staff and interns at Cru would be increased by conducting training online instead of face-to-face and by utilizing multiple forms of media.
This study enabled Cru to understand whether the utilization of an online training course would increase the level of engagement of participants. If this was proven to be true, Cru would increase their use of the online training by offering it in other regions of the United States.

In addition, other faith-based organizations which currently do not use online training may gain a better understanding of online training and how an online course can increase engagement of participants. This study would contribute to the body of knowledge of online training within faith-based organizations.

**Research Questions**

1) Did the survey successfully meet the requirements for measuring engagement according to the Rasch model?

2) What were the differences in level of engagement with the course materials between participants in Cru’s traditional face-to-face training with a coach and participants in a strictly online environment?
Chapter Two

Literature Review

Based on the focal point of this study, the literature review examined the development of training in organizations including the purposes, theories, models, formats, and evaluation of this training. Next, the nature, history, and training within faith-based organizations were discussed. Finally, participant engagement and how it can be promoted and evaluated in online learning followed.

Training in Organizations

Faith-based organizations, whether they are missionary organizations, hospitals, or social service organizations, need to train employees at an initial and on-going basis. Thus it is important for these organizations to understand the purpose behind training, theories that are utilized to develop training, and models that instructional designers follow.

Purpose of training. Purposes of training may be to develop employees’ knowledge base, observable skills and problem solving skills, and attitudes or beliefs. When developing employees’ knowledge this can include “knowledge of labels, facts, rules, procedures, and other discrete pieces of knowledge” (Landers, 2009, p. 25). Employees may be trained to accomplish observable skills such as cognitive skills, psychomotor skills, physical skills, and interpersonal skills, with the goal of these skills being taught to accomplish goals or solve problems. Problem solving skills may be taught which include anything that involves application of knowledge or observable skills. Attitudes and beliefs may also be targeted such as self-efficacy, sexual tolerance, or racial attitudes which can help create a healthy working environment socially
(Landers, 2009). When training is developed, an instructional designer must follow a specific process for the development of the training.

To begin the process of development, an instructional designer must be identified. It is the instructional designer who follows a specific design plan for course development and delivery (Baturay, 2008). Instructional design is the systematic method of analyzing, designing, developing, evaluating, and managing the instructional process. This is based on the designer’s knowledge and expertise of learning and instructional theories. The goal is to ensure the quality of instruction and retentive learning.

Before an instructional designer begins the development process, it is important to understand the purpose of the training to be able to answer very specific questions. According to Mager (1984), the instructional designer must answer three questions. The first is “Where are we going?” or “What are the objectives of the instruction?” The second is “How will we get there?” or “What are the instructional strategies and the instructional medium?” and “How will we know when we have arrived?” or “What should our evaluative measures look like?” (Mager, 1984). The purpose of asking these questions is to selectively find the right approach to design the training and obtain the best result. Additionally, the instructional designer will choose a relevant theory and specific model to guide the development of training.

**Theories for the development of training.** Many theories can be used in the development of training. Some of the more popular theories are adult learning theory, self-directed learning, and constructivism.

**Adult learning theory.** It is important for the instructional designer to understand how adults learn as opposed to how children learn and incorporate these differences in
training to promote higher levels of engagement for adults. Malcolm Knowles (1978), who wrote *The Adult Learner: A Neglected Species*, described adult learning through the use of the term andragogy, which is grounded in five assumptions about the characteristics of adult learners.

1. Self-concept – Individuals move from being dependent personalities to be self-directed personalities
2. Experience – As an adult grows in age, the amount of experiences on which to draw knowledge from increases
3. Readiness to learn – As a person matures, the desire to learn moves towards the development of tasks depending on his or her social role
4. Orientation to learning – The time needed for application of knowledge becomes less
5. Motivation to learn – As a person matures, the motivation to learn moves from external to internal (Knowles, 1978)

Adult learning theory can form the basis for the design of online training in work environments. The implication of adult learning theory is that the adult learner in the course would be more motivated to learn once learning objectives have been rationally established that meet the needs of the learner (Knowles, Holton, & Swanson, 1998). One way that online learning can foster the assumptions of adult learning theory is by allowing adults to choose the pace and direction of activities or modules. For example, a discussion question is posed and the trainee has the opportunity to respond when they are ready to engage with the conversation. If a video is presented, the trainee has the opportunity to watch the entire video or to skim through the video at their leisure. Self-
directed learning theory can explain how to support adults’ desire to control their learning during training situations.

**Self-directed learning theory.** Self-directed learning theory is the process where individual adults take control of their own learning (Merriam, Caffarella, & Baumgartner, 2007). Brookfield (1995) explains, “…adults take control of their own learning; in particular how they set their own learning goals, locate appropriate resources, decide on which learning methods to use, and evaluate their progress” (p. 1). The processes used to support adults in becoming self-directed learners are as follows:

1. To enhance the skill level of adults so as to become more self-directed in their learning.
2. To foster transformational learning as it is central to self-directed learning.
3. To promote emancipatory learning and also social action which are integral parts of self-directed learning. (Merriam et al., 2007, p.31)

The first goal is that adults become more self-directed in their learning by way of skill training. This is based on the work of Knowles (1978) in that adult learning is both a personal attribute and also a specific skill attribute (Greenberg, 2009). The adult must have the desire to learn and engage with the trainer, the materials, and also with fellow participants. The trainer or educator should assist the adult learner when it is requested. The second goal is to foster transformational learning. Brookfield (2007) believes that self-directed learning only takes place when the adult learner has the opportunity to reflect on what has been taught. Using today’s online tools such as blogs or discussion forums, participants can be offered new ways to reflect on what they are learning. The third goal is to promote emancipatory learning and also social action. This can also be
stated as promoting restriction-free learning. For example, adults might be given real-world experiences and relevant applications during their online training that require some form of social action outside the training environment. Self-directed learning is most effectively achieved when participants are allowed to construct their own knowledge. This can be better understood by looking at constructivist learning theory.

**Constructivist learning theory.** Constructivist learning is based on Piagetian and Vygotskian perspectives that emphasize the impact of constructed knowledge on an individual’s active and reflective thinking. Piaget focused on individual cognitive constructivism (Piaget, 1985) while Vygotsky focused on sociocultural systems and how these concepts impact learning (Vygotsky, 1978). Social constructivist theory states that knowledge is socially situated and constructed by reflecting on individual thoughts and experiences (Ruey, 2010). A constructivist approach to learning should focus on learning about ‘why’ and learning about ‘how’. In a constructivist environment, students are encouraged to engage in learning actively by discussing, arguing, negotiating ideas, and working collaboratively to solve problems.

Online training contains components for interaction to facilitate active learning by the use of discussion boards, video and audio discussion, live chat, and email. By utilizing these tools as a means to discuss, argue, negotiate, and collaborate, knowledge is constructed. According to Cavus (2007), “Both constructivism and Web-based synchronous collaboration assume that effective learning relies on active engagement by the student, and high levels of interaction, in social-dialogical environments and in real-world situations” (p. 305).
Once an instructional designer has formed a theoretical foundation for the development of online training that supports the self-directed, active, and reflective learning needed by adults, a systematic model will then be used to develop the actual training.

**Models for the development of training.** The main purpose of an instructional system is to advance student learning. The utilization of an instructional model allows a designer to view the entire system as it is being developed as well as to help prevent possible misunderstandings in communication between the instructional designer and others involved in the development. A model provides conceptual and communication tools to visualize, direct, and manage the process of designing instruction (Gustafson & Branch, 2002).

**ADDIE.** The basic underlying structures for most instructional models include the stages of analysis, design, development, implementation, and evaluation. This is referred to as the ADDIE model (Baturay, 2008). The ADDIE model is often mistaken for a model itself when in actuality it is a platform for other models to follow. The first stage is analysis which is comprised of analyzing the learner who will be participating in the instruction, the environment that the instruction will take place (whether it be online or face-to-face), and the tasks to be completed. The second stage is design, which involves the selection of course objectives and appropriate strategies and tactics to complete those objectives. The third stage is development, which is where the instructional content will be created. The fourth stage is implementation, which is where the tasks that were previously decided upon in stage one are carried out. Stage five is evaluation, which involves a summative evaluation of the process (Baturay, 2008).
Based on these five stages, many different models are available for instructional designers to use. The more commonly used models are those of Morrison, Ross, and Kemp (2006); Dick and Carey (1996); and Smith and Ragan (Baturay, 2008). While these models have been utilized for a number of years, they are still evolving. For the purpose of this study, the design model of Morrison, Ross, and Kemp will be explained below in further detail.

**Morrison, Ross, and Kemp.** In the Morrison, Ross and Kemp (2006) instructional design model, the instructional design process usually starts with curriculum development at the macro level, continues with course development at the micro level, and lesson development at the nano-level. The processes and procedures are flexible and dynamic. The flow of the model starts at the center and moves to the outer parts. Individuals may progress through the instructional process according to their preferences, starting with one element or another and following whatever order they consider logical or suitable (Baturay, 2008). An image of the model can be seen in Figure 1.

Figure 1. Components of the Morrison, Ross, and Kemp Design Model
The underlying principles of the model are as follows:

1. Identify the instructional problem and specify goals for designing the instruction.
2. Examine the characteristics of the learner, which will have an influence on instructional decisions.
3. Identify the subject content and analyze tasks related to the goals and purposes of the instruction.
4. Specify instructional objectives for the learners.
5. Sequence the content within each instructional unit.
6. Design instructional strategies so each learner can master instructional objectives.
7. Plan the instructional message and develop the instruction.
8. Develop instruments for evaluation to assess objectives.
9. Select resources that support the instruction and learning activities.

(Morrison, Ross, & Kemp, 2006)

As indicated by Figure 1, each of the processes in the model is non-linear, giving the instructional designer the choice of where to begin work. In some situations, not all of the processes will be utilized. Morrison, Ross, and Kemp (2006) also believe that revision is an ongoing activity associated with the other elements in the model.

Morrison, Ross, and Kemp’s (2006) instructional design model is one of many different models that an instructional designer may choose. While many of these models may include the steps of the ADDIE model, each model may order the steps differently or have a different name for a specific step. Some models support the need for formative
evaluation after each procedure while others do not. The instructional designer and organization must choose a model that best suits the needs of the organization, the learner, and the instructional goals. Instructional designers must also consider the ability to repeat the process of curriculum development for further training.

Regardless of the model that is chosen, it is important that one be considered for the design of the training within an organization. Once the instructional model is chosen, an organization must consider the format and media that will be used to deliver the training to employees within an organization.

**Distance education training.** The training format dictates how the materials will be delivered to the participants as well as how communication takes place between the participants and the trainer and among participants. In general, organizations identify three different formats for training. These formats are face-to-face, online, and blended learning. Blended learning involves participants interacting with each other and a trainer in a face-to-face format, with supplemental interactions and course delivery taking place over electronic media such as discussion boards, email, and media such as video and audio (Larreamendy-Joerns & Leinhardt, 2006). For the purposes of this study, the following section discusses the subject of distance education, specifically the definition, characteristics, history, and utilization, culminating in a discussion on the advantages and also disadvantages of distance education.

**Definition of distance education.** As previously noted, the medium used for educating over a distance has changed over a period of time from the use of the mail system to deliver course curriculum, assessments, and videos to the Internet delivering PDF materials, streaming audio and video, discussion boards, and online quizzes and
exams. The basic definition of distance education has not changed. Distance education can be defined as the act of a teacher, trainer, or coach educating a student or employee where the two are separated by a distance. Bruder (1989) states that distance education is “the application of telecommunications and electronic devices which enable students and learners to receive instruction from some distant location” (p. 30). McIsaac and Gunawardena (1996) argued that distance education is imparted where the learner is physically separated from the instructor, is a planned and guided learning experience, and is a two-way structure where the learner has more control over their learning.

**History of distance education.** Online training is a relatively new training format that developed as an outgrowth of personal computers and the emergence of the World Wide Web. However, the concept behind online training is much older and has its roots in distance education. While online training utilizes the Internet as a medium to transfer educational information, other media have been used in the past. Rumble’s (2001) view on the history of distance education is that it has moved from a modern education to a postmodern education. The medium by which education has been delivered has evolved from materials being delivered via the postal service to the present day use of the Internet.

The first instance of distance education was through the use of correspondence courses, specifically with the Pitman Shorthand training program (Matthews, 1999). In 1882, William Rainey Harper developed a course that was delivered via correspondence that later led the State of New York to authorize the use of correspondence courses. Following this, a Correspondence University was established in Ithaca, New York in 1883 (Erazo & Derlin, 1995). Other technologies advanced distance education such as
As technology advanced, courses were offered utilizing the personal computer and later the Internet.

As the 1990s approached, computer-based training modules with interaction and engagement became possible. Computer-based technologies provided new forms of access to knowledge and didactic tools (Bello, Pennisi & Maviglia, 2005). The primary problems with these newer technologies were that they were very expensive to develop and unlikely to be developed in a timely manner for training to remain relevant (Landers, 2009). Most of these models were developed for use on a CD-ROM with expensive and complicated software such as Macromedia Director. It was not until software became less expensive and bandwidth over the Internet increased that the use of computer-based modules for training became more readily available. These were major factors in the development of online training.

Another factor that made online training more accessible was the efforts of the World Wide Web Consortium, which standardized the user experience of the Internet. This standardization decreased development costs and thus made innovative training development simpler and less expensive. At this time, Internet usage was growing and by 2003 more than half of the U.S. households (over 61 million) had Internet access in their home (Landers, 2009). Market analysis indicated that the online learning industry was healthy and growing, as well as a growing market in online textbooks and computer-mediated instruction. This included online learning objects (i.e., digital tools to support learning) and intelligent tutor systems (i.e., computer-based environments that provided specific guidance and feedback resembled interaction with a tutor). More training was
being conducted online with the objectives of decreasing costs and increasing 
accessibility (Landers, 2009). These courses followed a similar format to the CD-ROM’s 
of the 1990s but with easier development and quicker dissemination of the course 
modules.

In more recent years, the Open University has made increasing use of computer-
based curriculum, originally with the CD-ROM and more recent developments such as 
website and video and audio conferences (Price, Richardson, & Jelfs, 2007). Open 
University currently provides 21% of all higher education in England. It is considered a 
model for distance learning in higher education and also for corporate training 
environments and has expanded to Belgium, France, Greece, Hong Kong, Israel, Italy, 
Luxembourg, Malaysia, the Netherlands, and Portugal. Businesses and corporations have 
followed the example of the Open University by creating their own online training 
schools and environments where multiple courses can be housed and delivered to 
employees.

The University of Phoenix, a for-profit organization, has greatly benefited from 
the use of online training by offering courses all over the world to adults that are seeking 
to advance their education. Founded by Dr. John Sperling in 1976, a Cambridge-
educated economist and professor, the University of Phoenix caters to working adults 
who are seeking higher education (University of Phoenix, n.d.). In 2006, the University 
of Phoenix offered 10 bachelor’s degrees, 18 masters degrees, and two doctorates as well 
as 21 continuing education programs (Casey, 2008). The University of Phoenix has 
grown to offer courses at more than 200 locations and online in most countries 
(University of Phoenix, n.d.).
Recently, distance education in the form of online training has flourished in the United States for many reasons including the distance between individuals and organizations offering education, the continued need for more education, and the rapid advancement of technology (Casey, 2008). Online training has become a common medium for delivery educational materials and for training courses within many types of organizations (Harper, Chen, & Yen, 2004).

Corporations have become some of the largest investors and clients of online education. Facing increasing levels of global competition, many U.S. corporations have a serious and urgent need to develop rapid and continuous learning processes for their employees, partners, and suppliers. Online education provides a viable means to continuously educate employees, establish better communication with customers, and develop products and services rapidly. Rosenberg (2006) noted that due to the flexibility of accessing an online course and the just-in-time delivery, online training is becoming a more popular method of training employees. In a corporate or organizational learning environment, the coach or trainer may be at one location teaching employees who are in other locations regionally, nationally, or globally.

Both large and small organizations are utilizing online courses to deliver training to employees. A report from the market research organization Global Industry Analysis revealed that the corporate online learning market was at $17.5 billion in 2007 and was projected to grow to $52.6 billion by 2010 (Kopf, 2007). With the growing investment in online learning, it is becoming evident that many organizations are taking advantage of this format to train employees.
The pedagogy required in corporate distance-learning programs is different from that in academic settings. Within the academic setting, the focus of the education is on the individual and instructors teach with the goal of educating students who will eventually move on to higher education. Within a company/business setting, the primary focus of educating or training is on increasing the productivity of the employee and instructors teach with the goal of increasing the profitability of the company (Harper et al., 2004).

Some larger companies and state and local agencies have also developed their own “corporate universities” to offer training with the distance education format. This is specifically true within health agencies, where state and local employees are being trained online as a means to lower training costs and decreasing travel expense (Benjamin et al., 2008). As mentioned previously, some research has been conducted to examine online learning in faith-based, higher educational settings but no studies were found on this same kind of training in faith-based, not-for-profit organizations.

**Characteristics of distance education.** The earliest forms of distance education included the use of manuals, exercises, and tests shipped by mail for individual or group use. Later, radio, television, and audio/video materials were used to deliver training materials. The transportation mode for these media has also changed, from the use of the mail system to the Internet. Regardless of the medium and transportation that has been used, specific characteristics of distance education have remained. These characteristics can be described in different ways and include synchronous communication, asynchronous communication, utilization of media-related tools, and a two-way structure.
Online learning may involve participants working in groups or independently, both with and without supervision (Slevin, 2008). This is a crucial part of distance education as the purpose of the communication is to support the educational process. Moore (2007) used the concept, “transactional distance” to explain how synchronous communication could be used most effectively. Transactional distance is where the distance between two individuals in an online learning environment is not measured by the physical distance, but is instead measured by the amount of interaction between the two. This can be determined by the amount of time it takes for individuals to send and receive communications and also how often communication takes place. It also may involve the type of communication such as through a synchronous text-based chat, a video chat or a discussion that is asynchronous. Garrison and Shale (1987) argue that distance education must include technology that facilitates communication. Synchronous communication, which utilizes tools that allow for real-time communication, includes tools such as teleconferencing, video conferencing, or a live chat conversation. Often, within a course that involves these technologies, students are required to log into a specific website and engage in an activity at a specific time.

Distance education can also use tools to support asynchronous communication, which is when participants have the freedom to communicate without the constraint of time. Specific tools that are used for asynchronous communication could be mail, email, blog postings, or the use of a discussion board. A trainee could write a discussion board post soliciting a response and another trainee may respond at a future time. While synchronous communication requires two parties to be engaged in a discussion at the same time, asynchronous communication does not.
Distance education can utilize media-related tools to serve as a medium for both communication and delivery of instructional materials. Examples of technology that could be used for communication are email, audio or video streaming, discussion boards, wikis, and blogs. Examples of technology that could be used for the delivery of instructional materials include paper mailings, PDF documents, videos, audio, wikis, blogs, images, and interactive objects such as timelines or modules.

Recently, educational institutions and organizations have been utilizing standardized collaborative learning tools and systems for the dissemination of courses. Online training can be presented with the use of a basic website, wiki, or blog or by the use of a learning management system (LMS) (Chamberlain & Taylor, 2011). Learning management systems (LMS) have been developed as a systematic way to teach online courses. According to Cavus (2007), “An LMS is often regarded as the starting point for developing an online course or program by researchers as it provides a means for managing, delivering, and tracking online instruction and student outcomes” (p. 302). Recently, LMS’s have become a very active domain among researchers studying online education (Chamberlain & Taylor, 2011). Learning management systems are traditionally developed to be similar in flexibility to that of a desktop application. Many well-known systems exist while some organizations create and utilize their own. Regardless, each LMS has similar functionalities.

An LMS acts as a bridge between the trainer and the trainee. Trainers have access to the administrative section of the course where they can load course materials; manage student accounts; and input test, surveys, and grades. The LMS is accessed using a secure password and viewed on a web browser. The intended design of an LMS is to
replicate what occurs in a face-to-face training session. A participant may have access to tests or quizzes, online discussion boards, video streams, audio streams, and PDF or other documents. Students may access these tools asynchronously or synchronously (at their own pace).

There are many advantages to utilizing a structured system such as an LMS. Benefits to the participants are that it allows them to meet with each other virtually, regardless of the location. Each participant may also gain access to course notes or discussions at any time in order to prepare for assessments (Landers, 2009). A benefit for the trainer is the ability to keep close observations of the participants and data related to when a participant entered the LMS, how long he or she was on the LMS, whether they posted on the discussion board or accessed a file, or whether they accessed an assessment such as a quiz or test. Using these features of an LMS, trainers can gain a snapshot of the participant’s learning activities.

One of the more commonly utilized LMS (also referred to as a Content Management System or CMS) is Moodle. According to Beatty and Ulasewicz (2006), Moodle is the leading open source LMS software package used by North American and European universities (as cited in Itmazi & Megias, 2005). Moodle, which was developed by Dougiamas (2011), wrote a dissertation titled “An exploration of the use of an Open Source software called Moodle to support a social constructionist epistemology of teaching and learning within Internet-based communities of reflective inquiry” (p.I). While the dissertation was not finished at the time of this writing, Dougiamas developed Moodle from the concepts found in the dissertation. In an electronic communication with the Moodle creator, Dougiamas stated the following:
Moodle is a course management system (CMS)—a free, open source software package designed using sound pedagogical principles, to help educators create effective online learning communities.... You can download and use it on any computer you have handy (including webhosts), yet it can scale from a single-teacher site to a 40,000-student university. Moodle has a large and diverse user community with over 50,000 users registered on this site alone (http://www.moodle.org), speaking 60 languages in 120 countries. (Dougiamas, personal communication, October 26, 2009)

**Advantages of distance education.** Online training has many advantages over face-to-face education and a growing body of literature suggests that online training can be an effective alternative. Many studies have been conducted revealing that online training can provide methods to engage students that are equal or better to that of face-to-face training. Specific advantages of online training are the opportunities to interact with and collaborate with others, the ability to cater to multiple types of learners, the utilization of asynchronous communication, and the support of self-directed learning.

Online training offers various tools where participants can interact and collaborate with fellow participants and the trainer. Not every student has the opportunity to respond immediately during a discussion in a face-to-face environment but because of the nature of online environments, all participants have the chance to be a part of class discussions. Also, many researchers posit that online discussions foster in-depth and critical thinking of students by allowing them the time to process their thinking when they post a message in online discussion (Kim, Lu, Lee, Bonk, Magjuka, Zhai, Su, Wise, & Shi, 2004). Allowing this time for formulation of thoughts can lead to collaboration where
participants are engaging with others of other cultures either next door or on the other side of the globe. Collaboration can give participants the cognitive, motivational, and social support that learners can provide to each other during learning activities (Maor & Volet, 2007). Moule (2006) discussed two ways discussion boards promote student engagement and peer interaction. The first is by the sharing of student-driven content and thus student-driven knowledge. By providing a forum for peer review and the exchanging of ideas, discussion boards also can create a supportive climate within an online course. By utilizing these tools and providing an environment of discussion and collaboration, participants may be more engaged with the course materials.

A second advantage of online training is that it can cater to multiple types of learners. Often a few dominant individuals can control a face-to-face environment, where some participants may not necessarily feel they have the freedom or ability to speak. Salmon (2004) suggested that an online environment could create equalization between individuals and an equal dynamic between participants. Also, trainers can present course materials in a variety of ways to engage different learning styles. The use of videos may appeal to participants who are more visually oriented, while others may learn more proficiently with the use of audio or text.

In a study, Harris, Chen, and Yen (2008) researched physicians in a chronic pain management program (CME). The educational objective was to improve the knowledge, attitudes, and beliefs important to chronic pain management. According to Harris,

The two pain educational programs were based on current best practices in managing chronic nonmalignant pain and had identical educational goals: 1) to enhance ability to diagnose common nonmalignant chronic pain syndromes, 2) to
improve ability to assess and manage functional status in chronic pain patients, 3) to increase skill and confidence in managing long-term pain medications, and 4) to improve management of referral and ancillary care providers for chronic pain patients. (p. 557)

Participants were randomly assigned to three adjacent hotel meeting rooms. The first room offered a live lecture on chronic pain management by three national experts. The second room offered an online continuing medical education (CME) pain program that was administered using laptop computers with headphones connected and high-speed Internet access. The online program was primarily text-based but did use video segments to illustrate key points. The third class offered a live presentation on palliative and end-of-life care by three national experts. During the event, researchers monitored each room to confirm participation and whether physicians changed meeting rooms. They found that when used under similar conditions, each of the methods provided similar positive results. An analysis of the data found an increase in post-test scores for the online group and the live lecture on chronic pain management over that of the palliative care lecture group. The mean satisfaction score for all groups was greater than or equal to 4.0. This demonstrated that all programs were well received. There was no significant difference between any satisfaction measures for each group. With very similar results between the online group and the two lecture-based groups, the results indicate that the use of an online training course with text and video segments kept students as engaged as the other two groups (Harris et al., 2008).

A third advantage of online training is the flexibility in determining the time to participate in the training due to an asynchronous environment. Participants may engage
in an asynchronous learning environment where they may choose the place and the time of education. For example, a real estate firm in which most of the agents work remotely must consider their time wisely when scheduling meetings with clients in a variety of locations. If each agent is required to participate in a face-to-face training session for a day, it may very well have an effect on the overall sales of the agent. An alternative method of training would be to conduct online training in an asynchronous environment, where participants can engage with the materials at his or her own pace and time (Landers, 2009).

A fourth advantage of online training is the ability to support self-learning. This is often in conjunction with constructivist learning theory. Constructivist learning theory posits that participants learn through their own self-discovery and individually constructed knowledge. With the ever increasing access to online content, online training can be taught in such a way to stress the importance of individual discovery and construction of knowledge (Jonassen, 2004). If a course is taught properly, learners can interact directly with content or they can have learning sequenced, directed, and chunked with the assistance of an instructor (Woods & Baker, 2004). Participants can choose to watch an entire video that is presented or move through a video at a quicker pace in order to obtain the knowledge they believe is most relevant to their learning. Depending on the specific course, participants can choose which module to begin or move to a module at their own pace. This ability to construct their own knowledge may increase participants’ level of engagement.

**Disadvantages of distance education.** Many traditional face-to-face trainers still view online training with skepticism. Others argue that online learning is trivial and a fad
or phenomenon in education (Slevin, 2008). Studies have also shown other disadvantages to online training including learning styles, instructional, interaction, and technological barriers (Blackmore, Tantam, & Deurzen, 2008).

A personal barrier to online training for participants is that the training may only cater to specific learning styles. Online training may not be for every type of learner. Depending on how the curriculum is presented, participants may have difficulty engaging with curriculum that is primarily text-based or primarily video-based. In a study by Chamberlain (2011), it was found that participants who read materials online skimmed through materials rather than reading them in depth. Some participants looked for specific keywords, while others read selectively. If a participant exhibits these behaviors, he or she may have a lack of retention of the materials (Kim et al., 2004).

Another barrier is the instructional methods utilized in online training. Cox (2005) stated that trainers in many cases simply transfer their in-class pedagogy to an online format. In specific cases, trainers may record long lectures and place them online, creating materials that are often difficult for participants to follow. Other trainers may choose not to engage the full breadth of tools that online training may offer such as discussion boards, video clips, or audio. The trainer instead offers a series of readings online which may cause some participants who have different learning styles to struggle. A trainer may offer suggestions for how an online course can be different than a face-to-face course but it is rarer that an instructor redesigns a course for an online format. Cox stated (2005) that as a result "most online courses have tended to look much like 'porting' existing classrooms onto the Internet” (p. 1780).
A third barrier is the degree of interaction that might lead to low levels of engagement. Bambara, Harbour, Davies, and Athey (2009) conducted a study in which they examined community college students enrolled in a high-risk online course. In-depth interviews were conducted with 13 students. Two of the themes that emerged as structural themes for the students’ experiences were the lack of interaction between the trainer and participants. One participant felt that the trainer acted as a grader but little to nothing more. Researchers state that this lack of interaction could cause low online course completion rates as participants feel they are isolated from both the trainer and from fellow participants (Bambara et al., 2009).

A fourth barrier is the usability of the online training environment and the prerequisite skills needed by participants to operate the technology. If an online learning environment is not easily accessible, participants may not have the ability to view certain course materials or even the course itself. If a course is difficult to navigate, such as buttons that are not clearly defined, participants may not be able to navigate to the appropriate sections on the course. Other participants may have a fear of utilizing technology and a poor interface may add to that fear. Thus, some individuals may not be able to engage with the materials and therefore may lose interest, grow frustrated, or quit the course completely. A recent study by Schmitt (2004) explored the barriers to online learning experienced by nurses who participated in a web-based, self-instructed, continuing education course. After 2-3 months of the online program in their hospital of employment, the nurse managers reported that almost all the nurses involved were not completing the online program. It was found that only three percent of the nurses had decided to take the course on the Internet, the rest having opted for print material. One of
the major reasons, according to the nurses, was their insufficient computer and Internet literacy, and general lack of confidence in using the technology. Most of them also mentioned lack of time available during work hours to complete the course due to understaffing, not having access to the Internet at home, and too much time spent downloading images and tables of information required to complete the assignments (Schmitt, 2004).

**Evaluation of training.** Kirkpatrick (2007) stated, “Instructional designers spend most of their time with design, development, and implementation. They are comfortable with course development and delivery and pay much too little attention to the needs of analysis and evaluation” (p. 37). Evaluation of the training is as important as the creation of the training and is a crucial part of the instructional design model. Indira (2008) provides three purposes of evaluation. These are (1) to see how future training programs can be improved, (2) to determine whether training should be continued, and (3) to justify the existence of the training program or department itself. The investment to train individuals is not worthwhile unless trainees are able to translate the content learned into actual performance that meets the intended objectives (Indira, 2008). Often within an organization, this is called return on investment (ROI).

**Kirkpatrick’s four levels.** Many different models exist for the evaluation of training. One of the most well-known models for the evaluation of training is that of Kirkpatrick’s Four Levels. Kirkpatrick originally developed the four levels of evaluation in 1959 and later revised the levels in 1987 and 1998 (Indira, 2008). The four levels represent a sequence of steps for the evaluation of a training program: reaction, learning, transfer, and result.
The initial level is reaction. In the reaction phase, participants give feedback on how they feel about the training. At this stage of development, information is often collected about learner satisfaction, engagement with the curriculum, and level of interaction, as well as other variables. This is done through a systematic means, whether it be through the use of a paper or online survey, or course interview (Frederickson, Reed, & Clifford, 2005). Information may be collected before, during, and after training.

At the second level (learning), knowledge acquired by the participants is evaluated. This may be done by the use of a pre-test at the start of the training and a post-test at the conclusion of the training, where the results of each test are compared with one another. The purpose of this level is to understand whether participants had a change in attitude, improvement of knowledge, or increased skill.

At the third level (transfer), participants are evaluated after the training on transfer of knowledge to the working environment. Often this is done when participants are assessed after training when a period of months or years has lapsed. Kirkpatrick (2007) stated that this is often called the forgotten level, and it is the key to maximizing training effectiveness.

The fourth level (result) evaluates the overall results based on return on investment of the training (Liebermann & Hoffmann, 2008). The results can be in the form of “increased production, improved quality, decreased costs, reduced frequency, and/or severity of accidents, decreased costs, increased sales, reduced turnover, and higher profits” (Indira, 2008, p. 140).

Kirkpatrick’s model has been used in many different situations but has been predominately utilized in the industrial setting due to the fact that the results are more
quantifiable in nature for the trainees and the trainers. Some of the companies and institutions that have utilized Kirkpatrick’s model are Motorola Corporation, University of Wisconsin, and Intel Corporation (Kirkpatrick, 2007).

According to Alliger, Tannenbaum, Bennett, Traver, and Shotland (1997), Kirkpatrick’s four levels is the dominant evaluation model due to its simplicity. While Kirkpatrick (2007) did not propose a causal relationship between each of the four levels, many researchers, including Hamblin (1974) and Newstrom (1978), assume each level to be “causally and hierarchically interdependent—or at least positively correlated” (Alliger et al., 1997). Alliger and Janak (1989) proposed a modified model that assumed no correlation between the first and second level, although recent meta-analysis revealed at least a modest relationship between the first and second level.

Course experience questionnaire. Another tool that is often utilized in the evaluation of training is the Course Experience Questionnaire (CEQ), which was devised by Ramsden (1991) as a measure of the academic quality of degree programs. Since 1993, an adapted version of the CEQ has been administered to all students graduating from Australian universities. An extended version of the CEQ was evaluated as a research instrument by Wilson and Lizzio (1997) and was found to be psychometrically robust. Lawless and Richardson (2002) adapted this version of the CEQ for students who were taking courses by distance. They created an instrument that contained 36 statements in seven subscales (Lawless & Richardson, 2002; Price et al., 2007).

Regardless of the method utilized to evaluate the training, evaluation should include an understanding of how the participants learn, specifically within an organization. Often, “significant gaps exist between corporate interests and learner needs
when it comes to e-learning” (Minhong et al., 2010, p. 167). Minhong et al. (2010) go on to say that the system should align individuals and organizational learning needs. Minhong et al. (2010) state, “This can be achieved by (a) identifying the training requirements of an organization based on its mission and vision, job design, and reward mechanism and (b) helping employees determine their learning objectives based on the organizational request and individual performance” (p. 169).

The ability to help employees determine learning objectives in training situations may involve an understanding of the cognitive ability and personality traits like achievement, self-efficacy, and motivation of trainees, all of which can affect the evaluation results of training. For example, if a participant in an online course struggles with the motivation to engage with an online discussion and these discussions obtain a low rating, it may very well affect their view on the course as a whole. Another factor that affects evaluation of training may be participants’ level of commitment to the organization, to one’s personal career, or to a direct employee or supervisor.

**Faith-Based Organizations**

**Characteristics of faith-based organizations.** Faith-based organizations are a subset of not-for-profit organizations. These organizations may include missions organizations, social justice organizations, or churches. Religious and faith-based organizations are defined by the importance of values and beliefs. Lichtenstein (2005) adds other characteristics such as “their articulation in myths and ritual, and the need for an ongoing community to enliven them” (p. 227).

Each of these organizations adhere to values that are common in the community in which each is a member and may have specific values in regards to war, justice,
punishment, peace, conflict, hate, love, relationships, restitution, and retribution. Some of these organizations may hold to specific artifacts such as liturgy, holy books, myths and stories, proverbs, the words of founders, or specific sermons (Lichtenstein, 2005). Faith-based organizations may emphasize conveyance of a religious message directly or may focus on acts of compassion and care, with a non-verbal approach (Belcher & DeForge, 2007). Christian or otherwise, faith-based organizations tend to stress the importance of self-sacrifice and service to the community rather than the accumulation of earthly possessions, and it is these qualities that have brought faith-based organizations to the forefront of business and social reform in recent years (Grant, 2007). Many faith-based organizations exist worldwide. These include Wycliffe Bible Translators, World Vision, Samaritans Purse, Focus on the Family, and Catholic Charities.

**Training in faith-based organizations.** Not-for-profit organizations in general are utilizing online learning for many different purposes. These may include public workshops, volunteer training, training for chapters or affiliated organizations, and advocacy of the organization (Isoph, 2004). The Nonprofit Technology Enterprise Network conducted a study in which they surveyed not-for-profit organization employees. They found the most common form of online education was that of self-paced, on-demand online learning. Half of the organizations that were surveyed used custom-built courses with their own content and one third of the organizations utilized blended learning. They found that the key benefits of this online learning were convenience, access by learners, and cost-effectiveness. The biggest barrier reported was staff time in developing training programs. Other concerns were funding, expertise, and concern about end users’ technology (Isoph, 2004).
While no research could be found on faith-based organizations’ use of online education, some research been conducted on the general use of technology by these organizations. Faith-based organizations may utilize technology for many different purposes. Jaffrian (2009) states:

Almost all Western missionaries, and many non-Western missionaries, now head to their holy assignments with computer firmly in hand. Much could be said about the impact of computer-aided translation, dubbing and production of media, e-mail and VoIP communication, Internet-based training, Internet evangelism, nonresidential missionaries, on-line missiological academic and historical resources, Web 2.0 social networking, and Web-delivered Christian media. (p. 33) 

As stated by Jaffarian (2009), missions organizations utilize technology for computer-aided translation of language, evangelistic purposes, open communication between employees, and training. A specific example of an organization that is utilizing technology is Wycliffe Bible Translators. Wycliffe has made it their mission to see the Bible translated into every language on earth. They began to utilize computers to aide in the translation of bibles long before the personal computer became a common household item.

Other faith-based organizations have utilized computers for missions research since the early 1990s. One particular faith-based organization that has utilized for tasks such as accounting, receipting, and other financial purposes is Campus Crusade for Christ (Cru). In more recent years, Cru has utilized technology for media-related purposes and is currently engaging in the process of utilizing technology to train new staff and interns online.
Campus Crusade for Christ. Cru was started by Dr. William R. Bright in 1952 at the University of California, Los Angeles. The original name for the organization was Campus Crusade for Christ, International. Dr. Bright believed that Jesus Christ was God incarnate and believed that Jesus Christ died and came back to life in order to save the human race from sin which leads to death. He therefore made it his mission to reach university students about the character of and work of Jesus Christ (Hedlund, 1977).

The current college ministry branch of Cru has grown from 200 to 1,000 college chapters in the United States since 1990 and comprises roughly 40,000 college students (McMurtrie, 2001). The organization has also moved into other countries such as Canada, which took place in 1967 and currently has a staff of 200 individuals. The organization also has 283 members working in the former Soviet Union. As of 1993, Cru had 11,800 paid staffers worldwide. Nine thousand four hundred of these raised the money for their own salaries through missionary work (Smith & Stark, 1993). Currently, Cru is in 191 countries. The following section is a literature review on online training and engagement. Specific sections discuss the definition of engagement, the importance of engagement in online training, the use of specific media-related tools to engage trainees, and how engagement is measured.

Engagement During Training

Chris Garrett (2011) conducted a poll with five colleagues at Texas A&M University and students in a Literature, Religion, and Culture course during the summer of 2006. The purpose was for each of them to define engagement. Responses include “Actively participating in their learning,” “The ability to get students to know about the topics you are exploring,” and “Wanting to know” (Garrett, 2011, p. 4). In his literature
review, Garrett found that engagement is linked with the quality of effort or things that students do on their own initiative. For purposes of this study, engagement is defined as the level of effort put forth by each student and the students’ perceptions of the materials.

Engagement is important specifically in the way that participants use materials and as they interact with the course trainer and with other participants in the course. A participant’s engagement is rooted in personality, affective, motivational, and persistence factors applied to the process of learning. This includes attributes such as intrinsic motivation, positive effect, persistence, effort, and self-confidence (Ruhe, 2006). In order for a student to engage they must have a willingness, need, desire, and compulsion to participate in the learning process (Bomia et al., 1997).

Engagement theory. Trainers continually search for ways to engage participants in the curriculum that is being taught, whether the classroom environment be face-to-face or online. Engagement has been continually linked with the learning of the participant, thus it is important for a trainer to understand specific ways that engagement can be accomplished.

Engagement theory, developed by Kearsley and Schneiderman (1999), presents a model describing why engagement is important for student learning. Unless individuals are engaged in learning activities through interaction with others and also with the course materials, effective learning cannot take place. In concurrence with adult, self-directed, and constructivist learning theories, engagement theory posits three means to accomplish engagement including collaborative efforts, emphasis on project-based assignments, and real-world applications of what is learned. By utilizing these three means, learning will be creative, meaningful, and authentic. Unfortunately, many trainers are mirroring a
traditional face-to-face course when developing online training and thus, they do not take advantage of specific tools and materials that could cause a higher level of engagement with the materials. This may be due to the trainers’ limited knowledge of different technologies or limited time in developing the course. In order for participants to interact with others, complete project-based assignments, experience real-world applications, different media-related tools should be utilized to present the course materials. Using a variety of media will have the potential of increasing participants’ level of engagement with the course materials (Revere & Kovach, 2011).

**Media that promotes engagement.** Different types of media, when utilized in an online training environment, have been shown to increase the level of engagement of participants. Thus, it is important for the instructional designer to consider the inclusion of media-related tools when designing online training. Inclusion of multiple forms of media during learning is supported by theories and research.

Doolittle (2001) proposed the cognitive theory of multimedia learning. His theory is based on three earlier theories. The first is constructivist learning theory, which states that meaningful learning occurs when a learner selects relevant information, organizes that information, and makes connections between corresponding representations. The second is cognitive load theory, which states that working memory has limited capacity. Short-term memory is incapable of retaining a large amount of information for extended period of time, where long-term memory is infinite. An instructional designer should find ways to deliver information that is optimal for short-term memory to be prolonged and retained. The third is dual coding theory, which emphasizes that humans have separate systems for representing verbal and non-verbal information. In developing this
theory, Doolittle found that by including multimedia, students learned better from words and pictures than from words alone.

**Multimedia.** Mandernach (2009) conducted a study with the purpose of examining the impact of instructor-personalized multimedia supplements on the level of student engagement in an online course. He hypothesized that student engagement would increase as a function of the number of instructor-personalized multimedia supplements. The study included four sections of an introductory-level general psychology course taught across sequential terms. All sections were taught online utilizing an LMS titled Blackboard. All sections were taught by the same instructor and utilized identical course structure, assignments, and materials. The first group contained no instructor-personalized multimedia, the second contained a video of the instructor, the third a PowerPoint with audio, and the fourth a PowerPoint with video and audio. A survey was given to the students with both quantitative and qualitative questions. The qualitative results indicated that the students preferred the use of instructor-personalized multimedia supplements showing that engagement increased in the control group. The quantitative results showed no significant difference between the control group and the three other groups.

Chen and Williams (2008) conducted an exploratory study on the use of multimodal media and tools for an online information literacy course, specifically streaming multimedia lectures, synchronous multi-user and one-on-one chat, discussion boards and online tutorial videos. The goal of the project was to establish a framework for developing, designing, and evaluating a course. Three research questions were considered, the second being “What are the relationships between the media employed in
each course module and the participant’s learning experience and satisfaction?” (p.18).

One hundred sixty-two undergraduate students responded to seven surveys. The first survey was given at the beginning of the course, additional surveys were given after each of the five modules, and a final survey was given at the end of the course. Specifically for the second course module, students reported that the use of webcasting increased their overall learning experience. Student experience scores also were positively related scores of class engagement. Chen and Williams (2008) stated, “The results of this study suggest that online courses should provide a rich array of online media and communication tools to strengthen course interactions and student engagement. Additionally, this array of media and tools can expose students to the benefits and challenges of dealing with information and information technology in a networked world” (p. 23). Both studies show that the use of multimedia in online training environments tend to have a positive effect on students’ level of engagement.

**Tools for interaction.** To increase the level of engagement, there must also be an emphasis on interaction that can lead to collaboration. The integration of collaborative activities and activities that cause the participant to reflect is the key to higher-order learning. (Garrison, 2011). Activities can be an interaction between a trainer and participant over a specific topic, or a video chat where a trainer demonstrates how to complete an activity. Rovai (2002) emphasizes the need for collaboration by arguing a positive significant relationship between sense of community and cognitive learning when collaboration takes place. Rovai (2002) field-tested the Classroom Community Scale which is a 20-item survey that measures sense of community in a learning environment. He collected data among 375 students enrolled in 28 different courses.
After the test, Rovai concluded that the instrument yielded factors of connectedness and learning.

In a study by Richardson & Swan (2003) ninety participants completed Empire State College’s online learning courses. The purpose of the study was to understand whether there was a correlation between social presence and students’ perceived learning and satisfaction of a course. The study found that students with higher perceptions of social presence also had higher scores and greater satisfaction with the instructor.

To foster an environment of collaboration, it is important to consider tools that provide interaction and thus collaboration (Rabe-Hemp, Woollen, & Humiston, 2009). Many tools are available for interaction such as wikis and discussion boards, as well as video, text, and audio chat.

**Tools for presentation.** The utilization of text in an online training environment may not flow as well as in a face-to-face setting. Therefore, the use of audio/video communication is often utilized to provide for more natural delivery of information (Revere & Kovach, 2011). With advances in technology, use of online video is becoming more versatile and accessible as well. Sites such as Vimeo and YouTube offer trainers opportunities to easily find materials to include in an online course or post materials provided there are no issues with copyright infringement (Sherer & Shea, 2011). Utilizing video and/or audio provides a visual medium, therefore taking advantage of the multimedia principle and the modality principle. The use of video and audio can allow participants with different learning styles the ability to gain knowledge and engage with the materials.

Schmeecle (2003) conducted a study to evaluate the effectiveness and
efficiencies of video in an online training as compared to classroom training with Nebraska Law Enforcement Training Center’s Jail Management trainees. She hypothesized that the use of video would enhance learning, motivation and attitude. Trainees were randomly assigned to participate in an online or classroom training course. Learning, motivation and attitudes were measured and the results of the study concluded that the online learning environment using video was equally as effective as the classroom environment. In regards to her hypothesis, there was no significant difference in students test scores or survey scores regardless of whether they received instruction with text only, audio and text, or video with text. The only difference between the two groups was instructional time (Schmeckle, 2003).

Another study by Tantrarungroj (2011) investigated the effectiveness of embedded streaming video in an online learning environment on declarative learned knowledge of neurosciences. A sample of 92 undergraduate students participated with an experimental group receiving online text-based instruction with graphics and embedded video, and a control group receiving online text-based instructions and graphics online only. According to the results of the study, no immediate difference was found between the two groups on learning performance. However, a significant difference was found in the students’ retention of knowledge. By adding streaming video to the online learning environment, it was found that this media enhanced the overall retention of knowledge.

Measurement of engagement. Specific tasks on the part of the participant often signify engagement. This can include participation in online discussion boards, providing feedback, solving problems that are presented during the training, and participating in activities (Robinson & Hullinger, 2008).
Handelsman, Briggs, and Sullivan (2005) conducted two studies that explored the validity of a measure of participant engagement, the Student Course Engagement Questionnaire. The researchers utilized exploratory factor analysis to reveal four dimensions of a college student’s engagement that were distinct and reliable. These dimensions were skills engagement, participation/interaction engagement, emotional engagement, and performance engagement. Handelsman et al. (2005) found a relationship between the four dimensions.

Mandernach (2009) later conducted a study that examined the impact of instructor-personalized multimedia supplements on student engagement. He compared student engagement between courses that featured instructor-personalized multimedia components with a modified version of the Handelsman et al. (2005) Student Course Engagement Questionnaire. Mandernach’s questionnaire was modified to target an online learning environment that utilized four discrete factors. These factors were skill engagement such as note-taking or studying, emotional engagement such as personal involvement with class materials, participation/interaction such as asking questions or discussion, and performance engagement such as grades (Mandernach, 2009). A one-way ANOVA was conducted for each factor and also for the final exam. The qualitative feedback of the students in the study indicated enhanced engagement as a function of multimedia, while the quantitative data from the survey instrument yielded no significant differences. While the statistical analysis yielded no significant difference, the mean scores of each factor increased, showing a difference between groups. For the purposes of this study, Cru modified this questionnaire (Appendix A) for participants in both an online training course and a face-to-face training course, specifically relating it to
participants who would take the survey after each module of the training course. For example, instead of the survey stating “Put forth effort,” the new survey states “I put forth effort into this module.”

**Summary**

The previous chapter reviewed literature in three sections: training in organizations, faith-based organizations, and engagement of participants in online training.

The section on training in organizations reviewed the purpose of training within an organization and why it is valuable for training to be conducted. The process of developing a training course was reviewed which involves the need for an instructional designer who has knowledge of specific learning theories and instructional design models. Distance education as it relates to organizations was reviewed, by describing a brief history of distance education, specific characteristics of distance education, advantages and disadvantages of online training, and how training is evaluated.

The second section on faith-based organizations placed faith-based organizations in the context of not-for-profit organizations and then described how these types of organizations utilize technology. A brief discussion on Campus Crusade for Christ was given as this organization pertains to the current study.

The third section discussed engagement as it relates to training. The variable of engagement was described, as well as how it can be evaluated. Specific tools for engagement in online training were discussed. The next chapter will present the methodology for the study conducted by Cru, providing the scope of the study, the design for the study, and the evaluation instrument.
Chapter Three

Methodology

This study investigated an online training course delivered by a content-management system in a faith-based organization. The purpose of this study was to determine if the Student Engagement Survey met the requirements for measuring engagement according to the Rasch model and if participants’ level of engagement in a training course taught to new staff and interns at Cru increased by conducting the training online rather than face-to-face.

Scope of the Study

The general population of this study was 600 new staff and interns with Cru in the United States. The target population was the Great Lakes region of Cru, which includes the states of Michigan, Ohio, Indiana, and Illinois and has a target population of 70 new staff and interns.

Participants in this study were selected with a random selection and sample assignment from the target population. Individuals in the target population were assigned numbers. A random number generator was used to pair each number to a group starting with group 1 and then group 2. Group 1 participated in a face-to-face training environment with support from a mentor/coach for 1 year (January to December) and consisted of 30 members. Group 2 participated in an online training environment with support from an online mentor/coach for 1 year (January to December) and consisted of 36 members. Each group participated in the study during the same academic year.
Data Collection and Instrumentation

In January of 2012, the Great Lakes region of Cru conducted online training for new staff and interns concurrently with their face-to-face training course. The national director of Cru created a survey that was completed by each group of trainees at the end of each module. In the online and face-to-face training environments, participants were required to complete the survey before moving on to the next module. In both environments the survey was administered using an online survey tool called Survey Monkey. The survey (Appendix A) included questions adapted from the Student Course Engagement Questionnaire (Handelsman et al., 2005). The survey had 12 items and was designed to measure trainees’ engagement with course materials. Each trainee indicated their level of agreement on a 4-point Likert-scale (1=not characteristic of me; 4=very characteristic of me) to statements regarding course engagement. Engagement was scored according to three factors. These factors were skill engagement such as note-taking or studying, emotional engagement such as personal involvement with class materials, and participation/interaction such as asking questions or discussion (Mandernach, 2009). The Student Course Engagement Survey was modified to target trainees in both an online and face-to-face training environment. The survey data was collected at the end of each module from January 2012 until May of 2012. Survey results were delivered in June 2012.

Data Analysis

For this study, the Rasch measurement model was used. The purpose for utilizing the model was to evaluate the effectiveness of the survey instrument in describing student engagement. Once the survey was evaluated, the first of five units were analyzed to
obtain a person measure and an item measure for the face-to-face group and the online group. In order to obtain person measures and item measures for unit two through unit five, measures were anchored to unit one.

In regards to research question one (Did the survey successfully meet the requirements for measuring engagement according to the Rasch model?), a Rasch analysis of the survey was conducted. The Rasch analysis was conducted by utilizing the WINSTEPS software package. In order to provide an overall sense of how the survey instrument functioned, a rating scale analysis was implemented. Following the rating scale analysis, baseline statistics for modules 1 through 5 (both face-to-face and online groups) were reviewed in order to understand the dimensionality of the survey. Individual items and persons were also analyzed for misfit but were not removed due to a lack of significance in the results.

In regards to research question two (What were the differences in level of engagement with the course materials between participants in Cru’s traditional face-to-face training with a coach and participants in a strictly online environment?), a one-way analysis of variance (ANOVA) was conducted. Results from each group from modules 1 through 5 were compared and the means of each as well as the f statistic were reviewed. Kersten and Kayes (2011) gave the following questions to guide the analysis of the survey instrument.

• Do the items describe the construct for participants in each group?
• Are the items unbiased?
• Do the items fit the Rasch model?
• Is the scale unidimensional?
• Is the spread of items along the construct good?

The remainder of this chapter will include an overview of Rasch measurement.

**Overview of Rasch measurement.** The purpose of utilizing a survey is to obtain outcome measures. Outcome measures provide quantification of a trait, which may otherwise not be directly observed. This is also known as latent trait or construct. Kersten and Kayes (2011) stated “outcome measures aim to capture something (e.g., blood pressure, height, pain, mobility, or depression) quantitatively” (p. 92).

A more recent development for analyzing data in order to achieve outcome measures is by utilizing a form of Item Response Theory (IRT). Panayides, Robinson, and Tymms (2010) gave the following features of IRT:

• Item characteristics are not group dependent.
• Scores describing examinees’ abilities are not test dependent.
• A measure of precision for each ability score is produced.
• The probability that an examinee of any ability will answer items of any difficulty correctly is estimated.

IRT has been around since the 1920s, but it was not until the 1950s and 1960s that IRT became more popular as a theory. At this time, the two most prominent IRT pioneers were Frederic Lord, a psychometrician at Education Testing Services, and a Danish mathematician named Georg Rasch. Both sought to solve many of the same issues in assessment but their approaches differed greatly. Royal (2010) stated that “Lord contended that measurement models must fit the data. Rasch’s approach contended data must conform to the measurement model” (p. 3).
**Rasch introduction.** Rasch analysis is based on the Rasch model, where the total score summarizes how much of the construct a person has. A comparison of two people is independent of the items that the person scored on. During Rasch analysis, a series of tests are utilized to assess data and whether it fits the Rasch model (Kersten & Kayes, 2011). A person may be given a test for which he or she could easily solve and yet still get it wrong. As well, another person may be given a test that is considered too difficult for them and yet they solve it. Rasch (1960) stated that “We can never know with certainty how a pupil will react to a problem, but we may say whether he has a good or a poor chance of solving it” (p. 11). Rasch saw that the probability for a right answer must be dictated by the person’s ability and the item difficulty (Panayides et al., 2010).

**Concepts underpinning the Rasch model.**

1. Each item on the survey has its own level of difficulty. This is also known as an item parameter on the construct. This could be seen as the difficulty to complete a task or the difficulty to agree or disagree with a statement. Thus, a Likert scale is used with items that are easier and items that are harder to endorse. Using data from a group of people completing the survey, item difficulty can be estimated and placed on an interval logarithmic scale. The statistic that is needed is the total score for each item (Kersten & Kayes, 2011).

2. Each person in each group has his or her own level of the construct. This is known as the person parameter. This can be placed on the same ruler as the item parameter. Using data from a group of people completing the survey, it is possible to estimate the level of ability of each person and place them on the
interval logarithmic scale. The statistic that is needed is the total score each person achieves.

3. With the person and item parameters on the same logarithmic scale, it follows that likelihood a person will endorse an item is related to how much of the construct he or she has and the item’s level of difficulty.

4. Item parameters are estimated independently of the distribution of abilities in a particular group for which the items are appropriate (Bond & Fox, 2001). Kersten and Kayes stated “Similarly, person parameters are estimated independently of the distribution of their responses to the measure’s items. This concept is called specific objectivity and is a necessary requirement for the unidimensionality of a scale” (p. 94).

Rasch demonstrated that these requirements for measurement can be summarized by a formula (see Figure 2) that specifies the probabilistic expectations of items and persons (Rasch, 1960). He proved that the probability of a positive response to an item is a logistic function of the difference between the person and item parameter (Kersten & Kayes, 2011). This can be seen visually as the distance between a person parameter and an item parameter on the x-axis. Both person and item parameters are specified in log-odd units and are referred to as logits. Logits are produced from the raw scores and then computed utilizing the Rasch model. The ordinal data that appears as raw scores from the survey are converted to natural logarithms. This allows the data to have interval properties (Royal, 2010).

\[
P \{X_{vt} = 1|(B_v),(D_1)\} = \exp (B_v - D_1)/[1+\exp (B_v - D_1)]
\]

Figure 2. Equation for Rasch Measurement
**Fit.** Rasch measurement models require data to fit the model. After conducting an investigation of fit statistics, it can be seen whether the data is unidimensional in data. Royal (2010) stated “Both infit and outfit statistics are evaluated to determine how data-to-model fit occurs for each item and person. *Infit* statistics are fit statistics that are sensitive to the inlier pattern of observations. *Outfit* statistics are sensitive to outlier observations” (p. 6). WINSTEPS® software can be utilized to determine whether items and persons conform to the specifications of unidimensionality, construct validity, or clarity of scale. Infit mean square fit (mnsq) and outfit mnsq have expected values of 1.0. Fink (2007) stated “Outfit mnsq is influenced by any unexpected behavior in person or item outliers” (p. 67).

**Limitations of the Study**

The study was restricted to only one faith-based organization in the United States. The target population was restricted to the Great Lakes region of Cru which includes the states of Ohio, Michigan, Indiana, and Illinois. Only 70 trainees participated in the study with 35 in each of two groups.
Chapter Four

Results

The purpose of this study was to determine if the level of engagement of participants in a training course for new staff and interns at Cru would be different by conducting training online instead of face-to-face. A survey created by Cru was taken by participants at the conclusion of each module in both the face-to-face group and the online group. This chapter presented the analysis of the data from the survey. Two research questions were asked.

Rasch Analysis

Rating scale analysis. Items 1 through 9 utilized a rating scale with categories related to characteristics. The scale had a step calibration greater than 1.4 and thus allowed participants to communicate through the measure (see Figure 3). Items 10 through 12 utilized a rating scale with categories related to agreement. The scale also had a step calibration greater than 1.4 (see Figure 4). The calibration statistics indicated that the scale functioned properly.

<table>
<thead>
<tr>
<th>Category</th>
<th>Observed Count</th>
<th>Observed Average</th>
<th>Infit MNSQ</th>
<th>Outfit MNSQ</th>
<th>Structure Calibration</th>
<th>Category Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all characteristic of me</td>
<td>9</td>
<td>-1.25</td>
<td>.76</td>
<td>.75</td>
<td>NONE</td>
<td>(-4.23)</td>
</tr>
<tr>
<td>Not really characteristic of me</td>
<td>152</td>
<td>.16</td>
<td>.99</td>
<td>.98</td>
<td>-3.09</td>
<td>-1.64</td>
</tr>
<tr>
<td>Characteristic of me</td>
<td>356</td>
<td>1.19</td>
<td>.89</td>
<td>.89</td>
<td>-.18</td>
<td>1.56</td>
</tr>
<tr>
<td>Very characteristic of me</td>
<td>77</td>
<td>2.36</td>
<td>.95</td>
<td>.95</td>
<td>3.27</td>
<td>(4.39)</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>8</td>
<td>.6</td>
<td>1.14</td>
<td>1.12</td>
<td>NONE</td>
<td>(-2.52)</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>71</td>
<td>1.49</td>
<td>1.19</td>
<td>1.33</td>
<td>-1.38</td>
<td>.00</td>
</tr>
<tr>
<td>Agree</td>
<td>119</td>
<td>2.41</td>
<td>1.26</td>
<td>1.21</td>
<td>1.38</td>
<td>(2.52)</td>
</tr>
</tbody>
</table>
In reviewing Figure 3, each category on the scale had a distinct curve, which indicated that each item had a distinct step from the other categories. Persons with a higher ability of 5 were more than likely to endorse step 3 (very characteristic of me), while a person who had an average ability such as a 0 (not at all characteristic of me) may have endorsed either 1 (not really characteristic of me) or 2 (characteristic of me).
In reviewing Figure 4, each category on the scale had a distinct curve, which indicated that each item had a distinct step from the other items. Persons with a higher ability of 5 were more than likely to endorse step 3 (agree), while a person who had an average ability such as a 0 (somewhat disagree) will more than likely endorse 2 (somewhat agree) and the person with a lower ability will more than likely endorse 1 (somewhat disagree). With a flatter curve of 2, this indicated that individuals were more than likely to endorse either 1 or 3.

**Dimensionality analysis.** In order to define the separation and reliability of both persons and items, baseline statistics were reviewed for modules 1 through 5.

**Baseline statistics.** Person summary statistics (see Tables 2, 4, 6, 8, and 10) indicated that both separation and reliability were low. Person reliability and separation look to see whether the participants have variation across the latent variable (this being
engagement). In this study, person separation and reliability were low in all five modules. This indicated that there was low differentiation between participants who took each module and that participants were a part of two specific groups: participants who found each module very engaging and other participants who found the modules un-engaging.

Item summary statistics (see Tables 3, 5, 7, 9, and 11) indicated strong separation and reliability. Item reliability and separation look to see whether the items have variation across the latent variable (this being engagement) with some items being more difficult to agree with while others are less difficult to agree with. Separation and reliability within each module indicated two distinct groups of items, which is considered strong.

Table 2
Summary Statistics for Module 1 for 66 Persons

<table>
<thead>
<tr>
<th></th>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>24.3</td>
<td>12.0</td>
<td>1.29</td>
<td>.55</td>
<td>1.00</td>
<td>-.1</td>
<td>1.01</td>
<td>-.1</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>3.7</td>
<td>.0</td>
<td>1.12</td>
<td>.04</td>
<td>.53</td>
<td>1.3</td>
<td>.55</td>
<td>1.2</td>
</tr>
<tr>
<td>Max</td>
<td>32.0</td>
<td>12.0</td>
<td>3.88</td>
<td>.65</td>
<td>2.56</td>
<td>3.0</td>
<td>2.55</td>
<td>2.3</td>
</tr>
<tr>
<td>Min</td>
<td>15.0</td>
<td>12.0</td>
<td>-1.23</td>
<td>.50</td>
<td>.18</td>
<td>-2.7</td>
<td>.18</td>
<td>-2.6</td>
</tr>
</tbody>
</table>

Real: Separation: 1.54 Reliability: .70
Model: Separation: 1.76 Reliability: .76

Table 3
Summary Statistics for Module 1 for 12 Items

<table>
<thead>
<tr>
<th></th>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>133.5</td>
<td>66.00</td>
<td>.00</td>
<td>.24</td>
<td>1.00</td>
<td>-.1</td>
<td>1.01</td>
<td>-.1</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>22.7</td>
<td>.0</td>
<td>.68</td>
<td>.02</td>
<td>.26</td>
<td>1.5</td>
<td>.31</td>
<td>1.6</td>
</tr>
<tr>
<td>Max</td>
<td>182.0</td>
<td>66.0</td>
<td>1.18</td>
<td>.30</td>
<td>1.47</td>
<td>2.5</td>
<td>1.74</td>
<td>3.0</td>
</tr>
<tr>
<td>Min</td>
<td>103.0</td>
<td>66.0</td>
<td>-1.61</td>
<td>.22</td>
<td>.60</td>
<td>-2.6</td>
<td>.58</td>
<td>-2.7</td>
</tr>
</tbody>
</table>

Real: Separation: 2.55 Reliability: .87
Model: Separation: 2.72 Reliability: .88
### Table 4
Summary Statistics for Module 2 for 66 Persons

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>24.4</td>
<td>12.0</td>
<td>1.34</td>
<td>.56</td>
<td>.99</td>
<td>-1</td>
<td>1.01</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>4.0</td>
<td>0.0</td>
<td>1.27</td>
<td>.07</td>
<td>.52</td>
<td>1.3</td>
<td>.57</td>
</tr>
<tr>
<td>Max</td>
<td>35.0</td>
<td>12.0</td>
<td>5.74</td>
<td>1.06</td>
<td>2.29</td>
<td>2.3</td>
<td>2.71</td>
</tr>
<tr>
<td>Min</td>
<td>15.0</td>
<td>12.0</td>
<td>-1.23</td>
<td>.30</td>
<td>.13</td>
<td>-3.1</td>
<td>.13</td>
</tr>
</tbody>
</table>

Real: Separation: 1.79  
Model: Separation: 2.01

### Table 5
Summary Statistics for Module 2 for 12 Items

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>134.0</td>
<td>66.00</td>
<td>.00</td>
<td>.24</td>
<td>.99</td>
<td>-2</td>
<td>1.01</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>23.1</td>
<td>0.0</td>
<td>.68</td>
<td>.02</td>
<td>.31</td>
<td>1.8</td>
<td>.37</td>
</tr>
<tr>
<td>Max</td>
<td>183.0</td>
<td>66.0</td>
<td>1.18</td>
<td>.30</td>
<td>1.59</td>
<td>3.0</td>
<td>1.93</td>
</tr>
<tr>
<td>Min</td>
<td>105.0</td>
<td>66.0</td>
<td>-1.61</td>
<td>.22</td>
<td>.53</td>
<td>-3.2</td>
<td>.50</td>
</tr>
</tbody>
</table>

Real: Separation: 2.53  
Model: Separation: 2.70

### Table 6
Summary Statistics for Module 3 for 66 Persons

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>24.6</td>
<td>12.0</td>
<td>1.43</td>
<td>.56</td>
<td>.98</td>
<td>-1</td>
<td>1.04</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>3.9</td>
<td>0.0</td>
<td>1.28</td>
<td>.07</td>
<td>.49</td>
<td>1.2</td>
<td>.60</td>
</tr>
<tr>
<td>Max</td>
<td>35.0</td>
<td>12.0</td>
<td>5.82</td>
<td>1.07</td>
<td>2.35</td>
<td>2.4</td>
<td>2.89</td>
</tr>
<tr>
<td>Min</td>
<td>16.0</td>
<td>12.0</td>
<td>-9.9</td>
<td>.51</td>
<td>.12</td>
<td>-3.1</td>
<td>.12</td>
</tr>
</tbody>
</table>

Real: Separation: 1.82  
Model: Separation: 2.02

### Table 7
Summary Statistics for Module 3 for 12 Items

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>135.1</td>
<td>66.00</td>
<td>.00</td>
<td>.24</td>
<td>.99</td>
<td>-2</td>
<td>1.04</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>23.1</td>
<td>0.0</td>
<td>.68</td>
<td>.02</td>
<td>.29</td>
<td>1.6</td>
<td>.40</td>
</tr>
<tr>
<td>Max</td>
<td>182.0</td>
<td>66.0</td>
<td>1.18</td>
<td>.31</td>
<td>1.48</td>
<td>2.5</td>
<td>2.11</td>
</tr>
<tr>
<td>Min</td>
<td>107.0</td>
<td>66.0</td>
<td>-1.61</td>
<td>.23</td>
<td>.57</td>
<td>-2.8</td>
<td>.56</td>
</tr>
</tbody>
</table>

Real: Separation: 2.49  
Model: Separation: 2.67

### Table 8
Summary Statistics for Module 4 for 66 Persons

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>MNSQ</th>
<th>ZSTD</th>
<th>MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>24.8</td>
<td>12.0</td>
<td>1.56</td>
<td>.57</td>
<td>.98</td>
<td>-1</td>
<td>.99</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>3.8</td>
<td>0.0</td>
<td>1.27</td>
<td>.07</td>
<td>.47</td>
<td>1.2</td>
<td>.48</td>
</tr>
<tr>
<td>Max</td>
<td>35.0</td>
<td>12.0</td>
<td>5.82</td>
<td>1.06</td>
<td>2.17</td>
<td>2.3</td>
<td>2.37</td>
</tr>
<tr>
<td>Min</td>
<td>15.0</td>
<td>12.0</td>
<td>-1.32</td>
<td>.52</td>
<td>.18</td>
<td>-2.8</td>
<td>.18</td>
</tr>
</tbody>
</table>

Real: Separation: 1.77  
Model: Separation: 1.95

55
Principle contrast analysis. A principle contrast analysis was then conducted to address the dimensionality of engagement. The purpose of a principle contrast analysis is to determine whether the survey measures one construct or more than one. Results of the analysis revealed that the primary linear measure explained 34.7% of the variance in the data. The total unexplained variance was 65.3%. This indicated that residual contrasts other than engagement explained the variance. Therefore, 65.3% of unexplained variance would indicate that the test was not unidimensional (see Table 12). This could be due to one or more multiple factors.
One explanation for the survey not being unidimensional is that the questions were not created with one specific factor of engagement but multiple factors. Questions were produced from factors of engagement such as skill engagement, emotional engagement and participation/interaction. Each group of questions related to one factor of engagement was analyzed for explained and unexplained variance but too few questions were in each factor to solicit a reliable explained variance. If one factor of engagement was used for producing questions, the likelihood of the survey being unidimensional would have been higher.

A more plausible explanation for the survey not being unidimensional is explained by the low person separation as determined by the examination of the baseline statistics. An analysis of the persons and the items will help to further determine whether a low person separation served as an explanation for the survey not being unidimensional.

Table 12
Explained and Unexplained Variance

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure</th>
<th>Model Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variance explained by the primary linear measure</td>
<td>6.4</td>
<td>34.7</td>
</tr>
<tr>
<td>Total unexplained variance</td>
<td>12.0</td>
<td>65.3</td>
</tr>
<tr>
<td>Unexplained variance in 1st contrast</td>
<td>2.2</td>
<td>11.7</td>
</tr>
<tr>
<td>Unexplained variance in 2nd contrast</td>
<td>2.0</td>
<td>10.8</td>
</tr>
<tr>
<td>Unexplained variance in 3rd contrast</td>
<td>1.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Unexplained variance in 4th contrast</td>
<td>1.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Unexplained variance in 5th contrast</td>
<td>1.2</td>
<td>6.4</td>
</tr>
</tbody>
</table>

Item analysis. The survey that Cru utilized at the completion of each module was adapted from the Student Course Engagement Questionnaire (Handelsman et al., 2005). The survey had 12 items and was designed to measure trainees’ engagement with course materials. Each trainee indicated their level of agreement on a 4-point Likert-scale (1=not characteristic of me, 2=somewhat not characteristic of me, 3=somewhat characteristic of me, 4=very characteristic of me) to statements regarding course
engagement for questions 1 through 9. Questions 10 through 12 were written on a different 4-point Likert-scale (1=Agree, 2=Somewhat Agree, 3=Somewhat Disagree, 4=Disagree). A four-point Likert scale was utilized in order to avoid future collapsing of categories, according to the Rasch model.

In order to measure engagement the questions were created out of three factors of engagement. These factors were skill engagement such as note-taking or studying, emotional engagement such as personal involvement with class materials, and participation/interaction such as asking questions or discussion (Mandernach, 2009) (see Table 13).

Table 13
Factors of Engagement

| Skill engagement: | - I studied on a regular basis |
| - I stayed up on all the readings |
| - I put forth effort into this module |
| Emotional engagement: | - I found a way to make the module materials relevant to my life |
| - I found a way to make the course materials interesting to me |
| - I thought about this module even when I was not working actively participating with the course |
| - I had fun with this module |
| - I am confident that I am doing well in this course |
| - I really desire to learn more |
| - After completing this module, I feel equipped to pass these materials on to others |
| Participation/interaction: | - I asked questions if I did not understand something |
| - Interaction with a coach helped me feel more engaged with the course |

Individual items were analyzed to determine if they fit the Rasch model’s description of data that is suitable for measurement. This was determined by analyzing the fit statistics of each item. The infit and outfit mean-square value was analyzed to see whether items were productive for measurement. The infit mean-square value for each of the items revealed that all items were productive for measurement. The question 11 outfit mean-square value indicated that the item was less productive for measurement but
not degrading (see Table 14). Point-measure correlation was reviewed to determine whether items were operating in the appropriate direction (whether positively or negatively). According to Table 14, all items operated in the appropriate direction. Infit and outfit z-standard statistics were analyzed for each item. Misfitting items were those outside of the -2.0 and 2.0 logit window. Question 9 was considered misfitting due to it being too predictable for measurement. This was due to the question being very easy for participants to answer and thus contained no level of difficulty (see Table 14). This item was not removed from the data as it did not significantly affect the overall separation or reliability of the item data.

Table 14
Individual Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Measure</th>
<th>Score</th>
<th>Error</th>
<th>In.MSQ</th>
<th>In.ZSTD</th>
<th>Out.MSQ</th>
<th>Out.ZSTD</th>
<th>PTME</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Studied</td>
<td>0.59</td>
<td>115</td>
<td>0.22</td>
<td>0.79</td>
<td>-1.27</td>
<td>0.78</td>
<td>-1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>02 Effort</td>
<td>-0.29</td>
<td>132</td>
<td>0.23</td>
<td>0.92</td>
<td>-0.44</td>
<td>0.92</td>
<td>-0.42</td>
<td>0.58</td>
</tr>
<tr>
<td>03 Read</td>
<td>0.44</td>
<td>118</td>
<td>0.23</td>
<td>1.08</td>
<td>0.48</td>
<td>1.08</td>
<td>0.48</td>
<td>0.61</td>
</tr>
<tr>
<td>04 Relevant to life</td>
<td>-0.19</td>
<td>130</td>
<td>0.23</td>
<td>0.71</td>
<td>-1.81</td>
<td>0.71</td>
<td>-1.73</td>
<td>0.45</td>
</tr>
<tr>
<td>05 Made course interesting</td>
<td>0.02</td>
<td>126</td>
<td>0.23</td>
<td>0.86</td>
<td>-0.81</td>
<td>0.84</td>
<td>-0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>06 Thought about module</td>
<td>1.18</td>
<td>103</td>
<td>0.22</td>
<td>1.17</td>
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<td>1.21</td>
<td>1.21</td>
<td>0.6</td>
</tr>
<tr>
<td>07 Asked questions</td>
<td>-0.29</td>
<td>132</td>
<td>0.23</td>
<td>1.47</td>
<td>2.39</td>
<td>1.44</td>
<td>2.27</td>
<td>0.38</td>
</tr>
<tr>
<td>08 Fun</td>
<td>0.74</td>
<td>112</td>
<td>0.22</td>
<td>0.83</td>
<td>-0.98</td>
<td>0.82</td>
<td>-1.07</td>
<td>0.56</td>
</tr>
<tr>
<td>09 Confident</td>
<td>-0.03</td>
<td>127</td>
<td>0.23</td>
<td>0.6</td>
<td>-2.61</td>
<td>0.58</td>
<td>-2.72</td>
<td>0.67</td>
</tr>
<tr>
<td>10 Desire to learn</td>
<td>-1.61</td>
<td>182</td>
<td>0.3</td>
<td>1.15</td>
<td>0.75</td>
<td>0.91</td>
<td>-0.15</td>
<td>0.36</td>
</tr>
<tr>
<td>11 Interaction helped</td>
<td>-0.59</td>
<td>168</td>
<td>0.25</td>
<td>1.47</td>
<td>2.5</td>
<td>1.74</td>
<td>2.95</td>
<td>0.16</td>
</tr>
<tr>
<td>12 Feel equipped</td>
<td>0.04</td>
<td>157</td>
<td>0.23</td>
<td>1.01</td>
<td>0.15</td>
<td>1.11</td>
<td>0.66</td>
<td>0.44</td>
</tr>
</tbody>
</table>
**Person analysis.** The general population of this study was 600 new staff and interns with Cru in the United States. The target population was the Great Lakes region of Cru, which includes the states of Michigan, Ohio, Indiana, and Illinois and has a target population of 70 new staff and interns. Group 1 participated in a face-to-face training and consisted of 36 members. Group 2 participated in an online training environment and consisted of 36 members.

The person mean from the face-to-face group for each module and the online group for each module was reviewed. After the review, it was determined that the overall difficulty of the survey was low. Participants in both groups consistently scored higher than expected. Based on the means, the first module was less difficult for the online group than that of the face-to-face group. This seemed to be a consistent finding with the other modules with the exception of module 2 (see Table 15).

<table>
<thead>
<tr>
<th>Table 15</th>
<th>Person means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Face to Face</td>
</tr>
<tr>
<td>Module 1</td>
<td>1.2</td>
</tr>
<tr>
<td>Module 2</td>
<td>1.39</td>
</tr>
<tr>
<td>Module 3</td>
<td>1.41</td>
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<tr>
<td>Module 4</td>
<td>1.43</td>
</tr>
<tr>
<td>Module 5</td>
<td>1.18</td>
</tr>
</tbody>
</table>

Individual persons were analyzed to determine if they fit the Rasch model’s description of data that is suitable for measurement. This was determined by analyzing the fit statistics of each item. The infit and outfit mean-square value was analyzed to see whether items were productive for measurement. After reviewing the infit and outfit mean-square it was determined that all persons were productive for measurement or were
not degrading the data with the exception of 14, 29, and 30. These individuals were possibly distorting the overall data according to both the infit and outfit mean-square statistic. These individuals may have found the survey to be of very low difficulty or chose not to take the test seriously (see Table 16). These individuals were not removed from the data as it did not significantly affect the overall person separation or reliability.

Table 16 - Individual Persons

<table>
<thead>
<tr>
<th>Name</th>
<th>Measure</th>
<th>Score</th>
<th>Error</th>
<th>In MSQ</th>
<th>In ZSTD</th>
<th>Out MSQ</th>
<th>Out ZSTD</th>
<th>PTME</th>
</tr>
</thead>
<tbody>
<tr>
<td>001 F</td>
<td>1.13</td>
<td>24</td>
<td>0.54</td>
<td>0.31</td>
<td>-2.16</td>
<td>0.29</td>
<td>-2.2</td>
<td>0.68</td>
</tr>
<tr>
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<td>1.74</td>
<td>26</td>
<td>0.57</td>
<td>0.29</td>
<td>-2.04</td>
<td>0.27</td>
<td>-2.07</td>
<td>0.74</td>
</tr>
<tr>
<td>003 F</td>
<td>1.13</td>
<td>24</td>
<td>0.54</td>
<td>1.31</td>
<td>0.8</td>
<td>1.36</td>
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<td>-0.16</td>
</tr>
<tr>
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<td>0.65</td>
<td>1.32</td>
<td>0.96</td>
<td>2.55</td>
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<tr>
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<td>2.41</td>
<td>28</td>
<td>0.59</td>
<td>0.68</td>
<td>-0.67</td>
<td>0.79</td>
<td>-0.27</td>
<td>0.41</td>
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<td>0.86</td>
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<td>25</td>
<td>0.56</td>
<td>0.72</td>
<td>-0.56</td>
<td>0.68</td>
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<td>0.82</td>
</tr>
<tr>
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<td>1.94</td>
<td>1.96</td>
<td>2</td>
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<td>-0.06</td>
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<td>0.56</td>
<td>0.72</td>
<td>-0.56</td>
<td>0.68</td>
<td>-0.63</td>
<td>0.82</td>
</tr>
<tr>
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<tr>
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<td>0.68</td>
<td>-0.86</td>
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<tr>
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<td>28</td>
<td>0.59</td>
<td>0.94</td>
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<td>1.02</td>
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<td>0.09</td>
</tr>
<tr>
<td>014 F</td>
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<td>0.51</td>
<td>2.12</td>
<td>2.28</td>
<td>2.12</td>
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<td>0.66</td>
</tr>
<tr>
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<td>0.51</td>
<td>0.74</td>
<td>-0.65</td>
<td>0.74</td>
<td>-0.66</td>
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</tr>
<tr>
<td>016 F</td>
<td>1.13</td>
<td>24</td>
<td>0.54</td>
<td>1.09</td>
<td>0.36</td>
<td>1.15</td>
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<td>0.14</td>
</tr>
<tr>
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<td>0.57</td>
<td>1.22</td>
<td>0.6</td>
<td>1.18</td>
<td>0.52</td>
<td>0.57</td>
</tr>
<tr>
<td>019 F</td>
<td>0.04</td>
<td>20</td>
<td>0.51</td>
<td>1.26</td>
<td>0.78</td>
<td>1.25</td>
<td>0.75</td>
<td>-0.08</td>
</tr>
<tr>
<td>020 F</td>
<td>0.29</td>
<td>21</td>
<td>0.51</td>
<td>0.56</td>
<td>-1.31</td>
<td>0.55</td>
<td>-1.32</td>
<td>0.87</td>
</tr>
<tr>
<td>021 F</td>
<td>1.43</td>
<td>25</td>
<td>0.56</td>
<td>1.08</td>
<td>0.33</td>
<td>1.05</td>
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</tr>
<tr>
<td>022 F</td>
<td>-0.22</td>
<td>19</td>
<td>0.5</td>
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<td>2.23</td>
<td>2</td>
<td>2.24</td>
<td>0.78</td>
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<tr>
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<td>0.91</td>
<td>-0.12</td>
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</tr>
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<td>0.53</td>
<td>0.73</td>
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<td>-0.65</td>
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<td>025 F</td>
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<td>1.79</td>
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</tr>
<tr>
<td>027 F</td>
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<td>23</td>
<td>0.53</td>
<td>0.98</td>
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<td>0.99</td>
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<td>2.28</td>
<td>2.22</td>
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</tr>
<tr>
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<td>28</td>
<td>0.59</td>
<td>2.56</td>
<td>2.66</td>
<td>2.42</td>
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</tr>
<tr>
<td>031 O</td>
<td>3.48</td>
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<td>2.96</td>
<td>1.91</td>
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<tr>
<td>032 O</td>
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<td>0.54</td>
<td>1.36</td>
<td>0.9</td>
<td>1.34</td>
<td>0.85</td>
<td>0.26</td>
</tr>
</tbody>
</table>

61
| O  | 0.56 | 22  | 0.52 | 1.48 | 1.22 | 1.46 | 1.17 | 0.38 |
| O  | 1.43 | 25  | 0.56 | 0.27 | -2.22 | -0.25 | 0.25 | 0.8 |
| O  | 0.56 | 22  | 0.52 | 0.97 | 0.05 | 0.99 | 0.1 | 0.25 |
| O  | 1.13 | 24  | 0.54 | 0.57 | -1.08 | 0.57 | -1.06 | 0.28 |
| O  | 1.74 | 26  | 0.57 | 0.39 | -1.59 | 0.72 | -0.51 | -0.07 |
| O  | 1.74 | 26  | 0.57 | 0.81 | -0.28 | 0.77 | -0.38 | 0.72 |
| O  | 1.43 | 25  | 0.56 | 0.93 | -0.02 | 0.9 | -0.07 | 0.6 |
| O  | 2.41 | 28  | 0.59 | 1.29 | 0.75 | 1.14 | 0.43 | 0.17 |
| O  | 1.43 | 25  | 0.56 | 1.05 | 0.26 | 0.99 | 0.13 | 0.46 |
| O  | 1.74 | 26  | 0.57 | 0.57 | -0.97 | 0.53 | -1.05 | 0.77 |
| O  | 1.74 | 26  | 0.57 | 0.43 | -1.45 | 0.42 | -1.45 | 0.57 |
| O  | 0.56 | 22  | 0.52 | 1.39 | 1.03 | 1.35 | 0.96 | -0.31 |
| O  | 2.76 | 29  | 0.59 | 1.67 | 1.51 | 1.44 | 0.89 | 0.57 |
| O  | 3.11 | 30  | 0.6 | 0.77 | -0.55 | 0.66 | -0.45 | 0.38 |
| O  | 0.04 | 20  | 0.51 | 0.67 | -0.91 | 0.67 | -0.89 | 0.07 |
| O  | 2.07 | 27  | 0.58 | 1.64 | 1.32 | 1.6 | 1.2 | 0.17 |
| O  | 1.74 | 26  | 0.57 | 0.18 | -2.67 | 0.18 | -2.6 | 0.65 |
| O  | -0.98 | 16  | 0.5 | 1.13 | 0.45 | 1.13 | 0.45 | 0.64 |
| O  | 1.13 | 24  | 0.54 | 0.66 | -0.77 | 0.65 | -0.78 | 0.52 |
| O  | 0.04 | 20  | 0.51 | 1.1 | 0.38 | 1.09 | 0.36 | 0.21 |
| O  | 0.56 | 22  | 0.52 | 0.82 | -0.39 | 0.81 | -0.39 | 0.57 |
| O  | 2.07 | 27  | 0.58 | 1.76 | 1.51 | 1.76 | 1.43 | 0.32 |
| O  | 0.29 | 21  | 0.51 | 0.37 | -2.14 | 0.37 | -2.14 | 0.88 |
| O  | 1.74 | 26  | 0.57 | 0.43 | -1.45 | 0.42 | -1.45 | 0.57 |
| O  | -0.47 | 18  | 0.5 | 0.41 | -1.92 | 0.41 | -1.93 | 0.45 |
| O  | 0.04 | 20  | 0.51 | 0.89 | -0.18 | 0.89 | -0.19 | 0.41 |
| O  | 0.56 | 22  | 0.52 | 0.75 | -0.58 | 0.75 | -0.57 | 0.47 |
| O  | -0.47 | 18  | 0.5 | 1.36 | 0.98 | 1.37 | 1 | -0.09 |
| O  | 1.13 | 24  | 0.54 | 0.79 | -0.39 | 0.86 | -0.19 | 0.16 |
| O  | 1.13 | 24  | 0.54 | 0.82 | -0.32 | 0.8 | -0.36 | 0.85 |
| O  | 3.88 | 32  | 0.65 | 1.02 | 0.16 | 1.48 | 0.78 | 0.45 |
| O  | 3.11 | 30  | 0.6 | 0.93 | -0.07 | 0.78 | -0.2 | 0.2 |
| O  | 2.41 | 28  | 0.59 | 0.31 | -2.07 | 0.28 | -1.85 | 0.63 |
| O  | 1.74 | 26  | 0.57 | 1.1 | 0.36 | 1.37 | 0.86 | 0.26 |

**Person-item map.** To verify the means and difficulty levels of items and persons, person-item maps were reviewed to see how person ability matched with each item difficulty. If the survey were to successfully meet the requirements for measuring engagement according to the Rasch model, item difficulty and person ability needed to vary such that they represented a linear continuum from less to more on the logit scale.
Items needed to have varying levels of difficulty with some being easier to answer positively to while others were more difficult to answer positively to. Persons needed to have varying levels of ability with some having a higher ability and others having a lower ability. After reviewing the item-person maps for each module, it was verified that with the exception of certain items, the difficulty of the survey was low and the ability of the participants was high.

Two items were consistently higher in difficulty for individuals to answer. These were question 10 and question 11 (see Figures 5, 6, 7, 8, and 9).

Figure 5. Variable Map for Module 1
Figure 6. Variable Map for Module 2
Figure 7. Variable Map for Module 3
Figure 8. Variable Map for Module 4
Figure 9. Variable Map for Module 5
Based on the Rasch Analysis, it was determined that the survey was weak and did not truly measure the construct of engagement. The baseline statistics indicated a low person separation and reliability. The principle contrast analysis concluded that the survey was not unidimensional with an unexplained variance of 65.3%. The item analysis concluded that the questions were fit for measurement but the person analysis and person-item map concluded that the survey questions were too easy for individuals and thus the person ability was much higher than it should have been for an effective survey.

**Analysis of Variance**

In order to determine whether there was a significant difference in the level of engagement between the face-to-face group and the online group, a one-way analysis of variance was conducted for each module. Person measure statistics were compared between groups in each module. Module 1 was not significant: $F(1, 64) = .286, p < .001$. After analyzing modules 2 through 5, similar results were found with no significant difference between groups (see Tables 17, 18, 19, 20, and 21).

**Table 17**
One-Way Analysis of Variance for Module 1

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>367</td>
<td>1</td>
<td>.367</td>
<td>.286</td>
<td>.595</td>
</tr>
<tr>
<td>Within Groups</td>
<td>82.073</td>
<td>64</td>
<td>1.282</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>82.440</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 18
One-Way Analysis of Variance for Module 2

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.112</td>
<td>1</td>
<td>.112</td>
<td>.068</td>
<td>.795</td>
</tr>
<tr>
<td>Within Groups</td>
<td>105.660</td>
<td>64</td>
<td>1.651</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>105.772</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 19
One-Way Analysis of Variance for Module 3

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.021</td>
<td>1</td>
<td>.021</td>
<td>.013</td>
<td>.911</td>
</tr>
<tr>
<td>Within Groups</td>
<td>108.487</td>
<td>64</td>
<td>1.695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>108.508</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 20
One-Way Analysis of Variance for Module 4

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1.011</td>
<td>1</td>
<td>1.011</td>
<td>.615</td>
<td>.436</td>
</tr>
<tr>
<td>Within Groups</td>
<td>105.244</td>
<td>64</td>
<td>1.644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>106.255</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 21
One-Way Analysis of Variance for Module 5

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.413</td>
<td>1</td>
<td>.413</td>
<td>.176</td>
<td>.676</td>
</tr>
<tr>
<td>Within Groups</td>
<td>150.321</td>
<td>64</td>
<td>2.349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>150.734</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

The previous chapter presented the analysis of the data. In order to understand whether the survey successfully met the requirements for measuring engagement according to the Rasch model, a Rasch analysis of the survey was conducted. A rating
scale analysis was conducted and baseline statistics were reviewed. A one-way ANOVA was conducted to see whether there was a difference in the level of engagement with the course materials between participants in Cru’s traditional face-to-face training with a coach and participants in a strictly online environment. Module 1 was not significant: \( F(1, 64) = .286, p < .001 \) with modules 2 through 5 having similar results. In the next chapter, a review of the results will be presented and conclusions given.
Chapter Five

Discussion

The purpose of this study was to investigate the differences in level of engagement with the course materials between Cru’s traditional face-to-face training with a coach and participants in an online environment. Before this could be investigated the survey had to be analyzed to understand if it successfully met the requirements for measuring engagement according to the Rasch model. This chapter provides conclusions about the data analysis based on each of the two research questions. The researcher will discuss the results of the survey instrument analysis and then student engagement as it was measured by analysis of variance. Implications for future research will be offered.

Research Question 1

To measure engagement in both the face-to-face course and the online course, Cru created a survey that was adapted from the Student Course Engagement Questionnaire (Handelsman et al., 2005). The survey had twelve items and was designed to measure trainees’ engagement with course materials. Each trainee indicated their level of agreement on a 4-point Likert-scale (1=not characteristic of me, 4=very characteristic of me) to statements regarding course engagement. Engagement was scored according to three factors. These factors were skill engagement such as note-taking or studying, emotional engagement such as personal involvement with class materials, and participation/interaction such as asking questions or discussion (Mandernach, 2009) (see Table 22). The Student Course Engagement Survey was modified to target trainees in both an online and face-to-face training environment.
Table 22  
Factors of Survey Questions

<table>
<thead>
<tr>
<th>Factor of Engagement</th>
<th>Question</th>
</tr>
</thead>
</table>
| Skill engagement: note-taking or studying (level of effort put forth by each student) | Q1: I studied on a regular basis  
Q2: I put forth effort into this module  
Q3: I stayed up on all the readings |
| Emotional engagement: personal involvement with class materials (students’ perceptions of the materials) | Q4: I found a way to make the module materials relevant to my life  
Q5: I found a way to make the course materials interesting to me  
Q6: I thought about this module even when I was not working actively participating with the course  
Q8: I had fun with this module  
Q9: I am confident that I am doing well in this course  
Q10: I really desire to learn more  
Q12: After completing this module, I feel equipped to pass these materials on to others |
| Participation/interaction: asking questions or discussion. | Q7: I asked questions if I did not understand something  
Q11: Interaction with a coach helped me feel more engaged with the course |

The first research question asked “Did the survey successfully meet the requirements for measuring engagement according to the Rasch model?” The purpose of this question was to determine if the survey could be utilized to measure the construct of engagement. Rasch analysis was conducted to determine if the survey functioned as needed.

**Findings.** Results from the Rasch analysis indicated that the survey did not perform successfully according to the Rasch model. The variance previously mentioned
indicates that the survey needs questions that are of greater difficulty so that the likelihood of measuring engagement is greater.

**Rating scale analysis.** The first test that was conducted was a rating scale analysis to understand whether a proper rating scale was created. The purpose was to determine whether or not participants were able to communicate effectively through the rating scale. The steps between each category on the scale and the category probability curve were reviewed. It was determined that the rating scale on the survey functioned properly. This meant that participants could clearly differentiate categories on questions 1 through 9 between “Very characteristic of me” and “Somewhat characteristic of me.” Participants could also differentiate categories on questions 10 through 12 between agree and somewhat disagree.

**Summary statistics.** The second test that was conducted involved reviewing the summary statistics from the data for each module. The purpose of this was to review the separation and reliability for items and person data. Item reliability and separation look to see whether the questions have variation across the latent variable (this being engagement) from less difficult to agree with to more difficult to agree with. For items, separation and reliability were high at an average of 2.37 for separation and .846 for reliability across all five modules. This meant that some items on the survey were more difficult to agree with while others were less difficult to agree with.

An example of this was question 6 which was “I thought about this module even when I was not working actively participating with the course.” This question was more difficult to agree with than question 10 which was “I really desire to learn more.” Other questions related to studying, enjoyment of the course, and reading were more difficult to
agree with while others relating to interaction and asking questions were less difficult to agree with. This was true, regardless of whether it was the face-to-face group or the online group. While a few of the questions had varying amounts of difficulty across the latent variable of engagement, a large majority of the questions fell at or below the mean. This was true, regardless of the group. Questions 1, 3, 6, 8 fell above the mean while questions 2, 4, 5, 7, 9, 10, 11 and 12 fell below the mean (see Table 23).

Table 23
Survey Questions In Relation To Mean

<table>
<thead>
<tr>
<th>Question</th>
<th>Above the mean</th>
<th>Below the mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1: I studied on a regular basis</td>
<td></td>
<td>Question 2: I put forth effort into this module</td>
</tr>
<tr>
<td>Question 3: I stayed up on all the readings</td>
<td></td>
<td>Question 4: I found a way to make the module materials relevant to my life</td>
</tr>
<tr>
<td>Question 6: I thought about this module even when I was not actively participating with the course</td>
<td></td>
<td>Question 5: I found a way to make the course materials interesting to me</td>
</tr>
<tr>
<td>Question 8: I had fun with this module</td>
<td></td>
<td>Question 7: I asked questions if I did not understand something</td>
</tr>
<tr>
<td>Question 1: I studied on a regular basis</td>
<td></td>
<td>Question 9: I am confident that I am doing well in this course</td>
</tr>
<tr>
<td>Question 3: I stayed up on all the readings</td>
<td></td>
<td>Question 10: I really desire to learn more</td>
</tr>
<tr>
<td>Question 6: I thought about this module even when I was not actively participating with the course</td>
<td></td>
<td>Question 11: Interaction with a coach helped me feel more engaged with the course</td>
</tr>
<tr>
<td>Question 8: I had fun with this module</td>
<td></td>
<td>Question 12: After completing this module, I feel equipped to pass these materials on to others</td>
</tr>
</tbody>
</table>

Questions that related to studying, reading, and thinking about the module were very defined questions and thus were more difficult to agree with. Questions that were more general such as “put for the effort in this module” were much easier to agree with.
After reviewing the item separation and reliability and person/item chart, it was determined that the item difficulty was not determined by the specific factor of engagement. All questions related to the factor of skill were more difficult to agree with except for question 2. Some questions relating to emotion were more difficult to agree with while others were less difficult. All questions relating to participation/interaction were below the mean and much less difficult to agree with.

The item separation and reliability for module 5 were lower than the other four modules with a separation of 1.82 and a reliability of .77. Due to the fact that items were anchored in modules two through five, a review of the person separation and reliability sought to understand the reason behind this discrepancy.

The separation and reliability of participants were also reviewed from the summary statistics. With all five modules, the person separation and reliability were low with an average separation of 1.738 and reliability of .75. This meant that there was not a continuum of people who took the survey with varying ability. After reviewing the item/person maps it was found that a large majority of participants, regardless of group, were above the mean and thus had a high person ability. Individuals could be part of one of two strata. One strata was those that were of higher ability while another strata (which was much smaller) were those of lower ability. This was true of modules 1 through 4 but not module 5, where more face-to-face participants fell below the mean and thus were considered to have low ability. A low person separation and reliability were due too low difficult of many of the questions or that participants chose to not take the survey in a serious manner.
As stated when reviewing the item separation and reliability, most of the items fell below the mean for each module meaning that the majority of the questions were easy for participants to indicate agreement. Regardless of the module, over half of the participants could answer every question with the exception of one or two with little to no effort, finding the questions to have no difficulty. The questions were too broad in nature such as “I put forth effort in this course” and much less defined.

Another possibility for low person separation and reliability was due to the fact that participants chose not to take the survey in a serious manner. It was originally thought that this could be due to the fact that the same survey was administered to the same participants for all five modules and thus participants became very familiar with the survey and thus did not process through the questions. This hypothesis was not supported because of the increase in person separation in module one from 1.54 to 1.79 in module two.

*Dimensionality.* An analysis of the dimensionality of the survey was conducted. The purpose of this was to see whether the survey was measuring one construct or if multiple constructs were being measured. The purpose of the survey was to measure the construct of engagement.

After reviewing the person dimensionality it was determined that the overall dimensionality of the survey was weak. The survey was not unidimensional, meaning that the survey did not measure one construct, this being engagement. This may have been due to multiple factors of engagement being utilized to create the survey. Another reason may have been the level of difficulty of the questions as compared to the ability of the participants.
Multiple factors of engagement were utilized to form the questions. Factors that were utilized were skill, emotional, and participation/interaction. As stated in Chapter 2, engagement can have different interpretations. As a part of Chris Garrett’s (2011) study, he received various definitions which include “Actively participating in their learning,” “The ability to get students to know about the topics you are exploring,” and “Wanting to know” (Garrett, 2011, p. 4). Within his literature review, Garrett found that engagement is linked with the quality of effort or things that students do on their own initiative. For purposes of this study, engagement was defined as the level of effort put forth by each student and the students’ perceptions of the materials.

With engagement having a very broad definition, Handelsman et. al. (2008) sought to utilize specific factors to help measure the construct (see Table 24). This may have contributed to the low dimensionality of the survey with only 34.7% explained by one construct. The dimensionality of the specific factors could have been analyzed but the factors of skill and participation had too few questions.

As determined by the analysis of the person separation and reliability, the survey questions were of very little difficulty for the majority of individuals who took the survey. Due to the fact that there was not a continuum of individuals who found the survey to be challenging, the ability to measure one construct (this being engagement) was weak.

**Research Question 2**

To understand if there was a difference in the level of engagement between the face-to-face group and the online group, a one-way analysis of variance was conducted between groups for each module. While none of the statistical analysis revealed any
significant differences, it was noted that the person mean scores did change from module to module.

The mean scores for both the face-to-face group and the online group increased from module 1 to module 2, from module 2 to module 3, and from module 3 to module 4. After module 4, the mean scores decreased for both groups for module 5. The mean score increase and decrease may have been due to the content of each module.

All five modules were reviewed for content. While there were similarities between modules that each group participated in, the differences between modules were that the online group watched videos, participated in online discussions, listened to audio podcasts, read articles, and participated in social activities, while the face-to-face group read articles and participated in social activities only. Each of the modules contained the same outline with three categories, which were education, exposure/experience, and evaluation.

It was observed after reviewing the materials that the modules with the lower means were those where more articles were read and more discussion took place. This was true in both module 1 and module 5, regardless of the group. For the online group, modules that contained items such as podcasts and videos had a greater mean. The purpose for a higher mean in the face-to-face group for these modules could have been due to fewer articles and an increase in more activities (see Table 24). Regardless, the differences in the mean between groups was not significant enough to differentiate between the face-to-face group and the online group. While the mean in the online group was consistently higher, with the exception of module 2, more differentiation between groups must take place if Cru would desire to go with an online format for their training.
in the future. The difference in mean is due to the fact that participants should experience a dynamic and engaging online training environment that promotes social presence, regardless of physical differences between participants.

Table 24
Overview of Modules

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
</tr>
</thead>
</table>
| Module 1 | - Read article and answer questions - 7  
                  - Podcast - 2  
                  - Video - 1  
                  - Questions - 1  
                  - Discussion – 2  
                  - Activity – 7  
                  - Writing assignment – 1 |
| Module 2 | - Read article and answer questions - 5  
                  - Podcast - 2  
                  - Video - 0  
                  - Questions - 0  
                  - Discussion – 5  
                  - Activity – 7  
                  - Writing assignment – 1 |
| Module 3 | - Read article and answer questions - 5  
                  - Podcast - 1  
                  - Video - 0  
                  - Questions - 2  
                  - Discussion – 0  
                  - Activity – 6  
                  - Writing assignment – 0 |
| Module 4 | - Read article and answer questions - 2  
                  - Podcast - 0  
                  - Video - 1  
                  - Questions - 5  
                  - Discussion – 2  
                  - Activity – 8  
                  - Writing assignment – 0 |
| Module 5 | - Read article and answer questions - 5  
                  - Podcast - 1  
                  - Video - 0  
                  - Questions - 2  
                  - Discussion – 1  
                  - Activity – 4  
                  - Writing assignment –0 |

*Both the face-to-face and the online group had similar activities with the exception of no podcasts, videos, or discussions in the face-to-face group. Face-to-face discussion, activities, and articles were substituted.
Conclusion

The purpose of this study was to determine if the level of engagement of participants in a training course for new staff and interns at Cru would be increased by conducting training online instead of face-to-face and by utilizing multiple forms of media. In order to determine if there was an increase in the level of engagement, a 12 question survey was created based on of the Handelsman et al. (2005) Student Course Engagement Questionnaire.

The first objective of the study was to determine if the survey successfully met the requirements for measuring engagement according to the Rasch model. The second objective was to understand if there was a difference in level of engagement with the course materials between participants in Cru’s traditional face-to-face training with a coach and participants in a strictly online environment.

Research Question 1. After reviewing the survey with the utilization of Rasch measurement, it was determined that the survey contained questions that had a low level of difficulty and most participants had a high level of ability. Therefore, it was determined that the survey was unfit to provide a true measure of engagement between the face-to-face and the online group and as a result the survey data cannot provide a significant difference in the level of engagement between both groups. The weakness of this study is the survey instrument that was used. In order to understand the differences in the level of engagement between two groups the survey must be able to provide a true measure of engagement of the participants in the course.

Research Question 2. A one-way analysis of variance was conducted on each of the five modules to determine if there was a level of difference between the online group
and the face-to-face group between modules. While there was a difference in the level of the mean between groups, the f statistic for each module revealed that it was not significant enough. The lack of difference supports the evidence that the survey was weak. Other reasons for no significance could be due too unclear expectations, a lack of media in the online course modules, or a lack of collaboration among participants.

**Unclear expectations.** According to adult learning theory, individuals would be more motivated once rational learning objectives are clearly established and the objectives meet the needs of the learner (Knowles, Holton, & Swanson, 1998). While introductory paragraphs were present at the beginning of each module, it may have been more engaging had the expectations been presented either with less text to make them clearer or in a different format such as a video or audio presentation.

**Lack of media.** Doolittle (2001) proposed the cognitive theory of multimedia learning, where individuals learn better by including words and pictures rather than from words alone. Modules may have lacked engaging content due to the poor quality or specific nature of the media that was used to present that content. If more media had been utilized such as pictures, video, and diagrams, rather than strictly PDF articles, the level of engagement in the online course might have been greater.

**Lack of collaboration.** Richardson & Swan (2003) studied participants in an online course and found a correlation between social presence and students perceived learning. While each module in the Cru online course contained space for reflection and online discussions, lack of mentor or student-to-student feedback or scaffolding during collaborative assignments may have led to students’ lack of interest in using these forms of media or course engagement. All assignments within each module were individual
assignments. To add more engagement, course designers might consider some form of explicit guidelines that students must follow in using the available media and interactive features of the course. Other types of interaction also could be considered such as synchronous text chat, audio chat or video chat. While these suggestions might lead to a greater sense of community they could also undermine an advantage of online learning, which is asynchronous communication.

**Future Research**

To determine if Cru’s new staff and intern training has a significant difference in the level of engagement between the online group and the face-to-face group, further research should be conducted. Adjustments to the training modules and the survey should be completed as well as a consideration of qualitative information.

**Items in training.** It was noted when reviewing the modules that the overall mean in the online group was greater than that of the face-to-face group. It was determined that this was due to the differences between the two groups. The online group participated in content that involved items such as videos, audio podcasts, and online discussions. The face-to-face group had the same content but utilized articles and had face-to-face discussions. While there were media-related items in the online group, it was noted that typically only one or two of these items were in each module. If Cru were to conduct another study, more items involving media should be utilized in the online group such as more videos and audio podcasts to show a greater difference in type of materials between groups. An analysis could then be conducted to determine if there was a difference in the level of engagement between groups at that point with a new survey.
**Survey adjustment.** This study utilized survey questions from Handelsman et al. (2005). While some of the questions functioned with higher difficulty level, some questions were weak. In order for the survey to function properly, questions 2, 7, 10 and 11 should be replaced with questions of higher difficulty. Each of these questions fell below the mean in level of difficulty for all five modules. The questions should have a greater level of difficulty to answer positively. Other surveys could be reviewed for questions such as the National Survey of Student Engagement (NSSE 2012) or the Course Experience Questionnaire (CEQ) (Brennan, Brighton, Moon, Richardson, Rindl, & Williams, 2002). A few sample questions that could be utilized in a revised survey are given (see Table 25). Questions that could be considered provide specific feedback on whether one form of media is more engaging than another. Other questions relate to the amount of time that participants were involved with each module.
Table 25
Question Suggestions For Survey

<table>
<thead>
<tr>
<th>Questions</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the training were not required, I would still have wanted to participate.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
<tr>
<td>During this module, about how many hours of reading and writing have you done?</td>
<td>None, 1-4, 5-10, 11-20, More than 20</td>
</tr>
<tr>
<td>How many hours did you spend per week on this module?</td>
<td>None, 1-4, 5-10, 11-20, More than 20</td>
</tr>
<tr>
<td>How many conversations relating to the materials did you participate in?</td>
<td>None, 1-4, 5-10, 11-20, More than 20</td>
</tr>
<tr>
<td>I struggled to understand the materials in this module.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
<tr>
<td>Reading the articles was my favorite part of this module.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
<tr>
<td>The videos were my favorite part of this module.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
<tr>
<td>The audio podcasts were my favorite part of this module.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
<tr>
<td>The online interaction was my favorite part of this module.</td>
<td>Not characteristic of me, Somewhat Characteristic of me, Characteristic of me, Very characteristic of me</td>
</tr>
</tbody>
</table>

Qualitative Data. This study was also similar to Mandernach’s (2009) study in that it utilized questions from the Handelsman et al. (2005) Student Course Engagement Questionnaire. However, Mandernach included qualitative feedback which, if used in this study, may have strengthened the results. Including qualitative data could allow for student response about their module experience and if their experience changed from module to module.
This study used a poorly constructed survey and thus the questions were too easy for students to say they agreed. Regardless, much can be learned at the completion of this study. A greater emphasis should be placed on the quality of questions that are asked in a survey instrument, specifically whether the question is difficult to agree with or not. Survey questions should cause the participants to pause and consider their response. Also, qualitative data should also be considered, as this was true of Mandernach’s (2009) study. Lastly, obtaining secondary data from the participating organization, as was done in this study, can also lead to a lack of control of the survey instrument. Had the survey been created not by Cru, the survey may have been more challenging and thus yielded sufficient results for Rasch measurement. Because of the nature of the survey instrument, it can not be stated with any certainty what differences existed between Cru’s face-to-face and online training groups in the level of engagement. With a more valid and reliable instrument that measures the specific activities or media that tend to lead to higher levels of engagement, Cru may be more able to discover which training format is more successful.

Online training courses are being utilized more each year and sometimes without a plausible reason or purpose behind choosing one method or another. Often the purpose for online training that is considered is cost savings. While research is being conducted in the field of corporate and not-for-profit online training, more research in regards to the engagement of participants in online training, specifically in faith-based organizations must be considered. The purpose of doing so will help instructional designers, management and other stakeholders understand the best methods for delivering courses.
that create a sense of social presence, community, and provide constructivist learning that engages participants.
References


Open University. (n.d.). History of the OU. Available at http://www8.open.ac.uk/about/main/the-ou-explained/history-the-ou


Appendix A

Student Engagement Survey
To what extent do the following behaviors, thoughts, and feelings describe you after completing this module.

<table>
<thead>
<tr>
<th></th>
<th>Very characteristic of me</th>
<th>Characteristic of me</th>
<th>Not really characteristic of me</th>
<th>Not at all characteristic of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>I studied on a regular basis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I put forth effort into this module</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I stayed up on all the readings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I found a way to make the module materials relevant to my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I found a way to make the course materials interesting to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I thought about this module even when I was not working actively participating with the course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I asked questions if I did not understand something</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I had fun with this module</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am confident that I am doing well in this course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To what extent do you agree, somewhat agree, somewhat disagree, or disagree with the following statements
<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I really desire to learn more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction with a coach helped me feel more engaged with the course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After completing this module, I feel equipped to pass these materials on to others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>