

## **Attrition Rate In A Swine Continuing Education Course Delivered Asynchronously**

Leah E. Wickersham, Sul Ross State University  
Kim E. Dooley, Texas A&M University

### **Abstract**

The purpose of this study was to determine, what learner characteristics, instructional design techniques, and technological comfort levels influenced attrition rates in an asynchronous learning environment.

After conducting a qualitative analysis of the data, the researcher was able to address the seven research questions posed in this study which dealt with four barriers thought to impact attrition rates. Situational and dispositional barriers are within the control of the learner such as lack of time, lack of a clear goal, time management, and attitude towards course content. Epistemological and institutional barriers are within the control of the institution and/or course designer and include quality and difficulty of course content, course availability, institutional procedures, and diversity of academic disciplines. The data suggested:

Situational and dispositional barriers contributed to the high attrition rate in this course. Busy schedules at work and home prevented learners from working on the course in a timely manner. The basic nature of the course content and the learners' attitude toward the content also played a role in the high attrition rate in the course.

The primary epistemological barrier found to influence attrition rate was the elementary level of the course content. While the researcher found sound instructional design techniques were used in the development of the course, the designers failed to take into consideration that more advanced producers might enroll in the course. No institutional barriers found to contribute to the non-completion of the course.

Completers and non-completers displayed little difference in technological ability; however, the researcher discovered differences in learner characteristics. Completers were found to be persistent. Non-completers tended to procrastinate and allowed other events to take precedence.

Suggestions for improvement to the course included: speeding up the pace, increasing difficulty level, incorporating learner interaction, advertising, shortening the length of time to complete, and adding additional reference material to the course content.

## **Introduction**

Rapid advances in technology and distance education have provided a way for educators to reach more learners, regardless of time or place. Examples of these technologies include satellite, videoconferencing, and web-based learning environments.

World Wide Web Course Tools, or WebCT, is one of the newest innovations used in the web-based learning environment. "As of September 1999, WebCT has more than 3.6 million student users in 97,000 courses at over 800 colleges and universities in more than 40 countries" (WebCT, 1999, company). Students who use WebCT have the ability to access course content, take quizzes, submit homework and interact with instructors. "By offering a rich suite of course tools, WebCT enables instructors to quickly and easily create and customize their courses" (WebCT, 1999, company).

These web-based courses are not limited to one content area, rather more disciplines are seeking the advantages that web-based courses have to offer faculty and students. Agricultural education is one area in particular that is at the forefront of these distance- learning technologies. Several studies have been conducted in order to determine faculty perceptions of web-based courses. These studies also look at the quality of the courses and the effectiveness they have on the learner (Day, Raven and Newman, 1998; Nti and Bowen, 1998; Born and Miller, 1999; Miller and Pilcher, 2000).

National Pork Producer's Council (NPPC) offered a continuing education, self-study farrowing management course available on the Internet as a WebCT course through NPPC's website (NPPC, 1999, producermain.html). This thirteen-week course was part of the Distance Learning Project, a program that was implemented by NPPC in 1998. The farrowing management course consisted of 10 lessons and incorporated a self-graded quiz with each lesson. The learner was allowed three attempts at the quiz. The lessons were self-paced and designed to be completed in about one hour. Participants who registered for the WebCT course was assigned a user name and password that gave them access to the farrowing management course. After all 10 quizzes were completed, the learner was then asked to fill out an on-line evaluation form. The learner was awarded a certificate at the end of the course.

NPPC first offered this course in the spring of 1999. Of the 84 participants enrolled, 23 completed the 10 lessons in the course. When the course was offered again the following fall, 133 people enrolled in the course, and 77 completed all 10 lessons. Even though distance education offers many opportunities to learners outside university walls, the completion rate of courses offered via distance education is lower than the completion rate in those courses offered through traditional modes.

## **Theoretical Framework**

In order to develop a full understanding of the high attrition rate within distance education programs, it is important to first understand the characteristics of the adult learners and their reasons for participating in these programs. It is also necessary to

incorporate instructional design, technological exposure, and barriers to course completion in relation to attrition rate.

Knowles, Holton, and Swanson (1998) define the characteristics of adult learners and their reasons for learning:

- 1) The need to know. Adults need to know why they need to learn something before undertaking to learn it. Adults should be made aware of how a learning situation can be applied toward real world experiences that in turn makes learning more meaningful.
- 2) The learner's self-concept. Adults have a self-concept of being responsible for their own decisions, for their own lives. Once they have arrived at that self-concept they develop a deep psychological need to be seen by others and treated by others as being capable of self-direction. They resent and resist situations in which they feel others are imposing their wills on them.
- 3) The role of the learner's experience. Adults come into an educational activity with both a greater volume and a different quality of experience from youths. These experiences lead to a diverse audience in any adult group setting. Background, learning styles, motivation, needs, interests, and goals vary to a large degree, and while the same is true of a group of youths, the big difference here is the emphasis on the individualization of teaching and learning techniques in adult education. Greater experience can also have some negative effects as well. Throughout a lifetime a person tends to develop mental habits, biases, and presumptions that tend to inhibit that individual from alternative ways of thinking and developing new ideas and different perceptions.
- 4) Readiness to learn. Adults become ready to learn those things they need to know and be able to do in order to cope effectively with their real-life situations.
- 5) Orientation to learning. Adult learners are life-centered in their orientation to learning. Adults are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or deal with problems that they confront in their life situations. Furthermore, they learn new knowledge, understandings, skills, values, and attitudes most effectively when they are presented in the context of application to real-life situations.
- 6) Motivation. While adults are responsive to some external motivators (better jobs, promotions, higher salaries), the most potent motivators are internal pressures (the desire for increased job satisfaction, self-esteem, quality of life). Motivation may be blocked by an adult's negative self-concept as a student, time constraints, and programs that violate principles of adult learning (pp. 55-61).

A primary concern of adult programs delivered at a distance is the high attrition rate. Many studies have been conducted in order to explain this phenomenon. Garrison (1987) believes that the reason for these studies is due to the need to show that "distance education is an effective and viable method of structuring and delivering education" (p.

95). A more important reason for these studies is the need to understand the characteristics of the distance learner in order to better design and deliver distance educational programs. Results from these studies “will not only ensure a better quality of program for current students but should also suggest means of improving access to educational programs and learning” (p. 95).

It is also important to recognize that attrition cannot and should not be attributed to one factor and that reasons for withdrawal are complex and interrelated (Bernard & Amundsen, 1989; Garrison, 1987; Kember, 1989; Morgan & Tam, 1999; Morgan & Littlewood, 1998; Powell, Conway, & Ross, 1990; Woodley & Parlett, 1983; Woodley, 1987). Barriers to learning and participation can be classified under three headings: situational, institutional, and dispositional (Cross, 1981). Other studies that have been conducted identify the same barriers but add an epistemological variable that creates difficulties for the learner and has an impact on his/her ability to complete a course (Enckevort, Harry, Morin, Schutze, 1986; Garland 1993; Gibson & Graff, 1992; Morgan & Tam, 1999; Woodley & Parlett, 1983). *Situational* barriers include a poor learning environment, lack of time due to work or home responsibilities and geographic location. *Institutional* barriers include cost, problems with institutional procedures, course scheduling, course availability and tutorial assistance. *Dispositional* barriers include lack of a clear goal, stress of multiple roles, time management, learning style differences, adult pride (interest, motivation and attitudes toward school and content), psychological, social and economic factors. *Epistemological* barriers are concerned with the diversity of the different academic disciplines such as the research paradigms and communication techniques. All four factors have an impact on persistence in completing a distance education course.

When educating adults in distance learning environments using technological tools such as computers, it is important to address the question of “which methods of instruction and learning are particularly suited to adults’ ways of learning” (Enckevort et al., 1986, p. 33). Galusha (1998) cited lack of technological training for the student as a barrier to learning in a distance education environment. Students who lack computer or writing skills may be inadvertently excluded from a course using an electronic medium as a delivery method. Students taking distance learning courses that require them to work on a computer must be taught the fundamentals of operating the system of choice of the course. “If distance learning is to be successful, technical barriers must be made a non-issue” (p. 11).

The issue of self-efficacy, “perceptions about one’s capabilities to organize and implement actions necessary to attain a designated performance of skill for specific tasks” (Oliver & Shapiro, 1993, p. 81) is believed to be able to provide a “foundation for developing positive strategies for introducing computer-related skills” (p. 81). Oliver & Shapiro (1993) noted that few studies had been conducted concerning the concept of computers and self-efficacy, but among the studies most revealed that “those who possess

a high degree of self-efficacy tend to be higher achievers than those who have a lower degree of self-efficacy” (p. 83).

The use of learner-centered strategies in web-based instruction is expected to lead to better instructional designs and improved andragogical practices (LeJeune, 1998). Intentional learning, self-direction, collaboration, and self-reflection which are commonly practiced in adult instruction may now be adapted to on-line courses. Dick and Carey’s (1996) systematic instructional design model is one example of the steps one could follow in designing instruction. It consists of 10 steps: 1) determining the instructional goal; 2) analyzing the instructional goal; 3) analyzing learners and context; 4) writing performance objectives; 5) developing assessment instrument(s); 6) developing instructional strategies; 7) developing and selecting instruction; 8) designing and conducting formative evaluation of the instruction; 9) revising the instruction; and 10) conducting a summative evaluation (pp. 5-7). This model was selected to determine if the course developers followed a systematic approach to designing the Farrowing Management Course on WebCT.

### **Purpose of Study and Research Questions**

The purpose of this study was to evaluate how the interrelationships among learner characteristics, systematic instructional design, and technological comfort levels influenced the completion rate of a NPPC Farrowing Management course delivered via WebCT.

The following research questions were addressed in this study:

- 1) Were there differences in adult learner characteristics (situational and dispositional barriers) between completers and non-completers of the WebCT Farrowing Management Course?
- 2) Were there differences in perception of the appropriateness of course design (dispositional and epistemological barriers) between completers and non-completers of the WebCT Farrowing Management Course?
- 3) Were there differences in prior technological exposure and technological self-efficacy between completers and non-completers of the WebCT Farrowing Management Course?
- 4) What were the components of systematic instructional design that course designers implemented during the development of the WebCT Farrowing Management Course?
- 5) What were the suggestions made by course designers, completers, and non-completers for improvement of the WebCT Farrowing Management Course?

### **Research Procedures**

The research for this study was conducted nationally in 15 states in the United States. The sampling technique used for this study was a qualitative method known as representative sampling. Representative sampling is “representative of a population to

which it is desired to generalize” (Lincoln & Guba, 1985, p. 200). “Gatekeepers” were utilized in order to identify the course developers, completers, and non-completers of the course.

Qualitative research was the methodology. A semi-structured interview (with an interview protocol specific to completers, non-completers and course designers) and document analysis (an evaluative review of the WebCT course and an on-line evaluation collected by NPPC) served as the data-gathering sources. The researcher was the data-gathering instrument.

The interviews were conducted by telephone and were recorded and transcribed for future data analysis. The researcher continued to conduct interviews from both the completers and non-completer populations until the interviews failed to turn up any new data. Respondents were coded to ensure confidentiality with initials representing course developers (CD), completers (C), non-completers (NC), and non-completers who completed no lessons (NCN). A number followed to indicate the interview order. See Table 1 for the list of respondents.

The researcher used the constant comparative method to compare across categories and construct meaning (Lincoln & Guba, 1985). From this analysis, the researcher determined the relationships of how learner characteristics, technological comfort and instructional design influenced the completion rate of a web-based course.

Table 1

List of Respondents in Study

Group	N	Code
Course Designers	5	CD1, CD2, CD3, CD4, CD5
Completers	15	C1, C2, C3, C4, C5, C6, C7 C8, C9, C10, C11, C12, C13 C14, C15
Non-Completers	11	NC1, NC2, NC3, NC4, NC5 NC6, NC7, NC8, NCN1, NCN2 NCN 3

**Findings**

The complete findings were written as case studies in three sections: course designers, completers, and non-completers. A summary of findings follows:

## Course Designers

The course was developed out of a need for the National Pork Producer's Council and the Agricultural Extension Service to work more closely in order to provide educational tools for anyone interested in expanding their knowledge about important issues in pork production such as farrowing management, breeding and gestation, nutrition, growing to finish, and nursery care.

Course designers wanted to create a course that would allow individuals to have access to information anytime and anywhere with the ability to work on it at their own pace provided they had a computer with access to the Internet. The purpose of the WebCT Farrowing Management Course was to provide producers with the information to perform their jobs better than before and to carry out their work more efficiently.

Although course designers did not specifically adopt an instructional design model, such as Dick and Carey's Systematic Instructional Design model, all of the steps in Dick and Carey's model were present to some degree.

- 1) Determining the Instructional Goal: Course designers used a variety of methods to determine the subject material to be used for the course. Initially, course designers met in Iowa to develop a list of learning objectives. A second method used by course designers in order to determine course content was a technique called visualization – seeing themselves as workers in a farrowing house.
- 2) Analyzing the Instructional Goal: The entry level skills required of the learner in order to succeed in this course were minimal; a desire to learn, a love for animals, the ability to read and write, and computer skills, although not mentioned in the course overview, were required of the learner prior to enrolling the course.
- 3) Analyzing the Learners and Context: On-line quizzes were created and implemented at the end of each lesson in order to analyze the learner and measure how much learning had taken place. The course designers were not able to incorporate any hands-on activities for the learners, but believed that the on-line quizzes were a way to provide the learner with something to do after they completed a lesson, and it provided the learners with feedback regarding their progress in the course.
- 4) Writing Performance Objectives: Performance objectives were identified to the learner at the beginning of each lesson, providing the learner with expected outcomes of each lesson.
- 5) Developing Assessment Instrument(s): Course designers developed on-line quizzes in order to assess the learners.
- 6) Developing Instructional Strategies: The course was converted to a web-based format by one individual, CD5, and a student worker by converting the print based material, videos, pictures and slides into digital formats and placing everything on-line in an easy to follow format.
- 7) Developing and Selecting Instruction: The instructional materials were derived from the course designers' determination of what was important for producers to know and learn about farrowing management in order to have a well functioning

- farrowing house. The expected outcomes of the course were two-fold: course designers wanted learners to understand the reason behind their actions and to enhance their job skills in order to continue to strive in the area of swine production. Course designers did not; however, develop and select instruction for the audience that actually enrolled in the course. This course was developed with the novice producer in mind and little consideration was given to the possibility of the more advanced producer enrolling in the course seeking more detailed information.
- 8) Designing and Conducting Formative Evaluation of the Instruction: Course designers used several methods to evaluate the course content. They used experts in the area of farrowing management to review the material for accuracy, conducted workshops and used the course content to teach them, and offered the course as a pilot study on-line to obtain feedback from the learners for suggestions for improvement.
  - 9) Revising the Instruction: The instruction was revised from the feedback received from the formative evaluations from the workshops, pilot course, and swine experts.
  - 10) Conducting a Summative Evaluation: The summative evaluations were collected at the end of the course and provided a way for course designers to continue to revise and improve the instruction.

Certificates were awarded to the learner upon completion of the course. Although the certificates did not have any educational credit attached, the course designers felt it was important to acknowledge those who had completed the course successfully.

### Completers

The audience for the completers ranged from the novice pork producer (C14) to the expert. There were a few college instructors enrolled in the course (C4, C12), a pre-vet student who worked as a farrowing technician (C7), an instructional specialist (C5), several farrowing house managers (C1, C8, C13, C15), a feed salesman (C3), farrowing house employees (C6, C9), and several individuals who were self-employed and had been in the business for many years (C2, C10, C11).

The majority of the completers asked for more scientific or technical content and viewed the course as a refresher course; good for training new comers, but leaving the experts wanting more (C1, C2, C3, C4, C5, C7, C8, C9, C12, C13, C14, C15). Based on the interviews with the course designers, the course content was developed for the novice producer (CD1, CD3, CD4).

All of the completers ranked this course middle to high priority on their list and maintained a schedule in order to work on the course (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15). Even though several completers expressed that the content was not scientific or technical enough, they continued on with the course because they had enrolled in the course, paid for it, and were determined to finish what they started (C1, C2, C3, C4, C5, C14, C15). Five completers also expressed their concern

with answers to a few of the quiz questions believing that it was probably a matter of opinion on technique (C8, C9, C12, C13, C14).

With the exception of two completers, this was the first time anyone had enrolled in a web-based course (C1, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C15); however, they were not intimidated by the technology used to deliver the material, and many enrolled because of the convenience the web-based learning environment afforded them (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15). Four of the learners; however, acknowledged the importance of hands-on training/learning (C5, C7, C10, C14). Technological difficulties were solved by the learners; either in their ability to fix the problem on their own, or by incorporating the help of a family member or someone associated with the farrowing management course (C1, C3, C6, C9, C11, C15). Completers described themselves as high (C2, C3) to average (C1, C4, C5, C7, C8, C10, C11, C12, C13, C14, C15) computer users. Almost all completers had difficulty downloading the videos and there was a common complaint among all concerning the amount of time it took to download the videos as well as the poor quality of the videos (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C12, C13, C14, C15).

The majority of the learners printed off the materials to study and logged back on to the course to complete the quizzes (C1, C2, C4, C5, C6, C8, C13, C14). Two people also expressed the desire to have a notebook with the course material, much like the notebooks used in the Nebraska Extension Home Study Kits prior to placing the course on-line (C3, C9).

Completers displayed a variety of adult learning characteristics found in the literature (Knowles, Holton, & Swanson, 1998). They had a purpose for enrolling in the course. For the majority of the learners, the purpose was to increase their knowledge about farrowing management (C3, C4, C6, C7, C9, C10, C11, C13, C14, C15). Others enrolled in the course in order to use the materials to train their employees on farrowing management techniques (C1, C8). They chose to learn via the Internet because they liked the advantages the web-based learning environment presented – the ability to work on a course at their own pace and on their own time in the convenience of their home or office. Completers also displayed a high degree of self-directedness, another characteristic of adult learners. Distance learning environments tend to be unstructured and require an individual to be in charge of their own learning. Completers developed and maintained a schedule to work on the course and ranked the course middle to high priority on their list of activities/responsibilities.

Completers had the background knowledge and prior experience to be successful in the Farrowing Management Course and the course content was relevant and meaningful to them. They also displayed a high degree of motivation to complete the course. Both issues demonstrated another characteristic of the adult learner.

## Non-completers

The audience for the non-completers included a farrowing specialist for a feed company (NC1), a farrowing manager (NC3), experienced producers (NC4, NC5, NC6, NC8), a manager at a nutrition research center (NC7), and novice producers (NC2, NCN1, NCN2, NCN3).

Almost all of the non-completers worked on the course in their home (NC1, NC2, NC3, NC4, NC5, NC6, NC8). They ranked this course as a middle (NC3, NC8) to low (NC1, NC2, NC4, NC5, NC6, NC7) priority and did not keep a schedule to work on the course.

The majority of the non-completers enrolled in the course in order to increase their knowledge in farrowing management (NC1, NC2, NC3, NC5, NC8, NCN1, NCN2, NCN3) and to train others under their supervision (NC4, NC6, NC7). They also enrolled in the course because of the convenience of a web-based learning environment (NC2, NC3, NC6, NC8). They described themselves as average computer users (NC1, NC2, NC3, NC4, NC5, NC6, NCN2, NCN3) with the exception of one individual, (NCN1). Lack of computer skills did not hinder the completion of the course for all respondents except NCN1. However, almost all of the non-completers cited the lack of scientific or technical content as a reason for not completing the course, claiming that they would not benefit from the instruction; therefore, they chose not to finish the course (NC1, NC3, NC5, NC7, NC8).

Other reasons for not completing the course included too much time allotted to complete the course (NC2, NC4, NC6), failing to submit the quizzes (NC4, NC6, NC8), poor time management (NC2, NC4, NC5, NC6, NC7, NC8, NCN2, NCN3), attitude toward course content (NC1, NC3, NC5, NC7, NC8), and home/work responsibilities (NC2, NC5, NC7, NC8, NCN2, NCN3). A snapshot of the differences and similarities between completers and non-completers follows (Table 2).

## **Conclusions, Implications and Recommendations**

A summary of findings indicated that course designers used instructional design methodologies while creating this course, but targeted the novice producer as the primary audience. They did not take into consideration that advanced producers seeking more scientific or technical content would enroll. Non-completers did not foresee learning anything new from the course, and the lack of advanced course material resulted in many of the non-completers dropping from the course. Completers voiced similar complaints regarding the course content; however, they chose to remain in the course because they set this as a goal and were determined to finish. Two implications exist from these findings: 1) course designers need to create a course or several courses to reach different levels of producers, and 2) completers and non-completers demonstrate a difference in motivation and learning characteristics in regards to finishing the course. Therefore, the researcher recommends conducting a needs assessment in order to determine the level of material producers are seeking and creating lessons to correspond to those learners'

specific needs. A second recommendation made by the researcher is to further study the role that persistence or motivation has in course completion. Completers demonstrated a high-degree of motivation in relation to the course, and wanted to finish regardless of their dissatisfaction, while non-completers were uninterested in receiving a certificate when they determined that the course content was not what they were seeking.

Table 2

Differences and Similarities Between Completers and Non-Completers Enrolled in the Farrowing Management WebCT Course

	Completers	Non-Completers Some Lessons	Non-Completers No Lessons
Learner Characteristics	Persistent	Procrastinate	Procrastinate
• Study Process	Print-Outs	Print-Outs/Some Failed Submit Quiz	N/A
• Study Location	Work/Home	Home	N/A
• Course Rank	Middle-High	Middle-Low	Low
Instructional Design	Too Simple – Just Right	Too Simple	N/A
Technological Comfort/Exposure	High-Average	Average Failed to Submit Quiz	Low/Average

Other barriers to completion include too much time (making it easy to procrastinate) or too little time due to multiple responsibilities; both indicate poor time management on the learners' part. The implication exists that an individual still needs structure, even in a self-paced learning environment such as a web-based course. The researcher recommends incorporating weekly chat sessions in order to provide peer interaction and feedback from experts.

Technology was a barrier for only one individual enrolled, resulting in non-completion of the course, but for the rest of the learners, technology was a non-issue. The majority of the learners experienced difficulty downloading the videos and complained about the poor quality of the clips if they were able to view them. Therefore, many of the learners chose not to incorporate the video clips in their learning process. An implication exists that course designers need to improve the quality of the videos as well as decrease the problems associated with download time. The researcher believes that the videos could provide value to the course content and recommends re-digitizing the videos with the new and improved software available today or distributing the videos on CD-ROM.

There were several suggestions made by course designers, completers, and non-completers for improvement to the Farrowing Management Course. The implication exists that the individuals who were involved in the development of the course and enrolled in the course are interested in seeing the course evolve and improve for future

enrollees. Based upon their suggestions, the researcher will provide recommendations for course improvement.

### Recommendations for Course Improvement

The researcher developed recommendations for the National Pork Producer's Council to help lower the attrition rate for the WebCT Farrowing Management Course. Although these recommendations evolved from findings in this study, the researcher believes that many of these suggestions may be applied to a wider audience and may be considered as best practices when developing/designing and delivering/teaching material for a web-based course.

- 1) Conduct an on-line needs assessment that would determine the level of material that the learner is seeking and have corresponding lessons created to match the learner's needs.
- 2) Hyperlink to additional information. This would encourage self-directed learning and allow learners to seek more detailed information.
- 3) Have a database for the quiz questions that will randomly select the questions each time a learner takes a quiz in order to avoid taking the same one three times.
- 4) The slow download time and poor quality of the videos created several problems and almost all of the learners chose not to watch them. The researcher believes that the videos could serve as a valuable teaching tool and may offer some of the more detailed and scientific information that the learners are seeking. One solution to the on-line video dilemma would be to place the video clips on a CD-ROM and offer it to the learner for a few additional dollars for those who have the capability to run CD-ROMs on their computer. For those individuals who do not have that capability, the researcher suggests re-digitizing or re-streaming the video clips using the more advanced software available today and incorporating more still images with audio overlay in order to cut down on the choppy appearance of the videos.
- 5) Add to the Introduction/Welcome page a list of technological capabilities needed in order to utilize everything the course has to offer. Also include a list of qualities for success and expectations when enrolling in a distance education course.
- 6) In order to obtain more learner interaction and feedback within the web-based environment, have the course designers sponsor weekly chat sessions featuring a topic of the week. This would allow individuals to ask questions and view other participant's queries. A Frequently Asked Questions (FAQ) page could also be added to address questions when not in a chat session.
- 7) Administer an on-line pre-test for potential students in order to determine if this course is right for them. If they pass the quiz, they should already have a solid understanding of the content in the course and are looking for higher level content.

- 8) Create several lessons (i.e. more than 10) and allow learners to choose content that is relevant to them. Once the learner has completed 10 lessons, they are awarded a certificate of completion for their custom designed course.

### Recommendations for Future Research

This study was exploratory in nature. Because teaching and learning on-line is a relatively new field of study, there was a need to determine learner characteristics and instructional design components that may or may not influence attrition rate. Based upon the results of this investigation, it is recommended that a follow-up study be conducted after implementation of the recommended changes in course design to determine if attrition rate changes.

Persistence or motivation and procrastination are learning characteristics that influence completion (Enckevort et al., 1986; Moore, 1986; Powell et al., 1990; Woodley, 1987). The researcher recommends that further research be conducted in this area utilizing a persistence or motivation instrument such as the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991) in further understanding the role that motivation or persistence plays in course completion.

### Final Reflections

The interrelationships among learner characteristics, instructional design, and technological comfort are quite complex. Just like the three legs of a stool provide support and balance, these three factors interplay to provide support to the learner in an asynchronous environment. For example, the course designers must consider prior technological exposure and comfort of the learner when developing a course. Depending on the learner's technological skill set, the course designers may need to provide an opportunity for practice, guided tutorials, or detailed instructions to ensure that technology is not a barrier to course completion. Additionally, course designers can create an atmosphere for peer interaction using communication tools such as chat rooms, threaded discussion, bulletin boards, etc., to simulate the types of discussions that are typical in face-to-face situations. These interrelationships deserve consideration for effective design and delivery of web-based courses.

Even though distance education is providing more convenience and access to continuing education, the learners are still accustomed to the "traditional" classroom environment. Although attrition rate is normally higher in asynchronous situations, it appears that it is more a result of our social norms rather than instructional design issues. With the exception of the simplicity of content, the only difference between completion and non-completion is within the control of the learner and their willingness to be self-directed.

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