

FIRST YEAR UNDERGRADUATE STUDENTS' PERCEPTION OF THE
EFFECTIVENESS AND TRANSFER OF MULTIMEDIA TRAINING FOR A
UNIVERSITY COURSE REGISTRATION SYSTEM

by

Merideth I. Dee

A Dissertation Submitted to the Faculty of
The College of Education
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

Florida Atlantic University

Boca Raton, FL

May 2011

Copyright by Merideth I. Dee 2011

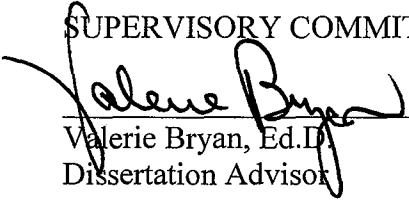
FIRST YEAR UNDERGRADUATE STUDENTS' PERCEPTION OF THE
EFFECTIVENESS AND TRANSFER OF MULTIMEDIA TRAINING FOR A
UNIVERSITY COURSE REGISTRATION SYSTEM

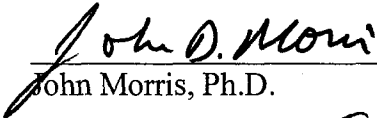
by

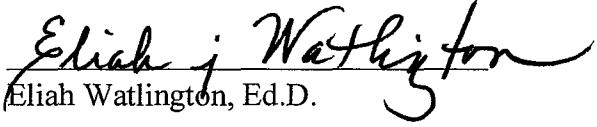
Merideth I. Dee

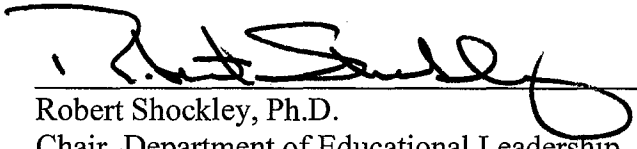
This dissertation was prepared under the direction of the candidate's dissertation advisor, Dr. Valerie Bryan, Department of Educational Leadership and Research Methodology, and has been approved by the members of her supervisory committee. It was submitted to the faculty of the College of Education and was accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

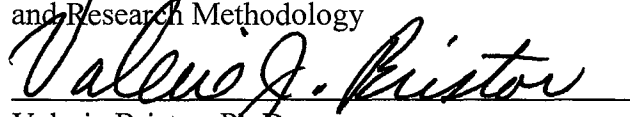
SUPERVISORY COMMITTEE:

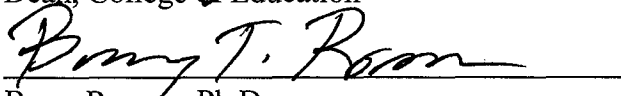

Valerie Bryan, Ed.D.
Dissertation Advisor


John Morris, Ph.D.


Eliah Watlington, Ed.D.


Robert Shockley, Ph.D.
Chair, Department of Educational Leadership
and Research Methodology


Valerie Bristol, Ph.D.
Dean, College of Education


Barry Rosson, Ph.D.
Dean, Graduate College


Date

ACKNOWLEDGEMENTS

“Do not anticipate trouble or worry about what may never happen.

Keep in the sunlight”. ~Benjamin Franklin

Here is what I know. To keep in the sunlight you need to have support; sunscreen, a hat, maybe an umbrella, and even a cold refreshing drink to keep you hydrated. At the start of my journey to a Ph.D., I was standing in the shade unsure about the type of sunscreen to buy and what hat to bring. However, a special thank you is in order to all the wonderful people in my life who have encouraged me over the past four years as I am now at the end of my journey standing confidently in the sunlight with all the support I ever needed.

To my doctoral committee members, I thank you for helping me and teaching me, I cannot express what an honor it was to work with you. To Dr. Eliah Watlington, thank you for teaching me to look beyond the words to find the story. You have given me the strength to believe in my abilities as a researcher. To Dr. John Morris, thank you for always giving me the opportunity to work out the answer then suggest a question I would have never thought about. Your patience was always appreciated and I cannot thank you enough. To Dr. Valerie Bryan, my committee chair, thank you for believing in my research and for giving me the confidence to overcome the many obstacles I encountered. I started this program as a young 22 year old student not quite sure what my passion was or what I wanted to do. Thank you for your endless guidance and for giving me the

experiences I needed to find my passion and to find who I am. Thank you will really never be enough.

To my friends and co-workers in Freshman Advising, thank you for your constant support and allowing me the opportunity to remove 2,800 holds. Thank you to Maryann for keeping me laughing, to Abdula for helping me with OARS and for listening and laughing with me, and to Manjula and Jess for listening and letting me feel overwhelmed when I needed to.

Finally, I must thank my family who was always there to listen to me when I'm sure I never made sense. To Mom, Dad, Nik, Nana, Papa, Aunt Cindy, Uncle Jeff, Savannah, and Gabriella, you are the most incredible family I could have ever dreamed of and I love you all so much. It's just two simple words, but they have so much meaning...

Thank You

ABSTRACT

Author: Merideth I. Dee

Title: First Year Undergraduate Students' Perception of the Effectiveness and Transfer of Multimedia Training for a University Course Registration System

Institution: Florida Atlantic University

Dissertation Advisor: Dr. Valerie Bryan

Degree: Doctor of Philosophy

Year: 2011

The purpose of this study was to evaluate the perceived effectiveness of a multimedia tutorial for first year undergraduate students (FTICs) using a university course registration system; to determine if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial.

The study was both quantitative and qualitative in design addressing 10 research questions. The instruments used in this study consisted of the Registration Tutorial which included: (1) an Information and Communication Technology (ICT) Fluency Questionnaire (Hilberg, 2007), (2) a multimedia tutorial designed by the researcher demonstrating the university course registration system, and (3) the Registration Video Questionnaire (RVQ) also designed by the researcher measuring perceived multimedia

tutorial effectiveness. A Registration Video Tutorial Transfer of Learning Questionnaire (TLQ) was also developed by the research to measure perceived proficiency with the registration system three months after initially viewing the multimedia tutorial.

The sample included 1,196 freshmen students from a large public university in the southeastern United States. Results of the study showed that students perceived the multimedia tutorial to be effective ($M = 4.19$, $SD = .756$) and seven themes emerged through qualitative analysis as to why the tutorial was or was not effective. Results also showed there was no relationship between multimedia tutorial effectiveness and gender, major, or ICT education. There were however significant weak relationships between multimedia tutorial effectiveness and ICT usage ($r = .095$), multimedia tutorial effectiveness and ICT fluency ($r = .286$), and multimedia tutorial effectiveness and ICT comfort ($r = -.133$). Furthermore, transfer of learning occurred for students ($n = 66$) who completed the TLQ ($M = 4.01$, $SD = .777$) and as suggested by qualitative analysis of student responses.

Implications of this study suggested that providing first year undergraduate students with a web-based multimedia tutorial is just the beginning and the need may be to focus upon the development of these students as adult learners so they can feel successful in the early stages of their academic career, thus building the self-confidence they need to effectively navigate the university environment.

FIRST YEAR UNDERGRADUATE STUDENTS' PERCEPTION OF THE
EFFECTIVENESS AND TRANSFER OF MULTIMEDIA TRAINING FOR A
UNIVERSITY COURSE REGISTRATION SYSTEM

List of Tables	xii
List of Figures	xiii
Chapter 1: Introduction	1
Problem Statement	3
Purpose Statement.....	4
Research Questions.....	4
Significance of Study	6
Definition of Terms.....	7
Delimitations.....	10
Limitations	10
Role of the Researcher	11
Chapter Summary	11
Chapter 2: Literature Review	13
Adult Learning	14
Adults as First Year Students.....	16
Information Literacy	19
Computer Anxiety: Self-efficacy, Gender, and Major.....	21
Retention	26
Multimedia.....	29
Cognitive Theory of Multimedia Learning	30
The Multimedia Principle	32
Cognitive Load Theory	33
The Spatial & Temporal Contiguity Principles	33
The Modality Principle	34
The Redundancy Principle.....	35
Transfer of Learning	37
Chapter Summary	39
Chapter 3: Methodology	41
Research Questions.....	41

Research Design.....	43
Sample.....	44
Instrumentation	44
Information and Communication Technology (ICT) Fluency Questionnaire	45
Registration Video Tutorial (RVT).....	45
Registration Video Questionnaire (RVQ).....	49
Registration Video Tutorial Transfer of Learning Questionnaire (TLQ)	50
Procedure	50
Step 1: ICT Fluency Questionnaire.....	51
Step 2: Registration Video Tutorial	51
Step 3: Registration Video Questionnaire.....	52
Step 4: Registration Video Tutorial Transfer of Learning Questionnaire	52
Student Information	53
Data Analysis	53
Chapter Summary	55
Chapter 4: Findings.....	56
Research Questions	56
Instrumentation Demographics	58
OARS & the Registration Tutorial	58
ICT Fluency Questionnaire.....	59
Registration Video Questionnaire.....	60
Combined: ICT Fluency Questionnaire and Registration Video Questionnaire	60
Registration Video Tutorial Transfer of Learning Questionnaire.....	60
Participant Demographics	62
Multimedia Tutorial Effectiveness	64
Research Question 1	64
Research Question 2	66
Research Question 3	66
Research Question 4	67
Research Question 5	68
Research Question 6	70
Research Question 7	71
Research Question 8	73
Transfer of Learning	73
Research Question 9	74
Research Question 10	75

Qualitative Analysis for Multimedia Effectiveness and Transfer of Learning...	77
Research Question 1	77
Please explain why you feel the multimedia tutorial was or was not effective in teaching you how to register for classes	77
Step-by-step	77
Easy to understand	77
Showed me details	78
Interactive	78
Visual and aural	79
Transfer of information.....	79
Human contact	80
Do you feel you are knowledgeable enough, after watching the multimedia tutorial, to register for classes on your own?	80
Yes	80
No.....	80
Would you change anything about the multimedia tutorial in order for you to perceive it as effective in teaching you how to register? ..	82
Research Question 10	83
Please explain why you were able to register for classes using the information you received from the Registration Video Tutorial	83
Please explain why you were not able to register for classes using the information you received from the Registration Video Tutorial ..	85
Chapter Summary	86
 Chapter 5: Findings, Discussions, & Limitations	87
Findings and Discussion	89
Perceived effectiveness of the multimedia tutorial (RQ1).....	90
Relationships between perceived effectiveness and gender, major, and ICT (RQ2-8)	95
Transfer of learning (RQ9-10)	97
Limitations to Study Design	99
Recommendation for Future Research.....	104
Conclusions.....	105
 Appendixes	107
A IRB Approval.....	107
B Letter of Approval – Student Information	108
C Amendment IRB Approval.....	109
D Registration Tutorial Web Page.....	110
E ICT Fluency Questionnaire (Part 1 of Registration Tutorial).....	111

F	Registration Video Tutorial (RVT) (Part 2 of Registration Tutorial).....	117
G	Registration Video Questionnaire (RVQ) (Part 3 of Registration Tutorial).	122
H	Web Form - Holds	124
I	Registration Tutorial “Thank You” Web Page	125
J	Email to Students - Transfer of Learning	126
K	Registration Video Tutorial Transfer of Learning Questionnaire (TLQ) ...	127
L	TLQ “Thank You” Web Page.....	129
	References.....	130

LIST OF TABLES

Table 1.	Research Design.....	43
Table 2.	Modifications to Hilberg (2007) ICT Fluency Questionnaire	46
Table 3.	Frequency of Slide Relevancy of the Registration Video Tutorial Pretest ...	47
Table 4.	Perceived Quality of Graphics, Narration, Animation, and Interactivity of Registration Video Tutorial	48
Table 5.	Perception of Effectiveness of RVT and Overall Rating	48
Table 6.	OARS and Registration Tutorial Demographics	59
Table 7.	Instrumentation Demographics.....	61
Table 8.	Participant Demographics.....	63
Table 9.	Symmetry Test Results for Multimedia Tutorial Effectiveness (RVQ)	65
Table 10.	Multimedia Tutorial Effectiveness by College.....	67
Table 11.	Distribution of Responses for ICT Education.....	69
Table 12.	Correlations of Perceived Tutorial Effectiveness and ICT Scores	72
Table 13.	Summary of Multiple Regression for Transfer of Learning	75
Table 14.	Symmetry Test Results for Transfer of Learning (TLQ).....	76
Table 15.	Examples of Participant “Yes” Responses to Registering on Their Own	81
Table 16.	Examples of Participant “Yes” Responses to Changing the Tutorial	83
Table 17.	Summary of Research Questions, Hypotheses, & Results	88
Table 18.	Age Discrepancies between Research Study and University Statistics	102

LIST OF FIGURES

Figure 1. Cooper and Weaver's (2003) Model of Individual Student.....	23
Figure 2. Tinto's (1975, 1993) Model of College Student Attrition	27
Figure 3. Mayer's (2001) Cognitive Theory of Multimedia Learning.....	31
Figure 4. Group AN; Incoming Animation and Narration Held in Different Working Memory Spaces	35
Figure 5. Group AT; Incoming Animation and On-screen Text Held in the Same Working Memory Spaces	35
Figure 6. Baldwin and Ford's (1988) Model of the Transfer Process.....	39
Figure 7. Frequency distribution of multimedia tutorial effectiveness	65
Figure 8. Frequency distribution of ICT usage	68
Figure 9. Frequency distribution of ICT fluency	71
Figure 10. Frequency distribution of ICT comfort.....	72
Figure 11. Frequency distribution of transfer of learning	74

Chapter 1

Introduction

In recent years the use of technology in higher education, the workplace, and society in general has grown by an enormous amount. According to a 2009 Entertainment Software Association (ESA) report, “thirty-seven percent of heads of households play games on a wireless device, such as a cell phone or PDA, up from twenty percent in 2002” (ESA-Industry Facts, 2009). The ESA also reported that males made up almost 60% of the online gaming population, while females made up a little over 40% of online gamers. This statistic is interesting to note as computer and/or video games have, until recently, been considered a male dominated activity (Dickey, 2006), and in 2009 it was estimated that women had become the computer and video game industry’s fastest growing demographic with about 40% of women over the age of 18 playing computer and video games (ESA, 2009).

With the increased use and availability of technology today (i.e.; computers, new software and computer programs, new forms of communication technology such as internet accessible cell phones, the development of online interactive training tools in organizations, the growth of distance learning programs, the use of the internet, and the increased popularity of such sites as Google, YouTube and the many social networking sites); it is no wonder why learners entering higher education today are much different than learners from past generations (Kennedy, Judd, Churchward, Gray, & Krause, 2008). Marc Prensky (2001) discussed this new breed of learners, often referred to as

Digital Natives, and argued that “today’s students *think and process information fundamentally differently* from their predecessors” (p. 1). As these Digital Natives enter higher education it is important for educators and administrators to understand that these students have “spent their entire lives surrounded by and using computers, videogames, digital music players, video [cameras], cell phones, and all the other toys and tools of the digital age” (Prensky, 2001, p. 1).

Additionally, information and communication technology (ICT) has become a popular educational tool among Digital Natives who are enrolling in higher education and entering the workforce. ICT allows learners the ability to access information from their own computer or even their phone, and multimedia technologies such as interactive videos with graphics, text, sound, and animation, offer today’s employees the opportunity to access training simulations and programs from anywhere at any time. Having information immediately available allows learners in higher education and in the workforce the option to learn at their own pace and create “learning environments in which students can actively work on solving problems encountered in daily life” (Volman & van Eck, 2001, p. 614).

Not all ICT and multimedia technologies however, are created to promote long term retention of information. Oblinger and Oblinger (2005) explained that “information technology is just a tool. Like all tools, if used properly, it can be an asset. If it is used improperly, it can become an obstacle to achieving its intended purpose. Never is it a panacea” (p. 7.8). Furthermore, Rowden (2007) described general training programs in the workforce and stated that training is a valuable tool; however, it may only provide information. He argued that information can only be transformed into understanding

when learners are able to apply the information to their job and to their life, and therefore training should emphasize skill and knowledge, as training is an active process and experience. If after viewing or participating in a training experience learners are unable to put their new found skills and knowledge into practice (i.e., transfer of learning), information gained is now of little value to the learner.

Problem Statement

First year undergraduate students often arrive at universities unfamiliar with the many layers of the registration process which they often find both complex and frustrating thus beginning their new life as an undergraduate student discouraged with university requirements. With the continued integration of technology in higher education, online registration has become common practice and a necessary skill students need to master to successfully navigate university life.

It is unclear whether the lack of understanding and retention of the steps in the registration process are because of a poorly designed registration system, the student's inability to learn the required process, or the student's lack of knowledge due to the inability to properly access and interpret the resources made available to learn about the registration system when they first arrive to the university. Students are left discouraged not understanding how to register for courses and unfortunately this can result in a poorly planned schedule or enrolling in courses not appropriate for their first semester. Such circumstances may lead to poor academic performance, which may lead to higher attrition rates among students since there is a "consistent relationship between college academic achievement and retention" (DeBerard, Spielmans, & Julka, 2004, p. 67).

Therefore, this research study provided first year undergraduate students with a web-based, multimedia tutorial focused upon the course search and registration process. It was the hope that the multimedia tutorial would allow students to feel successful in the early stages of their academic career and build self-confidence in their own abilities to navigate the virtual university environment. Any efforts taken in helping to assure that first year students are successful in their academic development and interests, may encourage students to exhibit high self efficacy, assure their retention in the academic community, and successful completion of not only their first degree, but hopefully additional degrees to follow.

Purpose Statement

The purpose of this study was to evaluate the perceived effectiveness of a multimedia tutorial for first year undergraduate students (FTICs) using a university course registration system; to determine if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, Information and Communication Technology (ICT) usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial.

Research Questions

1. Is the use of multimedia technology as a training tool effective as perceived by first year undergraduate students using a university course registration system?

H₀₁ The use of multimedia technology as a training tool is not effective as perceived by first year undergraduate students using a university course registration system.

2. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender?

H₀₂ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender.

3. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major?

H₀₃ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major.

4. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage?

H₀₄ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage.

5. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education?

H₀₅ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education.

6. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency?

H₀₆ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency.

7. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort?

H₀₇ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort.

8. Is perceived effectiveness of the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₈ Perceived effectiveness of the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

9. Is transfer of learning, if any, that may occur from watching the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₉ Any transfer of learning that may occur from watching the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

10. Did transfer of learning occur for first year undergraduate students who viewed the multimedia tutorial?

H₁₀ Transfer of learning did not occur for first year undergraduate students who viewed the multimedia tutorial.

Significance of Study

There have been many studies about the different uses of multimedia training, information and communication technology, and transfer of learning in higher education. This research study contributed to the current literature by proposing new ideas for using multimedia technology in the retention of those who attend higher education institutions. This research study facilitated student understanding of the registration process through the use of multimedia technology, thus providing them with the means to enrich their

academic, professional, and personal lives through the assessment of their own knowledge and learning preferences which may allow for increased satisfaction and retention in higher education.

Definition of Terms

Andragogy: the “art and science of helping adults learn” (Knowles, 1980, p. 43; Merriam & Caffarella, 1999).

Computer Anxiety: the fear evoked by using or the thought of using computers which can result in limited computer use (Brosnan, 1998).

Digital Native: People who were born between the late 1970’s and the early 1990’s; also known as the Net Generation, Millennial Generation, or Generation Y, although also includes those who were born in the late 1990’s and the early 2000’s (known as Generation Z). Digital Natives are considered to be proficient in ICT and the many varied forms of technology (Prensky, 2001).

First Year Undergraduate Student: A high school graduate and with no prior college experience usually entering the university in the summer or fall semester, also known as a First Time in College student (FTIC). For the purpose of this study, first year undergraduate students were referred to as FTICs.

Freshman: A student admitted to higher education who has earned 0-29 credit hours of course work. May also include FTICs and transfer students.

ICT Fluency: ICT fluency is having a high level of proficiency and understanding in the concepts of Information and Communication Technologies (Gross & Latham, 2009; Hilberg & Meiselwitz, 2008; Madigan, Goodfellow, & Stone, 2007).

Information Literacy: According to the Association of College and Research Libraries (ACRL) information literacy is “a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (Gross & Latham, 2009, p. 337-8).

Information and Communication Technology (ICT): Various forms of technology, such as computers, digital forms of communication, educational and social tools that enable communication and collaboration among users.

Information and Communication Technology (ICT) Questionnaire: The ICT Fluency Questionnaire, developed by Dr. Scott Hilberg (2007) is a self-reporting online survey designed to measure ICT fluency. It consists of 54 questions divided into 5 sections: (a) demographics, (b) usage, (c) education/training, (d) fluency, and (e) comfort.

Meaningful Learning: Meaningful learning is defined as a “deep understanding of the material” (Jamet & Le Bohec, 2007, p. 589; Tempelman-Kluit, 2006, p. 366).

Multimedia: Multimedia is the combination of multiple forms of media and content such as interactive videos that may include audio, graphics, text, animation, simulations or demonstrations (Mayer, 2001).

Online Advising & Resource [formally Registration] System (OARS): OARS is a web-based system where students select first semester courses by completing an online form which is sent to an academic advisor for review and sent back to the student once approved or not approved by the academic advisor.

Registration Tutorial: The registration tutorial was developed by the researcher and consisted of three sections: (1) the ICT Fluency Questionnaire (Hilberg, 2007), (2) the Registration Video Tutorial, and the (3) Registration Video Questionnaire.

Registration Video Questionnaire: The Registration Video Questionnaire (RVQ) was developed by the researcher and consisted of 11 Likert-type scale items regarding the course search and registration process and three open-ended questions asking students if they perceived the Registration Video Tutorial to be effective in teaching them about the university course registration system (see Appendix G).

Registration Video Tutorial: The Registration Video Tutorial (RVT) is a multimedia tutorial developed by the researcher through the use of Adobe Captivate Software that mirrored the current course registration system in use the research site. The tutorial also included screen captures of the registration process, animation, narration, and interactive activities as well as a web-based form, developed through the use of CoffeeCup® design software (see Appendix F). The design of the tutorial was based upon the cognitive theory of multimedia learning (Mayer, 2001).

Registration Video Tutorial Transfer of Learning Questionnaire: The Registration Video Tutorial Transfer of Learning Questionnaire (TLQ) was developed by the researcher and consisted of the same 11 Likert-type scale items regarding the course search and registration process as the RVQ. However, students were asked how proficient they thought they were across the 11 items. Two open-

ended questions asking students why they were or were not able to register for classes were also included (see Appendix K).

Retention: Retention is the staying power of a student in higher education. (Tinto, 1975).

Transfer of Learning: Transfer of learning is the degree of retention and continued effective application of knowledge, skills, and attitudes learned from a training context that is successfully transferred and maintained in a workplace context (Baldwin & Ford, 1988).

Delimitations

Only freshmen students who entered the university for the summer and fall semesters of the 2010-2011 academic year were asked to participate in the research study. Furthermore, freshmen had the opportunity to enroll in a Freshman Living Learning Community (LLC) or Freshman Learning Community (FLC) their first semester offered through the Center for Learning and Student Success (CLASS). These students were not subject to view the Registration Tutorial as students who participated in this program did not register for courses on their own. If students decided to withdraw from the FLC or LLC program, they were asked to participate in the study. Additionally, the multimedia tutorial developed by the researcher was designed to address the needs of the freshman population at the research site, thus this study and the results of this study may not generalize to all students.

Limitations

The main limitation of this study was that the researcher relied on each student to self report. Students were asked to enter their university email address on three different questionnaires in order to match their results. The information that was entered did not

match across questionnaires resulting in duplicate and additional responses. This limitation is discussed in further detail in chapter 5. Additionally, students may not have viewed the multimedia tutorial as there was a fast forward function built into the tutorial. Watching the tutorial was tied to students registration holds, and it would have been quite possible for students to fast forward through the tutorial without viewing it in order to have their holds removed. Furthermore, someone other than the student may have viewed the multimedia tutorial and this limitation is discussed in further detail in chapter 5.

Role of the Researcher

For the past five years the researcher has worked very close with the FTIC and freshman student population at the research site, and has noticed that students do not retain the knowledge needed to correctly register for courses. This has brought about student frustration and has led to such ramifications as poor student academic performance, thus the researcher felt an acute interest in providing a means to help solve the problem. Additionally, the researcher had firsthand experience explaining the registration process to FTIC students during orientation. Although the researcher brought their own assumptions, biases and preferences to the study, all efforts were taken to remove all biases during data collection, data analysis, and throughout the length of the study.

Chapter Summary

This chapter presented the increased role of technology in modern society and how ICT has become a frequently used tool for learning in higher education and in the workplace. Students enrolled in higher education are using ICT in their everyday lives

and it is clear that ICT has become an essential component for navigating university life. Concern over the complexity of online registration was raised as students do not fully retain the information needed to successfully register for courses. Whether the lack of understanding of the registration process is due to a poorly designed system, lack of available learning resources, or student's inability to learn the process, is to be determined. Furthermore, the purpose of this study and the research questions were stated, and the limitations and delimitations of the study were also discussed.

Chapter Two discusses the current literature relating to the purpose and significance of the study. The literature review covers such topics as adult learning, Digital Natives as first year students in higher education, student retention, theories of multimedia learning, and transfer of learning.

Chapter Three discusses the research methods used in this study and outlines the sample, procedure, instrumentation, and the research design used for data collection. Chapter Four presents the results of the study and Chapter Five presents the recommendations, summary and conclusions of the study.

Chapter 2

Literature Review

Students who are currently entering higher education are faced with a variety of new learning challenges and, over the course of their career in higher education, develop a variety of skills that enable them to succeed in the workforce. Such skills required for today's workforce are considered to be in the information and communications technology (ICT) category. Technology has become and will continue to be a large factor in our society. Students today are much more in tune with different technologies available to them, and utilize these different forms of technology on a day to day basis. Academic institutions are now adjusting their curriculums to meet the needs of their students, thus providing more ICT resources, which are essential to student's lifelong learning needs.

For the purposes of this research study, it is the assumption of the researcher that providing first year undergraduate students with access to a variety of ICT learning tools that are familiar to them, specifically multimedia learning tools, will enhance their skills as well as their motivation to learn, and the continued effort to "improve and maintain student motivation will lead to better retention and achievement" (Connolly & Murphy, 2005, p. S2C-11). Using ICT to create an influential learning environment may offer students the ability to involve themselves in an "active, self-directed and constructive way, leading to learning results that are more transferable to situations outside school"

(Volman & van Eck, 2001, p. 614), and gain the motivation needed to access the additional resources needed to remain engaged and ultimately lead to increased retention in higher education.

The following review examines the literature which corroborates the idea that multimedia may be an effective learning tool for first year undergraduate students.

Theories regarding adult learning, Digital Natives, retention, multimedia learning, and transfer of learning are discussed.

Adult Learning

Many of the adult learning theories state that adult learners bring a large amount of experience to the learning environment. In addition, adult learners have a demanding set of needs that must be fulfilled in order for learning to occur. Malcolm Knowles, one of the most respected names in andragogy, which is the “art and science of helping adults learn” (Knowles, 1980, p. 43; Merriam & Caffarella, 1999), discussed five assumptions about how adults learn:

- As a person matures, his or her self-concept moves from a dependent to a more self-directed personality.
- Experiences (including mistakes) provide the basis for learning activities.
- Adults are most interested in learning about subjects that have immediate relevance to their job or personal life.
- Adult learning is problem-centered rather than content-oriented.
- Motivation for learning is internal rather than external.

When learning needs were discussed, Amy Rose (1998) stated that there were particular resources adult learners employ for motivation when it comes to their learning

needs. For instance, adults rely on social relationships such as friendships and social welfare. Furthermore, motivation for professional advancement comes from the need to keep ahead of the competition and increase professional status. It should also be noted that many adults have the motivation and the willingness to learn for the sake of learning in order to entertain a curious mind (Rose, 1998).

As noted earlier, Merriam & Caffarella (1999) discussed andragogy and how adult learners are more intrinsically motivated to learn than they are extrinsically motivated. Merriam & Caffarella cited a study by Aslanian and Brickell (1980) who set out to test the hypothesis that life changes will motivate adults to seek out learning experiences. Aslanian and Brickell found that 83% of their sample could express instances where life changes led to learning experiences, while the other 17% of the sample reported they had engaged in learning to stay “mentally alert – or for the social aspects or because learning is a satisfying activity” (Merriam & Caffarella, 1999, p. 53).

Although there are many theories and assumptions about how adults learn, what is known is that learners must meaningfully retain information in order to benefit from a learning experience. One of Knowles (1980) assumptions about how adults learn is that they are interested in learning about subjects that have immediate relevance to their job or personal lives. For example, a human resource manager would design training workshops for employees distributing information through lectures, demonstrations, or group activities. The trainers’ job however, is not completely finished until they have provided each employee with the skills and strategies needed to retain the information.

Cookson (1998) stated that retention of information by learners is directly affected by their amount of practice during the learning experience. In order to retain the

information taught, learners must see a meaning or purpose for learning specific information. They must be able to understand, interpret and apply the information being taught to real life or work situations (Craft, Kerschenbaum, & Ware, 2007). Simply stated, if the information was not learned after the initial training, and immediately applied, learners will not retain the information.

As previously referenced, the theories of adult learning stated that adults are much more self-directed than children and should be treated as such. Adults should be involved in the planning and evaluation of their instruction and learning experiences in order to fully capture, understand, and meaningfully use the information. Students in higher education, who have the opportunity to explore their interests and grow as people, have the ability to become much more self-directed and perhaps feel confident in their academic skills leading to early success in their academic career.

The purpose of this study was to test if first year undergraduate students perceived a multimedia tutorial as effective in teaching them how to use a university course registration system, and if the tutorial helped them retain information. If students had a multitude of resources immediately available (such as multimedia tutorials available on the World Wide Web), then they would be able to practice what they were learning at any time and immediately apply what was learned and this type of immediate feedback could increase their satisfaction with the learning process.

Adults as First Year Students

As previously stated, students in higher education use ICT on a regular basis providing them with a way to navigate through the college experience. Sam, Othman, and Nordin, (2005) cited a survey of first year students conducted by Sax, Astin, Korn,

and Mahoney (1998) which revealed the majority of the students surveyed reported that using the computer had become “a way of life” (Sam et al., 2005) and that it allowed students a way to complete such tasks as class assignments, create study notes, use specialized multimedia for study purposes, research data for projects, e-mail with faculty and friends, search the internet for websites and professional organizations, and use library catalogs and other academic resources (Sam et al., 2005). It is clear that the evolution of technology has greatly impacted the way students learn.

Digital Natives or sometimes called the Net Generation, the Millennial Generation, or Generation Y, include those adults who were born between the late 1970’s and the early 1990’s. Additionally, Generation Z consists of the youth and adults who were born in the late 1990’s and the early 2000’s. For the purposes of this literature review, the Millennial Generation (Generation Y or Net Generation) and Generation Z will be referred to as Digital Natives (Prensky, 2001).

One of the main characteristics of Digital Natives, that makes them different from previous generations, is their increased use of and proficiency with technology. One of the principles Malcolm Knowles (1980) stated regarding adult learning was that adults are most interested in learning about subjects that have immediate relevance to their job or personal lives, and technology is one of the most relevant issues today. According to Junco and Mastrodicasa (2007), Digital Natives consist of traditional-aged college students who have been entering higher education since the year 2000 and are “the most technologically advanced group of students” (p. 17) to enroll in higher education.

What is particularly interesting about Digital Natives is they have never known a time when some form of technology was not available for their use (Junco &

Mastrodicasa, 2007). For example, according to Jones (2002) “20% of current college students began using computers between the ages of five and eight years” (Junco & Mastrodicasa, 2007, p. 42). It is also important to note that Digital Natives use computers and different forms of technology more than any other generation (Junco & Mastrodicasa, 2007). In 2001, Sax, Ceja, and Teranishi conducted a study which included the first group of Digital Natives to attend higher education. They found that 84.5% of first year college students used the computer. The study also showed that 64.1% communicated through e-mail and 70.2% communicated through instant messaging (IM).

Undergraduate students who are currently enrolled in higher education will graduate in the next few years ready to become part of the workforce and it is important to integrate ICT in their learning experiences (Sam et al., 2005) to help these learners become ready for the workforce. Boddie, Contardo, and Childs (2007/08) discussed a possible change in organizational behavior as Digital Natives enter the workforce as they will have specific expectations of the culture, climate, and behavior of the organization. Such expectations include the use of ICT and social networking advancements that have previously been integrated into their daily lives. These expectations, perspectives and unique experiences may ultimately change and drive new organizational behaviors.

Digital Natives are now entering the workforce and are going to become the workforce majority. They may not however, be prepared for the additional professional requirements that a chosen career path would entail. According to Sam et al. (2005), workforce readiness includes “communication skills, competencies in emerging technologies, and critical thinking skills” (p. 205). Although it is clear that most Digital

Natives use some form of ICT in their everyday lives, it is less clear if they are really fluent in ICT and use ICT to maximize workforce readiness.

Information Literacy. Although Digital Natives appear to be fluent in ICT, the demands of the workforce environment will require more than just basic knowledge of Facebook, the internet, and internet accessible mobile phones. Madigan et al. (2007) studied technology literacy among first year college students. They suggested that first year college students should be fluent in ICT as it fosters the ability to “capture, process, store, and transfer information which in turn enables them to focus on information content, communication, analysis, information searching, and evaluation” (p. 410).

The Association of College and Research Libraries (ACRL) defined information literacy as “a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (Gross & Latham, 2009, p. 337-8). Students who are able to search for information above and beyond initial requirements, are practicing for the skills they will need in their academic and work life, as well as fostering an arsenal of lifelong learning abilities (Gross & Latham, 2009; Hilberg & Meiselwitz, 2008; Madigan et al., 2007).

Hignite, Margavio & Margavio (2009) studied information literacy levels among college students and suggest that students need to understand and be able to make skilled decisions from the information they find, not just manipulate technology to complete a task. Furthermore, Bennett, Maton, and Kervin (2008) cited a study by Sutherland-Smith (2002) who observed students searching for text on the internet. The results of the study reported many students feeling frustrated when their search results did not instantly report the answer they were looking for. Lorenzo and Dziuban (2006) suggested that the lack of

immediate gratification may be cause for concern for Digital Natives as the expectation of immediate results will hurt their critical thinking skills. Students may accept the first result provided to them and not challenge the notion that there are additional possibilities. Additionally, these concerns may imply that “students aren’t as net savvy as we might have assumed” (Lorenzo & Dziuban, 2006, p. 2) and their technology proficiency may not be applicable to their work or academic lives.

In order to foster an environment which promotes and educates students about information literacy it is important to understand student’s perceptions of their own abilities when using ICT. The National Research Council (as cited by Hilberg and Meiselwitz, 2008) indentified three types of knowledge necessary for ICT fluency: (1) contemporary skills (being up to date with aspects of ICT, applying today’s technology, and using ICT in a practical sense to build new abilities), (2) foundational concepts (understanding how ICT can evolve, why and how ICT works), and (3) intellectual capabilities (being able to apply ICT in complex situations when problems occur). Hilberg and Meiselwitz (2008) studied ICT fluency and self-perception of ICT ability in undergraduate students. Results showed that students who took the Educational Testing Services’ (ETS) ICT Literacy Assessment scored on average only half the possible points available. These results illustrated a significant difference between students’ perceived and assessed ICT fluency.

Teresa McManus (2006) explained that “access to information technology is not the same as proficiency in the use of information technology” (p. 44) and Kennedy et al. (2008) add:

It is assumed that the technological experiences of students are more or less homogeneous and that most, if not all, incoming university students are Digital Natives. Not only is it assumed that these students will have had broadly universal experiences, but that they will also have a sophisticated knowledge and understanding of information and communication technologies (ICTs). Such generalizations risk overlooking a more complex mix of technological based skills, knowledge and preferences among the student population (p. 109).

It cannot be assumed that all students who enroll in higher education have the same proficiency level with technology, and therefore it was important to research self-perception of ICT fluency of first year students who use technology in order to gain a better understanding of the manner in which educators can provide adequate learning tools to this population of students.

Computer Anxiety: Self-efficacy, Gender, and Major. As already noted, Digital Natives may not be as fluent in ICT as previously thought and there seemed to be a disparity in the fundamental skills required to become fluent with technology (Madigan et al., 2007). Almost twenty years ago researchers found that “one-third of the 14 million college students in the United States suffered from technophobia” (DeLoughry, 1993, p. A25) and now, according to Saade and Kira (2009), about 50% of adults, which include first year undergraduate students “have some sort of computer anxiety” (p. 177). Anxiety impacts computer use and computer based learning, which can affect the level of self-efficacy of computer users. Although self-efficacy was not examined by the researcher for this particular study, self-efficacy does play an important role in a student’s perception of their abilities to use different forms of technology. Computer self-efficacy,

according to Compeau & Higgins (1995), is the “belief of one’s capability to use the computer” (as cited in Sam et al., 2005, p. 206). Learners who do not believe in their abilities when using the computer may not prefer computer-based or technology-based learning and would not view a multimedia tutorial, for example, as an effective learning tool.

Joel Cooper and Kimberlee Weaver (2003) developed a model (see Figure 1) that examined individual’s use and attitudes toward the computer. This model included four factors that influenced the use of, and attitudes toward the computer: (1) computer identification (self-concept about ability to use the computer), (2) computer anxiety, (3) performance attributions, and (4) expectations. The fundamental idea of the model is:

Anything that increases a person’s computer anxiety leads them to doubt their ability, or causes them to disidentify with computers, will lead the individual to form negative attitudes about computers and technology. Negative attitudes in turn, will mean that the individual is more likely to avoid activities, context and careers involving computers (Joiner et al., 2005, p. 372).

Joiner et al. (2005) used this model to investigate if gender differences in internet use existed, and if attitude toward the use of the internet was a factor that influenced gender differences. The results of the study indicated that there were gender differences in the use of the internet, as well as internet identification and internet anxiety related to internet use. The gender differences found however were not explained by internet identification and internet anxiety as internet identification and internet anxiety only reported 40% of the variance in internet use. They suggested that computer self-efficacy

and internet self-efficacy may play a part in explaining the other 60% of the variance in internet use.

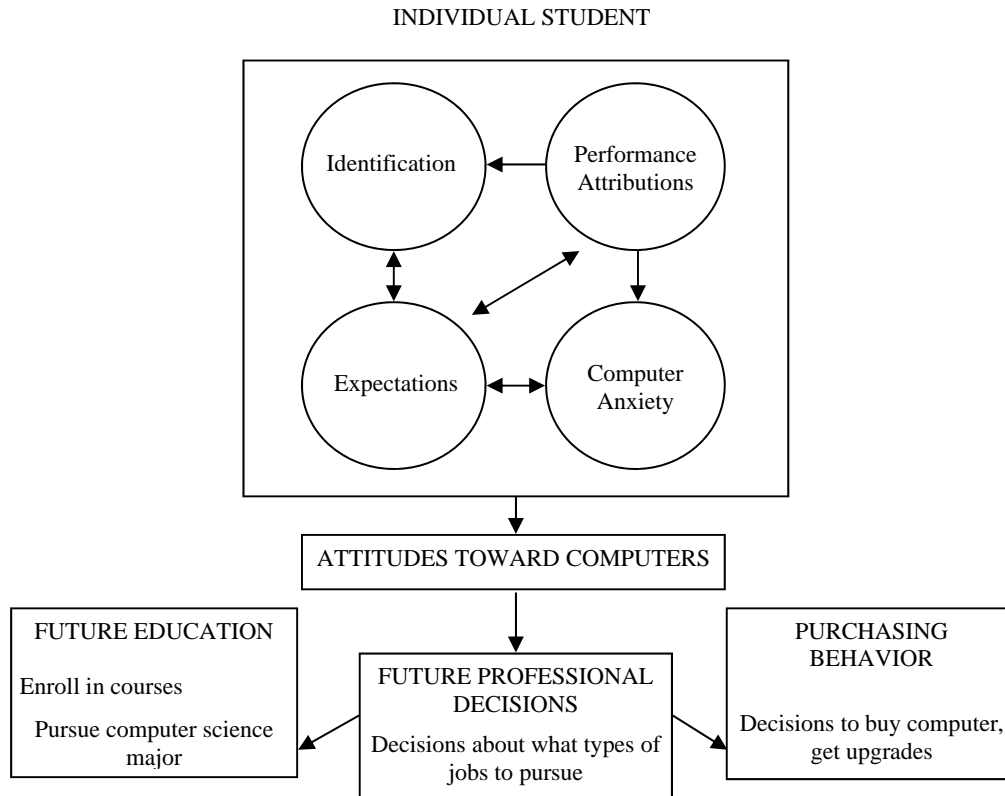


Figure 1. Cooper and Weaver’s (2003) Model of Individual Student. Reprinted with permission.

Research regarding gender differences has focused upon ICT skills and attitudes toward ICT. It was found that women use the computer much less than men (Koch, Müller, & Sieverding, 2008), are much less confident in their ability to use technology than men (Madigan et al., 2007), and use ICT, such as the internet, for very different reasons. Additional studies have found that women may be much more computer phobic than men and have a negative view of technology (Igarria & Chakrabarti, 1990; Rosen & Maguire, 1990) because of “sex role stereotypes, children’s computer games, a male

mystique surrounding computers, the hacker culture, and differences in socialization towards both technology and computers” (Morahan-Martin, 1998, as cited by Schumacher & Morahan-Martin, 2001, p. 97).

Additional research on ICT fluency illustrated a stark difference between how females and males manage technology. Studies on adult education, particularly concerning gender issues, have focused on the learning styles and learning needs of female students and many recommendations have been made to educators about this topic (Belenky, Clinchy, Goldberger, & Tarule, 1986; Salminen-Karlsson, 2009).

Salminen-Karlsson (2009) discussed these recommendations as “areas” to focus upon which included: “self-confidence as a learner, cooperation with other students, relationship to teacher authority, risk taking, and the connection of academic content to everyday life” (p. 152). It was important to focus upon the learning preferences of female students and to understand that the learning needs of this population may be different than that of the male population, specifically with ICT applications (Belenky et al., 1986; Rosser, 1989; Volman & van Eck, 2001).

Even though there seemed to be a gender gap between the way in which females and males approached technology, some argued that when planning educational programs for women, female learners should not be bunched into one specific category. Belenky et al. (1986) and Baxter Magolda (1992) explained that learners, not specifically females, may have different learning preferences depending upon the situation and learning does not “strictly follow the biological sex of the learners” (Salminen-Karlsson, 2009).

As already noted, self-efficacy played an important role in whether or not an individual used ICT. It was reported that men have higher computer self-efficacy than

women and studies examining female student's choice of courses and careers report that self-efficacy played a major role in those decisions (Sam et al., 2005).

The use of computer and interaction with ICT in higher education today has become an integral part of many academic majors. Although there seemed to be conflicting conclusions in the literature, academic major is still considered a possible factor correlating with computer anxiety. Gos (1996) conducted a qualitative study and discussed how computer anxiety affected academic performance. He discussed one participant as saying; "I hated an introductory computer class so much I just quit going to class and humbly accepted a failing grade at the end of the semester. I also vowed I would do anything to avoid another nightmare like that one" (p. 3). The question for educators then becomes, how often will students avoid using technology after a bad experience and how many students will avoid majors or change their major just so they will not have to use any form of ICT? These are important questions as ICT is very much part of education today.

The issue of students avoiding majors that incorporate ICT brought up another interesting point that the amount of women who enrolled and finished a degree in computer science was extremely low. In 2000 the National Science Foundation reported that the amount of computer science degrees women earned had decreased by 37% since 1984 (Mathis, 2002). A study of computer science majors conducted at Carnegie Mellon University found that women felt discouraged with their computer science courses and felt their male peers had more experience using the computer. Although the women's perception that they had less experience with computers was highly correlated with the actual amount of experience they had with computers, the women in the program

however, ended up performing better than they perceived they would have performed (Fisher, Margolis, & Miller, 1997, as cited by Mathis, 2002).

It is important for higher education to promote an environment that fosters information literacy among all students, not just specifically women or men, or certain majors. Understanding the learning needs of students in the digital world as well as the relationships between self-efficacy, computer self-efficacy, computer anxiety, gender, and academic major, would help to promote higher retention rates in higher education and encourage lifelong learning in the workforces' current and future Digital Native students.

Retention

Dr. Vincent Tinto, a leading scholar on student retention, explained how important it is to promote retention in higher education as more than 47% of students in America do not earn a college degree, and about 56% of all students who drop out of higher education leave before their second year (Tinto, 2002). In 2007 the average retention rate across U.S. higher education, specifically from the freshman to sophomore years, was 69% (Jamelske, 2009). It cannot be assumed, however, that every student stays or leaves higher education for the same reason. There are different barriers and situations that students' encounter which contribute to their decision to leave school which are sometimes beyond the control of higher education institutions.

Tinto and researchers in the field of student retention have identified seven leading causes as to why students withdraw from higher education: (1) academic difficulty, (2) adjustment difficulties, (3) goals, (4) commitments, (5) finances, (6) fit, and (7) learning (Tinto, 2001). Tinto's model of college student attrition (see Figure 2) helps

to describe the ideas of “fit” and “learning” and helps to explain the need for the current research study.

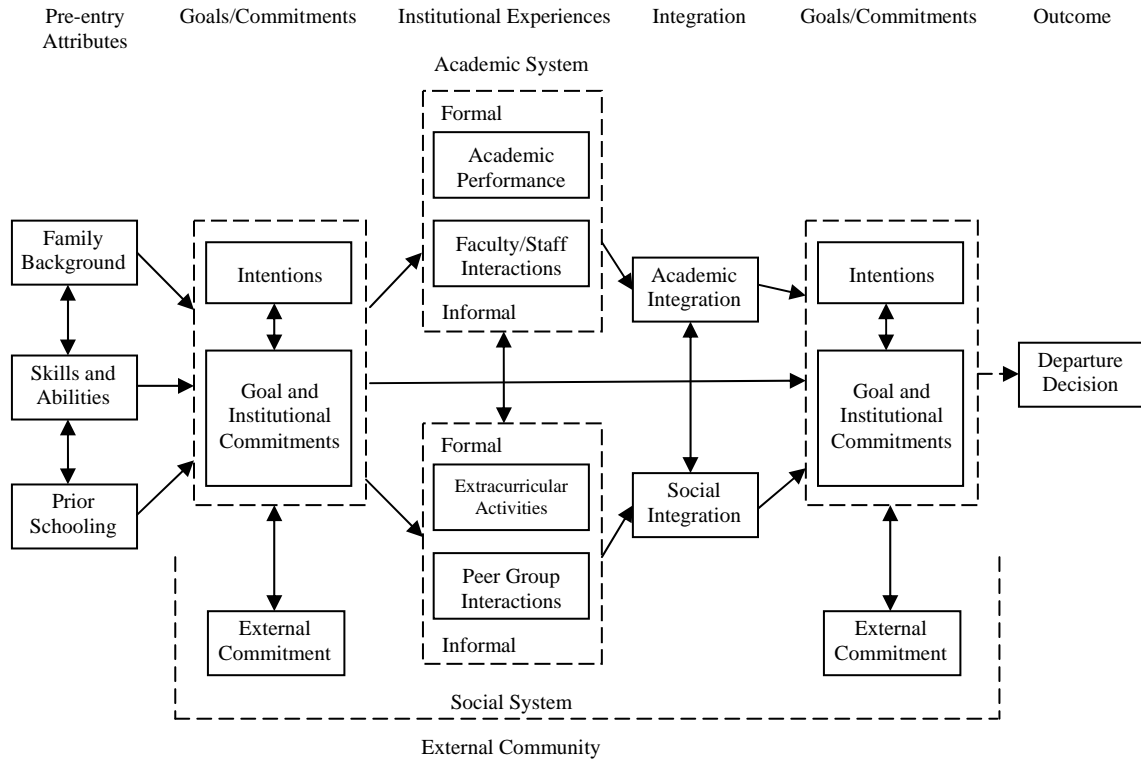


Figure 2. Tinto’s (1975, 1993) Model of College Student Attrition. Reprinted with permission.

Tinto’s model maintains that students must integrate into university life both academically and socially. This corresponds to the argument made by Lau (2003) that when students are satisfied with academic and social systems of a university (both formal and informal), students will tend to stay in school. Tinto (1975) stated:

...the process of dropout from college can be viewed as a longitudinal process of interactions between the individual and the academic and social systems of the college during which a person’s experiences in those systems (as measured by [their] normative and structural integration) continually modify [their] goal and

institutional commitments in ways which lead to persistence and/or to varying forms of dropout (p. 94).

According to Tinto (2001), “fit” or involvement (the “social system” as seen in Figure 2) is an important factor in student retention and some students may leave higher education for the reason that they feel as if they do not “fit” with the institution. Perhaps the atmosphere or the academic programs are not what the student imagined, or there is a lack of a collegial atmosphere, feeling of family, or even a lack of familiarity with learning experiences. What is important about student involvement and important to student retention is that students are able to connect with other students, the campus, professors and administrators (Tinto, 2002). Student involvement is one of the most important factors in student retention and being able to grab hold of students in their first year is even more important.

According to Levitz and Noel (1989) a critical period for first year student transition is during the first two to six weeks of classes. The first weeks of school are extremely important as Pascarella and Terenzini (1992) suggested “the initial encounters with the institution and its people can have profound effects on subsequent levels of involvement and aspirations for intellectual achievement” (p. 4). Students first experiences with and in school, as research suggested, played an important role in their future academic success (Woosley, 2003).

A second factor that contributed to what causes students to leave higher education, as it pertains to this research study, is learning (the “academic system” as seen in Figure 2). Learning is the goal of higher education and as Tinto (2001) stated:

...learning is a predictor of student persistence. Simply put, students who learn

and find value in their learning are students who stay. Least we forget the point of retention is not that students stay, but that they learn and graduate having acquired the knowledge and skills needed for participation in society (p. 3).

Whether for future academic endeavors or workforce goals, learning provides students with the ability to be prepared for their contribution in society. Students need to see the value in their education and understand why they are in college in the first place. Tinto (2002) explained that “learning is a condition of retention. The more students learn, the more value they find in their learning, the more likely they are to stay and graduate” (p. 3). If barriers are in place preventing students from receiving access to the classes they need or desire, in turn taking away the satisfaction they may feel with their academic and educational experience, students may feel lost or frustrated early in their college career thus the highest potential for learning may not occur and students may then choose to leave higher education all together.

Multimedia

Two of the purposes of this research study were to determine if first year undergraduate students perceived a multimedia tutorial as effective and whether or not transfer of learning occurred after using the multimedia tutorial. As Digital Natives might be most comfortable using technology, it was important to understand if providing students with multimedia resources would enhance their abilities to use and retain information about an online course registration system.

Using multimedia is just one of the ways in which educators can help to increase comprehension and understanding. Richard Mayer and Roxana Moreno (2002) stated that “computer based multimedia learning environments – consisting of pictures (such as

animation) and words (such as narration) – offer a potentially powerful venue for improving student understanding” (p. 108). As previously stated, one of the three main purposes of this research study was to see if transfer of learning could occur from viewing a multimedia tutorial. In order for transfer to occur, connections needed to be made and meaningful learning needed to take place.

Meaningful learning is defined as a “deep understanding of the material” (Jamet & Le Bohec, 2007, p. 589; Tempelman-Kluit, 2006, p. 366) and allows learners to apply what has been learned to new situations. Mayer (2001) suggested that active learning is the best way to promote meaningful learning, and meaningful learning depends on the learners “cognitive activity during learning rather than on the learner’s behavioral activity during learning” (p. 18). Researchers contend that in order for multimedia learning tools to promote meaningful learning, specific theories, principles, design elements and “learning experiences that prime appropriate cognitive processing” (Mayer, 2001, p. 19) should be taken into account.

Cognitive Theory of Multimedia Learning. Building upon research by Paivio (1986), Baddeley (1992), Chandler & Sweller (1991), Wittrock (1989), and Mayer (1999), Mayer (2001) developed the Cognitive Theory of Multimedia Learning which explored three core assumptions; (1) dual channels (there are separate channels for visual and verbal processing), (2) limited capacity (limited amounts of information can be processed in each channel at a time), and (3) active processing (selection, organization, and integration of information for both visual and verbal channels). Figure 3 illustrates the cognitive theory of multimedia learning.

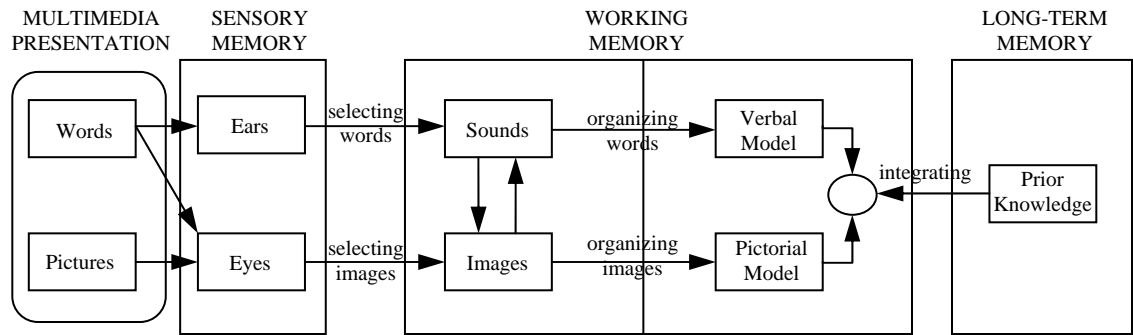


Figure 3. Mayer’s (2001) Cognitive Theory of Multimedia Learning. Copyright © 2011 by the Cambridge University Press. Reprinted with permission.

As information is processed into the working memory, learners pay attention to the presentation mode, as either words or pictures. Learners then capture pertinent fractions of information for each delivery mode, as seen as “selecting words” or “selecting images”. The relevant information is then held in the individuals working memory where learners build connections, for both verbal and visual modes, and organize the information into a “cause and effect chain” (Mayer & Moreno, 2002, p. 111) as depicted by the “verbal model” and “pictorial model” boxes. The last step in this process allows the individual to build connections between both verbal and visual models in their working memory, and use any prior knowledge they have to fully understand what they are viewing and store it on their long-term memory (Mayer & Moreno, 2002).

Using multimedia technologies in higher education can help to increase meaningful learning among first year undergraduate students as meaningful learning occurs when “connections are made between information in the visual and the verbal-processing channels of working memory” (Tempelman-Kluit, 2006). In order to ensure that meaningful learning can occur, multimedia learning tools should take into account the many instructional design elements available. Multimedia learning tools can include,

but are not limited to, using audio, text, animations, demonstrations and simulations concurrently. Using both verbal and visual elements have been found by researchers to enhance learning. Learners are able to pay more attention to the information provided if the information is divided between both visual and verbal channels rather than only two verbal channels or two visual channels (Moreno & Mayer, 1999; Wickens, 1984).

Using Mayer's cognitive theory of multimedia learning and taking additional instructional design elements into account, educators can design and implement effective multimedia learning tools that promote meaningful learning and ultimately higher transfer of learning of information.

The Multimedia Principle. The Multimedia Principle as referenced by Mayer and Johnson (2008) suggested that the use of both words and pictures was better for student learning. Mayer and Anderson (1991) conducted a study using two group of students who viewed a multimedia tutorial which explained how a bike pump worked. One group of students was provided with a visual and audio demonstration of the bike pump, while the other group of students was provided with an audio demonstration only. The results of the study showed that the students who were provided with the visual and audio tutorial demonstrated better problem solving abilities and performed better on transfer tests than the other group of students. Mayer (2001) explained:

When words and pictures are both presented, students have an opportunity to construct verbal and pictorial mental models and to build connections between them. When words alone are presented, students have an opportunity to build a verbal mental model but are less likely to build a pictorial mental model and make connections between the verbal and pictorial mental models (p. 63).

Cognitive Load Theory. Cognitive Load Theory (CLT) developed by Sweller (1994), provided a framework for designing instructional material based on the idea that working memory has a limited storage capacity. Working memory is part of the memory process where learners process and store new information. Therefore, an important factor to consider when designing multimedia is to minimize the load on working memory and maximize the capacity of long term memory (Tempelman-Kluit, 2006). In order to minimize the load of information that is processed in working memory, there are specific theories that need to be addressed.

Allan Paivio's Dual Coding Theory (DCT) (1986) stated that a visual processing channel and a verbal processing channel can be used to strengthen recognition and recall of information being processed in the working memory. Providing pictures and narration creates mental images, and associations are made from these images then stored in the long term memory. However, providing too many elements to be processed (i.e., too many pictures or too many words in a multimedia tutorial) can lead to an overload of information resulting in less information processed.

The Spatial & Temporal Contiguity Principles. The Contiguity Principle (Mayer & Anderson, 1992) stated that multimedia instruction increases in effectiveness "when words and pictures are presented contiguously in time or in space" (p. 444), i.e., when developing multimedia tutorials it is important to present audio (narration) at the same time as the corresponding visual (animation) experience (Mayer & Johnson, 2008). The Spatial Contiguity Principle (Mayer, 2001) suggested that words and pictures need to be presented near each other rather than far from each other. Mayer (2001) also suggested that student learning will increase when the Temporal Contiguity Principle is also taken

into account when designing multimedia learning. The principle suggested that words and pictures should be presented concurrently rather than sequentially.

The Modality Principle. The modality principle as referenced by Mayer & Johnson (2008) suggested that words should be presented verbally (narration) rather than as visual text and can be explained by understanding the Split-Attention Principle. The Split-Attention Principle (Mayer & Moreno, 1998) suggested that students were better able to learn when instructional material did not require them to split their attention between multiple sources of the same information. Mayer and Moreno (1998) conducted a study to find if verbal information should be presented as audio narration or as visual on-screen text. Students viewed an animation that illustrated the process of lightning with either concurrent narration (Group AN) or with concurrent on-screen text (Group AT). Figure 4 represents Group AN and it is shown, according to the cognitive theory of multimedia learning, that the animation (visual images) was held in the visual working memory and the concurrent narration (acoustic images) was held in the verbal working memory.

The results of the first part of this study showed that students in Group AN were able to hold corresponding verbal and visual information in working memory at the same time, and were better able to build connections between the verbal and visual information as evidenced by students generating better problem-solving performance and transfer. Group AT, on the other hand had to hold both animation (visual) and on-screen text (visual) in their visual working memory as depicted in Figure 5.

For students in Group AT, both animation and on-screen text were held in the same space, and highly likely for this experiment, their visual working memory became

overloaded. As the results of this study suggested, students in Group AT were less able to build connections between the animations and on-screen text. As students were watching the animation they were missing the on-screen text and therefore focusing their attention between both visual images thus missing a portion of the information given.

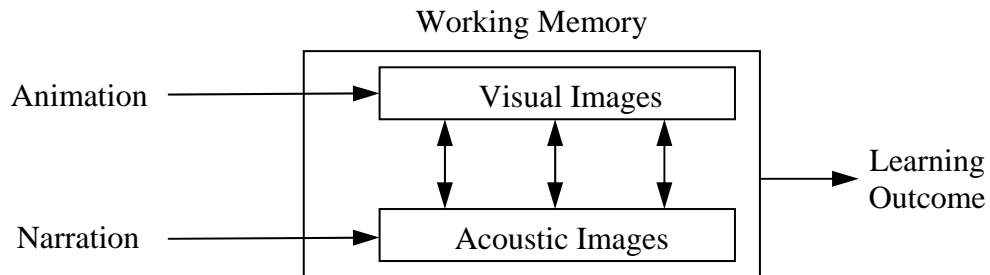


Figure 4. Group AN; Incoming Animation and Narration Held in Different Working Memory Spaces. Mayer, R. E. & Moreno, R. (1998). Copyright © 2011 by the American Psychological Association. Reprinted with permission.

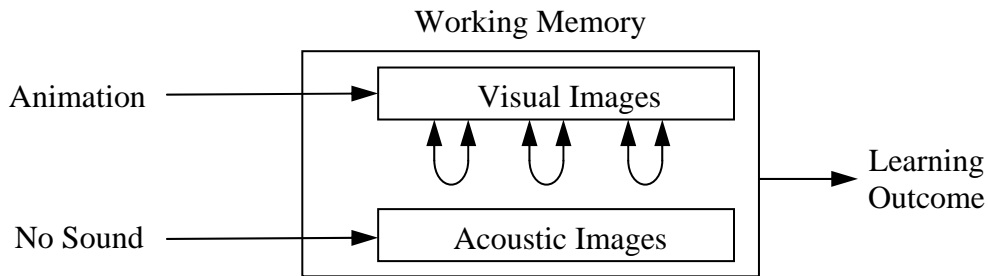


Figure 5. Group AT; Incoming Animation and On-screen Text Held in the Same Working Memory Spaces. Mayer, R. E. & Moreno, R. (1998). Copyright © 2011 by the American Psychological Association. Reprinted with permission.

The Redundancy Principle. An additional design principle that should be taken into account when designing multimedia is eliminating extraneous visual and/or verbal information. The Redundancy Principle (Jamet & Le Bohec, 2007; Mayer, 2001)

suggested that cognitive overload can occur when the same information is presented in different ways or when additional unnecessary information is presented. According to Mayer (2001) and Kalyuga, Chandler, & Sweller (1999) redundancy can negatively impact learning when a verbal explanation of an animation is duplicated as text on the screen. Adding such irrelevant information detracts from the learning process illustrated in Figure 3. Having additional text on screen that is identical to narration forces learners to jump from text to animation back to text all while listening to the same information being spoken. Therefore learners must process and organize more information in the limited amount of space available in their working memory and spend less time engaged in the cognitive processing needed for learning to occur.

In 2008, Mayer & Johnson suggested a revised Redundancy Principle and that the addition of “short redundant on-screen text can guide the learner’s attention toward relevant words (i.e., essential processing) without increasing extraneous processing or fostering generative processing” (p. 384). Mayer and Johnson (2008) conducted a study to test the new theory of redundancy and found that by adding short (two to three words), redundant text near (rather than far from or at the bottom of) a narrated series of static illustrations increased retention of information, however, improvements in transfer of learning did not occur. The reasons transfer did not occur were speculated to be because “the redundant text was not intended to promote generative processing (i.e., deeper cognitive processing), such as organizing the material into coherent representation and integrating it with existing knowledge” (Mayer & Johnson, 2008, p. 383) as illustrated in Figure 3, but to highlight the particular graphic the narration was describing.

It was also suggested that the mixture of verbal and visual modalities may increase the capacity of working memory by stimulating both verbal and visual working memory rather than just one (Mousavi, Low, & Sweller, 1995; Penney, 1989) and increase meaningful learning.

Transfer of Learning

Transfer of learning, according to Carey & Posavac (1997), is the result of training and was an important factor in this research study. If after watching the multimedia tutorial, students were unable to use what they learned from the training to successfully register for their courses, the tutorial was then unsuccessful. It was important that students were able to transfer knowledge from the training to the real life situation of course registration.

Although there have been many definitions of transfer of learning over the years, researchers seemed to agree that transfer of learning is viewed as a system of influences (Holton, Bates, & Ruona, 2000), and how much a behavior is repeated in a new situation (Detterman, 1993). Additionally, Ford and Weissbein (1997) suggested that transfer of learning involved the application, generalizability, and maintenance of new knowledge and skills (Holton et al., 2000, p. 334).

Baldwin & Ford (1988) developed a comprehensive review of the factors that affect transfer of learning and divided them into three categories: (1) training inputs; which included (a) trainee characteristics (ability, personality, and motivation), (b) training design, and (c) work environment; (2) training outputs, which include learning and retention; and (3) conditions of transfer, which include the generalization and maintenance of training.

Figure 7 describes Baldwin and Ford's model of the transfer process. They suggested that training outcomes, or the amount of learning that occurs during training and whether knowledge is retained when the training is complete, had a direct effect on the conditions of transfer, as seen at line 6 in Figure 7. Simply, if knowledge is to be maintained and used continually over time, it must be learned and retained initially. Additionally, trainee characteristics (such as motivation), or work environment, had a direct effect on transfer even if the information was not learned or retained, as seen at lines 4 and 5 in Figure 7. Furthermore, learning and retention were directly affected by training inputs (trainee characteristics, training design, and work environment) as seen at lines 1, 2, and 3 in Figure 7. However, training inputs, through their impact on training outcomes, indirectly affected the conditions of transfer.

The Identical Element Theory developed by Edward Thorndike and Robert Woodworth (as cited by Schunk, 2004) explored how individuals transfer learning that share similar characteristics. Their theory implied that transfer of learning depended on the proportion to which the learning task and the transfer task were similar. Additionally, Holding (1965) summarized the theory by stating that if the task is identical in both training and transfer, learners are just practicing the final task during training thus resulting in high positive transfer (Yarnill & McLean, 2001). Furthermore, Goldstein (1986) suggested that according to the Principles Theory, training should focus on the principles that are necessary to learn a task thus enabling the learner to apply the information learned to the transfer environment.

Similar to Baldwin and Ford's transfer model, Holton (1996) developed a conceptual evaluation model of training that focused on individual performance.

Holton's model suggested that there are three important factors that contribute to transfer of learning; (1) motivation to transfer, (2) transfer climate, and (3) transfer design.

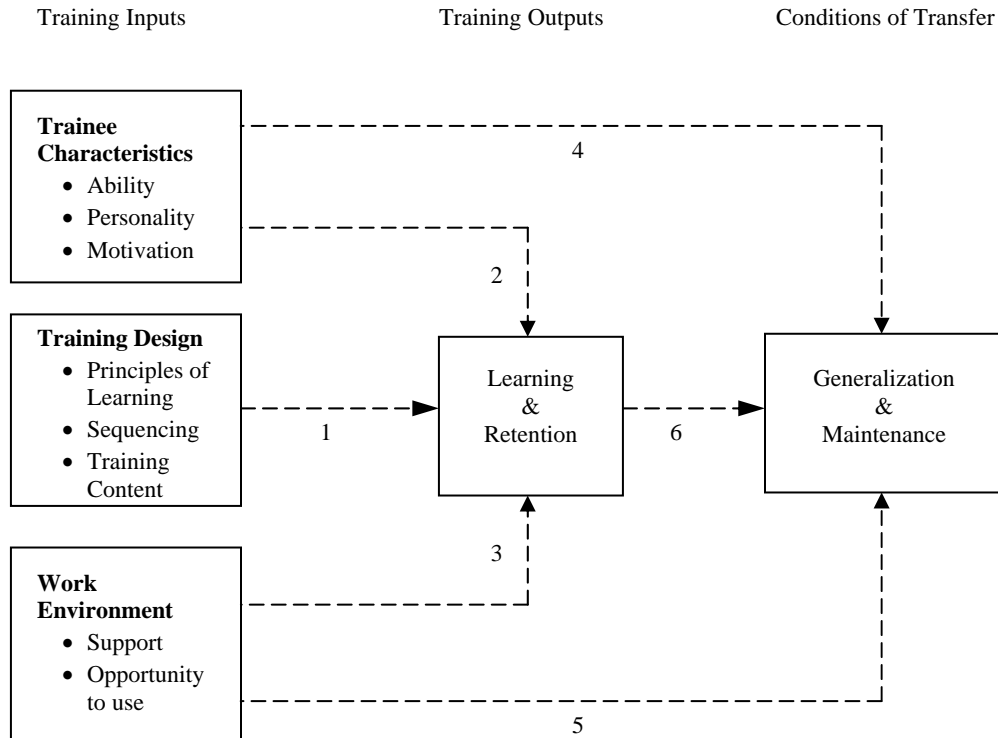


Figure 6. Baldwin and Ford's (1988) Model of the Transfer Process. Copyright © 2011 by John Wiley and Sons. Reprinted with permission.

Chapter Summary

This chapter reviewed the literature on adult learning, Digital Natives, student retention, multimedia instructional design, and transfer of learning. Digital Natives, who have been raised with technology, have a certain proficiency level with technology that previous generations do not. A review of the literature indicated that the use of technology is becoming a common training tool in higher education and it was important

that educators utilize different methods of training to best meet the needs of their students.

Using Baldwin and Ford's model of the transfer process, and referring to Holton's model of training, specifically motivation to transfer, this research study aimed to determine if by using the principles of adult learning, the knowledge about the Digital Natives use of different technologies, and multimedia training design, if first semester undergraduates were able to use a university course registration system after viewing a multimedia tutorial.

Chapter 3 will discuss the methodology used in this study, and the results and findings of this study will be discussed in chapters 4 and 5.

Chapter 3

Methodology

The purpose of this study was to evaluate the perceived effectiveness of a multimedia tutorial for first year undergraduate students (FTICs) using a university course registration system; to determine if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial. The research questions are as follows:

Research Questions

1. Is the use of multimedia technology as a training tool effective as perceived by first year undergraduate students using a university course registration system?

H₀₁ The use of multimedia technology as a training tool is not effective as perceived by first year undergraduate students using a university course registration system.

2. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender?

H₀₂ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender.

3. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major?

H₀₃ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major.

4. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage?

H₀₄ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage.

5. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education?

H₀₅ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education.

6. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency?

H₀₆ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency.

7. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort?

H₀₇ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort.

8. Is perceived effectiveness of the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₈ Perceived effectiveness of the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

9. Is transfer of learning, if any, that may occur from watching the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₉ Any transfer of learning that may occur from watching the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

10. Did transfer of learning occur for first year undergraduate students who viewed the multimedia tutorial?

H₁₀ Transfer of learning did not occur for first year undergraduate students who viewed the multimedia tutorial.

Research Design

To best investigate the topic at hand and to fully consider each research question, both quantitative and qualitative analysis were used in this research study. Table 1 outlines how each research question was addressed.

Table 1

Research Design

Research Question	Method	Analysis
RQ1	Quantitative & Qualitative	Summative score, symmetry test and open ended questions to gather thoughts and perceptions about the effectiveness of the multimedia tutorial.
RQ2	Quantitative	t-test to assess the means of perceived effectiveness of the multimedia tutorial and gender.
RQ3	Quantitative	ANOVA to assess the means of perceived effectiveness of the multimedia tutorial and major.

(table continues)

Table 1 (*continued*)

Research Question	Method	Analysis
RQ4	Quantitative	Pearson correlation to describe if a relationship exists between the perceived effectiveness of the multimedia tutorial and ICT usage.
RQ5	Quantitative	Pearson correlation to describe if a relationship exists between the perceived effectiveness of the multimedia tutorial and ICT education.
RQ6	Quantitative	Pearson correlation to describe if a relationship exists between the perceived effectiveness of the multimedia tutorial and ICT fluency.
RQ7	Quantitative	Pearson correlation to describe if a relationship exists between the perceived effectiveness of the multimedia tutorial and ICT comfort.
RQ8	Quantitative	Multiple Regression to predict multimedia tutorial effectiveness from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.
RQ9	Quantitative	Multiple Regression to predict transfer of learning from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.
RQ10	Quantitative & Qualitative	Paired samples t-test, symmetry test, and open ended questions to gather thoughts and perceptions about transfer of learning that may occur from using the multimedia tutorial.

Sample

The sample selected included first year undergraduate freshmen students who were admitted for the summer and fall semesters of the 2010-2011 academic year, at a large southeastern university consisting of approximately 28,000 students. The sample size for this study was approximately 3,000 students.

Instrumentation

The instrument that was used in this study was the Registration Tutorial designed by the researcher which consisted of three sections. The Registration Tutorial was

available online and was presented in the following order: (1) the ICT Fluency Questionnaire, (2) the Registration Video Tutorial (RVT), and the (3) Registration Video Questionnaire (RVQ). The Registration Video Tutorial Transfer of Learning Questionnaire (TLQ) was also developed by the researcher and presented online.

Information and Communication Technology (ICT) Fluency Questionnaire.

This instrument was developed by Dr. Scott Hilberg (2007) and was an online web-based survey containing 56 questions divided into the following five sections: (1) demographics, (2) usage, (3) education, (4) fluency and (5) comfort. In order to establish validity and reliability, Hilberg and associates pilot tested the instrument with a small group of undergraduate computer and information science students. The undergraduate students who did not participate in Hilberg's final study helped to identify unclear questions which were then modified by Hilberg and associates.

The ICT Fluency Questionnaire was made available online through Snap Professional Edition (SNAP) software, and modifications to the demographics and education sections were made to the ICT fluency questionnaire with permission from the author. Such modifications are outlined in Table 2.

Registration Video Tutorial (RVT). The Registration Video Tutorial was a multimedia tutorial developed by the researcher through the use of Adobe Captivate Software that mirrored the current course registration system in use at the research site. The tutorial included screen captures of the registration process, animation, narration, and interactive activities. The tutorial also included a web-based interactive form developed through the use of CoffeeCup® design software that allowed students to enter their information.

Table 2

Modifications to Hilberg (2007) ICT Fluency Questionnaire

Section	Question Number	Modification
Demographics	Q1	Used as provided
	Q2	Grouped into years
	Q3	Used as provided
	Q4	Was not used
	Q5	Was not used
	Q6	Modified to reflect majors at the university
Usage	Q7 – Q18	Used as provided
Education	Q19	All seven areas of ICT training were included and Q20-Q26 changed from grade levels to years to capture demographic data for current population. Permission granted by Gerri Penney (2010) to use revised ICT items.
	Q20 – Q26	Inserted into Q19
Fluency	Q27 – Q40	Used as provided
Comfort	Q41 – Q56	Used as provided

Note. Question number reflects the original question number in Hilberg (2007) ICT Fluency Questionnaire. The modified ICT Fluency Questionnaire used in this research study followed the same number formatting but question numbers were not visible to students.

In the spring of 2010 the Registration Video Tutorial was pretested by a select group of students (n=7) to determine the relevance of each slide (see Table 3), the quality of graphics, narration, animation, and interactivity (see Table 4). Students were also asked the following open-ended questions: (1) if the multimedia tutorial was effective in teaching them how to register for courses, (2) if they felt they were knowledgeable enough after viewing the multimedia tutorial to register for courses on their own, (3) if they would change anything about the multimedia tutorial to be effective in teaching them how to register for courses, and (4) their overall rating of the multimedia tutorial (see Table 5).

Table 3

Frequency of Slide Relevancy of the Registration Video Tutorial Pretest

	Relevancy ^a				
	1	2	3	4	5
Slide 1			1	3	3
Slide 2			1	1	5
Slide 3			1	3	3
Slide 4			1	1	5
Slide 5				2	5
Slide 6					7
Slide 7			1	1	5
Slide 8				4	3
Slide 9				2	5
Slide 10			1	1	5
Slide 11				2	5
Slide 12				1	6
Slide 13					7
Slide 14				1	6
Slide 15					7
Slide 16					7
Slide 17				1	6
Slide 18		1		3	3
Slide 19			1	1	5
Slide 20				1	6
Slide 21				1	6
Slide 22					7
Slide 23				1	6
Slide 24				3	4
Slide 25			1	1	5
Slide 26		1			6
Slide 27					7
Slide 28				2	5
Slide 29				3	4
Slide 30				1	6
Slide 31				1	6
Slide 32				1	6
Slide 33				2	5
Slide 34				3	4

^a 1-5: answering options for the Likert-type scale,
1 = not relevant, 5 = most relevant

Table 4

Perceived Quality of Graphics, Narration, Animation, and Interactivity of Registration Video Tutorial

	Frequency				
	Very Poor	Poor	Fair	Good	Excellent
Graphics				4	3
Narration			1	3	3
Animation				5	2
Interactivity			1	1	5

Table 5

Perception of Effectiveness of RVT and Overall Rating

Question	Frequency		Examples of Qualitative Responses
	Yes	No	
Did you perceive the multimedia tutorial to be effective in teaching you how to register for your classes?	7		<p>“It was very effective because the voice draws attention to the video making freshmen alert”.</p> <p>“The interactive feature was also very effective to students who are tactile learners”.</p> <p>“Tutorial helps you step-by-step to register as well as inform you about important information”.</p> <p>“Very straight forward and easy to comprehend”.</p> <p>“Tutorial is very effective and I wish I had it last year”.</p> <p>“Interactive feature is a great way to practice”.</p> <p>“The detail about different situations you can encounter helps with registration errors”.</p>
Do you feel you are knowledgeable enough, after watching the multimedia tutorial, to register for classes on your own?	6	1	<p>“Gave me specific directions”, “all necessary steps”.</p> <p>“Each step had a purpose”.</p> <p>“Goes into detail and different situations”.</p> <p>“Most difficult spots when registering were broken down into simple steps”.</p>

(table continues)

Table 5 (continued)

Question	Frequency		Qualitative Responses		
	Yes	No			
			(Example of participant NO response) – “People need practice to get adjusted for registering for classes. A video is not the only way people are going to learn to register, they need more than that”.		
Would you change anything about the multimedia tutorial in order for you to perceive it as effective in teaching you how to register for classes?	1	6	(Example of participant YES response) – “The background music was repetitive and could be distracting at times, fix volume issues with narration”.		
	Very Poor	Poor	Fair	Good	Excellent
Overall Rating				3	4

Registration Video Questionnaire (RVQ). The Registration Video

Questionnaire (RVQ) was developed by the researcher and made available online through SNAP. Students were asked to rate how effective the multimedia tutorial was in teaching them about 11 different items related to the course search and registration process. Each item was rated on a scale of 1 (poor) to 5 (excellent). Three open-ended questions were also included which asked students; (1) if the multimedia tutorial was effective in teaching them how to register for courses, (2) if they felt they were knowledgeable enough after viewing the multimedia tutorial to register for courses on their own, and (3) if they would change anything about the multimedia tutorial to be effective in teaching them how to register for courses.

Registration Video Tutorial Transfer of Learning Questionnaire (TLQ). The Registration Video Tutorial Transfer of Learning Questionnaire (TLQ) was developed by the researcher and made available online through SNAP and was used to assess student proficiency with the university course registration system. The TLQ mirrored the RVQ with the exception of the open-ended questions, which were revised to ask; (1) please explain why you were able to register for classes using the information you received from the Registration Video Tutorial, and (2) please explain why you were not able to register for classes using the information you received from the Registration Video Tutorial. Students did not view the TLQ until after November 15, 2010.

Procedure

All incoming FTICs were required to complete online advising in order to register for classes their first semester. Students were required to complete the Online Advising and Resource System (OARS) by going on the internet and logging into the OARS system. They had the option of watching a multimedia tutorial that guided them through the completion of their OARS form. Once students completed their OARS form, they received an email stating that their OARS form was submitted and would be reviewed by their academic advisor. An academic advisor then reviewed their selected courses and either approved or rejected the students OARS form. While students were waiting for their OARS form to be processed, they had the opportunity to complete the Registration Tutorial. When students received the email indicating that their OARS form had been submitted, (and when students received the email indicating their OARS form had been approved), students were given step-by-step instructions about how to access and complete the Registration Tutorial.

Each student had two specific registration holds on their account that were, in past years, removed once they completed OARS. However, for the purposes of this research study these holds (Freshman Advising and Orientation) were removed only once students completed the Registration Tutorial as completion of the tutorial was required by Freshman Academic Advising Services.

Given that completion of the Registration Tutorial was tied to the removal of each student's freshman advising and orientation holds, (which would have kept them from registering for courses if the holds were not removed), students who felt strongly about not participating in the research study were able to contact the researcher. In this case the researcher emailed each participant a hyperlink where they were able to view the Registration Video Tutorial and enter their personal information to have their holds removed. These students were not included in data collection.

Step 1: ICT Fluency Questionnaire. Students accessed the Registration Tutorial by going to a specific web link provided to them in an email through OARS. Students were able to read and give their informed consent to participate in the research study by clicking "I Agree" on the first page. Students were made aware that if they were not at least 18 years of age they would have to notify the researcher and complete a different version of the Registration Tutorial consisting of just the multimedia tutorial. Students were then asked to enter their university email address so the researcher could match their responses to post tutorial questions. Once students entered their email address they proceeded to complete the ICT Fluency Questionnaire (see Appendix E).

Step 2: Registration Video Tutorial. Once students clicked the submit button on the ICT Fluency Questionnaire, they were immediately brought to the multimedia

tutorial (see Appendix F) which took about 12-15 minutes to view. As soon as each student completed the RVT they were directed to an online web form (see Appendix H) and were asked to enter their full legal name, personal identification (Z) number, and university email address. An email was sent to the researcher and the researcher then removed the student's registration holds and kept their name in a password protected Microsoft Access database in order to send them the transfer of learning questionnaire in three months time.

Step 3: Registration Video Questionnaire. Completing the RVQ was the third step in completing the Registration Tutorial. After students finished entering their personal information on the web form and clicked submit, they were immediately taken to the RVQ (see Appendix G) and were asked to answer 11 Likert-type scale questions and three open-ended questions about the effectiveness of the RVT. As soon as students clicked the submit button on the RVQ they were taken to another webpage thanking them for participating in and completing the Registration Tutorial (see Appendix I). It is important to note that three weeks into data collection the researcher observed that students were not completing the RVQ and stopping at the web form. Therefore after approval from IRB, the researcher moved the web form where students entered their personal information to after the RVQ which resulted in students completing the RVQ.

Step 4: Registration Video Tutorial Transfer of Learning Questionnaire. On November 15, 2010 the researcher tested for transfer of learning by emailing a hyperlink (see Appendix J) to the TLQ to all the students (n=1,061) who completed the RVQ. Students received this e-mail after the initial advance registration period at the university began and data collection lasted until December 3, 2010, no more than three weeks after

the initial email was sent to students. The questionnaire included the same 11 Likert-type scale questions as the RVQ with two different open-ended questions (see Appendix K). Once students clicked the submit button they were again taken to a website thanking them for their participation (see Appendix L).

Student Information

Although each student was asked to enter their university email address, their information was only used to link their pre and post survey results and their email addresses were deleted after their survey results were matched. Student names and personal identification (Z) numbers were in no way linked to survey results in order to protect their identity. As previously stated, the list of students was kept in a password protected Access database and the researcher's computer and login information was also password protected. All information was destroyed after the TLQ email was sent to students. Furthermore, students were notified at the beginning of the study that they were being asked to participate in a research study for a doctoral dissertation. Even though students were required to view the Registration Video Tutorial as a part of completing their required online advising (OARS), students were able to opt out of completing the ICT Fluency Questionnaire, Registration Video Questionnaire, and the Registration Video Tutorial Transfer of Learning Questionnaire.

Data Analysis

Perceived effectiveness of the multimedia tutorial was analyzed through a post survey, the RVQ, immediately after students viewed the RVT. Students were asked to rate how effective the tutorial was on 11 different items on a scale of 1 (poor) to 5 (excellent). The summative scores of all items were used to determine multimedia

tutorial effectiveness and a symmetry test was performed to determine if the distribution of responses to the RVQ were symmetric. Qualitative analysis, finding themes in student responses, through the use of three open-ended questions was also used to determine if students thought the multimedia tutorial was effective and were provided an area to write in their responses.

A t-test was run to assess if there was a relationship between perceived effectiveness of the multimedia tutorial and gender, and an ANOVA was run to assess if a relationship existed between the perceived effectiveness of the multimedia tutorial and student's selected major. Student's majors were grouped by college (if a student selected psychology as their major, they would be grouped into the College of Science), thus assessing the mean differences across each college rather than major.

The Pearson product correlation method was used to describe if a relationship existed between the perceived effectiveness of the multimedia tutorial and ICT usage, ICT education, ICT fluency, and ICT comfort. Furthermore, a multiple linear regression was run to evaluate: (1) if perceived multimedia tutorial effectiveness could be predicted from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort, and (2) if transfer of learning could be predicted from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

Transfer of learning was analyzed through the TLQ three months after students viewed the RVT. Students were asked to rate how proficient they felt they were on the same 11 items as the RVQ, on a scale of 1 (poor) to 5 (excellent). The summative scores of all items were used to determine transfer of learning and a symmetry test was performed to determine if the distribution of responses to the TLQ were symmetric. A

paired-samples t-test was also run to compare transfer of learning and perceived multimedia tutorial effectiveness.

Students also had the opportunity to explain why they felt transfer of learning did or did not occur and if they felt the multimedia tutorial helped with transfer of learning. These responses were analyzed using qualitative methods, in search of themes in the data, in order to best capture the opinions and perceptions of the students regarding transfer of learning and the effectiveness of the multimedia tutorial.

Chapter Summary

Chapter three discussed the purpose of the study as well as the proposed research questions. The sample, instrumentation, data collection, and data analysis were also discussed. Chapter four provides the findings of the study and chapter five reviews the recommendations and conclusions of the study.

Chapter 4

Findings

The purpose of this study was to evaluate the perceived effectiveness of a multimedia tutorial for first year undergraduate students (FTICs) using a university course registration system; to determine if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial.

Research Questions

1. Is the use of multimedia technology as a training tool effective as perceived by first year undergraduate students using a university course registration system?

H₀₁ The use of multimedia technology as a training tool is not effective as perceived by first year undergraduate students using a university course registration system.

2. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender?

H₀₂ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender.

3. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major?

H₀₃ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major.

4. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage?

H₀₄ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT usage.

5. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education?

H₀₅ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education.

6. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency?

H₀₆ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency.

7. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort?

H₀₇ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort.

8. Is perceived effectiveness of the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₈ Perceived effectiveness of the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

9. Is transfer of learning, if any, that may occur from watching the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₉ Any transfer of learning that may occur from watching the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

10. Did transfer of learning occur for first year undergraduate students who viewed the multimedia tutorial?

H₁₀ Transfer of learning did not occur for first year undergraduate students who viewed the multimedia tutorial.

The following chapter presents the results of the study outlined and discussed by individual research question. The data were analyzed using SPSS Version 17.0 as well as Microsoft Excel to organize and analyze the qualitative data while looking for recurring themes to best help answer the proposed research questions.

Instrumentation Demographics

The following describes the number of responses for each instrument:

OARS & the Registration Tutorial. For the 2010-2011 academic year, a total of 3,050 First Time in College students (FTICs) were admitted to the university for the summer (n=462) and fall (n=2,588) semesters. Of the 3,050 students, 2,770 completed OARS and 2,622 viewed the Registration Tutorial. Because OARS and the multimedia tutorial were available before the research study was approved by the university's Institutional Review Board (IRB), 1,526 students viewed the Registration Tutorial without participating in the research study. Those students viewed only the multimedia

tutorial and did not complete the ICT Fluency Questionnaire or the RVQ. After the research study was approved by IRB a total of 1,127 students completed the Registration Tutorial with 31 students contacting the researcher to indicate they were not at least 18 years of age and therefore could not participate in the study. Therefore 1,096 students participated in the research study. Table 6 offers an overview of OARS and the Registration Tutorial demographics.

Table 6

OARS and Registration Tutorial Demographics

Demographic	Type	n	%
Admitted for 2010-2011 Year			
	Summer	462	15.00
	Fall	2,588	85.00
	Total	3,050	100.00
Completed OARS			
	Total	2,770	100.00
Viewed the Registration Tutorial			
	Before IRB	1,526	57.00
	After IRB	1,127	42.00
	Not at least 18	31	1.00
	Total	2,622	100.00

ICT Fluency Questionnaire. Once each student completed OARS they were instructed to complete the Registration Tutorial. The ICT Fluency Questionnaire was the initial survey students viewed which resulted in 1,912 submissions. After deleting 514 duplicate responses indicated by participant email address, and 14 completely blank

responses, the ICT Fluency Questionnaire SPSS file consisted of 1,384 responses. See Table 7 for a summary of the ICT Fluency Questionnaire demographics.

Registration Video Questionnaire. The RVQ was the second survey students completed which took place after each student viewed the multimedia video tutorial and resulted in 1,128 submissions. Sixty-seven (67) duplicate responses were deleted as indicated by students email address, thus the RVQ SPSS file consisted of 1,061 responses. Table 7 provides a summary of the RVQ demographics.

Combined: ICT Fluency Questionnaire and Registration Video Questionnaire. The ICT Fluency Questionnaire and the RVQ SPSS files were merged by matching student email address in order to match student responses. The merge of the RVQ into the ICT Fluency Questionnaire resulted in 1,476 responses. Upon further inspection of the combined database the researcher found 141 additional duplicate responses. These duplicate responses were deleted resulting in a different sample of (n=1,335) students and the deletion of additional responses is discussed in greater detail in chapter 5. Furthermore, 139 additional responses were identified as students who had reported they were not at least 18 years of age and therefore should not have completed the research study. These responses were deleted and not included in the final sample of (n=1,196) students. Table 7 provides a summary of the combined ICT Fluency Questionnaire and RVQ demographics.

Registration Video Tutorial Transfer of Learning Questionnaire. A hyperlink was emailed to 100% (n=1,061) of the students who had completed the RVQ and of the 1,061 emails sent, 37 resulted in delivery failures meaning the email addresses the students provided were either blocked or not a valid email address. A total of 74 students

responded and eight (8) duplicate responses were deleted resulting in a total response rate of 6.25%. All 66 responses were merged into the ICT and RVQ database resulting in zero duplicate responses. Table 7 provides a summary of the TLQ demographics.

Table 7

Instrumentation Demographics

Instrument	Type	n	%
ICT Fluency Questionnaire			
	Submitted Responses	1,912	100.00
	Duplicates Deleted	514	27.00
	Completely Blank	14	0.70
	Total	1384	72.00
Registration Video Questionnaire			
	Submitted Responses	1,128	100.00
	Duplicates Deleted	67	6.00
	Total	1,061	94.00
ICT & RVQ			
	Merged Responses	1,476	100.00
	Duplicates Deleted	141	9.60
	Not at least 18	139	9.40
	Total	1,196	81.00
Registration Video Tutorial Transfer of Learning Questionnaire			
	Students Emailed	1,061	100.00
	Delivery Failure	37	3.50
	No Response	950	89.5
	Submitted Responses	74	7.00
	Duplicates Deleted	8	0.75
	Total	66	6.25

Participant Demographics

Of the final sample of 1,196 students, 600 were male and 546 were female with 50 students not responding. As expected of the freshman population, 90.8% of the sample reported that they were 18-21 years of age. Additionally, 2.4% reported they were 22-24 years of age, 1.4% reported they were between 25-30 years of age, and 1.1% reported they were between 31- 40 years of age. An additional 0.5% of the students responded they were the following: between 41-50 years of age (0.2%), 51- 60 years of age (0.2%), 61 or more years of age (0.1%), and 46 students did not respond. The reported age of students is discussed further in chapter 5. When asked about their race and ethnic background half of the students identified themselves as Caucasian (50%), 20.2% as Hispanic, 13.6% as African American, 4% as Asian, 0.7% as Native American, and 7.1% as Other, with 4.3% not responding.

Students were also asked what major they planned to pursue. As there were 52 majors at the research site, each major was grouped into their respective college. A total of 95.6% responded with a specific major with 4.4% not responding. As observed in previous years, a large number of students (25.3%) indicated they were pursuing a major in the College of Science, while 13.8% indicated their major was Business. Furthermore, 10.7% indicated Engineering as their major, 10.6% in the College of Arts and Letters, 6.4% reported to be Education majors, 5.8% were Nursing majors, 5.4% indicated their major to be in the College of Design and Social Inquiry, and a substantial amount of students (17.7%) reported to be Undecided about their major. Table 8 provides greater detail of participant demographics.

Table 8

Participant Demographics

Demographic	Type	n	%
Gender	Male	600	50.20
	Female	546	45.60
	Missing	50	4.20
	Total	1196	100.00
Age	18-21	1086	90.80
	22-24	29	2.40
	25-30	17	1.40
	31-40	13	1.10
	41-50	2	0.20
	51-60	2	0.20
	61 or more	1	0.10
	Missing	46	3.80
	Total	1196	100.00
Race/Ethnic Background	African American	163	13.60
	Asian	48	4.00
	Caucasian	598	50.00
	Hispanic	242	20.20
	Native American	8	0.70
	Other	85	7.10
	Missing	52	4.30
	Total	1196	100.00
Major into College	Undecided	212	17.70
	Design & Social Inquiry	64	5.40
	Arts & Letters	127	10.60
	Business	165	13.80
	Education	76	6.40
	Engineering	128	10.70
	Nursing	69	5.80
	Science	302	25.20
	Missing	53	4.40
Total	1196	100.00	

Multimedia Tutorial Effectiveness

Two of the three purposes of the research study were to determine if first year undergraduate students perceived a multimedia tutorial as effective in teaching them how to use a university course registration system and if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort. In order to evaluate multimedia tutorial effectiveness, the students viewed the multimedia tutorial then completed the RVQ to evaluate multimedia tutorial effectiveness across 11 items related to the course search and registration process.

Research Question 1. Is the use of multimedia technology as a training tool effective as perceived by first year undergraduate students' using a university course registration system?

H_{01} The use of multimedia technology as a training tool is not effective as perceived by first year undergraduate students' using a university course registration system.

The mean sample score of multimedia tutorial effectiveness for 898 students was 4.19 ($SD = 0.756$) with 5.00 representing the highest score. Figure 7 illustrates the frequency distribution of responses for perceived effectiveness of the multimedia tutorial. To better evaluate the distribution of multimedia tutorial effectiveness a symmetry test, developed by Cooper (1976) and Whitney (1978) was performed. The computer program designed by Morris (1979) was used to test the null hypothesis that the responses of multimedia tutorial effectiveness were symmetric. Results showed that the distribution of responses for perceived multimedia tutorial effectiveness (RVQ) leaned in a positive

direction and were not symmetric. Therefore the null hypothesis was rejected ($p < .001$) and Table 9 summarizes these findings.

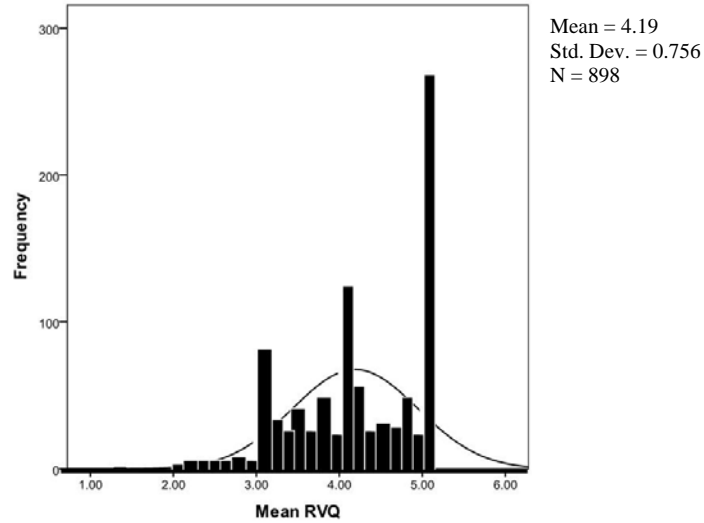


Figure 7. Frequency distribution of multimedia tutorial effectiveness.

Table 9

Symmetry Test Results for Multimedia Tutorial Effectiveness (RVQ)

P^a	BA	A	AA	E	Cooper		Whitney		
					Z	p	df	t	p
3	3	126	198	565	31.188	0.000	894	57.330	0.000
2	7	135	209	539	30.222	0.000	891	54.169	0.000
4	23	188	237	443	25.822	0.000	894	40.816	0.000
5	31	213	257	391	23.574	0.000	896	36.161	0.000
7	21	200	249	416	24.763	0.000	892	38.532	0.000
4	21	231	276	365	23.078	0.000	896	36.694	0.000
5	34	236	251	371	22.417	0.000	896	33.871	0.000
8	29	185	257	419	24.788	0.000	897	37.928	0.000
6	26	195	251	417	24.759	0.000	894	38.377	0.000
1	27	211	271	385	23.931	0.000	894	38.310	0.000
10	26	233	250	375	22.573	0.000	893	33.771	0.000

^a Answering options for RVQ Likert-type scale,
P = Poor, *BA* = Below Average, *A* = Average, *AA* = Above Average, *E* = Excellent

Research Question 2. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender?

H₀₂ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and gender.

To analyze if a relationship existed between multimedia tutorial effectiveness and gender, the researcher performed an independent samples t-test. The results showed there was no significant difference in multimedia tutorial effectiveness scores for males ($N = 461$, $M = 4.15$, $SD = 0.749$) and females ($N = 414$, $M = 4.23$, $SD = 0.755$); $t(873) = 1.63$, $p = .104$. Therefore the researcher failed to reject H₀₂ as no relationship existed between multimedia tutorial effectiveness and gender.

Research Question 3. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major?

H₀₃ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and major.

A one-way analysis of variance (ANOVA) was conducted to compare perceived multimedia tutorial effectiveness between different majors. As there were 52 majors, each major was dummy coded into a respective college resulting in eight colleges. The results showed no statistical difference between colleges on multimedia tutorial effectiveness at the .05 alpha level $F(7,868) = 0.708$, $p = 0.665$. Therefore the researcher failed to reject H₀₃ as no relationship existed between multimedia tutorial effectiveness and major. Table 10 provides an overview of multimedia tutorial effectiveness for each college.

Table 10

Multimedia Tutorial Effectiveness by College

College	N	M	SD	SE	95% CI		Minimum	Maximum
					LL	UL		
Undecided	169	4.13	0.788	0.061	4.01	4.25	2.00	5.00
Design & Social Inquiry	43	4.29	0.899	0.137	4.01	4.57	1.36	5.00
Arts & Letters	86	4.27	0.743	0.080	4.11	4.43	2.27	5.00
Business	128	4.12	0.752	0.066	3.98	4.25	2.45	5.00
Education	61	4.19	0.690	0.884	4.01	4.36	2.60	5.00
Engineering	100	4.15	0.681	0.681	4.01	4.28	2.64	5.00
Nursing	55	4.23	0.738	0.099	4.03	4.43	2.30	5.00
Science	234	4.22	0.746	0.049	4.13	4.32	2.00	5.00
Total	876	4.19	0.751	0.025	4.14	4.24	1.36	5.00

Research Question 4. What relationship exists, if any, between first year undergraduate students’ perceived effectiveness of the multimedia tutorial and ICT usage?

H₀₄ There is no relationship between first year undergraduate students’ perceived effectiveness of the multimedia tutorial and ICT usage.

The mean sample score of ICT usage (the number of hours a week spent using ICT) was 2.94 (*SD* = 0.908, *N* = 1,124) and Figure 8 illustrates the frequency distribution of ICT usage. A Pearson product correlation was computed to examine if a relationship existed between perceived multimedia tutorial effectiveness and the amount of hours

spent using ICT. The results showed there was a statistically significant positive correlation between perceived multimedia tutorial effectiveness and ICT usage ($p < 0.01$). Therefore the researcher rejected H_{04} as there was a very weak positive relationship between perceived multimedia tutorial effectiveness and ICT usage, thus the more hours a week spent using ICT, the more effective the multimedia tutorial was perceived to be. These results are summarized in Table 12.

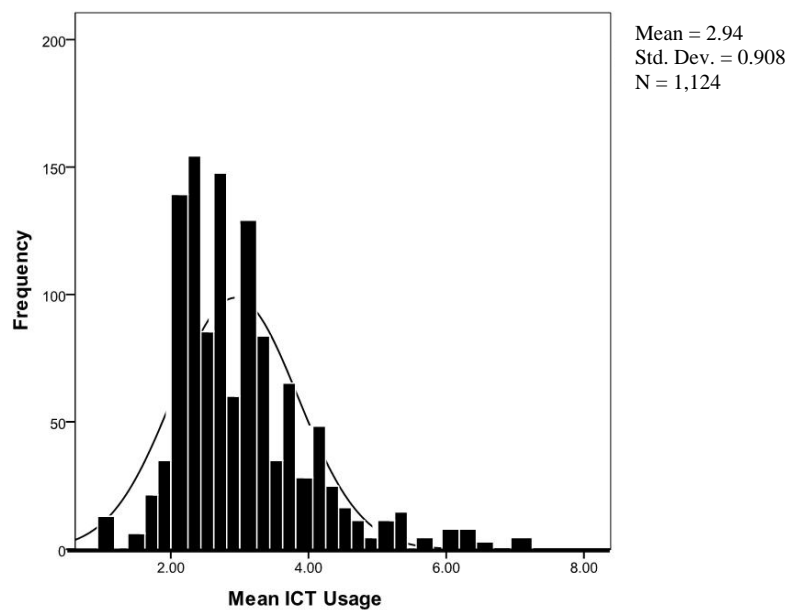


Figure 8. Frequency distribution of ICT usage.

Research Question 5. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education?

H_{05} There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT education.

The mean sample score of ICT education for 1,120 students was 2.26 ($SD = 0.908$). Table 11 illustrates the frequency distribution of responses for ICT education. A Pearson product correlation was computed to examine if a relationship existed between perceived multimedia tutorial effectiveness and how many years it has been since students have received education in ICT. The results showed there was no statistically significant correlation between perceived multimedia tutorial effectiveness and ICT education, $p = .081$. Therefore the researcher failed to reject H_{05} as there was no relationship between perceived multimedia tutorial effectiveness and ICT education. These results are summarized in Table 12.

Table 11

Distribution of Responses for ICT Education

Type of Education	Number of Years	n	%
Introduction to Computers	Within the last 5 years	401	33.50
	6-10 years ago	318	26.60
	More than 10 years ago	182	15.20
	Not at all	213	17.80
	Missing	82	6.90
	Total	1196	100.00
Windows or other operating systems	Within the last 5 years	379	31.70
	6-10 years ago	317	26.50
	More than 10 years ago	114	9.50
	Not at all	282	23.60
	Missing	104	8.70
	Total	1196	100.00
Research, library or information science	Within the last 5 years	415	34.7
	6-10 years ago	320	26.80
	More than 10 years ago	90	7.50
	Not at all	266	22.20
	Missing	105	8.80
	Total	1196	100.00

(table continues)

Table 11 (*continued*)

Type of Education	Number of Years	n	%
Word, Excel, PowerPoint, or Access	Within the last 5 years	539	45.10
	6-10 years ago	333	27.9
	More than 10 years ago	65	5.4
	Not at all	174	14.5
	Missing	85	7.1
	Total	1196	100.00
Email	Within the last 5 years	372	31.1
	6-10 years ago	310	25.90
	More than 10 years ago	78	6.50
	Not at all	337	28.20
	Missing	99	8.30
	Total	1196	100.00
Programming	Within the last 5 years	358	30.00
	6-10 years ago	162	13.50
	More than 10 years ago	35	2.90
	Not at all	540	45.20
	Missing	101	8.40
	Total	1196	100.00
Internet	Within the last 5 years	329	27.50
	6-10 years ago	340	28.40
	More than 10 years ago	122	10.20
	Not at all	305	25.50
	Missing	100	8.40
	Total	1196	100.00

Research Question 6. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency?

H₀₆ There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT fluency.

The mean sample score of ICT fluency for 1,122 students was 3.68 (*SD* = 0.751) and Figure 9 illustrates the frequency distribution of ICT fluency. A Pearson product

correlation was computed to examine if a relationship existed between perceived multimedia tutorial effectiveness and ICT fluency. The results showed there was a statistically significant positive correlation between perceived multimedia tutorial effectiveness and ICT fluency ($p < 0.01$). Therefore the researcher rejected H_{06} as there was a weak positive relationship between perceived multimedia tutorial effectiveness and ICT fluency, thus the more fluent one is with ICT, the more effective the multimedia tutorial is perceived to be. These results are summarized in Table 12.

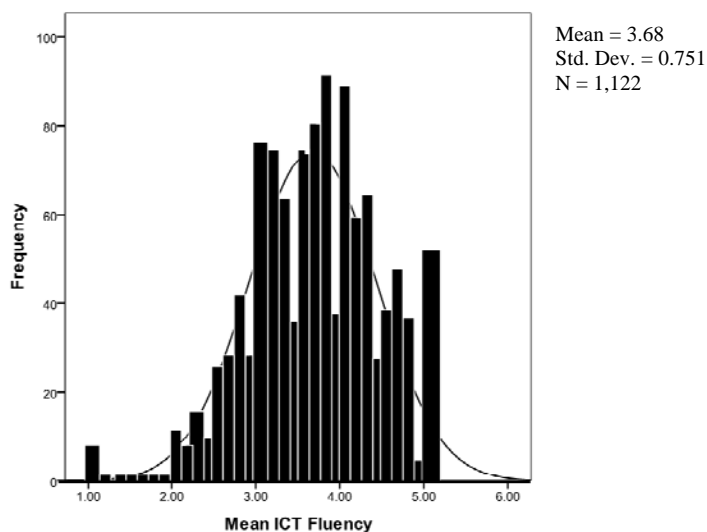


Figure 9. Frequency distribution of ICT fluency.

Research Question 7. What relationship exists, if any, between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort?

H_{07} There is no relationship between first year undergraduate students' perceived effectiveness of the multimedia tutorial and ICT comfort.

The mean sample score of ICT comfort for 1,112 students was 2.72 ($SD = 0.991$) and Figure 10 illustrates the frequency distribution of ICT comfort. A Pearson product

correlation was computed to examine if a relationship existed between perceived multimedia tutorial effectiveness and ICT comfort. The results showed there was a statistically significant ($p < 0.01$) negative correlation between perceived multimedia tutorial effectiveness and ICT comfort. Therefore the researcher rejected H_{07} as there was a weak negative relationship between perceived multimedia tutorial effectiveness and ICT comfort, thus the more comfortable one is with ICT, the less effective the multimedia tutorial is perceived to be. These results are summarized in Table 12.

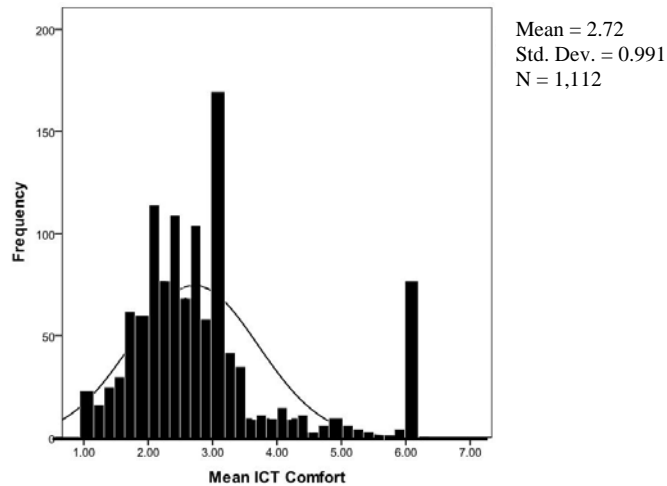


Figure 10. Frequency distribution of ICT comfort.

Table 12

Correlations of Perceived Tutorial Effectiveness and ICT Scores

	ICT Usage	ICT Education	ICT Fluency	ICT Comfort
Pearson r	0.095**	0.059	0.286**	-0.133**
p (2-tailed)	0.005	0.081	0.000	0.000
N	869	865	872	867

Note: **Correlation is significant at the 0.01 level (2-tailed).

Research Question 8. Is perceived effectiveness of the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₈ Perceived effectiveness of the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

A multiple regression analysis was performed to test if gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort predicted multimedia tutorial effectiveness. Results of the regression analysis indicated the model was statistically significant and accounted for 9.2% of the variance in multimedia tutorial effectiveness, $R^2 = 0.092$, $F(12,837) = 7.051$, $p < .01$. The researcher rejected H₀₈ as there was a relationship between multimedia tutorial effectiveness and the six independent variables tested. Furthermore, ICT usage ($p = .005$), ICT fluency ($p = .000$), and ICT comfort ($p = .000$) all had significant correlations with multimedia tutorial effectiveness. Even though ICT usage showed a positive correlation with multimedia tutorial effectiveness it did not offer unique predictive power to the model ($\beta = .010$, $p = .781$) given the other variables, and only ICT fluency ($\beta = .257$, $p = .000$), and ICT comfort ($\beta = -.079$, $p = .025$), demonstrated a significant, although small, contribution in predicting multimedia tutorial effectiveness ($p < .05$) having all other variables present.

Transfer of Learning

A component of the research study was to determine if transfer of learning could be predicted from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial. The mean transfer of learning score of 66 students was 4.01 ($SD = .858$) and Figure 11 illustrates the frequency distribution of transfer of learning.

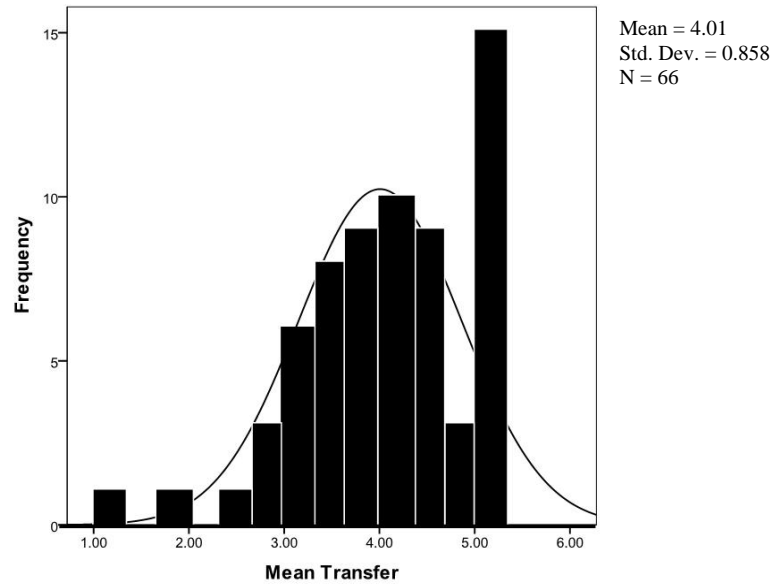


Figure 11. Frequency distribution of transfer of learning.

Research Question 9. Is transfer of learning, if any, that may occur from watching the multimedia tutorial predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort?

H₀₉ Any transfer of learning that may occur from watching the multimedia tutorial is not predicted by gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort.

A multiple regression analysis was performed to test if gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort predicted transfer of learning. Results of the regression analysis indicated the model was not statistically significant and only accounted for 2.4% of the variance in transfer of learning, $R^2 = .240$, $F(12, 50) = 1.317$, $p = .239$. The researcher failed to reject H₀₉ as transfer of learning was not predictable

from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort. Table 13 summarizes these results.

Table 13

Summary of Multiple Regression for Transfer of Learning

	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
(Constant)	3.439	1.185		2.903	.005
Female	.135	.245	.077	.552	.584
Undecided	.355	.350	.147	1.016	.314
Design & Social Inquiry	.619	.655	.128	.945	.349
Arts & Letters	1.014	.468	.292	2.167	.035
Business	-.111	.366	-.044	-.304	.763
Education	.729	.477	.210	1.527	.133
Engineering	.503	.373	.198	1.349	.183
Nursing	-.190	.476	-.055	-.400	.691
ICT Usage	-.155	.109	-.194	-1.428	.160
ICT Education	.213	.120	.229	1.777	.082
ICT Fluency	.017	.212	.013	.081	.936
ICT Comfort	.060	.216	.039	.275	.784

Research Question 10. Did transfer of learning occur for first year undergraduate students who viewed the multimedia tutorial?

H₁₀ Transfer of learning did not occur for first year undergraduate students who viewed the multimedia tutorial.

A paired samples t-test was used to compare transfer of learning and multimedia tutorial effectiveness for 66 students. The results showed there was a statistically

significant difference in the scores for transfer of learning ($M=4.01$, $SD = .857$) and multimedia tutorial effectiveness ($M=4.26$, $SD = .777$); $t(65) = -2.36$, $p = .021$. These results suggested that perceived multimedia tutorial effectiveness does have an effect on transfer of learning even though students did not perceive themselves to be as proficient with the registration system ($d = -.31$) three months later.

To better evaluate the distribution of responses for transfer of learning, a symmetry test developed by Cooper (1976) and Whitney (1978) was performed using a computer program designed by Morris (1979) to test the null hypothesis that the responses to the TLQ were symmetric. Results showed that the distribution of responses for transfer of learning (TLQ), leaned in a positive direction and were not symmetric, and therefore the null hypothesis was rejected ($p < .001$). Table 14 summarizes these findings.

Table 14

Symmetry Test Results for Transfer of Learning (TLQ)

P^a	BA	A	AA	E	Cooper		Whitney		
					Z	p	df	t	p
1	0	6	13	47	9.114	0.000	66	16.464	0.000
1	0	10	20	36	7.818	0.000	66	13.087	0.000
1	3	12	24	27	6.349	0.000	66	9.460	0.000
1	7	13	20	26	5.486	0.000	66	7.241	0.000
2	5	15	20	25	5.313	0.000	66	6.935	0.000
3	6	20	15	22	4.134	0.000	65	5.038	0.000
3	2	20	16	26	5.226	0.000	66	6.702	0.000
2	3	17	17	28	5.745	0.000	66	7.622	0.000
3	6	20	18	20	4.017	0.000	66	5.023	0.000
2	5	18	23	18	4.395	0.000	65	5.985	0.000
2	4	14	16	31	6.090	0.000	66	7.879	0.000

^a Answering options for RVQ Likert-type scale,
P = Poor, BA = Below Average, A = Average, AA = Above Average, E = Excellent

Qualitative Analysis for Multimedia Effectiveness and Transfer of Learning

Research Question 1. Is the use of multimedia technology as a training tool effective as perceived by first year undergraduate students using a university course registration system?

To help clarify research question 1, students were asked three open-ended questions at the end of the RVQ (see Appendix G). Responses were analyzed and coded into themes to best capture the thoughts and perceptions of each student.

Please explain why you feel the multimedia tutorial was or was not effective in teaching you how to register for classes. Out of the 1,061 students who completed the RVQ, 963 responded to the first question. All 963 responses were analyzed and coded into the seven themes describing why the tutorial was or was not effective: (1) step-by-step, (2) easy to understand, (3) showed me details, (4) interactive, (5) visual and aural, (6) transfer of information, and (7) human contact.

Step-by-step. Twenty-eight percent (28%) of students responded they thought the multimedia tutorial was effective as it offered them a process they could follow step-by-step. For example, one participant explained the tutorial “showed me step-by-step detailed information on how to register for my classes which had cleared any confusion that I had before watching the tutorial”. Another participant commented that “it was very effective as it showed step-by-step on how to deal with everything that could occur, and showed everything that needed to be done in order to complete registration online”.

Easy to understand. Twenty-one percent (21%) of the students stated they felt the multimedia tutorial was effective because the tutorial made the registration process easier to understand and that the tutorial was thorough and described the process in a clear and

specific manner. One participant felt the tutorial was very effective because “it explained every aspect that will occur when trying to register for classes as well as answered many of my questions”. Furthermore, students commented that “it clearly stated the information needed” and that it was “very thorough in explaining what to do”. Another participant explained that the “tutorial was definitely helpful for me! This is all new to my family since I am the first to go to college...and this tutorial made everything very clear and it was 100% helpful!”.

Showed me details. Eighteen percent (18%) of the students stated the multimedia tutorial was effective because the tutorial showed them details about the registration process and the registration system. Such comments included: “I believe it was [effective] because it showed [me] how the operation worked”, “it was [effective] because it showed me how everything was correctly done”, and “the multimedia tutorial was effective in teaching me how to register for classes as it gave specific examples and direct information that will aid me in registering for my classes”.

Interactive. Twelve percent (12%) of the students indicated the multimedia tutorial was effective because the tutorial was interactive. Such responses from students included the notion that “the interactive parts of the video were especially effective because it allowed you to better understand the explanations and also made sure you were paying attention”. Another participant concluded the tutorial was effective because “it was interactive and made me participate in the lecture, that way there was no uncertainty about how to sign up for my classes”. Additional comments about interacting with the tutorial included “it virtually showed you how to register”, and “provided screen shots of the actual pages that are used and showed you exactly where to click in order to complete

the entire registration process”. One participant also commented that “the video showed me slowly and calmly how to register for my classes. It also let us perform actions to help us better understand what to do when registering for classes”.

Visual and aural. Although quite related to the “interaction” theme, one of the first comments that stood out to the researcher referred to the tutorial providing audio and visual examples of the registration process, “I am an auditory and visual learner, so the combination best suits me”. Therefore, 9% of the students explained the multimedia tutorial was effective because there was a visual and aural element that was provided. One participant explained that the “video was able to teach me how to register for classes [because of] the demonstrations and the audio”. Additional such comments included: “[the tutorial] helped give me a visual image and let me interact with it making it easy to learn” and “it was a very visual description on how to do and [how] to complete each task”.

Transfer of information. The multimedia tutorial “was effective because it allowed me to visualize everything I needed to do and register, and it made sure I understood by forcing me to click throughout the tutorial”. The researcher determined that understanding the registration process at the end of the tutorial was crucial to multimedia tutorial effectiveness and 7% of the students expressed they had gained some knowledge after viewing the tutorial. One participant described they felt “the multimedia tutorial was effective in teaching me how to register for classes because now I know what I am doing”. Moreover, one participant stated the tutorial was effective because “now I know which tabs and links I need to click on”. Another participant believed that the tutorial “served its main function in training me to be ready for the actual registration of

my courses and that is was far more helpful than a plain text document would have been”.

Human contact. Six percent (6%) of students felt that although the tutorial was effective, they would have preferred to have a “human” help them with registration. Such examples include: “it was effective, but I would have just rather talked to an actual person”, “it was effective, but I think meeting with, or speaking with an advisor is more helpful”. Some students did not indicate if they felt the tutorial was effective and just stated they preferred a person to help them. This was evidenced by the following statements from two different students “I prefer a person to explain to me how to do it” and “it needed more explanation in some areas. A human being that could answer questions would be great”. This is discussed further in chapter 5.

Do you feel you are knowledgeable enough, after watching the multimedia tutorial, to register for classes on your own? Of the 1,061 students who completed the RVQ, 965 responded to the second open-ended question with 93.4% responding “yes” and 6.6% responding “no”. Student responses were either a one word answer or a “yes” or “no” response accompanied by an explanation.

Yes. Responses to which students answered “yes” were analyzed and coded into six of the seven themes found in the first open-ended question. Table 15 provides an outline of these themes and an example of participant response.

No. Sixty-three “no” responses were analyzed and two themes emerged. Selecting courses was the first theme that emerged from 54% (N=34) of the responses. Students explained they did not feel knowledgeable enough to register because they did not know for which specific courses they should register. For example, one student

stated; “no, because I’m still not sure what classes are prerequisites for my specific major”. Another student explained they had “doubts” about which courses they should take.

The additional 28 “no” responses (44%) mirrored the seventh theme found in the first opened-ended question; students wanted a “human being” to teach and help them register for classes. Such examples of “no” responses include: “[I] need to continue to go back to it and open another page - would rather sit with someone or have someone help me via phone”; “no, because I would still need an advisor to help me decide which courses I should select”, and “I could, but I want to wait for an advisor”. One additional “no” response indicated that the participant did not feel comfortable registering for courses on their own “because I will probably forget what I just learned”. “No” responses and corresponding themes are discussed further in chapter 5.

Table 15

Examples of Participant “Yes” Responses to Registering on Their Own

Theme	Example of Participant Response
Step-by-Step	“Yes, it was very helpful [because] it was step by step”.
Easy to Understand	“Yes, everything was explained very well”. “I do feel it helped. It made it fairly simple to understand”.
Showed Me Details	“Yes, because it showed me different scenarios that I would encounter such as error messages”. “I feel that I am ready to register for classes on my own. The video went into detail for each step of the process and I feel that I should have no problems registering”.

(table continues)

Table 15 (continued)

Theme	Example of Participant Response
Interactive	<p>“Yes, because it showed me different scenarios that I would encounter such as error messages”.</p> <p>“I feel that I am ready to register for classes on my own. The video went into detail for each step of the process and I feel that I should have no problems registering”.</p>
Visual/Aural	<p>“Yes, because of the visual and hands-on approach to each step”.</p> <p>“Yes, I feel like I am able to register for my classes because I got to look at a visual and hear the video at the same time”.</p>
Transfer of Information	<p>“I feel that I am knowledgeable enough to register on my own because now I know every single step to the process”.</p> <p>“Yes, because I now know how to do the different things that the tutorial showed me and [I am] ready to do it myself”.</p> <p>“Yes, because I now know all of the correct ways to choose my classes, what errors may occur, and what to do when presented with such errors”.</p>

Would you change anything about the multimedia tutorial in order for you to perceive it as effective in teaching you how to register? Students were asked if they would change anything about the tutorial and the majority (87.3%) of the 963 students responded “no”, they would not change anything about the tutorial. Some students included a brief statement as to why they would not change anything about the tutorial such as; “no, it’s extremely easy to use and provides an answer for every question”. The additional 12.7% of the students indicated “yes” they would change something about the tutorial. These responses were analyzed and coded into four themes: (1) content, (2) music/narration, (3) instructional design, and (4) human contact. Table 16 provides an

outline of these themes and examples of participant response which are discussed in greater detail in chapter 5.

Table 16

Examples of Participant “Yes” Responses to Changing the Tutorial

Theme	Example of Participant Response
Content	<p>“More highlighting on the key facts”.</p> <p>“I’d spend a little more time discussing the actual finding dates and times for different courses”.</p>
Music/Narration	<p>“Make the voice recording a little more upbeat”.</p> <p>“Yes, different music...I was falling asleep there”.</p> <p>“I would honestly change the speaker's voice. While clear and concise, it also has a habit of being boring and emotionless, and as such, is boring”.</p>
Instructional Design	<p>“I would make it more animated to keep the viewers attention”.</p> <p>“I would make it easier to understand, and I would put an instant message chat link in too, in case you had a question during the video and had to ask somebody”.</p> <p>“Maybe to give another example about each part just in case people have doubts”.</p>
Human Contact	<p>“I would prefer to have directions emailed to me by an advisor so that I can use them while I schedule my classes”.</p> <p>“Yes, I wouldn’t have it at all. I would rather meet with a counselor”.</p>

Research Question 10. Did transfer of learning occur for first year undergraduate students who viewed the multimedia tutorial?

Please explain why you were able to register for classes using the information you received from the Registration Video Tutorial. Three months after the students completed the Registration Tutorial they were asked if by using the information from the

multimedia tutorial they were able to register for their classes. Out of 66 responses from the TLQ, 47 students answered the first open-ended question. Responses were analyzed and coded into themes. Of the seven themes that emerged from the open-ended questions on the RVQ, four of the same themes emerged: (1) step-by-step, (2) easy to understand, (3) transfer of information, and (4) interactive.

Thirty-two percent of the students explained they were able to register for classes because the multimedia tutorial “showed me where to go and what to do”. Another student stated they were able to register because “the video showed me how to register step-by-step”. Furthermore, 34% of the students responded they were able to register because the tutorial was easy to understand. For instance, one student stated they were able to register for classes because “the information in the tutorial was clear and it led me exactly to where I needed to be”, while another student commented; “the tutorial was very descriptive about how to choose, find, and register for classes”. A smaller amount of students (19%) were coded into the transfer of information theme as the reason they were able to register for classes. For example, one student stated: “I was able to find classes and plan out my schedule based on the knowledge I gained from viewing the video”, while another student related the video to training. They stated: “I was able to register for classes by myself because of the video which was like training. It looked complicated at first, but later on it was quite easy”. Another student simply stated they were able to register for classes because “I understood it”. Fifteen percent of the students responded they were able to register for classes because the multimedia tutorial was interactive. One student explained they were able to register using the registration

tutorial “because the video was very explanatory and it showed me exactly what I needed to do in order to register. It was very visual and very hands on, so it was perfect”.

Please explain why you were not able to register for classes using the information you received from the Registration Video Tutorial. Out of 66 responses from the TLQ, 19 students answered the second open-ended question. Responses were analyzed and coded into four emerging themes: (1) system issues, (2) holds, (3) course uncertainty, and (4) transfer of information. After reading all 19 responses, the researcher concluded the reason these students could not register was not due to the multimedia tutorial, but due to system requirements and/or student responsibilities. Of the 19 responses, three stated the system was the reason for non registration. For example, one student said: “the registration tutorial is fine. I have more issues with the layout of the departmental course schedule, which is not intuitive and is a pain to work with”. Six students commented that they had “registration holds” (such holds are discussed in chapter 5) and therefore could not register for courses.

An additional seven students said they were still unsure about registering for classes. Upon further examination however, the researcher noted that such hesitation about registration was not due to being unable to navigate the registration system, but not knowing which classes to choose appropriate to their major. The final three students stated they should be able to register for classes as they had viewed the tutorial. One student so elegantly stated: “I completely remember how to register for classes because the video and what to do actually stuck in my head. The video was very helpful, and if you pay attention there is no way you cannot figure it out”.

Chapter Summary

This chapter provided the results of the research study including participant and instrumentation demographics. Quantitative analyses were presented and discussed by individual research question. Qualitative analyses were also presented and resulting themes were discussed. Chapter Five presents the findings, recommendations, and conclusions of the research study.

Chapter 5

Findings, Discussions, & Limitations

The purpose of this study was to evaluate the perceived effectiveness of a multimedia tutorial for first year undergraduate students (FTICs) using a university course registration system; to determine if a relationship existed between perceived effectiveness of the multimedia tutorial, gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort; and to describe the transfer of learning, if any, that resulted from viewing the multimedia tutorial.

Online registration at universities, state colleges, and community colleges is now common practice and understanding how to register for courses online is essential to successful participation in higher education. First year undergraduate students can arrive at universities extremely unfamiliar with the online registration process. Sometimes the freshman student does not fully understand how to correctly use the registration system, which can result in a poorly planned schedule or registering for inappropriate courses, which can ultimately result in poor academic performance.

This research study provided first year undergraduate students with a multimedia tutorial that offered them the opportunity to learn about the registration process from the comfort of their own computer. It was also the hope that the multimedia tutorial would allow the students to feel successful in the early stages of university life. An additional

goal of this research study was to add to the current literature in multimedia instructional design, adult learning, and student retention.

All incoming FTICs were required to complete online advising through OARS and each student was instructed to complete the Registration Tutorial in order to have their registration holds removed. All students were notified at the beginning of the Registration Tutorial that they were being asked to participate in a research study for a dissertation and were able to opt out of completing the ICT Fluency Questionnaire, Registration Video Questionnaire and the Registration Video Tutorial Transfer of Learning Questionnaire. Three months after initial data collection in November 2010, during advance registration, the researcher tested for transfer of learning by emailing a link to the Registration Video Tutorial Transfer of Learning Questionnaire to 1,061 students who had initially completed the Registration Video Questionnaire. Data collection lasted no more than three weeks after the date the initial email was sent to students. Furthermore, the results of each research question and hypothesis are summarized in Table 17.

Table 17

Summary of Research Questions, Hypotheses, & Results

Research Question	Hypothesis	Result
RQ1	Rejected H ₀₁	Distribution of responses for perceived multimedia tutorial effectiveness leaned in a positive direction, were not symmetric ($p < .001$).
RQ2	Failed to reject H ₀₂	No significant difference in multimedia tutorial effectiveness scores for males ($N = 461, M = 4.15, SD = 0.749$) and females ($N = 414, M = 4.23, SD = 0.755$); $t(873) = 1.63, p = .104$.

(table continues)

Table 17 (continued)

Research Question	Hypothesis	Result
RQ3	Failed to reject H_{03}	No statistical difference between colleges (major) on multimedia tutorial effectiveness at the $p < .05$ level $F(7,868) = 0.708, p = 0.665$.
RQ4	Rejected H_{04}	Statistically significant positive correlation between perceived multimedia tutorial effectiveness and ICT usage ($p < 0.01$).
RQ5	Failed to reject H_{05}	No statistically significant correlation between perceived multimedia tutorial effectiveness and ICT education, $p = .081$.
RQ6	Rejected H_{06}	Statistically significant positive correlation between perceived multimedia tutorial effectiveness and ICT fluency ($p < 0.01$).
RQ7	Rejected H_{07}	Statistically significant negative correlation between perceived multimedia tutorial effectiveness and ICT comfort ($p < 0.01$).
RQ8	Rejected H_{08}	Model was statistically significant and accounted for 9.2% of the variance in multimedia tutorial effectiveness, $R^2 = 0.092, F(12,837) = 7.051, p < .01$.
RQ9	Failed to reject H_{09}	Model was not statistically significant and only accounted for 2.4% of the variance in transfer of learning, $R^2 = .240, F(12, 50) = 1.317, p = .239$.
RQ10	Rejected H_{10}	Statistically significant difference in scores for transfer of learning ($M=4.01, SD = .857$) and multimedia tutorial effectiveness ($M=4.26, SD = .777$); $t(65) = -2.36, p = .021$. Distribution of responses for transfer of learning leaned in a positive direction, were not symmetric ($p < 001$).

Findings and Discussion

The overall findings of the study suggested that students perceived the multimedia tutorial to be effective in teaching them how to use a university course registration system. Although the test for transfer of learning was administered less than three

months after the students first viewed the multimedia tutorial, transfer of learning did occur. The following discusses these findings in further detail.

Perceived effectiveness of the multimedia tutorial (RQ1). Students reported ($N=898$) the multimedia tutorial to be effective across 11 items as the mean perceived multimedia tutorial effectiveness score was 4.19 ($SD = .756$). To further test whether the multimedia tutorial was perceived as effective, a symmetry test was performed. The results showed that the distribution of scores on the RVQ (multimedia tutorial effectiveness) were not symmetric and leaned in a positive direction. This indicated that students reported the multimedia tutorial to be effective as the majority of the responses on the RVQ were distributed between a score of 3 (average) and the score of 5 (excellent).

This finding, although not directly related as there is limited literature available regarding the perceived overall effectiveness of multimedia tutorials, was supported by the research regarding student attitudes toward multimedia and using multimedia technology to enhance learning outcomes. Perry and Perry (1998) surveyed 109 students enrolled in teacher education and computer information system courses which used different forms of instruction including multimedia. The results of the survey indicated that 97% of the students reported they would prefer a class that utilized multimedia. A large majority of the students (95%) indicated that more material could be covered when using multimedia, 92% of the students felt their learning could be enhanced with the use of multimedia, 85% of the students felt it would be easier to learn difficult concepts using multimedia, and 93% reported they felt they could retain the information better with the use of multimedia technology.

To further make the argument that the multimedia tutorial was effective, students were asked to explain why they felt it was or was not effective in teaching them about the course registration system. Student responses were analyzed and seven themes emerged as to why they thought the tutorial was effective:

- Step-by-step. Students felt the multimedia tutorial was effective as it provided them with a way to follow a step-by-step process.
- Easy to understand. Students also felt the tutorial was effective because it was easy to understand. The information was provided to them in a clear and concise manner thus easy to follow.
- Showed me details. The tutorial was designed to show students exactly what they needed to do with specific examples which went into detail. Students expressed that the details helped them to understand what and what not to do.
- Interactive. Students expressed the tutorial was effective because it provided them with hands on experience, interaction, and practice time before they actually went and registered on their own.
- Visual and aural. The tutorial was also designed to include visual, aural, and tactile elements, which students indicated to be an effective element in teaching them about the registration system. Some students identified that they were in fact a visual learner, thus the tutorial helped them learn the information.
- Transfer of information. Another theme that resulted from student responses as to why the tutorial was effective was that once they had

finished watching the tutorial they understood what they needed to do. It would need to be determined through additional research if this finding was actually transfer or just recall of information.

- Human contact. Students indicated that although they perceived the tutorial to be effective, they still wanted a person to help them with either teaching them about the registration system or helping to register them for their courses.

A majority of the students (N=902) responded “yes” they felt they were knowledgeable enough to register on their own after watching the Registration Tutorial. Students felt they could register on their own because the tutorial provided them with:

- Step-by-step. “Yes, I do feel knowledgeable. I didn't know how to register before and this helped me learn all the steps that I needed to take to do so. It also provided nice tips, like making a schedule layout so I can keep them organized”.
- Easy to understand. “Yes, because it gave a brief enough explanation for me to comprehend”.
- Showed me details. “Yes, I feel I am knowledgeable enough to register for classes after this tutorial because it explained everywhere to go and everything to do precisely”.
- Interactive. “Yes, the video stopped and made me do activities to show me exactly what I need to do to register for classes”.
- Visual and aural. “Yes, I believe now after watching the tutorial I do have enough knowledge to navigate through MyFAU and register for classes on my

own because of the accompanied visuals as well as the interactive moments through the video”.

- Transfer of information. “Yes, because how it makes you practice so I now have a mental picture in my head when I am registering”.

A number of these findings are consistent with research conducted by Bradley and Boyle (2004) who found that students (78%) perceived multimedia “learning aids” (specifically with animations) in helping them to learn about computer programming. Students reported the animated learning aids were useful because: “you can see the code, [it] shows you what’s going on when you press run. Interactive” (p. 385). Furthermore, students commented that the learning aids were “good, shows you step-by-step the program. Animations help a lot” (p. 385).

Students who answered “no”, they did not feel they were able to register for classes on their own were coded into two different groups: (1) those students ($N=34$) who did not feel they could register because they still did not know what courses to take, and (2) those students ($N=28$) who felt they needed a person to help them with registration. The Registration Tutorial did not review course selection as that was the purpose of OARS. The tutorial was meant to teach students how to register for the courses they had selected within OARS and confusion about course selection and having a person to help with registration is discussed further in the implications section of this chapter.

A large portion of students ($N=840$) indicated they would not change anything about the tutorial. However, 12.7% ($N=123$) indicated they would change something about the tutorial. Such suggestions included:

- Content. “I would add a link for course descriptions next to the courses. That way I know what classes I'm choosing and that they are the right classes”.
- Music/Narration. “Yes, make the lady talk faster because it went really slow. Just to keep student's attention, it would help”.
- Instructional Design. “Yes - I would prefer bullets or tabs so that I can skip to a part that I do not understand and don't have to watch the parts that I already know how to do”.
- Human contact. “Yes, I would change the whole thing. I would handle this during orientation so students could work with advisors one on one and understand what to do without having to call people over and over again without getting any answers”.

These findings are not supported by any one research study as there is limited literature regarding the specific findings from this study as design elements and content for multimedia tutorials can vary across topics. There is however literature (Mayer, 2001; Tempelman-Kluit, 2006) that supports the principles and theories that should be taken into account when designing multimedia tutorials.

The overall conclusion was that students did perceive the tutorial as effective in teaching them how to register for courses. This was evidenced by the overall mean effectiveness score of 4.19 out of 5.00, the symmetry test that was performed which concluded positive non-symmetric responses for the RVQ, and indications from student responses on the RVQ. Although most students responded it was effective, some responded they needed more help or needed a person to help them. Additionally, students responded that they would change a few things about the tutorial to better help

them register such as providing more details in the content that is shown, and designing the tutorial differently so students have access to more information. One of the themes found throughout was the need for an actual person to help these students with course registration rather than just a computer. Students indicated they felt they needed a real person there to help them select classes and help them register for those classes. These implications of needing human contact are discussed in further detail in the implications section of this chapter.

Relationships between perceived effectiveness and gender, major, and ICT (RQ2-8). Results from the t-test showed there was no relationship between multimedia tutorial effectiveness and gender as males reported a mean multimedia tutorial effectiveness score of 4.15, while females reported a mean multimedia tutorial effectiveness score of 4.23. This finding was not quite supported by the current literature as Madigan et al. (2007) explained that “gender studies have found that women are generally less frequent and less confident technology users when compared to their male counterparts” (p. 410). However, a study by Jones and Ramanau (2009) found that women were more likely to use social networking sites than men, thus it could be speculated that a reason females reported the mean effectiveness of the multimedia tutorial to be 4.23 was because “women prefer interaction with computers that provide help or make a connection with someone” (Madigan et al., 2007, p. 410). Additionally no relationship existed between multimedia tutorial effectiveness and major, as all majors reported about the same mean effectiveness score.

Research questions four through seven asked if there was a relationship between effectiveness and ICT usage, ICT education, ICT fluency, and ICT comfort. There was

no relationship between multimedia tutorial effectiveness and ICT education (the amount of years it's been since they had formal ICT education) and the frequency distribution of scores as seen in Table 11 suggested that the majority of students had received training in ICT within the past 5-10 years, however a large portion of students had never received formal training in ICT. The lack of formal training in ICT may suggest that because Digital Natives have been brought up with technology their whole lives, ICT education was not necessary.

Additionally, the results showed relationships between multimedia tutorial effectiveness and ICT usage, as well as ICT fluency, and ICT comfort. The results would indicate that the more hours spent using ICT, the more effective one would perceive the tutorial to be; the more fluent one is with technology, the more effective one would perceive the tutorial to be; and the more comfortable one is with ICT, the less effective they would perceived the tutorial to be. These findings have found little support from the literature as research studies have suggested that students may not be able to successfully assess their own ICT skills. Hilberg & Meiselwitz (2008) noted that ICT education did not significantly increase the ICT fluency of 198 undergraduate students. Furthermore, a disparity between perceived ICT skills and actual ICT skills was also noted, i.e., "most students (73%) were overly confident in their own ICT fluency. In other words, they were less fluent than they perceived" (Hilberg & Meiselwitz, 2008, p. 8).

A multiple regression was performed to test if gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort could predict multimedia tutorial effectiveness. The regression model was statistically significant, and although ICT usage did have a positive relationship with perceived multimedia tutorial effectiveness, it did not provide

unique predictive power to the regression model given all the other variables present and only ICT fluency and ICT comfort demonstrated a significant contribution in predicting effectiveness with all other variables present.

Transfer of learning (RQ9-10). The mean transfer score for the 66 students who completed the TLQ was 4.01. To test whether transfer of learning could be predicted from gender, major, ICT usage, ICT education, ICT fluency, and ICT comfort, a multiple regression was performed and the results indicated the model was not statistically significant and transfer of learning was not predictable from any of the variables tested. To further test if transfer of learning occurred a paired samples t-test was run to compare transfer of learning and multimedia tutorial effectiveness. For the 66 students who completed both the TLQ and the RVQ, their mean transfer score was 4.01 and their mean effectiveness score was 4.26. The multimedia tutorial did have an effect on transfer of learning even though students did not perceive themselves to be as proficient with the registration system ($d = -.31$) three months later. In order to further test the distribution of scores on the TLQ, a symmetry test was performed and the results showed that the responses to the TLQ leaned in a positive direction and therefore not symmetric. The majority of student responses about their proficiency level with the registration system were between 3 (average) and 5 (excellent).

Additionally, students explained the reasons they were or were not able to register for courses on two open-ended questions on the TLQ. Student responses were analyzed and four of the same themes emerged as in the first open-ended research question from the RVQ: (1) Step-by-step, (2) Easy to understand, (3) Interactive, and (4) Transfer of information.

Students were also asked to explain why they were not able to register for classes and their responses indicated that the registration problems they encountered did not result from their experience with the tutorial but from other issues such as:

- System Issues. The layout of the department course schedule. Although the tutorial reviewed this information, there was still confusion about how to navigate the schedule which suggests a possible redesign of the tutorial.
- Holds. All students had holds on their accounts which would have prohibited course registration. Issues with course registration were then due to students not taking care of requirements to have their holds removed, rather than issues from the tutorial.
- Course uncertainty. Students indicated they were still unsure about which classes to register for. This may have been because they had yet to meet with an academic advisor at the time they completed the TLQ, or they were still unsure about which courses they should take and why.
- Transfer of information. Students had indicated they should be able to register for courses from the information they received from the tutorial.

These findings were not supported by the current available literature. It is the belief of the researcher that these findings were specific to the population and research site used in this study. It is unclear why some freshmen students do not fully prepare for course registration by meeting with their academic advisor or by checking for holds. Additionally, as the concepts of “fit” and “learning” (Tinto, 2001) are important factors in student retention, and as the results of this study showed, many students indicated they were “undecided” about their major which may perhaps have an effect on how a student

feels they “fit” with the university. Lau (2003) suggested that institutions should help students adjust to the transition into higher education by providing many services such as academic support as “academic and career advisors are essential to the success of student retention programs” (p. 128). Therefore, it would be advantageous of the researcher to conduct a future study to address the current findings regarding academic support.

Limitations to Study Design

The design of the study allowed for all questionnaires and the multimedia tutorial to be made available on the internet thus anyone would have been able to participate. As such, students completed each questionnaire more than once resulting in the 1,912 students who responded to the ICT Fluency Questionnaire, but only 1,128 responding to the RVQ. Because of this flaw in the design, many duplicate and blank responses were deleted from each questionnaire.

Students were required to enter their university email address on both the ICT Fluency Questionnaire and RVQ in order to match their responses. Some students would enter their email address with a different domain name (i.e., @fau.edu or @gmail.com). For example, students would complete the ICT Fluency Questionnaire and enter *abcde@fau.edu*; they would then enter *abcde@gmail.com* on the RVQ. Although the username portion of their email was the same, the domain name portion of their email was different causing issues when merging SPSS databases. Furthermore, some students would enter the same domain name, but change their username. For example, students would enter *abcde@fau.edu* on the ICT Fluency Questionnaire and *Abcde@fau.edu* on the RVQ. Although a slight difference in only one letter, this also caused issues when merging SPSS databases to match student responses.

Not only did students enter different variations of their email address, including many spelling errors, but they completed the Registration Tutorial more than once. Some students would complete just the ICT Fluency Questionnaire and view the RVT, and some students would continue through the RVQ. One student for example, completed the tutorial six times with six different variations of their email address.

Another limitation of the study was that anyone could enter their email address to view the Registration Tutorial. If the Registration Tutorial is again required by Freshman Academic Advising, the tutorial needs to be produced by the university's Information Resource Management (IRM) division so students can log in and complete the tutorial using only their university email address and password. The researcher did not have the knowledge at the time to build and program such software.

Furthermore, only 66 students responded to the TLQ as the response rate was only 6.25%. Although studies have shown that response rates to surveys can be low (Kaplowitz, Hadlock, & Levine, 2004) the 6.25% response rate resulting from this study may have been specific to this population of freshmen students as the researcher has observed that these freshmen do not regularly check their university email. Therefore, to gather additional student responses to better test for transfer of learning, completion of the TLQ needs to be required. Registration holds are placed on freshmen at the university during their first semester which requires them to meet with their academic advisor to plan for next semester course work. To gather a larger response to the TLQ removal of the "registration hold" needs to be condition upon completion of not only meeting with their academic advisor, but completion of the TLQ as well.

The implications from the study suggested to the researcher that although students did perceive the multimedia tutorial to be effective in teaching them how to use the course registration system they may not be as self-directed or as fluent in ICT as previously assumed Digital Natives would be.

1. The researcher made the observation throughout the course of data collection that student's parents were completing the Registration Tutorial for them. Even though official data collection for the research study did not begin until IRB approval, the Registration Tutorial was available to students once OARS was made available in May 2010. The researcher originally thought the reason parents were completing the Registration Tutorial was because their student was still in high school at the time and were busy studying for their final exams. However, once data collection began in June 2010, students were out of high school and yet parents continued to complete the Registration Tutorial.

The researcher received many phone calls from parents asking questions about the registration process and about courses, but not about the research study, which led the researcher to conclude that the parents were completing the Registration Tutorial (possibly contributing to the numerous responses and variations of email address) and registering their students for courses. At the end of data collection, the researcher noticed that a number of students had responded they were; 31-61+ years of age ($N=18$), 25-30 years of age ($N=17$), 22-24 years of age ($N=29$), and 18-21 years of age ($N=1,086$). Usually FTICs enter higher education right out of high school and are rarely older than 25 years old. Therefore, this led the researcher to check FTIC age statistics for the summer and fall semesters of 2010 from the university's department of Institutional

Effectiveness and Analysis (IEA). The researcher found that no one over the age of 29 were admitted to the university for the 2010 summer and fall semesters and the self reported ages of the students who participated in the research study differ from university statistics. Table 18 outlines these discrepancies.

Table 18

Age Discrepancies between Research Study and University Statistics

Demographic	Age in Years	N
<i>Research Study</i>		
	18-21	1,086
	22-24	29
	25-30	17
	31-61+	18
	Total	
<i>University Statistics^a</i>		
	18-21	2,272
	22-24	7
	25-30	3
	31-61+	0
	Total	

^a University statistics retrieved from Florida Atlantic University (2010).

This observation then begged the question, who completed the Registration Tutorial, the parents or the students? Do these “millennial”, Digital Native students need more hand holding when making the transition to higher education? If parents register their students for courses, how will these students know how to do it the next time they have to register for courses?

2. As discussed in chapter two, students entering higher education have been raised with technology and would be considered technology proficient. However,

responses to the open-ended questions suggested that perhaps these students are not as proficient or fluent with ICT as previously believed. Throughout data collection the researcher observed that although students had viewed the Registration Tutorial they could not apply some of what was learned when registering for their courses.

The multimedia tutorial provided students with step-by-step instructions, specific information, and detailed examples. However, the tutorial did not provide examples of every scenario students may have faced when registering for their courses thus resulting in many frustrated students. As Digital Natives expect to have immediate results, it may have been easier to make a phone call to their academic advisor rather than take the time to evaluate and figure out the problem on their own using the knowledge they gained from watching the multimedia tutorial. Critical thinking is an important factor in making sound decisions, and Lorenzo & Dziuban (2006) cite the University of Central Florida (UCF) and their focus on information fluency:

The ability to function effectively in an information-rich environment demands fluency in technology and information, mediated by critical thinking. Information fluency is the ability to know when information is needed and to be able to effectively locate and communicate that information – in other words, to gather, evaluate, and use information (p. 5).

It is important that students are able to take what they have learned and apply the information to new situations as this is key to meaningful learning.

3. Poorly planned schedules can be the result of not understanding the course registration system, but they are also the result of not understanding which courses are appropriate to take. Students reported the multimedia tutorial to be effective in teaching

them how to register for courses, however students still expressed their concern that they did not know for which courses they should register. Knowing which courses are appropriate to take during the freshman year of college is extremely important to student's academic success.

Before students enter the university, and even before they complete OARS, they are provided with a variety of material that helps them to understand the university curriculum and which courses are appropriate for their first semester of enrollment. Nevertheless, what FTICs do with the material made available to them may also be cause for concern. Students not taking the time to research the types of classes available, or by allowing their parents to register them for courses, can create a poor start academically and even a feeling of not fitting in with the university at the beginning of their academic career.

Recommendations for Future Research

The following recommendations were made based upon the findings of the study:

1. As this research study was developed specifically for the first year student population at the research site, it would be advantageous to replicate this study at a different higher educational institution to test if such findings are similar across the first year undergraduate student population.

2. As suggested by Feiertag and Berge (2008), "adult learning theory calls for a practical approach to education; students must see the end goal and understand how the steps toward it fit the big picture" (p. 462). It would be beneficial to evaluate students on their level of self-directedness as the Digital Natives "need each other, and thrive in group activities" (Feiertag & Berge, 2008, p. 458) and will need to learn how to think

critically on their own. It would also be valuable to evaluate students on their actual level of ICT fluency, rather on their perceived level of ICT fluency. Understanding that ICT fluency is much more than emailing and navigating a website can be a valuable tool for students in both academic and work environments.

3. It would be important to redesign the Registration Tutorial and add additional features such as more examples and registration scenarios, additional resources about course requirements, and build a live chat function into the tutorial if students have questions about the registration process. Assessing perceived tutorial effectiveness will also help to add to the current literature.

4. Although the FLC/LLC program is designed to build a sense of community for students upon their transition into the university during their first semester, it would be advantageous for future studies to compare the retention of those students that use the multimedia tutorial and the FLC/LLC students who are usually provided alternative techniques when learning about the registration process.

5. It would also be important to survey the same population of students four years later to find out who stayed at the university to complete their degree and who did not. Additionally, it would be important to understand if the Registration Tutorial was viewed as effective and helped students to be successful in their first year of university life thus giving them the confidence in their own academic skills and leading them to stay and complete their degree.

Conclusions

The overall conclusions of the study suggested that students did perceive a multimedia tutorial to be effective in teaching them how to register for courses; there was

no relationship between multimedia tutorial effectiveness and gender, major and ICT education, but there was a relationship between perceived multimedia tutorial effectiveness and ICT usage, ICT fluency, and ICT comfort, but only ICT fluency and ICT comfort lent predictive power in predicting multimedia tutorial effectiveness.

Transfer of learning did occur for students who viewed the multimedia tutorial. It would benefit the university, and specifically Freshman Advising, to redesign OARS and supplementary curriculum materials to help teach students from the very beginning, even before they enter the university, the relevance of understanding and selecting classes appropriate for their major. It is the belief of the researcher that if students are able to understand which courses they should take and why, navigating the course registration system might be easier.

There have been many studies about the different uses of multimedia training, information and communication technology, and transfer of learning in higher education. This research study contributed to the current literature by proposing new ideas for using multimedia technology in the retention of students enrolled in higher education institutions. It was the purpose of this research study to facilitate student understanding of the registration process through the use of multimedia technology, thus providing them with the means to enrich their academic, professional, and personal lives through the assessment of their own knowledge and learning preferences allowing for increased satisfaction and retention in higher education.

APPENDIX A

IRB Approval



Institutional Review Board

Tel: 561.297.0777 Fax: 561.297.2319
www.fau.edu/research/irb

Nancy Aaron Jones, Ph.D., Chair
Administrative Staff
Elisa Gaucher
Angela Clear
Tina Horton

DATE: June 4, 2010

TO: Valerie Bryan, Ed.D/Merideth Dee
FROM: Florida Atlantic University IRB

PROTOCOL #: H10-83
PROTOCOL TITLE: [168944-2] First Year Undergraduate Student's Perception of the Effectiveness and Transfer of Multimedia Training for a University Course Registration System

SUBMISSION TYPE: New Project
ACTION: APPROVED

APPROVAL DATE: June 4, 2010
EXPIRATION DATE: June 3, 2011

REVIEW TYPE: Expedited
REVIEW CATEGORY: Expedited review category # B7

Thank you for your submission of Response/Follow-Up materials for this research study. The Florida Atlantic University IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

- It is important that you use the approved, stamped consent documents or procedures included with this letter.
- Please note that any revision to previously approved materials or procedures must be approved by this office prior to initiation. Please use the appropriate amendment forms for this procedure.
- All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed, if applicable.
- Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.
- Please note that all research records must be retained for a minimum of three years.
- **This approval is valid for one year.** A Continuing Review form will be required prior to the expiration date if this project will continue beyond one year.

If you have any questions or comments about this correspondence, please contact Tina Horton at

Institutional Review Board
Research Integrity/Division of Research

Florida Atlantic University
ADM Bldg. 10, Suite 239
Boca Raton, FL 33431
Phone: 561-297-0777

* Please include your protocol number and title in all correspondence with this office.

This letter has been electronically signed in accordance with all applicable regulations,
and a copy is retained within our records.

APPENDIX B

Letter of Approval - Student Information



Freshman Academic Advising Services
Student Support Services Building - Room 201
777 Glades Road
Boca Raton, FL 33431
tel: 561.297.3064
fax: 561.297.3132
e-mail: freshmanadvising@fau.edu
www.fau.edu/freshmanadvising

MEMORANDUM

TO: Dr. Edward E. Pratt
Dean, Undergraduate Studies

THRU: Deborah Minney *DM*
Assistant Provost and Director

FROM: Merideth Dee
Coordinator of Academic Programs

DATE: April 28, 2010

SUBJECT: First year undergraduate student's information for dissertation use

*Approval.
Edward E. Pratt
4/28/10*

I am writing this memorandum to request permission to gather first year undergraduate student's information, particularly their name, university email address, and Z number for dissertation use. The purpose of my research study is to evaluate the perceived effectiveness of multimedia training for first year undergraduate students who use the university course registration system. Participants will be asked to view the Registration Tutorial which consists of: the Information and Communication Technology (ICT) Fluency Questionnaire, the Registration Video Tutorial, a multimedia tutorial that mirrors the current course registration system in use, and an eleven question Registration Tutorial Video Questionnaire. A transfer of learning questionnaire will also be used three months after initial data collection.

Participation is voluntary, however Freshman Academic Advising Services requires students to view the Registration Video Tutorial in order for their academic advising and orientation holds to be removed. Each participant will be asked to enter their university email address on both the ICT Fluency Questionnaire and the Registration Tutorial Video Questionnaire, but their email address will only be used to link their pre and post survey results. Participant's name, Z number, and university email address indicating that they have completed the Registration Video Tutorial will in no way be linked to any survey results in order to protect their identity. The list of students who have completed the Registration Video Tutorial will be kept in an Access database which will be password protected and will only be used to remove holds and send students the transfer of learning survey. All information will be destroyed after the transfer of learning survey email has been sent.

If you have any questions about my proposed research, please feel free to contact me at 561-716-0476 or mdee1@fau.edu.

:MD

Boca Raton • Dania Beach • Davie • Fort Lauderdale • Jupiter • Treasure Coast
An Equal Opportunity/Equal Access Institution

APPENDIX C

Amendment IRB Approval



Institutional Review Board

Tel: 561.297.0777 Fax: 561.297.2319
www.fau.edu/research/ircs

Nancy Aaron Jones, Ph.D., Chair

Administrative Staff

Elisa Gaucher

Angela Clear

Tina Horton

Corrected Approval Letter

DATE: July 2, 2010

TO: Valerie Bryan, Ed.D., Merideth Dee
FROM: Florida Atlantic University IRB

PROTOCOL #: H10-83
PROTOCOL TITLE: [168944-3] First Year Undergraduate Student's Perception of the Effectiveness and Transfer of Multimedia Training for a University Course Registration System

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

EFFECTIVE DATE: July 2, 2010

Thank you for your submission of Amendment materials for this research protocol. The Florida Atlantic University IRB has approved your request to modify your protocol as outlined below:

- Change the procedure by which students complete the Registration Tutorial to the following: 1) complete the ICT fluency Questionnaire, 2) watch the Registration Video Tutorial, 3) Complete the Registration Video Tutorial Questionnaire, 4) enter name/Z number/email.

If you have any questions or comments about this correspondence, please contact Angela Clear at

Institutional Review Board
Research Integrity/Division of Research
Florida Atlantic University
ADM Bldg, 10, Suite 239
Boca Raton, FL 33431
Phone: 561-297-0777

* Please include your protocol number and title in all correspondence with this office.

**This letter has been electronically signed in accordance with all applicable regulations,
and a copy is retained within our records.**

APPENDIX D

Registration Tutorial Web Page

A graphic representing a web page for a registration tutorial. It features a dark blue header with the text "Registration Tutorial" in white, italicized font. Below the header is a white main content area with a red heading "Teach me how to register for my courses..." and a blue underlined link "Click here to view the Registration Tutorial". At the bottom is a dark blue footer with white text providing contact information for Merideth Dee.

Registration Tutorial

Teach me how to register for my courses...

[Click here to view the Registration Tutorial](#)

Questions/Concerns: Merideth Dee - mdee1@fau.edu or 561-297-3064

APPENDIX E

ICT Fluency Questionnaire

(Part 1 of Registration Tutorial)

"Registration Tutorial"

Welcome to the "Registration Tutorial". In order to register for classes in the upcoming semester, you must have your Freshman Advising and Orientation holds removed. These holds will be removed by completing the "Registration Tutorial". As an academic advisor, I know how difficult it can be starting your journey in higher education especially during your first semester trying to select courses. It is my hope that this tutorial will ease your anxiety just a little. The "Registration Tutorial" is part of my doctoral dissertation titled *First Year Undergraduate Student's Perception of the Effectiveness and Transfer of Multimedia Training for a University Course Registration System* at Florida Atlantic University, and I am asking your help in completing this research study about student perceptions of multimedia tutorials and information and communication technology (ICT).

The purpose of the study is to evaluate the perceived effectiveness of multimedia training for first year undergraduate students who use a university course registration system. Participation in this study will require you to complete the "Registration Tutorial". This tutorial includes three parts: the Information and Communication Technology Fluency Questionnaire that will take no longer than 10 minutes to complete, the Registration Video Tutorial that will take no longer than 20 minutes to complete, and the Registration Video Tutorial Questionnaire that will take no longer than 5 minutes to complete. Three months after completion of the Registration Tutorial (after the initial advance registration period at the university has begun), you will be asked to complete a Transfer of Learning Survey and will be available November 15, 2010 to December 3, 2010. The Transfer of Learning Survey will take no longer than 7 minutes to complete.

There are no "right" or "wrong" answers. While most questions should be answered with a single response, a few questions allow multiple responses. The information you provide is very valuable so please answer questions as best as you can. If you are not comfortable with a particular question you may elect to not answer, and you are free to withdraw from the study at any time without penalty. The risks involved with participating in this study are no more than one would experience in regular daily activities. All identifiable information will be kept confidential and all necessary steps have been taken to protect your identity. Potential benefits that you may receive from participation include greater knowledge of your own learning needs, specifically with Information and Communication Technology and may allow for increased satisfaction and retention in higher education.

If you experience problems or have questions regarding your rights as a research subject, contact the Florida Atlantic University Division of Research at (561) 297-0777. For other questions about the study, you should contact the co-investigator, Mendeth Dee at 561-297-3064 or the principal investigator Dr. Valerie C. Bryan at 561-799-8639. By completing the following questionnaire, you give your consent to participate in this study. If you have **STRONG** reservations about participating in this study please contact Mendeth Dee at mdee1@fau.edu.

If you are not at least 18 years of age you will not be able to participate in this study. Please contact Mendeth Dee at mdee1@fau.edu or 561-297-3064

By checking **I AGREE** below: I am giving my consent to participate in this study and that I am at least 18 years of age. Please print this page for your records (Click here to access and PRINT this page)


Approved on: 6/4/2010
Expires on: 6/3/2011

I agree

Next

Internet | Protected Mode: On 75%

Information and Communication Technology (ICT) Fluency Questionnaire

The purpose of this survey is to evaluate first year undergraduate student's perceptions and experience with information and communication technology (ICT). Fluency with ICT is important in school today - especially as many courses add online components. This survey collects data to provide a better understanding of student preparedness to effectively use ICT and to identify factors which may influence their ICT fluency. Your responses to this survey could have a large impact on the way multimedia tutorials are created for students in higher education.

This survey contains 54 questions in 5 sections designed to collect general student information and information regarding ICT usage, education, fluency, and comfort level. Instrument was created by Dr. Scott Hilberg. Permission has been granted to use instrument.

To continue to the ICT Fluency Questionnaire please enter your *FAU* email address

Enter your FAU email address (example: mdeel@fau.edu)

[Back](#) [Next](#)

Internet | Protected Mode: On

Section 1 - Demographics

This section is designed to collect general information about you. Please answer the questions by selecting the appropriate responses.

What is your Gender?

Male
 Female

What is your age?

17 or less
 18-21
 22-24
 25-30
 31-40
 41-50
 51-60
 61 or more

What is your race/ethnic background?

African American
 Asian
 Hispanic
 Native American
 White
 Other
Please specify

What is your current major?

--Click Here--

[Back](#) [Next](#)

Internet | Protected Mode: On

Section 2 - Usage

This section is designed to collect information about your use of information and communication technology. Please answer the questions by selecting the appropriate responses.

Hours Spent per Week

	None	Under 5	5 to 10	11 to 20	21 to 30	31 to 40	41 or more
How many hours per week do you use a computer for fun (personal use)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Of the time you spend using a computer for fun each week, how many of those hours involve accessing the Internet / Web?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Of the time you spend using a computer for fun each week, how many of those hours involve using written communication technology (email, chat, text, messaging, etc.)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many hours per week do you use a computer for work (including school work)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Of the time you spend using a computer for work each week, how many of those hours involve accessing the Internet / Web?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Of the time you spend using a computer for work each week, how many of those hours involve using written communication technology (email, chat, text, messaging, etc.)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many hours each week do you use verbal communication technology (telephone, cell phone, voice mail etc.)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many hours per week do you use video or computer games?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

When did you begin using a computer?

- Before Kindergarten
- Kindergarten
- 1st grade
- 2nd grade
- 3rd grade
- 4th grade
- 5th grade
- 6th grade
- 7th grade
- 8th grade
- 9th grade
- 10th grade
- 11th grade
- 12th grade
- College Freshman
- Sometime between high school and college
- I have never used a computer before

How do you usually access a computer?

- I do not have regular access to a computer
- I have my own computer and can use it when I want
- I access a computer in my home or dorm and can use it on a regular basis
- I access a friend's computer and can use it when they are not using it
- I access a computer at school, the library or another place

When did you begin using the Internet

- Before Kindergarten
- Kindergarten
- 1st grade
- 2nd grade
- 3rd grade
- 4th grade
- 5th grade
- 6th grade
- 7th grade
- 8th grade
- 9th grade
- 10th grade
- 11th grade
- 12th grade
- College Freshman
- Sometime between high school and college
- I have never used a computer before

How do you usually access the Internet?

- I do not have regular access to the Internet
- I have my own access to the Internet and can use it when I want
- I access the Internet using a computer in my home or dorm and can use it on a regular basis
- I access the Internet using a friend's computer and can use it when they are not using it
- I access the Internet at school, the library or another place

[Back](#) [Next](#)

Section 3

This section is designed to collect information about your education in information and communication technology. Please answer the questions by selecting the appropriate responses. (Permission granted by Gerri Penney (2010) to use revised ICT questions).

Check the ICT area(s) in which you have ever taken a course or had formal training. **Please check all that apply, and please give a time frame in years when the course was taken.**

	Within the last 5 years	6 - 10 years ago	More than 10 years ago	Not at all
Introduction to computers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Windows or other operating systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research, library or information science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Productivity applications such as Word, Excel, PowerPoint or Access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Email	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Programming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet or World Wide Web	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate your method of acquiring ICT information by using the follow scale:

	Least Often/Rarely	Regularly	Most Often
Formal courses at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informal education (through a friend and/or associate, on your own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work related	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 4 - Fluency

This section is designed to collect information about your fluency with computer and information technology. Please rate your fluency (or proficiency) using the following scale:

1 = Poor (I have never hear of it and don't know how it use it)

2 = Below Average (I have heard of it, but have little or no knowledge of how to use it)

3 = Average (I use it and can do the basic operations)

4 = Above Average (I use it and can use most of its features)

5 = Excellent (I use it, I know it very well and could teach others)

Please rate your fluency (or proficiency) using the following scale:

	Poor = 1	Below Average = 2	Average = 3	Above Average = 4	Excellent = 5
Email	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Voicemail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Text Messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instant Messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chat Rooms and Discussion Boards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Course Management Systems (Blackboard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browsing the Web	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching and finding credible information online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Citing courses for information found	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating, editing and formatting a document using a word processor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating, editing and formatting a spreadsheet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating, editing and formatting a presentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating, editing and formatting a web page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating, editing and managing data in a database	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section - 5 Comfort

The following section is designed to collect data about your comfort level using information and communication technology. Please indicate how strongly you agree or disagree with the statement using the following scale:

1 = Strongly Agree
2 = Somewhat Agree
3 = Neutral
4 = Somewhat Disagree
5 = Strongly Disagree

If a statement does not apply to you, select N/A

	<i>Strongly Agree = 1</i>	<i>Somewhat Agree = 2</i>	<i>Neutral = 3</i>	<i>Somewhat Disagree = 4</i>	<i>Strongly Disagree = 5</i>	<i>N/A</i>
I prefer to improve my ICT skills by experimenting and trial-and-error	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to improve my ICT skills by taking courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The courses I have taken have improved my ICT skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My ability to effectively use ICT has a significant impact on my performance in school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am adequately prepared to take a course which is partially online (some classroom meetings)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am adequately prepared to take a course which is entirely online (no regular classroom meetings)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer courses that meet in a classroom and do not require ICT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer courses that include some online components but continue to have some regular classroom meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others often seek my help when they are using ICT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am usually able to resolve technical issues I have when using ICT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with my ability to effectively use ICT for personal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with my ability to effectively use ICT for work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with my ability to effectively use ICT for school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I am satisfied with my ability to effectively use ICT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared to my peers, I am more fluent with ICT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The image is a screenshot of a web browser window. The browser's address bar is empty, and the toolbar shows icons for home, back, forward, print, and search, along with a 'Page' dropdown menu, a 'Safety' dropdown menu, and a 'Tools' dropdown menu. The main content area has a yellow background and contains the following text:

Thank you for completing the ICT Fluency Questionnaire.

Please follow the steps below to have your Academic Advising and Orientation holds removed.

- 1. Click Submit and watch the Registration Video Tutorial**
- 2. Complete the Registration Video Questionnaire**

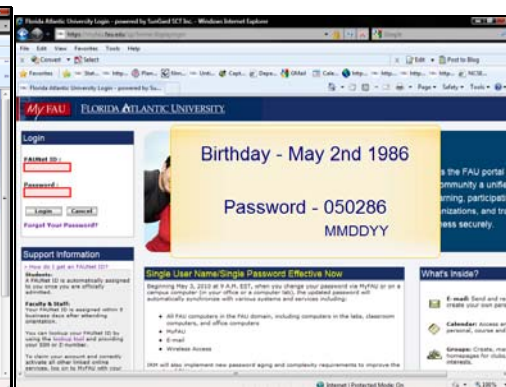
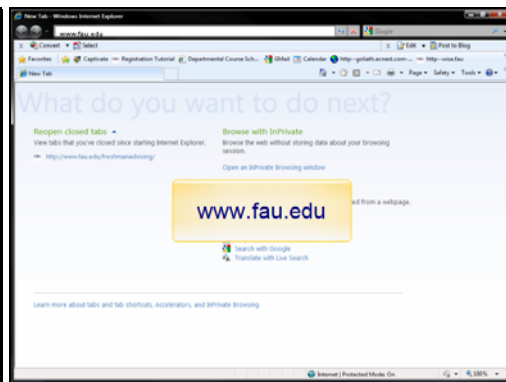
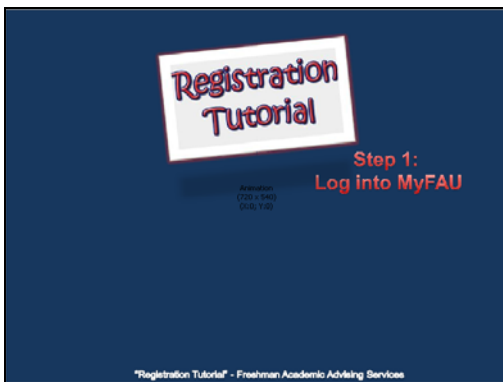
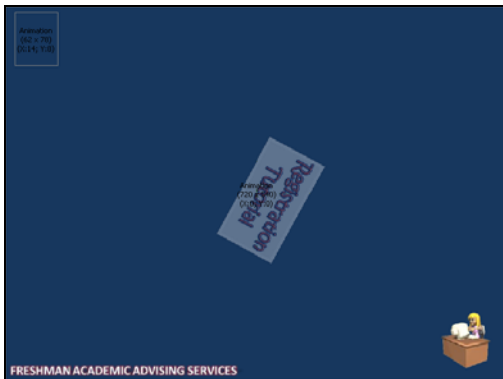
Please note that in order to register for your courses your OARS form must be approved and you must complete the Registration Tutorial.

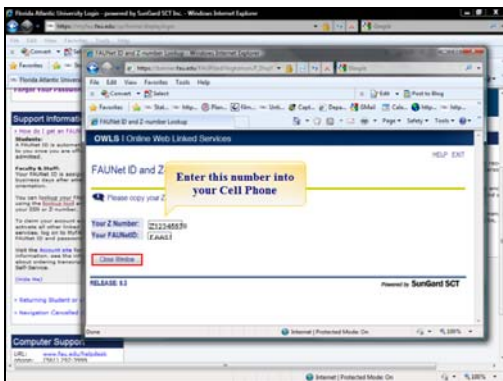
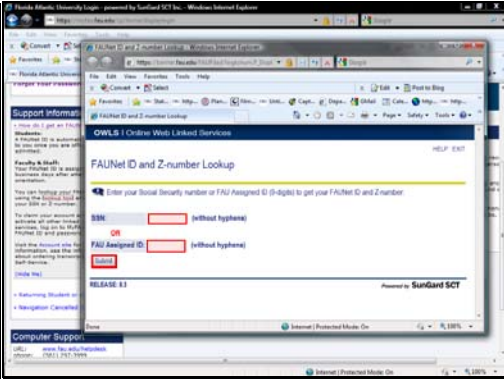
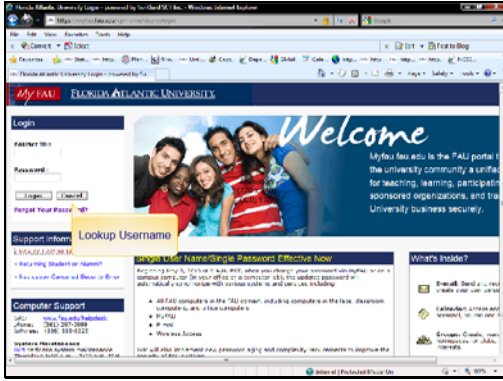
At the bottom of the page, there are two buttons: 'Back' and 'Submit'.

APPENDIX F

Registration Video Tutorial (RVT)

(Part 2 of Registration Tutorial)

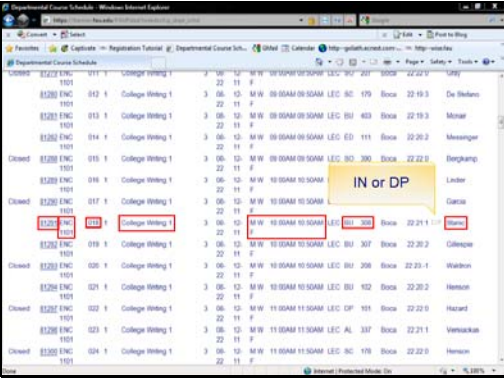
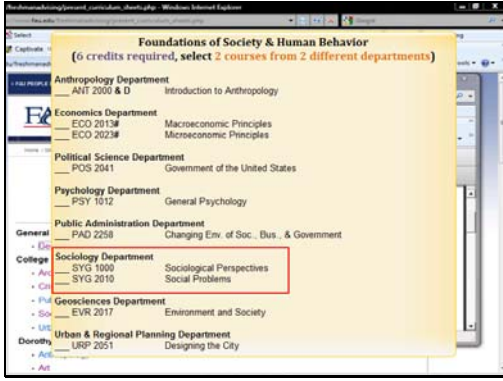
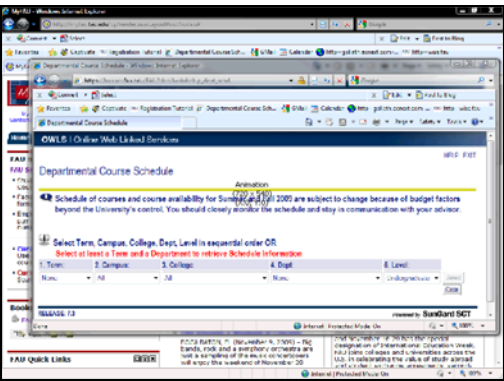
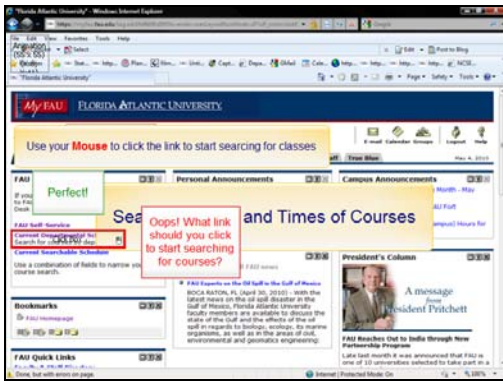




Registration Tutorial

Step 2: Search for Courses (Days and Times)

Registration Tutorial - Freshman Academic Advising Services



Click on the CRN for Detailed Course Information

Status	CRN	Course	Seat Part	Title	Cr. Hrs	Days	Time	Room	Camp	Seats	Inst	Instructor
Head	6215	CS 4362	301	Cryptography And Info Security	3	08	12	101	Box	30	030	Stewart
Head	6242	MAC	001	Modern Analysis	3	08	12	101	Box	30	17	Naught
Head	6243	MAC	001	Introductory Analysis I	3	08	12	101	Box	30	17	Naught

5 digit Co-Reference

TBA = To Be Announced
TBD = To Be Determined

Click on the CRN of the Lecture course to view detailed information

Perfect! Use your mouse and click on the CRN for detailed information

Oops! Click the CRN 62426 to see detailed information

LAB - Lab Class

Corequisite

Discussion

an take this course

the SAME TIME

Schedule of courses and course availability for Summer and Fall 2009 are subject to change because of budget factors beyond the University's control. You should closely monitor the schedule and stay in communication with your advisor.

Select Term, Campus, College, Dept, Level in sequential order OR Select at least a Term and a Department to retrieve Schedule Information

2 Course Reference Numbers

1 CRN for the Lecture
1 CRN for the Lab

Monday	Tuesday	Wednesday	Thursday	Friday
ENC110 10am-10:50 CRN 12345				

Day and Time

Course Reference Number

Registration Tutorial

Step 3: Register for your Courses

"Registration Tutorial" - Freshman Academic Advising Services

Perfect! Use your mouse and click on the link to access registration

Oops! What link do you click to access Registration?

Perfect! Go ahead and try it! Use your mouse and click on the appropriate link

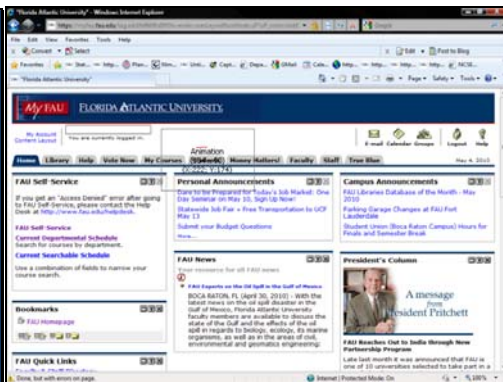
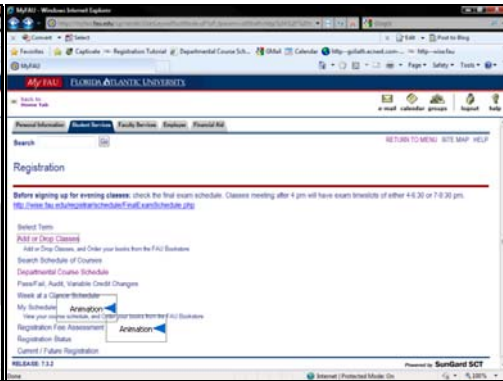
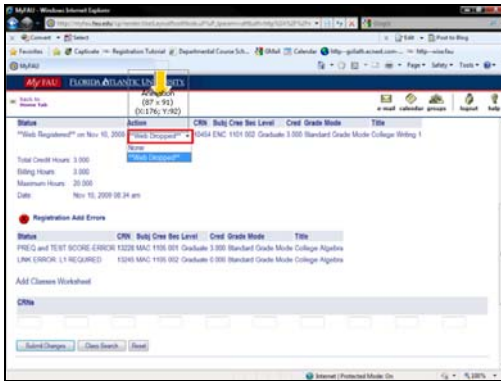
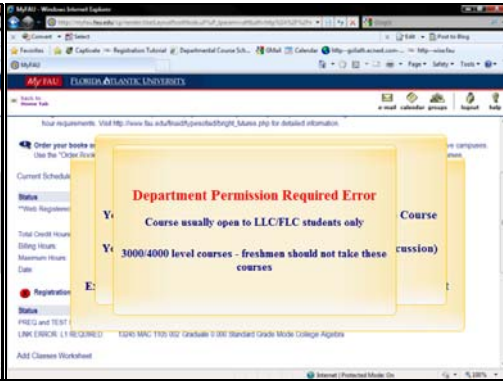
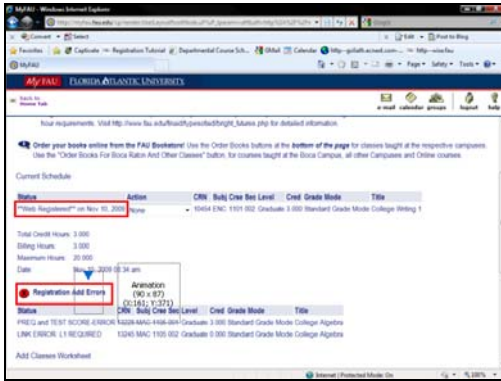
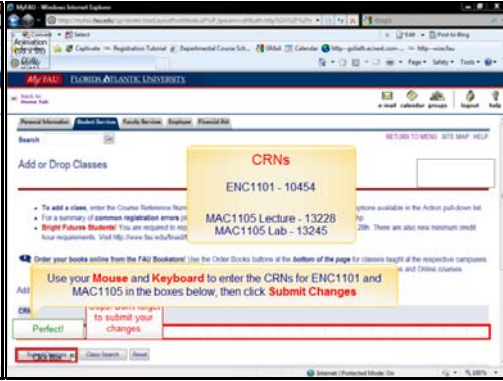
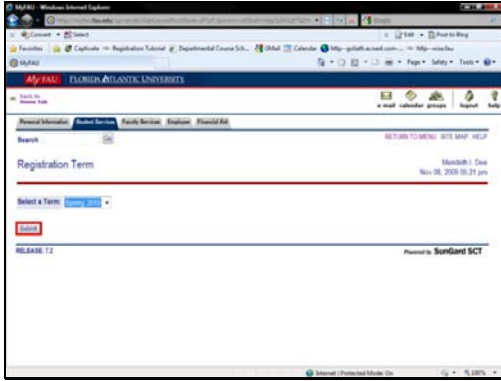
Oops! Make sure to click the Registration Tab

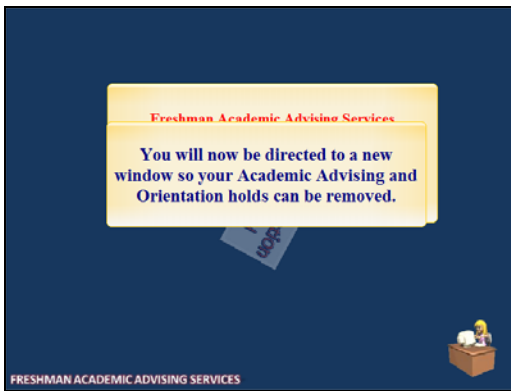
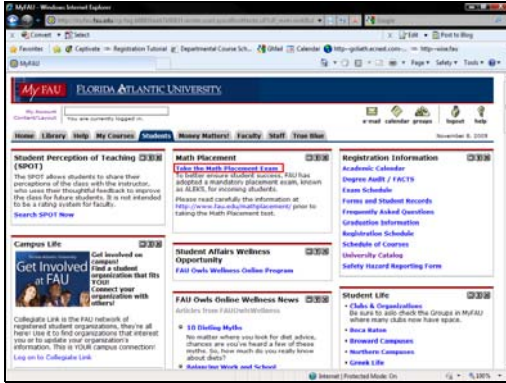
Check for HOLDS

Go ahead and try it! Use your mouse and click on the Add/Drop link

Perfect!

Oops! Make sure you click the Add or Drop Classes link





APPENDIX G

Registration Video Questionnaire (RVQ)

(Part 3 of Registration Tutorial)

"Registration Video Questionnaire"

Please answer the following questions about the "Registration Video Tutorial" you just watched.

In order to match your responses to the ICT Fluency Questionnaire please enter your **FAU** email address below.

Enter your FAU email address (example: mdee1@fau.edu)

Powered by **snap** **Next**

Done Internet | Protected Mode: On 100%

Please answer the following questions about the effectiveness of the multimedia tutorial in teaching you about the following items with 1 being the lowest level of effectiveness and 5 being the highest level of effectiveness.

1 = Poor 2 = Below Average 3 = Average 4 = Above Average 5 = Excellent

How effective was the multimedia tutorial in teaching you the following items:

	Poor = 1	Below Average = 2	Average = 3	Above Average = 4	Excellent = 5
Logging into MyFAU	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Looking up your FAU Username	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching for the days and times of courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigating the Department Course Schedule	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding what a CRN is for	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How to find additional information about a course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How to find a LAB or Discussion for a specific Lecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Actually registering for your courses in Self-Service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding different error messages that may appear at the point of registration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigating the Freshman Advising Website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Downloading a Curriculum Sheet for your major	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Powered by **snap** Back Next

Please answer the following question to the best of your ability regarding how you feel about the "Registration Video Tutorial"

Please explain why you feel the multimedia tutorial **WAS** or **WAS NOT** effective in teaching you how to register for classes.

Do you feel you are knowledgeable enough, after watching the multimedia tutorial, to register for classes on your own? **Why or Why not? Please explain**

Would you change anything about the multimedia tutorial in order for you to perceive it as effective in teaching you how to register? If **YES** please explain what you would change and why.

Powered by **snap** Back Submit

APPENDIX H

Web Form - Holds

Registration Tutorial

One more step!

Enter your information and click **SUBMIT** to have your holds removed

NOTE: Please allow 24-48 hours for your Freshman Advising and Orientation holds to be removed once your OARS form has been approved.

Full Legal Name

FAU Email (ex. mdee1@fau.edu)

Z Number (8 digits)
Z

Questions/Concerns please contact: Merideth Dee at mdee1@fau.edu

Done Computer | Protected Mode: Off 100%

APPENDIX I

Registration Tutorial “Thank You” Web Page

Registration Tutorial

Thank you for viewing the Registration Tutorial. Please allow 24-48 hours for your Academic Advising and Orientation holds to be removed.

REMEMBER: Your Academic Advising and Orientation holds will only be removed once your OARS form is approved AND you have viewed the Registration Tutorial.

If you have not completed OARS please visit <http://oars.fau.edu>

Important Information

Bookmark the following link for the Registration Video Tutorial just in case you need a quick review (you will not have to answer questions or enter your information, it's just the video)

[Click here for the Registration Video Tutorial](#)

(don't forget to add the link to your favorites)

Questions/Concerns: Merideth Dee - mdee1@fau.edu or 561-297-3064

APPENDIX J

Email to Students – Transfer of Learning

PLEASE CLICK THE LINK BELOW TO ANSWER QUESTIONS ABOUT THE REGISTRATION TUTORIAL.

Advanced Registration is here and hopefully you have or will register for your classes in the next few days. Think about the *Registration Video Tutorial* you viewed between June and August of 2010. Keeping the Registration Video Tutorial in mind, I would be very grateful if you could answer some questions about your proficiency level with the course search and registration process. I will then match your responses to your responses on the *Registration Video Questionnaire* you completed earlier in the year.

By answering these questions you are helping me to ensure that future versions of the *Registration Tutorial* are much more user friendly and focus upon the specific information you need to register for courses.

PLEASE CLICK THE LINK BELOW TO ANSWER QUESTIONS ABOUT THE REGISTRATION TUTORIAL.

<http://iea.fau.edu/surveys/snap/transfermultimedia.htm>

Thank you in advance and please let me know if you have any questions or concerns.

Merideth Dee, Ed.S.
Coordinator of Academic Programs
Freshman Academic Advising Services
561.297.3064
www.fau.edu/freshmanadvising

APPENDIX K

Registration Video Tutorial Transfer of Learning Questionnaire (TLQ)

"Registration Video Tutorial Transfer of Learning Questionnaire"

Advanced Registration is here and hopefully you have or will register for your classes in the next few days. Think about the Registration Video Tutorial you viewed between June and August of 2010. After you completed OARS (online advising) you were asked to view a multimedia video tutorial that walked you through the course search and registration process.

In order to match your responses to the Registration Video Questionnaire please enter your FAU email address below.

Enter your FAU email address (example: mdee1@fau.edu)

Powered by **snapp** Next

Done Internet | Protected Mode: On 100%

Keeping the Registration Video Tutorial in mind, please answer the following questions about your proficiency level with the course search and registration process with 1 being the lowest level of proficiency and 5 being the highest level of proficiency

1 = Poor 2 = Below Average 3 = Average 4 = Above Average 5 = Excellent

Please rate your proficiency using the following scale:

	Poor = 1	Below Average = 2	Average = 3	Above Average = 4	Excellent = 5
Logging into MyFAU	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Looking up your FAU Username	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching for the days and times of courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigating the Department Course Schedule	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding what a CRN is for	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How to find additional information about a course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How to find a LAB or Discussion for a specific Lecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Actually registering for your courses in Self-Service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding different error messages that may appear at the point of registration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigating the Freshman Advising Website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Downloading a Curriculum Sheet for your major	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please explain why you **WERE** able to register for classes using the information you received from the Registration Video Tutorial.

Please explain why you **WERE NOT** able to register for classes using the information you received from the Registration Video Tutorial.

Powered by **snap** **Back** **Submit**

Internet | Protected Mode: On 100%

APPENDIX L

TLQ "Thank You" Web Page

Registration Tutorial

Thank you for completing the "Registration Video Tutorial Transfer of Learning Questionnaire". Your help is very much appreciated.

Your responses will help to make future versions of the "Registration Tutorial" more user friendly and focus on the needs of the student.

If you have any additional comments about the Registration Tutorial, please feel free to contact Merideth Dee at mdee1@fau.edu.

Thanks!

Important Information

Bookmark the following link for the Registration Video Tutorial just incase you need a quick review (you will not have to answer questions or enter your information, it's just the video)

[Click here for the Registration Video Tutorial](#)

(don't forget to add the link to your favorites)

Questions/Concerns: Merideth Dee - mdee1@fau.edu or 561-297-3064

Computer | Protected Mode: Off

References

- Aslanian, C. B., & Brickell, H. M. (1980). *Americans in transition: Life changes as reasons for adult Learning*. New York: College Entrance Examination Board.
- Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology, 41*(1), 63-105. doi:10.1111/j.1744-6570.1988.tb00632.x
- Baxter Magolda, M. B. (1992). *Knowing and reasoning in college. Gender-related patters in students' intellectual development*. San Francisco, CA: Jossey-Bass.
- Belenky, M. F., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. (1986). *Women's ways of knowing: The development of self, voice, and mind*. New York: Basic Books.
- Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology, 39*(5), 775-786. doi:10.1111/j.1467-8535.2007.00793.x
- Baddeley, A. (1992). Working memory. *Science, 255*, 556-559. Retrieved from <http://www.jstor.org/stable/2876819>
- Boddie, W., Contardo, J., & Childs, R. (2007/2008). The future workforce: Here they come: *Public Manager, 36*(4), 25-28. Retrieved from <http://find.galegroup.com/gtx/infomark.do?&contentSet=IAC-Documents&type=retrieve&tabID=T002>

&prodId=AONE&docId=A175444579&source=gale&srcprod=AONE&userGroup
pName=gale15691&version=1.0

- Bradley, C., & Boyle, T. (2004). The design, development, and use of multimedia learning objects. *Journal of Educational Multimedia and Hypermedia*, 13(4), 371-389. Retrieved from <http://find.galegroup.com/gtx/infomark.do?&contentSet=IAC-Documents&type=retrieve&tabID=T002&prodId=AONE&docId=A132304034&source=gale&srcprod=AONE&userGroupName=gale15691&version=1.0>
- Brosnan, M. (1998). *Technophobia: The psychological impact of information technology*. New York: Routledge.
- Carey, R., & Posavac, E. (1997). *Program Evaluation Methods and Case Studies (5th ed.)*. Upper Saddle River, NJ: Prentice-Hall, Inc.
- Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8(4), 293-332. Retrieved from <http://www.jstor.org/stable/3233596>
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2), 189-211. Retrieved from <http://www.jstor.org/stable/249688>
- Connolly, C., & Murphy, E. (2005). Retention initiatives for ICT based courses. *Frontiers in Education Proceedings of the 35th Annual Conference, Indianapolis, IN, S2C-10*. doi:10.1109/FIE.2005.1612215
- Cookson, P. S. (Ed.). (1998). *Program planning for the training and continuing education of adults*. Malabar, FL: Krieger Publishing Company.

- Cooper, M. (1976). An exact probability test for use with Likert-type scales. *Educational and Psychological Measurement, 36*(3), 647-655. doi:10.1177/001316447603600310
- Cooper, J., & Weaver, K. D. (2003). *Gender and computers: Understanding the digital divide*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Craft, R., Kerschenbaum, S., & Ware, J. (2007). Training tomorrow's workforce. *Training and Development, 61*(4), 58-60. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a75997795c836d80430b76208bfbcdbbce7221d81c490e544bcf86c&fmt=P>
- DeBerard, M. S., Spielmans, G. I., & Julka, D. L. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal, 38*(1), 66-80. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a759977995c836d80430b7620cc944990fae8f3fe8db67303b2fc92cd&fmt=P>
- DeLoughry, T. (1993). 2 researchers say "technophobia" may affect millions of students. *Chronicle of Higher Education, 39*(34), A25-26. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a75997799a5514ca8e28368c0a8897a42e3d55fd1334e172ad6274509&fmt=C>
- Detterman, D. K. (1993). *The case for prosecution: Transfer as an epiphenomenon*. In D. K. Detterman & R. J. Sternberg (Eds.), *Transfer on trial: Intelligence, cognition, and instruction* (pp. 1-23). Norwood, NJ: Ablex.

- Dickey, M. D. (2006). Girl gamers: The controversy of girl games and the relevance of female-oriented game design for instructional design. *British Journal of Educational Technology*, 37(5), 785-793. doi:10.1111/j.1467-8535.2006.00561.x
- Entertainment Software Association. (2009). Retrieved from <http://www.theesa.com/facts/index.asp>
- Feiertag, J., & Berge, Z. L. (2008). Training generation N: How educators should approach the net generation. *Education + Training*, 50(6), 457-464. doi:10.1108/0400910810901782
- Fisher, A., Margolis, J., & Miller, E. (1997). Undergraduate women in computer science: Experience, motivation and culture. *Proceedings of the 28th SIGCSE technical symposium on Computer Science Education, New York, NY, USA*, 106-110. doi:10.1145/268084.268127
- Florida Atlantic University. (2010). *Interactive Reporting, Admissions*. Retrieved from <http://iea.fau.edu/reports/admissions.aspx>
- Ford, J.K., & Weissbein, D. A. (1997). Transfer of training: An updated review and analysis. *Performance Improvement Quarterly*, 10(2), 22-41. doi:10.1111/j.1937-8327.1997.tb00047.x
- Goldstein, I. L. (1986). *Training in organizations: Needs assessment, development, and evaluation*. Pacific Grove, CA: Brooks and Cole.
- Gos, M. W. (1996). Computer anxiety and computer experience: A new look at an old relationship. *The Clearing House*, 69(5), 271-6. Retrieved from <http://www.jstor.org/stable/30189184>

- Gross, M., & Latham, D. (2009). Undergraduate perceptions of information literacy: defining, attaining, and self-assessing skills. *College & Research Libraries*, 70(4), 336-350. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a759977995c836d80430b762050755a12419fe1d5c493c7fa1043b306&fmt=P>
- Hignite, M., Margavio, T. M., & Margavio, G. W. (2009). Information literacy assessment: Moving beyond computer literacy. *College Student Journal*, 43(3), 812-821. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a75997799f6cd7252bebc930330dbff11c838f2f0ef9aa766ec18dff7&fmt=P>
- Hilberg, J. S. (2007). *Fluency with information and communication technology: Assessing undergraduate students*. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3275273)
- Hilberg, J. S., & Meiselwitz, G. (2008). Undergraduate fluency with information and communication technology: Perceptions and reality. In J. J. Ekstrom & M. Stockman (Eds.), *Proceedings of the 9th AMC SIGITE Conference on Information Technology Education*, (pp. 5-10). New York, NY: ACM. doi: 10.1145/1414558.1414562
- Holding, D. H. (1965). *Principles of training*. New York, NY: Pergamon Press
- Holton, E.F. (1996). The flawed four-level evaluation model. *Human Resource Development Quarterly*, 7(1), 5-21. doi:10.1002/hrdq.3920070103

- Holton, E. F., III, Bates, R. A., & Ruona, W. E. (2000). Development of a generalized learning transfer system inventory. *Human Resource Development Quarterly*, *11*(4), 333-360. doi:10.1002/1532-1096(200024)11:4<333::AIDHRDQ2>3.0.CO;2-P
- Igbaria, M., & Chakrabarti, A. (1990). Computer anxiety and attitudes towards microcomputer use. *Behavior and Information Technology*, *9*(3), 229-241. doi: 10.1080/01449299008924239
- Jamelske, E. (2009). Measuring the impact of a university first-year experience program on student GPA and retention. *Higher Education*, *57*(3), 373-391. doi:10.1007/s10734-008-9161-1
- Jamet, E., & Le Bohec, O. (2007). The effect of redundant text in multimedia instruction. *Contemporary Educational Psychology*, *32*, 588-598. doi: 10.1016/j.cedpsych.2006.07.001
- Joiner, R., Gavin, J., Duffield, J., Brosnan, M., Crook, C., Durndell, A., ... Lovatt, P. (2005). Gender, internet identification, and internet anxiety: Correlates of internet use. *CyberPsychology & Behavior*, *8*(4), 371-378. doi:10.1089/cpb.2005.8.371
- Jones, S. (2002). *The Internet goes to college: How students are living in the future with today's technology*. Pew Internet & American Life Project, Washington, DC. Retrieved from <http://www.eric.ed.gov/PDFS/ED472669.pdf>
- Jones, C., & Ramanau, R. (2009). Collaboration and the net generation: The changing characteristics of first year university students. In C. O'Malley, D. Suthers, P. Reimann, & A. Dimitracopoulou (Eds.), *Proceedings of the 9th International*

Conference on Computer Supported Collaborative Learning: Vol. 1. International Society of the Learning Sciences (pp. 237-241). AMC. Retrieved from <http://delivery.acm.org/10.1145/1610000/1600089/p237-jones.pdf?key1=1600089&key2=5487658921&coll=DL&dl=ACM&ip=131.91.117.24&CFID=10102144&CFTOKEN=73009332>

- Junco, R., & Mastrodicasa, J. (2007). *Connecting to the net generation: What higher education professionals need to know about today's students*. Washington, DC: NASPA, Inc.
- Kalyuga, S., Chandler, P., & Sweller, P. (1999). Managing split-attention and redundancy in multimedia instruction. *Applied Cognitive Psychology, 13*(4), 351-372. doi:0.1002/(SICI)1099-0720(199908)13:4<351::AID-ACP589>3.0.CO;2-6
- Kaplowitz, M., Hadlock, T., & Levine, R. (2004). A comparison of web and mail survey response rates. *Public Opinion Quarterly, 68*(1), 94-101. doi:10.1093/poq/nfh006
- Kennedy, G. E., Judd, T.S., Churchward, A., Gray, K., & Krause, K. L. (2008). First year students' experiences with technology: Are they really digital natives?. *Australasian Journal of Educational Technology, 24*(1), 108-122. Retrieved from <http://www.ascilite.org.au/ajet/ajet24/kennedy.pdf>
- Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy*. Englewood Cliffs: Prentice Hall/Cambridge.
- Koch, S. C., Müller, S. M., & Sieverding, M. (2008). Women and computers. Effects of stereotype threat on attribution of failure. *Computers & Education, 51*, 1795-1803. doi:10.1016/j.compedu.2008.05.007

- Lau, L. (2003). Institutional factors affecting student retention. *Education*, 124(1), 126-136. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a759977995c836d80430b7620ea9dd188b49aa17d5740b61139e62861&fmt=P>
- Levitz, R., & Noel, L. (1989). *Connecting students to institutions: Keys to retention and success*. In Upcraft, M.L., Gardner, J. N., & Associates (Eds.), *The Freshman Year Experience* (pp. 65-81). San Francisco, CA: Jossey-Bass Publishers.
- Lorenzo, G. & Dziuban, C. (2006). *Ensuring the net generation is net savvy*. EDUCAUSE Learning Initiative Paper 2. Boulder, CO: EDUCAUSE. Retrieved from <http://net.educause.edu/ir/library/pdf/ELI3006.pdf>
- Madigan, E. M., Goodfellow, M., & Stone, J. A. (2007). Gender, perception, and reality: Technological literacy among first-year students. *Proceedings of the 38th SIGCSE technical symposium on Computer Science Education, ACM, New York, NY: 410-414*. doi:10.1145/1227310.1227453
- Mathis, S. G. (2002). Improving first-year women undergraduates' perceptions of their computer skills. *TechTrends*, 46(6), 27-29. doi:10.1007/BF02824157
- Mayer, R. E. (1999). Multimedia aid to problem-solving transfer. *International Journal of Educational Research*, 31(7), 611-623. doi:10.1016/S0883-0355(99)00027-0
- Mayer, R. E. (2001). *Multimedia Learning*. New York, NY: Cambridge University Press.
- Mayer, R. E., & Anderson, R. B. (1991). Animations need narrations: An experimental test of a dual-coding hypothesis. *Journal of Educational Psychology*, 83(4), 484-490. doi:10.1037/0022-0663.83.4.484

- Mayer, R. E., & Anderson, R. B. (1992). The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology, 84*(4), 444–452. doi:10.1037/0022-0663.84.4.444
- Mayer, R. E., & Johnson, C. I. (2008). Revising the redundancy principle in multimedia learning. *Journal of Educational Psychology, 100*(2), 380-386. doi:10.1037/0022-0663.100.2.380
- Mayer, R. E., & Moreno, R. (1998). A split-attention effect in multimedia learning: Evidence for dual processing systems in working memory. *Journal of Educational Psychology, 90*(2), 312-320. doi:10.1037/0022-0663.90.2.312
- Mayer, R. E., & Moreno, R. (2002). Aids to computer-based multimedia learning. *Learning and Instruction, 12*(1), 107-119. doi:10.1016/S0959-4752(01)00018-4
- McManus, T. (2006). Assessing proficiencies in higher education: Benchmarking knowledge and ICT skills of students at an urban community college. *Community & Junior College Libraries, 13*(3), 43-51. doi: 10.1300/J107v13n03_06
- Merriam, S., & Caffarella, R. (1999). *Learning in Adulthood: A Comprehensive Guide* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Morahan-Martin, J. (1998). Males, females, and the internet. In J. Gackenback (Ed.), *Psychology and the internet: Intrapersonal, interpersonal, and transpersonal applications* (pp. 169-197). San Diego, CA: Academic Press.
- Moreno, R., & Mayer, R. E. (1999). Cognitive principles of multimedia learning: The role of modality and contiguity. *Journal of Educational Psychology, 91*(2), 358-368. doi:10.1037/0022-0663.91.2.358

- Morris, J. D. (1979). *Two recent statistical developments that aid in the analysis of instructor evaluation instruments*. Paper presented at the Florida Statewide Conference on Institutional Research, Fort Myers, FL.
- Mousavi, S., Low, R., & Sweller, J. (1995). Reducing cognitive load by mixing auditory and visual presentation modes. *Journal of Educational Psychology*, 87(2), 319-334. doi:10.1037/0022-0663.87.2.319
- Oblinger, D., & Oblinger, J. (Eds.) (2005). *Educating the net generation*, EDUCAUSE, Retrieved from <http://www.educause.edu/ir/library/pdf/pub7101.pdf>
- Paivio, A. (1986). *Mental representations: A dual coding approach*. Oxford, England: Oxford University Press.
- Pascarella, E., & Terenzini, P. (1992). Designing colleges for greater learning. *Planning for Higher Education*, 20, 1-6. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a75997799a5514ca8e28368c0e00a1e2cd9559f79cb88e7ca729bde74&fmt=C>
- Penney, C. G. (1989). Modality effects and the structure of short-term verbal memory. *Memory & Cognition*, 17(4), 398-422. Retrieved from <http://80-proquest.umi.com.ezproxy.fau.edu/pqdweb?did=6147689&sid=1&Fmt=2&clientId=3326&RQT=309&VName=PQD>
- Penney, G. (2010). *Executive Fire Officers' strategic thinking capabilities and their relationship with information and communication technology*. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3420060)

- Perry, T., & Perry, L. (1998). University students' attitudes towards multimedia presentations. *British Journal of Educational Technology*, 29(4), 375-377.
doi:10.1111/1467-8535.00083
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-2.
Retrieved from <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf>
- Rose, A. D. (1998). Challenges in training adult educators. *Adult Learning*, 9(3), 4-5.
Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a7599779973d06fa7b4869506182501669a060a82c209472a1580a471&fmt=H>
- Rosen, L., & Maguire, P. (1990). Myths and realities of computerphobia: A meta-analysis. *Anxiety, Stress & Coping: An International Journal*, 3(3), 175-191.
doi: 10.1080/08917779008248751
- Rosser, S. V. (1989). Teaching techniques to attract women to science: Applications of feminist theories and methodologies. *Women's Studies International Forum*, 12(3), 363-377. doi:10.1016/S0277-5395(89)80013-5
- Rowden, R. W. (2007). *Workplace learning principles and practice*. Malabar, FL: Krieger Publishing Company.
- Saade, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education*, 8, 177-190. Retrieved from <http://find.galegroup.com/gtx/infomark.do?&contentSet=IAC-Documents&type=retrieve&tabID=T002&prodId=AONE&docId=A208275948&source=gale&srcprod=AONE&userGroupName=gale15691&version=1.0>

- Salminen-Karlsson, M. (2009). Women who learn computing like men: Different gender positions on basic computer courses in adult education. *Journal of Vocational Education and Training*, 61(2), 151-168. doi:10.1080/13636820902933254
- Sam, H. K., Othman, A. E. A., & Nordin, A. S. (2005). Computer self-efficacy, computer anxiety, and attitudes toward the internet: A study among undergraduates in unimas. *Educational Technology & Society*, 8(4), 205-219. Retrieved from http://www.ifets.info/journals/8_4/19.pdf
- Sax, L. J., Astin, A. W., Korn, W. S., & Mahoney, K. M. (1998). *The American freshman: National norms for fall 1998*. Los Angeles, CA: Higher Education Research Institute, University of California at Los Angeles Graduate School of Education and Information Studies.
- Sax, L. J., Ceja, M., & Teranishi, R. T. (2001). Technological preparedness among entering freshmen: The role of race, class, and gender. *Journal of Educational Computing Research*, 24(4), 363-383. doi:10.2190/4K49-VQW7-UR8P-8HAW
- Schumacher, P., & Marahan-Martin, J. (2001). Gender, internet and computer attitudes and experiences. *Computers in Human Behavior*, 17(1), 95-110. doi:10.1016/S0747-5632(00)00032-7
- Schunk, D. (2004). *Learning theories: An educational perspective* (4th ed.). Upper Saddle River, NJ: Pearson.
- Sutherland-Smith, W. (2002). Weaving the literacy web: Changes in reading from page to screen. *The Reading Teacher*, 55(7), 662-669. Retrieved from <http://www.jstor.org/stable/20205116>

- Sweller, J. (1994). Cognitive load theory, learning difficulty and instructional design. *Learning and Instruction, 4*(4), 295-312. doi:10.1016/0959-4752(94)90003-5
- Tempelman-Kluit, N. (2006). Multimedia learning theories and online instruction. *College & Research Libraries, 67*(4), 364-9. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a7599779909c3222764db0a79b878397662eb45d7708ff0808e256904&fmt=P>
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125. doi:10.3102/00346543045001089
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*, (2nd ed.). Chicago, IL: University of Chicago Press.
- Tinto, V. (2001). *Rethinking the first year of college*. Higher Education Monograph Series, Syracuse University. Retrieved from <http://www.mcli.dist.maricopa.edu/fsd/c2006/docs/rethinkfirstyearcollege.pdf>
- Tinto, V. (2002). Establishing conditions for student success. *Proceedings from the 11th Annual Conference of the European Access Network*, Monash University, Prato, Italy. Retrieved from <http://faculty.soe.syr.edu/vtinto/Files/European%20Access%20Network%202002%20Keynote.pdf>
- Volman, M. & van Eck E. (2001). Gender equity and information technology in education: The second decade. *Review of Educational Research, 71*(4), 613–634. doi:10.3102/00346543071004613

- Whitney, D. R. (1978). An alternative test for use with Likert-type scales. *Educational and Psychological Measurement*, 38(1), 15-18. doi:10.1177/001316447803800103
- Wickens, C. D. (1984). *Engineering psychology and human performance*. Columbus, OH: Merrill.
- Wittrock, M. C. (1989). Generative processes of comprehension. *Educational Psychologist*, 24(4), 345-376. doi: 10.1207/s15326985ep2404_2
- Woosley, S. A. (2003). How important are the first few weeks of college? The long term effects of initial college experiences. *College Student Journal*, 37(2), 201-7. Retrieved from <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790e7e1f464a759977997b1eac6cad235ff6f903412313c1a803a53b07f7e9823a5f&fmt=P>
- Yamnill, S., & McLean, G. N. (2001). Theories supporting transfer of training. *Human Resource Development Quarterly*, 12(2), 195-208. doi:0.1002/hrdq.7