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COOPERATIVE EDUCATION AS A PREDICTOR OF
BACCALAUREATE DEGREE COMPLETION

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
in the Department of Educational Research, Technology, and Leadership
in the College of Education
at the University of Central Florida
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ABSTRACT

Baccalaureate degree completion statistics are surprisingly low. National four-year graduation rates hover around 38%, and six-year graduation rates have remained steady at approximately 63% (Berkner, He, & Cataldi, 2002). At the University of Central Florida, as at many public research institutions, the numbers are even lower. Literature has emerged, however, which suggests that students who participate in cooperative education programs may experience increased motivation to continue the formal education process (Avenoso & Totoro, 1994; Schambach & Dirks, 2002; Somers, 1986). This study investigated the effect of co-op participation on undergraduate degree completion in the context of several risk factors for attrition.

The population for this study was the cohort of full-time, bachelor's degree-seeking undergraduate students who entered the University of Central Florida as first-time-in-college (FTIC) students in the fall semester of 1999. Group One (Co-op Students) consisted of full-time FTIC students who successfully participated in the University of Central Florida Cooperative Education program and Group Two (Non-Participants) included full-time FTIC students with at least 20 credit hours completed and consistent grade point averages of at least 2.5 who did not participate in the University of Central Florida Cooperative Education program. The additional parameters on the Non-Participant group were included to control for any potential differences between the two groups due to increased requirements for participation in the co-op program. The two groups arrived at the University of Central Florida with nearly identical high school grade point averages and standardized test scores, and also were remarkably similar in age,

ethnic composition, and college at entry.

Results indicated that students who graduated within four years seemed to do so regardless of co-op participation, but for those who took longer, there was a correlation between co-op and degree completion. There was also some evidence to suggest that internships are associated with degree completion as well. Further, some of the known risk factors for attrition (lower high school grade point average, male gender, and non-White/non-Asian ethnicity) may be mitigated by the student's participation in their institution's co-op program, though additional research in this area is suggested.

This book is lovingly dedicated to my favorite people in the universe: my husband,
whose tireless support and fabulous sense of humor keeps me grounded, and my
daughter, whose unbridled enthusiasm for life inspires me to continue every day with a
smile.

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CHAPTER ONE: INTRODUCTION

College attendance has proliferated in recent years, leading greater numbers of students to apply for and enroll in institutions of higher education (American Association of State Colleges and Universities, 2004). High school students with mediocre grades who at one time might have shunned universities are now attending in record numbers, and adults who already entered the world of work are returning to the classroom for part-time or full-time studies (Miller, 2001; United States Department of Education, 2002). Alexander (2000) offered commentary on this trend, saying “the expansion of the higher education system in Western Europe and other...nations during the last fifteen years has been viewed by some as the most significant higher education development of this century” (p. 415). Using the term “massification,” he cites an article in *The Economist*, which speculates that in the near future, all secondary students in economically advantaged nations will be expected to pursue higher learning opportunities (Alexander, p. 415).

Despite the increase in student numbers, four-year graduation rates seem to hover around 38%, and six-year graduation rates have remained steady at approximately 63% (Berkner, He, & Cataldi, 2002). “The fact that only about one-half of college attendees graduate is widely perceived as a failure – a failure of either the student, the institution, or the entire educational system” (DesJardins, Ahlburg, and McCall, 2002, p. 555-556), and a new interest in the operation of our nation’s higher education system has arisen. Legislators and taxpayers are examining college graduation rates, and in some cases,

governmental authorities have instituted programs to encourage students to earn degrees at a faster rate (McGee, 2005). According to the American Association of State Colleges and Universities (2004), an amplified concern over higher education outcomes has contributed to this trend, as well as increased student expectations, fiscal limitations, and emerging international competition. Consequently, higher education is under the unprecedented watchful eye of numerous stakeholders.

Literature has emerged which suggests that students who participate in experiential learning programs such as cooperative education may experience increased motivation to continue the formal education process (Avenoso & Totoro, 1994; Schambach & Dirks, 2002; Somers, 1986). However, it is clear that additional studies in this area are needed (Somers, 1986; Stull, Crow, & Braunstein, 1997). According to a survey completed by cooperative education students at the University of Central Florida during the 2004-2005 school year, 82% reported an increase in their motivation to persist to graduation, with 42% of students noting a “significant increase” in this area as a result of their co-op experience (Co-op Student Learning Outcomes, n.d.). Two reasons for this increase could be found in Leppel’s research (2001) indicating that a student’s probability of persistence may be a result of his or her level of commitment to a particular occupation or major and their overall interest in the subject area. Cooperative education, with its occupational focus, may enhance commitment and interest. Together, these findings suggest that campus cooperative education programs may offer institutions a way to increase the likelihood that students will persist until graduation.

In the most recent study of its kind, Stull, Crow, and Braunstein (1997) found that

one of the most critically needed areas of research in cooperative education, according to members of the Cooperative Education Association (now the Cooperative Education and Internship Association) research committee and co-op administrators, is “quantitative data on the impact of cooperative education participation on recruitment, retention, academic performance, and graduation (time and rate) of students” (p. 32). In addition, Cantor (1997) asserts that a primary concern of most college faculty center around student retention and completion rates. Because the literature has shown that risk factors for non-completion include male gender, being of black or Hispanic descent, lower standardized test scores, and a lower grade point average in high school, the purpose of this study is to determine if there is a relationship between participation in cooperative education as an undergraduate student and degree attainment at the University of Central Florida and to see if any differences exist based on gender, ethnicity, standardized test scores, and high school grade point average.

Statement of the Problem

Carey (2004) asserted “America’s colleges and universities have a serious and deep-rooted problem: far too many students who enter our higher education system fail to get a degree” (p.1). In recent years, college and university success has been measured by undergraduate graduation rates (McGee, 2005). While the validity of this idea has been debated (Burd, 2004), it is nonetheless considered to be a benchmark by which higher education institutions are evaluated (American Association of State Colleges and Universities, 2004).

According to the American Association of State Colleges and Universities:

Social, political, and economic forces are converging to ensure that student success—particularly as reflected by the graduation rate—will remain a key policy objective at the state and federal levels. If real progress is to be made on this objective, better data systems are needed to promote better public policy and institutional practice (Conclusion section, para. 2).

Baccalaureate degree completion statistics are alarmingly low. Berkner, He, and Cataldi's study (2002) showed the national average for undergraduate degree attainment after six years is 63%. This graduation rate was corroborated by Adelman's longitudinal study (2004), showing that the degree completion rate for students attempting a bachelor's degree was 66-67%. Further, Adelman showed that these rates have not varied since the early 1970s, and Tinto (1982) asserted that these rates have not changed in the past century. When reduced to a four-year timeframe, the national graduation rate decreases: only 38% of students who begin four-year degree programs complete their goal (Berkner, et al.).

As shown in Figure 1, the numbers are even lower at the University of Central Florida: for the Fall 1999 cohort of full-time, first-time-in-college (FTIC) bachelor's degree seekers, only 57% of students attained their degree within six years and 30% of students completed their degree in four years (Office of Institutional Research, n.d.a).

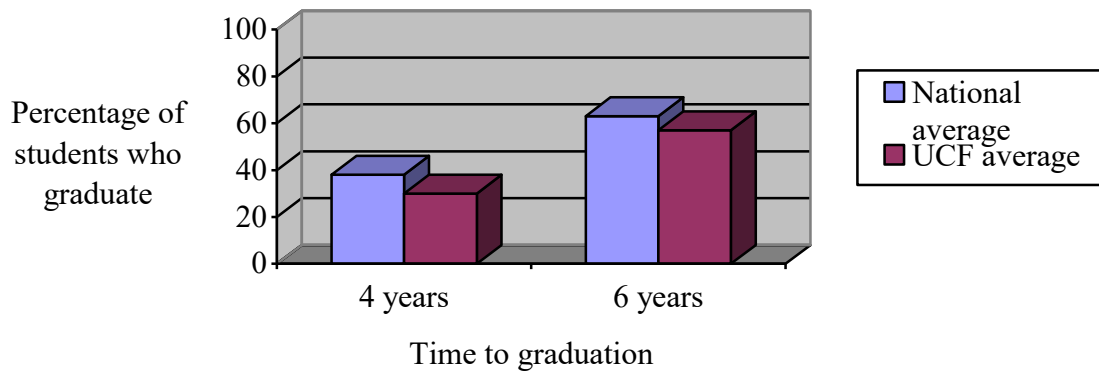


Figure 1

National and UCF Degree Completion Statistics

The preponderance of attrition leaves millions of individuals without the credential they need for higher-wage jobs, and worse, many of these former students are now burdened with substantial student debt (Redd, 2001). Additional consequences include cost to the student and university (Carey, 2004) and a less educated citizenry leading to lower wages and a smaller tax base (Huffman & Schneiderman, 1997). The public perception of higher education suffers as a result of attrition, as does the stability of institutional budgets, as legislators are now linking institutional funding with graduation rates (DesJardins et al., 2002). It is important to keep in mind, as Tinto (1982) reminded us, that the goal is not to eliminate attrition completely, as there are rational and compelling reasons for a student to leave institutions of higher education, but rather to reduce, “within reason, dropout among certain groups of students in the general student population” (p. 698).

Research Questions

A better understanding of the relationship between cooperative education and degree attainment may be ascertained from answering the following research questions:

1. What is the relationship, if any, between participation in cooperative education and degree completion at the University of Central Florida?
2. To what extent, if any, at the University of Central Florida, can time-to-degree be predicted by participation in cooperative education, gender, ethnicity, standardized test scores, and high school grade point average?

In addition, this study describes characteristics of the co-op and non- co-op populations, including the number of years students were enrolled prior to earning the baccalaureate degree, degree completion rates for each group, gender, age, ethnicity, standardized test scores, high school grade point average, major upon entry, college upon entry, and grade point average at the time of graduation. For co-op students, the number of semesters completed prior to beginning the first cooperative education assignment is also described.

Definition of Terms

The following definitions are offered to clarify terms used in the study:

1. *ACT (American College Test) Score*: Also known as the Composite Score, the ACT score is the mean of each of the four test scores (English, Reading, Mathematics, and Science) rounded to the nearest whole number. The score can range from 1 to 36.
2. *Cooperative education (Co-op)*: “An academic program that allows students to apply classroom theory in practical work settings and gain personal, academic and work skills over multiple semesters” (Experiential Learning, University of Central Florida, n.d.a.,

para 1). Co-op students are always paid, may or may not earn credit, and complete structured reflection activities designed to enhance learning.

3. *Cooperative education course*: An academic course in any major or with any prefix that contains a course number of 2949, 3949, or 4949. These courses are graded on a satisfactory/unsatisfactory basis, are instructed by co-op faculty, and involve a series of reflective assignments and evaluations throughout the semesters in which the student is working (Co-op...the competitive edge: Course syllabus, n.d.).

4. *Cooperative education student*: A student who earned a grade of “Satisfactory” (S) in at least two semesters of co-op courses.

5. *Ethnicity*: “Identity with or membership in a particular racial, national, or cultural group and observance of that group's customs, beliefs, and language” (Ethnicity, n.d.).

6. *Experiential Learning*: A model of education in which the learner begins with an experience, follows it with reflection, develops a theory to explain the experience, and finally tests this theory in new situations (Kolb, 1984). Cooperative education and internships are forms of experiential learning.

7. *Degree Completion (also referred to as Degree Attainment)*: The act of completing a baccalaureate degree.

8. *First-time-in-college (FTIC) students*: “Students who have completed fewer than 12 semester hours and currently are in their first term as a UCF college student after high school” (University of Central Florida, 2006, p. 435).

9. *Full-time enrollment*: For undergraduates, enrollment in 12 or more credit hours during the fall or spring semesters (University of Central Florida, 2006).

10. *High school grade point average*: The cumulative high school grade point average reported to the University of Central Florida at the time of university matriculation.
11. *Internship*: An academic course lasting one semester in which a student applies theory to practice in a relevant work environment and actively reflects on it. Typically internships are major-related, credit-bearing, may be paid or unpaid, and usually occur near the end of the student's academic program (Experiential Learning, University of Central Florida, n.d.b).
12. *Massification*: A term used by Alexander (2000) to describe the increase in higher education enrollment.
13. *Non-completer*: A student who begins, but does not complete, a baccalaureate degree within the stated time frame for this study, 7.67 years.
14. *Retention*: An institutional measure assessing consecutive student persistence from freshman to sophomore year.
15. *SAT (Scholastic Assessment Test) Score*: Combined verbal and quantitative scores on the SAT I test. The score may range from 400 to 1600.
17. *Time to Degree*: The number of years elapsed between the beginning of a student's first semester and baccalaureate degree completion.
18. *Transfer student*: A student who changes the school in which s/he is enrolled prior to earning the baccalaureate degree.

Assumptions

The researcher assumed the following in conducting this study:

1. Data obtained by the Office for Institutional Research are accurate and complete.

2. Instructors grading the co-op courses assessed the students' progress fairly and consistently, and that differences between instructors will be distributed uniformly throughout the dataset.

Limitations

The following limitations are acknowledged in this study:

1. At the University of Central Florida, participation in the cooperative education program is limited to students meeting the following criteria: (a) a grade point average of 2.5 or better, (b) full-time degree-seeking student status, (c) completion of at least 20 credit hours, and (d) ability to complete multiple semesters of co-op prior to graduation (Experiential Learning, n.d.d). Therefore, the generalization of results is restricted to the smaller population of students that meet the above requirements at the University of Central Florida.
2. Due to the nonexperimental nature of this research, it is possible that confounding variables not addressed in this study may influence the outcome. For example, if a stronger relationship is found between participation in cooperative education and degree attainment than non-participation and degree attainment, it should be acknowledged that co-op students may be more motivated to succeed than non-co-op students, and might have graduated regardless of their participation. Further, research has demonstrated that correlations exist between ethnicity and socioeconomic class (Alexander et al., 1982), so it may be difficult to differentiate the effects of each in this study.
3. This study did not control for all student characteristics such as academic major or

gender. Further, certain academic majors require co-op participation whereas others do not. Therefore, certain populations may have greater representation in the co-op or non-participant groups.

4. This study only analyzed full-time students who graduate from the University of Central Florida (UCF) in a specific time frame (7.67 years). If a student did not graduate from UCF in this specific timeframe, they were listed as a non-completer for purposes of this study. Further, if a student transferred to a different university, they were also listed as a non-completer due to the unavailability of data. This is cited as a common limitation in persistence studies (Tinto, 1982).

Significance of the Study

Results from this study may be used to better predict student success in traditionally risk-prone populations such as males, students of color, students with lower SAT or ACT scores, or students with lower high school grade point averages at a large, public university like the University of Central Florida. Since it has been shown that public universities have considerably worse graduation rates than private universities (Berkner, He, & Cataldi, 2002), it will be important to identify ways to overcome this challenge in this particular environment. “Studies of dropout among specific groups of students, especially among the disadvantaged, may aid in the development of institution and system policies designed and targeted to assist the educational continuance of particular subpopulations within the student body” (Tinto, 1982, p. 692). A plethora of research has been conducted on student retention among disadvantaged groups, but there seems to be fewer studies using one of the most fundamental student goals, graduation, as

its indicator. Further, if participation in cooperative education is shown to be a predictor of degree completion, or if students who participate in co-op complete degrees more quickly than students who do not participate, it may help experiential learning offices nationwide to better articulate their contribution on college campuses.

Since cooperative education research often focuses on subjective measures based on student perceptions of learning or expectations (Eyler, 1993), a need exists for the assessment of an objective, measurable outcome of student participation. Yu (n.d.) warned against the reliance on self-reported data due to memory recall inaccuracies and the tendency to report only positive behavior. Gosenpud (1990) suggested that future research should include “evaluating experiential learning on the basis of behavioral and specified attitudinal outcomes” (p. 326). This study’s focus on student persistence offers an objective, behaviorally-based dependent variable and eliminates the possibility of confounding psychological or cognitive influences on the construct of interest.

Carey (2004) asserted that “extra time for degree completion comes at a significant cost, both to the student and to the institution, resources that might be better spent elsewhere” (p. 15). Conversely, the completion of a Bachelor’s degree offers many economic and social benefits including higher salaries and consequently, higher tax revenues, reduced likelihood of criminal activity in the children of college-educated adults, and increased volunteerism in the community (Zhu, 2004). Consequently, higher education leaders are beginning to rethink methods used to improve student success. Research like this study will help faculty and administrators to make more informed, evidence-based decisions.

Summary and Organization of Remainder of the Study

This chapter introduced the issues, provided background for the reader, and summarized the research questions, definitions, assumptions, limitations, and overall significance of the study. The existing literature pertaining to the research problem will be reviewed in Chapter Two. Chapter Three will describe the methodological approach, including a description of the population and groups, as well as data collection and analysis procedures. Chapter Four will offer results of the data analyses. Conclusions will be offered in Chapter Five, including a summary of findings, recommendations based on the results, and thoughts about opportunities for future research

CHAPTER TWO: REVIEW OF THE LITERATURE

When considering the multitude of factors affecting student retention and persistence, it seems unlikely to develop a solution which singlehandedly eliminates the attrition problem facing higher education institutions. Nevertheless, there exists a plethora of literature offering evidence of several risk factors for attrition. Some characteristics of students who are less likely to graduate include male gender, Black or Hispanic ethnicity, lower standardized test scores, and lower high school grade point averages. Further, some studies suggest that student employment (especially off-campus) is a hindrance to baccalaureate completion. At the same time, several studies suggest that undergraduate participation in cooperative education programs may help increase the probability that a student will graduate. Therefore, in the context of the risk factors for attrition, cooperative education will be studied to determine if there is a relationship between participation and persistence. To this end, a review of the literature will focus on the following topics: what is cooperative education, cooperative education as a pedagogical approach, cooperative education and student employment, the political zeitgeist in higher education: accountability, and student risk factors for non-completion.

What is Cooperative Education?

A multitude of definitions exist in the cooperative education literature. Therefore, it may be helpful to describe cooperative education in terms of three general areas: theoretical underpinnings, best practices, and the importance of standards.

Theoretical Underpinnings of Cooperative Education

For centuries, educators have been discussing the merits of learning by doing. Colleges and universities worldwide have embraced this philosophy and implemented programs designed to offer students the opportunity to apply theory learned in the classroom to real situations. In higher education, many kinds of experiential learning opportunities have been developed including internships, cooperative education, and service learning. While each of these programs vary in terms of scope, time investment, and structure, the basic premise remains constant: “for real learning to happen, students need to be active participants in the learning process rather than passive recipients of information given by a teacher” (Sweitzer & King, 2004, p.7). Sexton and Ungerer (1975) define experiential learning as:

Learning activities outside the normal classroom environment, the objectives of which are planned and articulated prior to undertaking the experience, involving activity that is meaningful and real and on the same level as that of other nonstudents in the same nonclassroom environment, and in which the learner has the assistance of another person...in expanding the learning as much as possible that takes place in nonclassroom settings. (p. 1)

This explanation is sharply contrasted with the public perception of work experience, whereby the individual’s gain in knowledge is somewhat happenstance due to exposure to new concepts on a jobsite.

Most educators give credit to John Dewey, American educator and philosopher, for pioneering the concept of experiential learning. In *Democracy and Education*, Dewey states “an ounce of experience is better than a ton of theory simply because it is only in experience that any theory has vital and verifiable significance” (1916, p. 144). He

described the differences between traditional and progressive education, and proposed the latter, containing the element of real world experience, is more helpful to younger learners than rote memorization or lecture methods. In essence, Dewey lobbied for a new kind of education; he wanted to move away from the abstract pedagogical techniques of years past and toward more concrete methodologies.

Piagetian theory also played a role in the development of experiential learning models. According to Jean Piaget, individuals progress through four distinct intellectual stages: sensorimotor, pre-operations, concrete operations, and formal operations (Harcharik, 1993). While these stages are thought to be linked with specific physical ages (for example, infants learn using sensorimotor skills whereas adolescents and adults use formal operations to process data), Harcharik reminded us that Piaget himself acknowledged that many adults do not utilize the highest level of thinking in their daily work. In fact, he theorized “perhaps adolescents and adults use formal operations only in situations which are compatible with their interests and professional concerns” (Harcharik, p. 25). Further, Harcharik pointed out that the teacher’s role is to encourage the process of learning and to guide the student toward the stage of formal operations. Therefore, in getting to the final stage of intellectual development, it is important for students to have opportunities to become interested. Since college students are most likely in the concrete stage of development, providing tangible, experiential activities seems to be the best approach for cultivating interest and excitement.

The ideas that Dewey and Piaget expressed concerning the importance of tangible experiences in learning are echoed and built upon by David Kolb. In his landmark work

Experiential Learning: Experience as the Source of Learning and Development, Kolb suggested that experiential learning is a four-part process, where the student engages in a new experience, actively reflects on it in some way, creates a new mental model based on the experience, and finally experiments with this new knowledge in other situations (1984). Through the discussion of reflection and integration processes, Kolb described not just the importance of experiential learning, but also the ways in which students can derive the most benefit from it.

Sweitzer and King (2004) developed a model which helps to explain some of the emotional reactions to a new experiential learning opportunity. While the authors conceived this model with internships in mind, it can be equally applied to cooperative education students. According to Sweitzer and King, experiential learning students progress through a series of five distinct stages: “anticipation, disillusionment, confrontation, competence, and culmination” (p. 27). The model suggests that students will move through the stages at a rate dependent upon previous experience, personality, supervision style received, and the nature of the work. For each of the stages, issues may need to be resolved, and as they are, the students will continue to progress.

Stage One (Anticipation), refers to the wide range of mixed emotions students feel prior to beginning the experience which could include anxiety, euphoria, and excitement. They may be concerned about socially fitting in, and often question their own competencies. Concerns about time management and other responsibilities may surface. At the same time, students often are looking forward to the experience. In Stage Two (Disillusionment), false expectations often contribute to a feeling of disappointment

in the setting, co-workers, supervisor, or responsibilities. Sometimes, a student who felt they wanted to pursue a particular career path for a long time finds out that they do not enjoy the actual tasks. This can cause unexpected dissatisfaction with the experience. As a result, students may complain and feel their morale sagging. It may cause more tardiness or absences. Sweitzer and King (2004) refer to the disillusionment stage as a “crisis of growth” (p. 31) and warn that students may either stagnate or grow from the experience. By acknowledging the crisis of growth, students can prepare to deal with their feelings in Stage Three (Confrontation). Some may rebel, blaming others or internalizing guilt, while others realize that by reframing the experience, they may be able to resolve negative issues. “As issues raised in the Disillusionment stage are resolved, morale begins to rise, as does task accomplishment” (p. 32). As a result, students’ confidence levels may increase as they begin to feel empowered. Once students understand the environment in which they work and have dealt with any false expectations, they can begin to focus on their tasks. During Stage Four (Competence), students often produce their best work and feel more like a part of the team. Interestingly, Sweitzer and King point out that an increasing commitment to work may place pressure on other aspects of a student’s life such as relationships or additional academic pursuits. As the experience nears the end, students may feel a variety of emotions, not unlike stage one. In Stage Five (Culmination), a feeling of accomplishment may exist, as may guilt over not having worked hard enough. Students often look forward to returning to school, but at the same time feel sad for leaving new friends. To avoid dealing with these conflicting feelings, students may begin to complain

about the experience once again, which can result in a less than positive ending. The alternative, however, is that students will deal positively with the emotions, and recognize the complexity of the situation. As a result, they continue to give their best work and leave with pride intact. The process of guided reflection assists students to successfully move through these stages.

Best Practices in Cooperative Education

When considering cooperative education as a predictor of graduation, it can be helpful to discuss the principles of best practices found in the literature. Wiseman and Page (2000) found several indicators of quality from the students', the site supervisors', and the school coordinators' points of view. Their study compared answers on 60 items to find similarities and differences between the opinions of the three parties. Like many experiential learning studies, the data are self-reported and are based on perceptions rather than objective outcomes, but it offers some insight into factors which might indicate a quality experiential learning program. Offering challenging learning climates seems to be one of the key elements of a good experiential education program (Wiseman & Page). When students' experiences are field-based, the institution often relies on the site supervisor for providing this climate, but as the study showed, students appreciated having a school coordinator who stayed involved in the experience throughout.

In sum, Wiseman and Page listed eight indicators of quality:

- (1) Provide the student with professional development,
- (2) Promote a challenging learning climate,
- (3) Use educational standards to generate student pride and competence,
- (4) Help students develop occupational work ethic,
- (5) Expose students to practical problem solving,
- (6) Allow students a degree of independence,
- (7) Allow students to maintain an academic approach, and
- (8) Encourage students to think critically (p. 74).

The researchers cautioned against using these indicators blindly, but suggested that practitioners might integrate some of these elements into existing experiential learning programs if situational factors allow.

Following The Gallup Organization's model of surveying top performers to discern attributes of greatness, Melanie Gold (2002) surveyed some of the employers reported by members of the National Association of Colleges and Employers as having exemplary programs. Her research validated the findings of Wiseman and Page (2000) and offered several additional best practices including the importance of a mentor, the inclusion of compensation, and the perpetual evaluation and improvement of one's experiential learning program.

The Importance of Standards in Cooperative Education

Despite the relatively clear theoretical framework by which experiential learning programs operate, many researchers have lamented the fact that it is not a well-defined construct (Collins, 1971; Gossenpud, 1990; Ricks, Cutt, Branton, Loken, & Van Gyn, 1993). In actuality, cooperative education has been well-defined since the model was first implemented at the University of Cincinnati in 1906. However, with the influx of

federal dollars during the 1960s and 1970s, some institutions interpreted the definition of cooperative education rather broadly, and the term soon included programs that may not truly be deserving of the name (Accreditation Council for Cooperative Education, n.d.c; Walter, 1994). Further, when federal funding was rescinded several decades later, institutions that had not secured institutional commitment were left with a shortfall of resources to run their programs and consequently eliminated important elements of the co-op model (S. Dressler, personal communication, September 4, 2007).

Even with common goals, cooperative education programs across the nation are fairly diverse, with individual academic programs typically determining the requirements necessary for students to participate (Collins, 1971). Ryan (1999) pointed out that this can be an issue for researchers or evaluators who are attempting to control variables or compare similar programs. Some faculty and administrators believe that only students with a high grade point average should participate in experiential learning opportunities, whereas others argue that this philosophy borders on discrimination and could result in a larger divide between the socioeconomic classes (Cantor, 1997). Some institutions require students to earn academic credit during the experience, whereas others do not (Dodge & McKeough, 2003). Certain academic majors are more likely to offer experiential learning programs than others, and of those that do, some are mandatory and some are optional (Akeyo, 1993). Clearly, it is difficult to generalize experiential learning research to more than a small population, usually contained within the same institution (Dodge & McKeough).

With the variation in cooperative education programs across different colleges

and universities, a set of standards called the Attributes of Cooperative Education were developed in 1993 to unify the discipline (American Society for Engineering Education, 1998). These attributes were accepted by the Cooperative Education and Internship Association and were later used to form an accreditation process for the discipline. Though requirements still vary for student participation among accredited programs, the standards form a framework under which co-op professionals operate. According to Thomas Akins, the President of the Accreditation Council for Cooperative Education, the accreditation guidelines allow an institution's co-op offerings to be "diverse without compromising the program's quality" (Accreditation Council for Cooperative Education, n.d.a., para 1). Some traits of an accredited program include written guidelines for employers, student performance evaluations, transcript notation, student wages, and full integration with the student's curriculum (Accreditation Council for Cooperative Education, n.d.b.). See Appendix A for the full accreditation standards. Cooperative Education at the University of Central Florida is one of the few accredited programs in the nation.

Cooperative Education as a Pedagogical Approach

While a great deal of credit goes to John Dewey for institutionalizing the concept of experiential education within the boundaries of formal education (Beudin & Quick, 1995), philosophers as ancient as Sophocles promoted the concept of education through experience (Henson, 2003). In A.D. 400, Sophocles is reported to have stated, "One must learn by doing the thing, for though you think you know it – you have no certainty, until you try" (as cited in Gentry, 1990, p.1). However, experiential learning encompasses

more than simply participating in an activity (Kolb, 1984). Introducing the concept of reflection, Dewey offered a new way of thinking about the process of education (Itin, 1999). Stevens and Richards (1992) described experiential learning's departure from lecture-based methods when they wrote:

This type of learning differs from much traditional education in that teachers first immerse students in action and then ask them to reflect on the experience. In traditional classrooms, teachers begin by setting knowledge (including analysis and synthesis) before students. They hope students will later find ways to apply the knowledge in action (paragraph 3).

For experiential learning students, this could mean asking themselves a series of questions during and after the event (Beaudin & Quick, p. 24): "What happened? What did I feel? What did it mean?" For the educator, this line of questioning can help facilitate the students' learning and can help them to apply their newfound knowledge in other situations. With the reflection element in place, cooperative education becomes an academic experience, rather than extracurricular.

These ideas also help to differentiate a cooperative education assignment from the routine part-time job. According to Kolb (1984), for a student to learn adequately, he or she will cycle through four distinct stages: (a) concrete experience, (b) reflective observation, (c) abstract conceptualization, and (d) active experimentation. In other words, once the experience occurs, the student must consciously reflect on that experience, consider how other situations might be impacted by the learning, and actively test the new knowledge in the future for it to be beneficial. In considering the hallmark traits of a cooperative education program, it might be useful to use Kolb's model as a theoretical framework.

Since the term “internship” is sometimes incorrectly interchanged with co-op since both are academically oriented work experiences with a reflection component, it is important to distinguish the differences between them. According to the Experiential Learning office at the University of Central Florida, (Experiential Learning, University of Central Florida, n.d.c.) key differences between internships and cooperative education include: a) internships may be paid or unpaid, whereas co-op students are always paid; b) internships typically last only one semester whereas co-op experiences extend into multiple terms; and c) internships usually occur near the end of a student’s academic program, whereas co-op may occur at any time. More recently however, students are given access to internships earlier in their academic programs.

In one study, Eyler (1993) attempted to empirically assess experiential learning as a pedagogical technique without using subjective measures such as student perceptions or impressions. Instead, Eyler developed a unique instrument designed to measure “whether the internship increased the likelihood that students would both see the relevance of principles in their core coursework and use them when they were not cued” (1993, p. 43). The researcher divided 71 students who were about to embark on internship experiences into three groups. The interns received the same training, but the support structures available from the college were varied for each of three groups. Group I ($n=17$) wrote open-ended journal entries and met weekly to discuss their experiences. Groups II & III ($n=30$ and $n=24$, respectively) completed exercises designed to analyze their experiences and learn the curriculum, they were asked to write about “critical incidents” in their journals, and they attended multi-day workshops where the curriculum was intertwined

with their experiences. At the beginning of the internship experience and at the end, the 71 students were given the instrument Eyer (1993) developed in the form of an assignment to measure pre-post differences in addition to group differences. The instrument described the following scenario:

You are a star student in Vanderbilt's innovative UHD program; your best friend from back home has been content with a program at Somewhere Else University, and while s/he feels academically prepared to do the job, s/he is terrified about the world of work. You are, of course, an expert on people and organizations. Write him/her a one page letter of advice in which you discuss how s/he should approach the new job; what clues about working in a complex organization can you share? (p. 44).

The researcher scored each letter, looking for seven distinct attributes: platitudes ("keep smiling"), empathy ("it will be okay"), coursework (recommending specific books to read), people skills (suggesting ways to form relationships), organizations (mentioning culture or structure of organizations), politics (discussing power or influence), and inquiry (offering advice such as "interview key players" or "research the company"). Eyer found that the students who completed the more intensive reflection activities (groups II and III) scored significantly higher on the letters than the group who simply wrote in a journal and met once each week. "Students [in groups II and III] were significantly less likely to write platitude filled missives and significantly more likely to mention specific course materials, and give advice, process, and suggest a systematic inquiry orientation" (p. 45). These findings suggest that students who are given significant opportunities to reflect on their experiences and who are guided by a mentor are more able to select the important elements of organizational life they choose to share. From this, one can infer that the students are more able to apply these concepts in their

own lives.

In another study, Lee (2006) compared student perceptions of learning in a traditional classroom environment with learning in a cooperative education context. A modified version of the P.L.A.C.E. (Predicting Learner Advancement through Cooperative Education) instrument was given to 681 students. A majority of the sample was comprised of hospitality majors, and most students were 18-22 year old females in their junior or senior year. At the time the survey was taken, approximately one third of the respondents completed one semester of cooperative education (comparable to an internship), slightly more than one third completed two or more semesters of cooperative education, and slightly less than one third did not participate in co-op. Of the students who participated in the cooperative education program, Lee found that higher perceptions of learning due to their cooperative education or internship experience were reported in several areas including practical knowledge related to the major, leadership skills, understanding how organizations function, and ability to adapt to change.

Colleges and universities worldwide have embraced the experiential learning philosophy. Structured in a variety of ways and found in nearly all academic disciplines (Cantor, 1997), programs have been designed to offer students the opportunity to apply theory learned in the classroom to real situations (Franks, 1998). As we consider the effects of cooperative education on degree completion, it is helpful to understand its academic nature and associated learning outcomes.

Cooperative Education and Student Employment

Cooperative education participants balance dual roles of college student and

employee. Both offer opportunities to learn but each in significantly different ways. As experiential education became more prevalent on college campuses over the past few decades (Howard, 2004; Phipps, Phipps, Kask, & Higgins, 2001), many positive outcomes have been observed related to students' future professional life. Students engaging in cooperative education programs during their undergraduate years have reported increased self-confidence (Cornelius, 1978; Sharma, Mannell, & Rowe, 1995), more career satisfaction (Kysor & Pierce, 2000), and faster career progression (Calway & Murphy, 2000). Further, the typical delay between college graduation and the first day of professional employment is shown to be decreased (Kysor & Pierce), and entry level wages are higher for co-op participants than non-participants (Nagle & Collins, 1999; Siedenberg, 1994). To maintain a high grade point average and perform well at the workplace, these students have to practice good time management skills and be careful not to overextend themselves in either direction. They have to learn how to interact with both supervisors and colleagues, and are able to form professional networks and cultivate mentors. Even the employers who hire undergraduate co-op students seem to reap rewards such as reduced training and recruitment expenditures, decreased turnover, and higher productivity (Braunstein & Stull, 2001).

Despite these benefits, some argue that working while attending college may have negative consequences. Ehrenberg and Sherman (1987) showed that working off-campus can hinder degree completion, though upon further review, it seems that a number of factors may mitigate this risk. In this study, the researchers analyzed data from the National Longitudinal Survey of the High School Class of 1972 to see how employment

during college affects persistence, undergraduate grade point average, and post-college outcomes. Their sample included 23,000 male high school seniors who graduated high school by October 1972, were enrolled full-time in a two-year or four-year academic program in October 1972, and who reported both grade point averages and number of hours worked when asked in follow-up surveys in 1973, 1974, 1976, and 1979. It should be noted that the use of a convenience sample which included only male students may have imposed some limitations on the generalizability of the results. In their first year of school, 57% of the two-year students worked, while only 30% of the baccalaureate students were employed. In the sophomore year, employed students comprised 64% of the two year sample and 39% of the four-year sample. In the junior year, 41% of the students worked, and in the senior year, approximately half (49%) of the students worked. The mean number of hours worked for two-year and four-year students were 21.3 and 25.8, respectively.

Data analysis showed that junior and senior-level students who worked off-campus part-time (defined as 20 hours per week or less) were more likely to drop out of school than those who did not work. Of the students who worked part-time off-campus, time-to-degree was lengthened as well. However, there were no statistically significant differences between students who worked part-time on-campus and those who were unemployed. It was surmised that the students who worked on-campus were more fully integrated into the institutional culture, and therefore were protected, to some degree, from the likelihood of attrition. Though it was not stated in the article, another reason for the differential could be that the employers of students who worked on-campus were

more understanding of school schedules and were less likely to ask students to work during periods of high academic intensity (e.g. finals week or weeks when papers were due).

In a more recent study, Harding and Harmon (1999) investigated undergraduate students' off-campus work patterns. The dataset included students enrolled in Washington state universities, junior colleges, and technical colleges in Winter/Spring 1997 ($n=146,639$) and Winter/Spring 1998 ($n=146,106$). Both part-time and full-time students were included. It was shown that 69% of these students worked off-campus at least part-time, which is significantly more than Ehrenberg and Sherman's report of the 1972 high school class (1986), where at most, 49% of students worked off-campus. 17% of students who worked did so full-time. Harding and Harmon found that the number of hours a student worked had a slight effect on re-enrollment the following year, with students working less than 260 hours per quarter (roughly equivalent to 20 hours per week) having a greater likelihood of re-enrollment. However, the researchers did not deem this difference "meaningful" (p. 15). Age seemed to play the biggest role in re-enrollment, with students younger than 22 enrolling the following year in the same institution with the greatest frequency. The number of hours worked had no effect on grade point average.

In another study, Marlowe, Koonce, Lee, and Cai (2002) examined the impact of the number of hours a student worked on academic performance, as measured by the students' final grades in an undergraduate consumer economics course at a large southern university. For 13 weeks, the students maintained records of the number of hours spent

studying and working. The sample included 193 students, most of them (82.4%) female. Of the 193 students, 109 students were employed. The researchers did not differentiate between on-campus and off-campus employment. Unlike the other studies mentioned, they found that employment was positively correlated with higher grades in the course. Further, students who studied the fewest number of hours in a given week also worked the fewest number of hours, suggesting that students who have abundant free time may not be scheduling it adequately.

Lundberg's study of 3744 college students at a variety of 4-year institutions showed that the number of hours a student worked off-campus did not affect the amount learned (2002). However, she noted that certain elements of the college experience were diminished as a result of working such as the amount of peer teaching, less engagement with faculty members and lower satisfaction with student relationships. These findings were particularly strong in the group of students who worked more than 20 hours per week off-campus, which is consistent with other studies. Because of the marked increase in the number of employed students over the past few decades, she suggested that higher education institutions should accept this trend and find a way to enhance student learning through these positions. While cooperative education was not mentioned explicitly, this is one example of institutions working in partnership with corporations to provide learning experiences through workplace encounters.

In his article, "Student Involvement: A Developmental Theory for Higher Education," Astin (1984) postulated that students who are physically and psychologically tied to the institution through activities and relationships with other students, faculty, and

staff are more likely to persist through graduation, whereas students who stay to themselves are more likely to drop out. The article refers to one of Astin's earlier longitudinal studies (1975) that found linkages between on-campus employment and retention. He surmised that, similar to on-campus living, a student who works on-campus comes into contact with other students, faculty, and staff on a more regular basis. While most cooperative education assignments take place off-campus, it can be argued that cooperative education assignments are similar to on-campus positions due to constant contact with the faculty supervising their experiences. Further, cooperative education employers are aware that the students' academic progress is of paramount importance. Finally, in a co-op program, the student's work is related to the academic program. These factors may act as intervening variables which help to explain some of the benefits shown from participating in experiential learning. As a result, cooperative education students may share some of the same protections as students employed on-campus.

The Relationship between Cooperative Education and Degree Completion

One area which has not been fully explored is the relationship between undergraduate participation in cooperative education programs and degree completion (Somers, 1986). While schools may collect this data locally for internal reports, it has not been widely documented in the literature. This is surprising to some, given the emphasis on graduation rates and other measures of accountability in higher education for the past few years (Avenoso & Totoro, 1994; Braxton, Hirschy, & McClendon, 2004). However, several studies have emerged which investigated some aspect of the persistence puzzle as it relates to cooperative education. A description of four studies follows.

Smith (1965) was the first published researcher to attempt to connect objective academic performance measures such as degree completion with cooperative education participation in undergraduate students. Analyzing the records of engineering majors who entered Virginia Polytechnic Institute (VPI) in the Fall of 1959, Smith divided the students into two groups: the Cooperative group and the Four-Year group. Although it was not explicitly stated in the article, it can be inferred that the entire Cooperative group followed an alternating approach to co-op, vacillating between periods of work and periods of school. The researcher ensured that the two groups were similar on three measures: grade point average, intelligence quotient (IQ) gleaned from the Otis Quick-Scoring Mental Abilities Test, New Edition, and the total score for a standardized test known as the Cooperative School and College Ability Tests (SCAT). The grade point averages of the two groups were within one-hundredth of a point, and the mean IQ as well as the SCAT score both just varied by one point among the two groups. In addition, the two groups included approximately the same percentage of married students (3.5% married in the cooperative group and 3.9% in the four-year group) and military students (74.4% enrolled in the military program for cooperative students and 77.4% enrolled in the military program for four-year students), and the mean age was identical at 18.8. In this study, any student who left the field of engineering was considered a dropout, and any student who left the cooperative program but finished the degree was coded as a completer. Results indicated that participation in cooperative education did favorably impact retention, especially between the freshman and sophomore years. Smith found that 18% of the four-year students dropped out after their first year, whereas only 1% of

the cooperative students left VPI. Interesting too, was the finding that no students in the lower half of the original cooperative education sample group dropped out in the first year. It was hypothesized that the cooperative education program helped to increase commitment to the field of engineering by immersing students into real work situations with mentors and also alleviated some financial pressures due to the wages received. After the first year, attrition in both groups seemed to occur at approximately the same rates, though the overall retention rate was still higher for the cooperative group than the four-year group due to the noticeable difference in the first year. This outcome supports the trend for early internships and for starting co-op programs earlier in the academic path.

Smith's research inspired Lindenmeyer (1967) to begin a similar study at the Northwestern University Technological Institute on the effects of co-op on academic achievement among engineering undergraduates. Lindenmeyer chose to analyze the entering classes of 1960 and 1961. The co-op group included 180 students and the four-year group included 58 students. Similar to Smith's study, Lindenmeyer assessed each group's academic potential based on several factors prior to comparing the graduation rates of each group and found similar grade point averages and Standardized Achievement Test (SAT) scores. Further, Lindenmeyer noted that the SAT scores were similar for students who graduated, regardless of co-op status, suggesting that academic potential was not the primary influence behind persistence. The researcher did not use inferential statistics, but instead used comparative analysis to determine that 10% of the co-op group dropped out of the Engineering program, whereas nearly 25% of the four-

year group left the program.

Using a sample of students from Gordon College, a small, liberal arts institution in Wenham, Massachusetts, Somers (1986) compared the graduation rates of students who participated in the co-op program with those who did not. To be eligible for cooperative education, Gordon students were required to have a grade point average of at least 2.0 and should have completed the second term of their sophomore year. The records of all students who participated in the co-op program between 1980 and 1984 and were no longer at Gordon were reviewed to see who graduated ($n=125$). Additionally, a random sample of students who did not participate in the co-op program and who had completed the second term of the sophomore year was selected for comparison purposes ($n=329$). At Gordon, the co-op program is optional and is open to all majors. Grade point averages of the two groups were nearly identical. Somers found that “75% of the co-ops completed their degrees at Gordon, while 65% of the non-co-ops completed their degrees at Gordon” (p. 77).

In the most recent study on this topic, Avenoso and Totoro (1994) compared the retention rates of students who participated in co-op with those who did not. This study focused on co-op students from four entering classes (1989 through 1992) of Long Island University/Southampton Campus (LIU/Southampton), a small, private liberal arts college in New York, who were placed in positions during the freshman or sophomore year. At LIU/Southampton, the co-op program is elective and offers both parallel and alternating positions for students with grade point averages greater than 2.0. The average retention rate of these students was compared with the retention rate of non-co-op students in the

same entering classes. The researchers ensured that the two groups were on equal academic footing, based on verbal SAT scores and college grade point average so that pure intellectuality did not skew results. The researchers found that, of the co-op group ($n=55$), 93% returned for the sophomore year, whereas of the non-co-op group ($n=973$), 69% returned, indicating statistical significance at the .001 level. Further, of the remaining 570 students, 83% of the co-op group ($n=95$) returned for the junior year, whereas 75% of the non-co-op group ($n=475$) returned. Though retention and degree completion are different constructs, the results of this study suggest a statistically significant relationship between student persistence to the junior year and participation in cooperative education programs early in one's academic career ($\chi^2=2.953, p<.1$). They suggested that future studies might attempt to analyze potentially confounding variables such as gender.

Research into the effects of cooperative education on degree attainment is a topic which needs further investigation (Somers, 1986; Stull, Crow, & Braunstein, 1997). With two studies focusing exclusively on engineering majors (Lindenmeyer, 1967; Smith, 1965) and two studies conducted at private liberal arts universities (Avenoso & Totoro, 1994; Somers, 1986), it might be helpful to re-examine this relationship at a large, public, research institution such as the University of Central Florida with many majors represented to see if results are corroborated. Further, an analysis of student characteristics such as gender, ethnicity, standardized test scores, and high school grade point average will allow higher education administrators to better understand how these potentially at-risk populations may be assisted through cooperative education programs.

The Political Zeitgeist in Higher Education: Accountability

As systems theory tells us, any discussion of higher education would be incomplete without also considering the political times in which we live. The notion of accountability seems to be at the forefront of many legislative decisions concerning education in recent years (DesJardins, Ahlburg, & McCall, 2002). Communities throughout our nation abound with questions for their school districts and politicians about the quality, affordability, and methods of education (Clayton, 2003). In the past, this discussion began with early childhood and ended with high school, leaving colleges and universities virtually immune to the pressures of politics. Faculties across America enjoyed relative anonymity in their teaching, research, and service, comfortable with their practices that went largely unnoticed. However, over the past two decades, more attention has been focused on public higher education (Clayton). Due to tax cuts, an increase in competing fiscal priorities, a reduction in public confidence in higher education, and a change in the overall ideology of the country, colleges and universities are learning to manage their affairs with less public revenue (Gibbs, 1999). As a result, students are experiencing rising tuition rates, smaller financial aid packages, and fewer services (Zusman, 1999). Further, the public is demanding answers, and politicians are feeling pressured to move education to a performance-based funding model, using either test scores or graduation rates as the measure of success (Clayton).

More than 88 million students are enrolled in colleges around the world (Ferguson, 2005; Goodman, 2001). Students are graduating from secondary school at ever increasing rates, and the trend is toward higher education accessibility for all

students is seen, so it is not surprising that in less than 20 years, there will be an estimated 125 million post-secondary students (United Nations Educational, Scientific, and Cultural Organization, 2003). In the United States, “the percentage of students going on to two-year or four-year colleges and universities increased from less than half in 1975 to almost two-thirds in 2001, with the biggest gains among female and low-income students” (Carey, 2004, p. 2). According to Keller (2001), in 1940, only 24.5% of the American population could claim to be a high school graduate, and only 4.6% had graduated college. These numbers are in stark contrast with the 85% of Americans who graduated from high school and 28% who earned a four-year degree in 2005 (U.S. Census Bureau, 2006). Further, the description of a typical college student has changed. El-Khawas (1996) noted that several populations are gaining in numbers on American college campuses, specifically, women, students of color, older students, students with disabilities, and international students. Alexander (2000) noted that a primary reason that well-developed nations are encouraging the massification of higher education is because they believe that a well educated society will transform a low skill, low wage community into a skilled and economically sound area. As a result, governments across the globe are investing billions of dollars into the education of their citizens, and are expecting a high return on investment. According to Alexander, this is the driving force behind the trend toward accountability seen in education over the past few decades. With the growth and increasing diversity seen on college campuses in recent years, the focus has shifted to the success of these students.

Student Risk Factors for Non-Completion

With the emphasis on accountability, reducing student attrition is one of the primary concerns of higher education administrators in recent years (Braxton, Hirschy, & McClendon, 2004). In Florida alone, an estimated \$60 million each year is lost due to non-completion (Huffman & Schneiderman, 1997). While a plethora of research has been conducted to predict the factors that influence persistence or attrition (Castle, 1993; Tinto, 1982), the following review will focus on student characteristics relevant to this study (gender, ethnicity, standardized test scores, and high school grade point average), as well as additional themes found throughout the literature.

Gender

According to the National Center for Education Statistics (Peter & Horn, 2005) women earned 57% of all Bachelor degree in the 2001-2002 school year. Even when crossing gender and ethnicity, women outpaced men in all ethnic groups in terms of degree attainment, with American Indian women earning 60% of degrees awarded to American Indian individuals, Asian/Pacific Islander women earning 55% of degrees awarded to Asian/Pacific Islander individuals, Black women earning 66% of degrees awarded to Black individuals, Hispanic women earning 60% of degrees awarded to Hispanic individuals, and White women earning 57% of degrees awarded to White individuals (Peter & Horn). Cross & Slater (2000), who studied the interaction between gender and ethnicity in African-American individuals, also noted the striking difference in degree attainment between black men and black women.

While on first glance the gender disparity seems clear, it is important to note that

women comprised approximately 56% of enrolled students in 2001 (Peter & Horn, 2005), so gender may not be a risk factor for completion, but rather for college enrollment. However, at least one study suggests that gender may have an effect on retention when the student is pursuing a major not traditionally completed by students of his or her gender (Leppel, 2001). For example, a female engineering student or a male nursing student may face an additional set of challenges, making the goal of degree attainment more difficult to achieve. Further, when considering time-to-degree, Peter and Horn found that male students may take longer to graduate than their female counterparts.

The gender disparity is a relatively new occurrence. In the early 1980s, women earned 50% of all baccalaureate degrees awarded, but 20 years later, they earned 57% of degrees (Peter and Horn, 2005). Overall, though it is unclear whether gender is a determinant of degree completion (Blecher, 2006; DesJardins et al., 2002), additional research in this area using different variables such as participation in a cooperative education program seems to be warranted.

Ethnicity

The literature suggests that several ethnic groups, specifically African Americans, Hispanics, and Native Americans, tend to attain degrees at lower rates than their Asian and Caucasian counterparts (Castle, 1993; Jackson, Smith, & Hill, 2003). This is an important issue to be studied because of the significant shortfalls in the numbers of skilled workers in these underrepresented ethnic groups (Castle). In one study, Jackson, Smith, and Hill discussed the disparity between the Native American six-year graduation rate of 36% compared with the total population average of 56%-67% (the percentage

varies depending on the source, see Adelman, 2004; Berkner, He, & Cataldi, 2002). In this group, the researchers found lack of family support, racism found on some college campuses, and “conflicting pressures to be (a) successful in college and (b) maintain their identity as a member of the reservation community” (p. 558). While one must use caution when grouping ethnicities together, common factors influencing degree completion among African American and Hispanic students include “language, culture, historical orientation to particular institutions, and degree of acceptance into, and satisfaction with, the university community” (Castle, p. 27). DesJardins et al. (2002) offered a similar explanation for the increased time to degree found in the Hispanic population, citing the language barrier as a potential deterrent to a timely graduation. It is important to note that it can be difficult to discuss ethnicity as a variable without also discussing socioeconomic class, as the two seem to be inextricably linked (Alexander, Riordan, Fennessey, & Pallas, 1982). In a study assessing populations in all socioeconomic levels, Alexander et al. explained,

...blacks were found to have somewhat higher completion rates at low-SES levels, whereas whites had higher completion rates at high-SES levels. With regard to percentages, of course, blacks are very much concentrated at the lower SES continuum, and whites are overrepresented at the upper end. It is these differences in SES distributions that account for the overall white advantage... (p. 329).

Taken together, these studies indicate a need for higher education institutions to further investigate ways in which persons of color and individuals in lower socioeconomic groups can be successful in college.

Standardized Test Scores

Scores on standardized achievement tests such as the SAT I and ACT are widely used by college admissions officers as a tool to grant or deny admission (Zwick, 2007). Though controversy has surrounded the use of these tests due to potential for ethnic or gender bias (Carlton & Harris, 1992) or redundancy with high school grades (Crouse & Trusheim, 1988), it is generally accepted that a student's score on standardized tests such as the SAT or ACT is a valid predictor of college achievement (Shivpuri, Schmitt, Oswald, & Kim, 2006). Further, SAT I and ACT scores have been shown to predict college graduation at approximately the same rate (Stumpf & Stanley, 2002).

When considering the factors which constitute college achievement, most validity studies of standardized tests measure the degree to which the assessment predicts college grades, not college graduation (Zwick, 2007). Often, this is due to the perception that freshman coursework is fairly comparable across disciplines, as well as the lack of graduation data available (Zwick; Zwick & Skylar, 2005). However, in one of the largest studies of its kind, Astin, Tsui, and Avalos (1996) found a correlation between SAT score and degree completion. In researching more than 53,000 freshmen at 365 institutions, Astin et al. found that only 28% of students with SAT scores lower than 700 and high school grade point averages of A or A+ graduated within four years, whereas 80% of students with SAT scores higher than 1300 and high school grade point averages of A or A+ graduated within the same time frame. Burton and Ramist (2001), in their review of research about the connection between standardized test scores and degree completion, noted that students with lower SAT scores do eventually graduate, but it takes them

longer. Ultimately, they concluded that “there is a solid academic component to graduation that is measured by the preadmission measures” (p. 17).

High School Grade Point Average

Like standardized test scores, a student’s high school grade point average is often considered a predictor of college success (Zwick & Skylar, 2005). According to the National Association for College Admission Counseling, 94% of institutions responding to its Counseling Trends Survey, reported that overall high school grade point average was used in admissions decisions (Hawkins & Clinedinst, 2006). An investigation including 1429 institutions conducted by Stumpf and Stanley (2002) stated that although standardized achievement tests predict college graduation at higher rates than high school grade point average, both seemed to be valid predictors. Further, their analysis showed that lower quartiles on each measure predicted graduation slightly better than higher quartiles, suggesting that a minimum level of aptitude was necessary for persistence, and at the upper levels, other factors were more salient.

In another study, Zwick and Skylar (2005) showed that “higher high school grades and SAT scores were associated with a higher probability of graduation...” (p. 461). The researchers separated their subjects by ethnic background and language of origin, and found that high school grade point average and SAT scores were statistically significant indicators of graduation for White students whose native language was English, whereas only the SAT score was a significantly significant indicator of graduation for Hispanic students whose native language was English. In sum, for many students, lower high school grade point averages may indicate a risk factor.

Additional Factors

In addition to student characteristics like gender, ethnicity, SAT scores, and high school grade point average, institutional factors such as enrollment size and the quality of faculty-student relationships may play a role in degree completion for undergraduate students. There is mixed evidence regarding institutional size on degree attainment (Pascarella & Terenzini, 1991). Some researchers found that large enrollments may have a negative effect on student persistence toward graduation (Astin, 1993), even after controlling for variables thought to influence graduation rates, specifically academic preparation, residence hall availability, percentage of part-time students, expenditure per student, and student to faculty ratio (Huffman & Schneiderman, 1997). Kamens (1971) surmised that “size often is seen as an indicator of low student-faculty contact, low student participation rates, and impersonal, bureaucratic arrangements which produce personal anonymity and immunity from faculty or peer normative control” (p. 271). However, in Kamens’ investigation of dropout rates at institutions of varying sizes, it was shown that higher enrollment numbers do not necessarily predict higher rates of attrition. Therefore, institutional size may be a factor mitigated by other variables.

Perhaps the most important factors contributing to student persistence are social and academic integration into university life (Astin, 1984; Tinto, 1993). Specifically, the quality of interaction between the student and their faculty members seems to play a key role in the reduction of attrition (Jackson, Smith, & Hill, 2003; Tinto), and this interaction may be enhanced through the use of active learning techniques, as students taught using this pedagogical method seem to be less likely to drop out of college (Braxton, Milem, &

Sullivan, 2000). In their book, *How College Affects Students*, Pascarella and Terenzini (1991) summed up the literature by naming the two primary themes associated with college success:

The first is the central role of other people in a student's life, whether students or faculty, and the character of the learning environments they create and the nature and strength of the stimulation their interactions provide for learning and change of all kinds. The second theme is the potency of students' effort and involvement in the academic and non-academic systems of the institutions they attend (p. 648).

These factors linked with success have broad implications for cooperative education, since, by its nature, co-op offers students both the close relationship with faculty and a necessity for strong student effort and involvement in the experience (Kendall, Duley, Little, Permaul, & Rubin, 1986). Although cooperative education occurs outside the classroom, it could be argued that active learning techniques are part of its fundamental model. Therefore, when considering which institutional programs might influence degree completion, especially in a large institution, and among populations traditionally thought to be at risk, co-op seems to be worthy of further inquiry.

Summary

This chapter summarized the literature relating to cooperative education theory, best practices, standards, and pedagogies, and examined the pertinent research on risk factors for attrition. Relationships between co-op and student employment were also examined, as was the political environment in which higher education administrators currently operate. The literature suggests a need for further research on the relationship

between cooperative education and degree completion, and therefore supports this study's goals. The next chapter will present the research questions, and will describe the study design, the population and groups involved, and the procedures for data collection and analysis.

CHAPTER THREE: METHODOLOGY

This chapter describes the procedures used to assess the effects of cooperative education participation on persistence and time to degree. The following sections are included: (a) statement of the problem and research questions, (b) study design, (c) population and groups, (d) data collection and preparation, and (e) data analysis.

Statement of the Problem and Research Questions

Baccalaureate degree completion statistics are alarmingly low. Berkner, He, and Cataldi's study (2002) showed the national average for undergraduate degree attainment after six years is 63%. This graduation rate was corroborated by Adelman's longitudinal study (2004), showing that "the bachelor's degree attainment rate for all students who earned any credits from a bachelor's degree granting institution was 66-67%" (p. iv). Further, Adelman showed that these rates have not varied since the early 1970s, and Tinto (1982) asserted that "rates of dropout from higher education have remained strikingly constant over the past 100 years" (p. 694). When reduced to a four-year timeframe, the national graduation rate decreases: only 38% of students who begin four-year degree programs complete their goal (Berkner, et al.). At the University of Central Florida, the numbers are even lower. For the Fall 1999 cohort of full-time, first-time-in-college (FTIC) bachelor's degree seekers, only 57% of students attained their degree within six years and 30% of students completed their degree in four years (Office of Institutional Research, n.d.a). A better understanding of the relationship between

cooperative education and degree attainment may be ascertained from answering the following research questions:

1. What is the relationship, if any, between participation in cooperative education and degree completion at the University of Central Florida?
2. To what extent, if any, at the University of Central Florida, can time-to-degree be predicted by participation in cooperative education, gender, ethnicity, standardized test scores, and high school grade point average?

Study Design

This study was conducted as nonexperimental quantitative research. Degree completion rates for students who successfully completed at least two semesters of cooperative education were compared with degree completion rates for students who were not registered for cooperative education courses, between the Fall 1999 semester and the Spring 2007 semester. A six-year time frame is most commonly used to measure baccalaureate degree completion because “a huge number of students successfully complete college during those additional two years” (Carey, 2004, p. 15). However, the researcher chose to extend the date range to capture data on as many graduates as possible. At the time of writing, Spring 2007 was the most recent semester for which graduation data are available, so a 7.67 year time frame was used.

Population and Groups

Cooperative education programs sometimes lack consistency across higher education institutions. To address this issue, this study focused exclusively on students

from the cooperative education program at one institution, the University of Central Florida. As “one of the largest co-op programs in the country [which] assists more students in more disciplines and colleges than any other university in Florida,” (Experiential Learning, n.d.a), this institution seemed to offer a diverse population from which to draw groups. Further, it was one of the few programs to be accredited by the Accreditation Council for Cooperative Education (Accreditation Council for Cooperative Education, 2006).

The University of Central Florida (UCF) is a major, metropolitan research university in the southeastern United States with a total current student population (as of October 15, 2006) of approximately 46,719, of which 29,853 are undergraduates. Women outnumber men, comprising approximately 55% of the undergraduate population. UCF is a public, coeducational institution on the semester system, with an acceptance rate of approximately 52%. At the time the students in this study were freshmen (October 1999), the total student population was 31,673, of which 26,485 were undergraduates. Women outnumbered men then too, comprising approximately 56% of the undergraduate population. The acceptance rate at the time was approximately 62% (Office of Institutional Research, n.d.b).

The cooperative education program at the University of Central Florida has been in existence since 1968 and is open to students in all majors. For most majors, participation in co-op is optional. Academic credit is sometimes awarded; however all participating students receive transcript notation and a grade (Satisfactory or Unsatisfactory) regardless of credit earned. Placements are related to the student’s major

or career goals, and most co-op students are placed in parallel positions, working approximately 20 hours per week while attending school full-time.

The population for this study was the cohort of full-time, bachelor's degree-seeking undergraduate students who entered the University of Central Florida as first-time-in-college (FTIC) students in the fall semester of 1999. Group One (hereafter referred to as Co-op Students) consisted of full-time FTIC students who successfully participated in the University of Central Florida Cooperative Education program at some point during their undergraduate careers (between the Fall 1999 and Spring 2007 semesters) and Group Two (hereafter referred to as Non-Participants) included full-time FTIC students with at least 20 credit hours completed and consistent grade point averages of at least 2.5 who did not participate in the University of Central Florida Cooperative Education program as an undergraduate student (between the Fall 1999 and Spring 2007 semesters). The additional parameters on the Non-Participants, namely grade point average and completion of at least 20 credit hours, were included to control for any potential differences between co-op and non-co-op students due the fact that participation in the cooperative education program is typically limited to students meeting the following criteria: (a) grade point average of 2.5 or better, (b) completion of at least 20 credit hours, and (c) full-time, degree-seeking status (Experiential Learning, n.d.d). Although certain majors such as Hospitality require participation in co-op and therefore do not limit access to the program, students who did not meet the above criteria were eliminated from the data set to help ensure consistency.

Participants in the cooperative education program were identified by grades of

“Satisfactory” (S) for at least two semesters in the co-op course (designated by a course number of 2949, 3949, or 4949 on the students’ transcripts). Students in the non-participant group were not registered for any semesters of the co-op course. For each group, the entire population was used.

According to Cohen (1998), each group should consist of at least 120 students, based on an alpha of .05, five independent variables, power of .80, and a multiple R squared of at least .10. However, after a review of the data, it was noticed that the co-op group contained only 100 data points. This may not be sufficient power to detect a relationship if it exists. However, if a slightly larger effect size is found (multiple R squared of .135), power will increase to a sufficient level (.80) so that detecting a relationship if it exists is more probable.

Data Collection and Preparation

The chair of the Institutional Review Board (IRB) indicated that this study was exempt from further review by the IRB (see Appendix B), so no approval was necessary. To ensure student confidentiality, it was originally requested that all identifying information would be removed from the dataset, but this proved to be impossible because the data was extracted from a variety of university databases, and needed to be linked in some way. Therefore, the researcher submitted an addendum to the IRB, which was later approved (see Appendix C).

The data for this study were obtained from the Office of Institutional Research at the University of Central Florida. Appendix D contains the full list of information requested for each full-time, first-time in college (FTIC), Bachelors-degree seeking

student who first enrolled at UCF in Fall 1999, with at least 20 credit hours completed and overall grade point averages of at least 2.5 during all semesters.

Once the dataset was received, it was necessary to convert some of the data into a format more amenable to analysis. Time-to-degree in years was calculated for each student who graduated and a single consolidated standardized test score was developed from the SAT and ACT scores using the College Board's SAT-ACT Score Comparison Chart (see Appendix E). Because the majority of students submitted SAT scores ($n=1837$) rather than ACT scores ($n=77$), ACT scores were converted to SAT scores.

Data received on the students who participated in co-op courses included those who were not part of the official cohort due to the overall grade point average falling below 2.5 during one or more semesters and/or completing less than 20 credit hours at the University of Central Florida. Therefore, those students were eliminated from the co-op group ($n=32$).

The number of credit hours completed prior to the first semester of cooperative education was not available, and residency status was coded differently in the university's database, so these variables will not be included in the final analysis. However, the number of semesters completed prior to the first semester of cooperative education was available and was included. The student's full-time status (12 credit hours per fall or spring semester) was only verified during the first enrolled semester (Fall 1999). After Fall 1999, the student may have attended school full-time or part-time. Variables obtained but not pertinent to the research questions were not presented in this study.

Several variables were collapsed or recoded during the study. Ethnicity was collapsed into two groups: (a) Asian/Pacific Islander and White students, and (b) Alaskan/American Indian, Black, and Hispanic students. This was done for two reasons: to reduce the number of categories for the ethnicity variable since the co-op group size was small, and because literature has shown that Asian and White students tend to complete degrees at higher rates than American Indian, Black, and Hispanic students (Horn, 2006; Hudson, 2003). Two other variables, standardized test score and high school grade point average, were also collapsed into three levels each for easier analysis of the first research question, though they were left as continuous variables for the second research question. Standardized test scores were coded “low” if the score fell between 400 and 999, “moderate” if the score was between 1000 and 1299, and “high” if the score fell between 1300 and 1600. High school grade point average was coded “low” if it was between 2.0 and 3.0, “moderate” if it was between 3.1 and 4.0, and “high” if it was between 4.1 and 5.0.

Data Analysis

The data was analyzed using SPSS Version 15.0. Descriptive statistics were reported on the two groups to discern and describe the characteristics of co-op and non-co-op students at the University of Central Florida. Chi-square analyses were generated to determine what relationship, if any, exists between undergraduate student participation in cooperative education and degree attainment in 7.67 years, 6 years, and 4 years. Student risk factors (gender, ethnicity, standardized test score, and high school grade point average) were evaluated using chi-square analyses for the co-op and non-participant

groups. Multiple regression was conducted to determine the extent, if any, to which time-to-degree can be predicted by participation in cooperative education, gender, ethnicity, standardized test score, and high school grade point average. The relationship between participation in co-op (multiple semesters) or an internship (one semester) and degree completion was also analyzed. Further, the relationship between degree completion and decisiveness of major was tested. Finally, correlation coefficients were calculated to measure the relationship between time-to-degree and the number of semesters enrolled in co-op, grade point average prior to first co-op semester, and the number of semesters completed prior to the first co-op semester.

Summary

This chapter described the methods used to collect and analyze the data for this study. Conducted as nonexperimental quantitative research, the dataset was divided into two groups: co-op students (n=100) and non-participants (n=1779). Degree completion rates for students who successfully completed at least two semesters of cooperative education were compared with degree completion rates for students who were not registered for cooperative education courses between the Fall 1999 semester and the Spring 2007 semester. A variety of statistical analyses were conducted to investigate the two dependent variables of interest, degree completion and time-to-degree, including chi square, correlation, and multiple regression. The next chapter will provide details about the results obtained from these analyses.

CHAPTER FOUR: RESULTS

Introduction

This study compared baccalaureate completion rates of students who participated in cooperative education with those who did not participate in co-op. Since a plethora of literature has shown that risk factors for non-completion include male gender (Cross & Slater, 2000; Leppel, 2001; Peter & Horn, 2005), being of black or Hispanic descent (Castle, 1993; Jackson, Smith, & Hill, 2003), lower standardized test scores (Shivpuri, Schmitt, Oswald, and Kim, 2006; Astin, Tsui, & Avalos, 1996; Burton & Ramist, 2001), and a lower grade point average in high school (Zwick & Skylar, 2005), the study also attempted to discern any differences based on gender, ethnicity, standardized test scores, and high school grade point average. SPSS, Version 15.0, was used to analyze the data.

The population included all individuals who first entered the University of Central Florida in the Fall semester of 1999 as a full-time, first-time-in-college (FTIC) student with an overall grade point average of 2.5 every semester enrolled, and who completed at least 20 credit hours ($N=1916$). Table 1 shows the three distinct groups which emerged from this cohort: students who completed two or more semesters of the cooperative education program (co-ops) ($n=100$; 5.2%), students who completed only one semester of the cooperative education program (interns) ($n=37$; 1.9%), and students who did not complete any semesters of the cooperative education program (non-participants) ($n=1779$; 92.8%).

Table 1

Experiential Learning Status (Frequency and Percentage)

	Frequency	%
Co-op	100	5.2
Intern	37	1.9
Non-Participant	1779	92.8
Total	1916	100.0

Because this study primarily focused on the differences between co-ops and non-participants, interns were removed from the dataset. When interns were removed, the cohort included a total of 1879 students, with 5.3 % participating in cooperative education and 94.7% coded as non-participants.

Describing the Co-op and Non-Participant Groups

College and Major

Table 2 illustrates the variety of colleges and majors represented by students in both groups at the time of entry into the University of Central Florida. Although many students change majors during the course of study, final major information was not available on the entire cohort so it was not included. In both the Co-op and Non-Participant groups, the College of Sciences was most highly represented, with 28% and 27% of students enrolled, respectively. The Colleges of Health and Public Affairs, Nursing, and Education were among the least represented in both groups, making up a

combined total of 9% of the Co-op group and 16.1% of the Non-Participant group.

Almost one-fifth of the Non-Participant group began their programs of study as

Undeclared; this was the second most common “college” for this group. 11% of the Co-op group did not choose a major upon entering the University of Central Florida. For a detailed breakdown of frequency and percentage by major, see Appendix F.

Table 2

College at Entry for Co-op Students and Non-Participants (Frequency and Percentage)

	Co-op	Non-Participant
Arts and Humanities	7 (7.0%)	193 (10.8%)
Business Administration	27 (27.0%)	305 (17.1%)
Education	1 (1.0%)	114 (6.4%)
Engineering	18 (18.0%)	162 (9.1%)
Health and Public Affairs	7 (7.0%)	137 (7.7%)
Nursing	1 (1.0%)	35 (2.0%)
Sciences	28 (28.0%)	481 (27.0%)
Undeclared	11 (11.0%)	345 (19.4%)
Undergraduate Studies	0 (0.0%)	7 (0.4%)
Total	100 (100.0%)	1779 (100.0%)

Age, Gender, and Ethnicity

As Table 3 illustrates, the age of students in both groups was very similar, with 96% of the Co-op group born in 1980 or 1981, and 97.6% of the Non-Participant group born in 1980 or 1981. In both groups, the most common age was 18 (birth year 1981).

Table 3

Birth Year for Co-op Students and Non-Participants (Frequency and Percentage)

	Co-op	Non-Participant
1975	0 (0%)	1 (0.1%)
1976	1 (1%)	0 (0%)
1978	0 (0%)	1 (0.1%)
1979	2 (2%)	11 (0.6%)
1980	34 (34%)	535 (30.1%)
1981	62 (62%)	1202 (67.6%)
1982	1 (1%)	28 (1.6%)
1989	0 (0%)	1 (0.1%)
Total	100 (100%)	1779 (100.0%)

The gender balance of the Co-op group was more evenly distributed than the Non-Participant group. As shown in Table 4, males slightly dominated in the Co-op group, encompassing 52% of the group, whereas the Non-Participant group included more women, at 59.4% of the group.

Table 4

Gender of Co-op Students and Non-Participants (Frequency and Percentage)

	Co-op	Non-Participant
Female	48 (48%)	1056 (59.4%)
Male	52 (52%)	723 (40.6%)
Total	100 (100%)	1779 (100%)

Table 5 illustrates the ethnic composition of both groups. There were no noticeable differences, though slightly more students identified themselves to the University of Central Florida as Non-Resident Aliens in the Co-op group (2%) than in the Non-Participant group (0.8%). Students identifying themselves as White comprised the majority of both the Co-op and the Non-Participant groups, at 75% and 76.3%, respectively. Hispanic students were the second largest category in both groups, at 11% and 9.5%, respectively. Asian and Pacific Islander students were slightly more represented in the Co-op group than Black students (6% and 5%, respectively), whereas Black students comprised slightly more of the Non-Participant group than Asian and Pacific Islander students (5.6% and 4.2%, respectively). 1% of the Co-op group and 3.1% of the Non-Participant group chose not to report ethnicity.

Table 5

Ethnicity of Co-op Students and Non-Participants (Frequency and Percentage)

	Co-op	Non-Participant
American Indian or Alaskan	0 (0%)	8 (0.5%)
Asian or Pacific Islander	6 (6%)	75 (4.2%)
Black	5 (5%)	100 (5.6%)
Hispanic	11 (11%)	169 (9.5%)
Non-Resident Alien	2 (2%)	15 (0.8%)
White	75 (75%)	1357 (76.3%)
Not Reported	1 (1%)	55 (3.1%)
Total	100 (100%)	1779 (100%)

Standardized Test Score and High School Grade Point Average

As shown in Table 6, the mean SAT score for the two groups were virtually identical, at 1139.8 for the Co-op group and 1140.48 for the Non-Participant group. The score range was more condensed for the Co-op group, at 830 to 1380, as compared to 780 to 1560 for the Non-Participant group.

Table 6

Standardized Test Score of Co-op Students and Non-Participants

	Co-op ($n=100$)	Non-Participant ($n=1777$)
Mean	1139.80	1140.49
Median	1135.00	1130.00
Mode	1210.00	1110.00
Standard Deviation	118.47	113.94
Minimum	830.00	780.00
Maximum	1380.00	1560.00

Note. Data were not reported for two students in the non-participant group due to missing data.

The two groups had remarkably similar high school grade point averages as well. Table 7 illustrates the mean grade point average for the co-op group was 3.72, and the mean grade point average for the non-participant group was 3.74, though the co-op group mode was 3.80 and the non-participant group mode was 3.90. The standard deviations were .64 and .60, respectively.

Table 7

High School Grade Point Average of Co-op Students and Non-Participants

	Co-op (<i>n</i> =98)	Non-Participant (<i>n</i> =1757)
Mean	3.80	3.76
Median	3.80	3.80
Mode	3.80	3.90
Standard Deviation	.52	.52
Minimum	2.60	2.20
Maximum	4.80	5.00

Note. Data were not reported for two students in the Co-op group and for twenty-two students in the Non-Participant group.

Number of Co-op Semesters Completed Overall

Cooperative education occurs over multiple semesters. As shown in Table 8, students in the 1999 cohort varied in terms of the number of co-op semesters completed, ranging from two semesters to nine semesters. The mean number of semesters completed was 3.49, with a standard deviation of 1.73. More than half the students completed two (38%) or three (25%) semesters. The median was three semesters and the mode was two semesters.

Table 8

Number of Co-op Semesters Completed (Frequency and Percentage)

	Frequency	%
2 semesters	38	38.0
3 semesters	25	25.0
4 semesters	13	13.0
5 semesters	12	12.0
6 semesters	3	3.0
7 semesters	6	6.0
8 semesters	1	1.0
9 semesters	2	2.0
Total	100	100.0

Number of Semesters Completed Prior to the First Co-op Experience

For most students participating in the Cooperative Education program, several semesters are spent engaged solely in coursework. As shown in Table 9, co-op students completed an average of 7.5 semesters of coursework prior to their first co-op assignment. Though the range was large (from 1 semester to 20 semesters), no one completed 15, 16, 17, 18, or 19 semesters prior to beginning co-op. The majority of students completed eight semesters of coursework before the first co-op assignment commenced. The standard deviation for the group was 2.96.

Table 9

Number of Semesters Completed Prior to First Co-op Assignment (Frequency and Percentage)

	Frequency	%
1 semester	1	1.0
2 semesters	2	2.0
3 semesters	5	5.0
4 semesters	8	8.0
5 semesters	8	8.0
6 semesters	14	14.0
7 semesters	8	8.0
8 semesters	21	21.0
9 semesters	12	12.0
10 semesters	9	9.0
11 semesters	6	6.0
12 semesters	1	1.0
13 semesters	2	2.0
14 semesters	2	2.0
20 semesters	1	1.0
Total	100	100.0

Time to Degree and Degree Completion

Table 10 illustrates the number of years the students attended school for both the co-op and non-participant groups. As shown, 99% of co-op students graduated within the 7.67 year time frame, whereas only 79.5% of the non-participants graduated within the same span of time. The mean number of years was similar for all students regardless of co-op participation. Co-op students took, on average, 4.13 years, whereas non-participants took, on average, 4.11 years to graduate. Standard deviations were .82 and .74, respectively. Median and mode statistics were the same for each group, at 4 and 3.67, respectively. This table only reflects students who graduated within 7.67 years, as the study ended at the end of this time frame. Of the students who graduated, the majority in both groups took between 3.67 and 4.67 years to finish their baccalaureate degrees.

In four years, 50% of the co-op group graduated, whereas 46.6% of the non-participants graduated. At 4.3 years, fully 70% of the co-op group graduated and 59.9% of the non-participants completed degrees. After 4.67 years, 87% of the co-op group finished their studies, compared with 70.9% of the non-participant group. In a six-year time span, as degree completion data is most often reported (Carey, 2004), 97% of co-op students graduated, whereas only 77.6% of non-participants graduated.

Table 10

Time-to-Degree of Co-op Students and Non-Participants (Frequency and Percentage)

	Co-op (<i>n</i> =99)	Non-Participant (<i>n</i> =1415)
2.00-2.67 years	7 (7.0%)	37 (2.1%)
3.00-3.67 years	34 (34.0%)	628 (35.2%)
4.00-4.67 years	46 (46.0%)	598 (33.6%)
5.00-5.67 years	10 (10.0%)	109 (6.2%)
6.00-6.67 years	0 (0.0%)	22 (1.8%)
7.00-7.67 years	2 (2.0%)	11 (0.6%)
Total	99 (99.0%)	1415 (79.5%)

Note. Data were only reported for students who graduated within 7.67 years. After this time period, data were not available.

Note. Each academic year is comprised of three semesters. Therefore, 2 years is equivalent to six semesters, 2.33 years is equivalent to seven semesters, and 2.67 years is equivalent to eight semesters.

Analysis of Research Questions

Two research questions were defined for this study:

1. What is the relationship, if any, between participation in cooperative education and degree completion at the University of Central Florida?
2. To what extent, if any, at the University of Central Florida, can time-to-degree be predicted by participation in cooperative education, gender, ethnicity, standardized test scores, and high school grade point average?

For each research question, several areas of inquiry were developed to analyze the data more completely. They are described below.

Research Question One

The first research question asked: What is the relationship, if any, between participation in cooperative education and degree completion at the University of Central Florida? The relationship between cooperative education and degree completion is multifaceted, as many factors outside the researcher's control are present. Therefore, in addition to answering the primary research question, the researcher separately evaluated the relationships between several student characteristics and degree completion. First, the overall relationship between co-op participation and degree completion was examined. Then, gender, ethnicity, standardized test score, and high school grade point average were investigated to see if these factors played a role in the relationship between co-op participation and degree completion. Finally, because the dataset contained a large number of students who had not declared their majors upon arriving to the university, the relationship between degree completion and decisiveness of major was tested among both co-op and non-co-op students.

A chi square test of association was conducted to evaluate the relationship between cooperative education and degree completion in undergraduate students at the University of Central Florida. The assumption of five expected frequencies per cell was met. A statistically significant positive relationship was found, Pearson $\chi^2 (1, N=1879) = 22.91, p = .000, \phi = .110$. As shown in Table 11, of students who participated in at least two semesters of the cooperative education program, 99% graduated within 7.67

years while only 79.5% of students who did not participate in experiential learning graduated within 7.67 years.

Table 11

Crosstabulation: 2+ Semesters of Experiential Learning (Frequency and Percentage)

	Co-op (<i>n</i> =100)	Non-Participant (<i>n</i> =1779)
Graduated	99 (99.0%)	1415 (79.5%)
Did Not Graduate	1 (1.0%)	364 (20.5%)
Total	100 (100.0%)	1779 (100.0%)

The effect size seemed small by Cohen's standards (1998), at .11. On these data alone, one might be tempted to conclude that the relationship between degree completion and cooperative education is weak enough to be considered inconsequential. However, statisticians acknowledge that effect size is dependent largely upon the context of the study. It is often suggested to review other research with similar themes to determine the true strength of a particular relationship (Thompson, 2001; Wilkinson & American Psychological Task Force on Statistical Interference, 1999). Unfortunately, of the four published studies similar in nature to this one, three used descriptive statistics to draw conclusions (Lindenmeyer, 1967; Smith, 1965; Somers, 1986) and the fourth did not report effect sizes (Avenoso & Totoro, 1994). However, this statistic was calculated manually for Avenoso and Totoro's work, and a much smaller effect size was found ($\phi=.014$). Therefore, it is possible that the relationship found between degree completion and cooperative education in the current study is actually moderately strong.

It is important to note that many factors influence persistence, and that each may only explain a tiny percentage in the variation in whether a student graduates or not.

Cooperative education, it seems, may explain some of this variation.

Because of the effect size, the researcher ran another chi square test of association, this time including students who completed one or more semesters of experiential learning (comparable to both cooperative education and internships). A statistically significant relationship was found again, Pearson $\chi^2 (1, N=1916) = 23.12, p = .000, \phi = .110$. The phi statistic continued to suggest a weak association according to Cohen's rules (1998), but again, the relationship may actually be fairly strong. As seen in Table 12, of students who participated in at least one semester of experiential learning (co-op or internships), 96.4% graduated while only 79.5% of students who did not participate completed degrees.

Table 12

Crosstabulation: 1+ Semesters of Experiential Learning (Frequency and Percentage)

	1+ Semester Experiential Learning (<i>n</i> =137)	Non-Participant (<i>n</i> =1779)
Graduated	132 (96.4%)	1415 (79.5%)
Did Not Graduate	5 (3.6%)	364 (20.5%)
Total	100 (100.0%)	1779 (100.0%)

To learn more about the relationship between cooperative education and degree completion, the researcher ran additional chi square tests of association to evaluate the relationships between degree completion and gender, ethnicity, standardized test score,

high school grade point average, and decisiveness of major among co-op and non co-op students. All tests were conducted using an alpha of .05.

A statistically significant relationship was not found between gender and degree completion for either co-op students or non-participants, Pearson $\chi^2 (1, N=100) = 1.094, p = .296$, Cramer's phi = .105 and Pearson $\chi^2 (1, N=1779) = 3.250, p = .071$, Cramer's phi = .043, respectively. With the observed probability value in the non-participant group less than 0.10, a relationship may indeed exist, though conclusive evidence could not be obtained. The assumption of five expected frequencies per cell was violated in the test of co-op students, as two cells (50%) in this group contained less than five expected frequencies. This increases the likelihood of a Type II error. Table 13 shows the frequencies and percentages of students in each category.

Table 13

Crosstabulation: The Relationship between Gender and Degree Completion among Co-op and Non-Co-op Students

	Co-op (n=100)	Non-Participant (n=1779)
Graduated (Female)	47 (47.0%)	855 (48.1%)
Graduated (Male)	52 (52.0%)	560 (31.5%)
Did Not Graduate (Female)	1 (1.0%)	201 (11.3%)
Did Not Graduate (Male)	0 (0.0%)	163 (9.2%)
Total	100 (100.0%)	100 (100.1%)

Note. All percentages may not equal 100% due to rounding.

For students who did not participate in co-op, degree completion was statistically significantly related to ethnicity, Pearson $\chi^2(1, N=1709) = 4.187, p = .041$, Cramer's phi = .049. Students who participated in co-op did not show a statistically significant relationship between ethnicity and the receipt of a baccalaureate degree, Pearson $\chi^2(1, N=97) = .200, p = .655$, Cramer's phi = .045. The assumption of five expected frequencies per cell was violated in the test of co-op students, as two cells (50%) in this group contained less than five expected frequencies. This increases the likelihood of a Type II error. Table 14 shows the frequencies and percentages of students in each category.

Table 14

Crosstabulation: The Relationship between Ethnicity and Degree Completion among Co-op and Non-Co-op Students

	Co-op (<i>n</i> =97)	Non-Participant (<i>n</i> =1709)
Graduated (Asian or White)	80 (82.5%)	1127 (65.9%)
Graduated (American Indian, Black, or Hispanic)	16 (16.5%)	233 (13.6%)
Did Not Graduate (Asian or White)	0 (0.0%)	305 (17.8%)
Did Not Graduate (American Indian, Black, or Hispanic)	1 (1.0%)	44 (2.6%)
Total	97 (100.0%)	1709 (99.9%)

Note. All percentages may not equal 100% due to rounding.

A statistically significant relationship was found between standardized test score and degree completion among co-op students, Pearson $\chi^2(2, N=100) = 9.091, p = .011$,

Cramer's phi = .302. Students who did not participate in co-op did not show a statistically significant relationship between standardized test score and the receipt of a baccalaureate degree, Pearson $\chi^2(2, N=1777) = 2.250, p = .325$, Cramer's phi = .036. The assumption of five expected frequencies per cell was violated in the test of co-op students, as three cells (50%) in this group contained less than five expected frequencies. This increases the likelihood of a Type I error. Table 15 shows the frequencies and percentages of students in each category.

Table 15

Crosstabulation: The Relationship between Standardized Test Score and Degree Completion among Co-op and Non-Co-op Students

	Co-op (<i>n</i> =100)	Non-Participant (<i>n</i> =1777)
Graduated (High Score)	9 (9.0%)	139 (7.8%)
Graduated (Moderate Score)	78 (78.0%)	1152 (64.8%)
Graduated (Low Score)	12 (12.0%)	123 (6.9%)
Did Not Graduate (High Score)	1 (1.0%)	29 (1.6%)
Did Not Graduate (Moderate Score)	0 (0.0%)	308 (17.3%)
Did Not Graduate (Low Score)	0 (0.0%)	26 (1.5%)
Total	100 (100.0%)	1777 (99.9%)

Note. All percentages may not equal 100% due to rounding.

Note. Standardized test scores between 400 and 999 were coded "low." Standardized test scores between 1000 and 1299 were coded "moderate." Standardized test scores between 1300 and 1600 were coded "high."

For students who did not participate in co-op, degree completion was statistically significantly related to high school grade point average, Pearson $\chi^2 (2, N=1757) = 26.777$, $p = .000$, Cramer's phi = .123. Students who participated in co-op did not show a statistically significant relationship between high school grade point average and the receipt of a baccalaureate degree, Pearson $\chi^2 (2, N=98) = 2.184$, $p = .336$, Cramer's phi = .149. The assumption of five expected frequencies per cell was violated in the test of co-op students, as three cells (50%) in this group contained less than five expected frequencies. This increases the likelihood of a Type II error. Table 16 shows the frequencies and percentages of students in each category.

Table 16

Crosstabulation: The Relationship between High School Grade Point Average and Degree Completion among Co-op and Non-Co-op Students

	Co-op (<i>n</i> =98)	Non-Participant (<i>n</i> =1757)
Graduated (High HS GPA)	30 (30.6%)	471 (26.8%)
Graduated (Moderate HS GPA)	60 (61.2%)	828 (47.1%)
Graduated (Low HS GPA)	7 (7.1%)	103 (5.9%)
Did Not Graduate (High HS GPA)	1 (1.0%)	72 (4.1%)
Did Not Graduate (Moderate HS GPA)	0 (0.0%)	42 (2.4%)
Did Not Graduate (Low HS GPA)	0 (0.0%)	241 (13.7%)
Total	98 (99.9%)	1757 (100.0%)

Note. All percentages may not equal 100% due to rounding.

Note. High school grade point averages between 2.0 and 3.0 were coded “low.” High school grade point averages between 3.1 and 4.0 were coded “moderate.” High school grade point averages between 4.1 and 5.0 were coded “high.”

A statistically significant relationship was not found between the declaration of major upon entering the university and degree completion for either co-op students or non-participants, Pearson χ^2 (1, *N*=100) = .125, *p* = .724, Cramer’s phi = .035 and Pearson χ^2 (1, *N*=1779) = 2.876, *p* = .090, Cramer’s phi = .040, respectively. With the *p* value in the non-participant group less than 0.1, a relationship may indeed exist, though conclusive evidence could not be obtained. The assumption of five expected frequencies per cell was violated in the test of co-op students, as two cells (50%) in this group

contained less than five expected frequencies. This increases the likelihood of a Type II error. Table 17 shows the frequencies and percentages of students in each category.

Table 17

Crosstabulation: The Relationship between Declaration of Major and Degree Completion among Co-op and Non-Co-op Students

	Co-op (<i>n</i> =100)	Non-Participant (<i>n</i> =1779)
Graduated (Declared)	88 (88.0%)	1152 (64.8%)
Graduated (Undeclared)	11 (11.0%)	263 (14.8%)
Did Not Graduate (Declared)	1 (1.0%)	282 (15.9%)
Did Not Graduate (Undeclared)	0 (0.0%)	82 (4.6%)
Total	100 (100.0%)	1779 (100.1%)

Research Question Two

The second research question asked: To what extent, if any, at the University of Central Florida, can time-to-degree be predicted by participation in cooperative education, gender, ethnicity, standardized test score, and high school grade point average? Time-to-degree, like degree completion, is a complex construct requiring several analyses to more thoroughly explain the phenomenon. Therefore, a multiple linear regression analysis was conducted first to determine if time-to-degree can be predicted by cooperative education, gender, ethnicity, standardized test score, and high school grade point average. Chi square tests of association were then conducted to

determine the relationship between co-op participation and degree completion in six years and four years. Finally, for the co-op participants, correlations between time-to-degree and the number of semesters enrolled in co-op, grade point average prior to first co-op semester, and the number of semesters completed prior to the first co-op semester were also performed.

The null hypothesis for the regression analysis was that the regression coefficients (i.e., the slopes) were equal to zero. Time-to-degree was used as the independent variable, and dependent variables included a dummy variable for co-op participation (no=0; yes=1), a dummy variable for gender (female=0; male=1), a dummy variable for ethnicity (asian_white=0; amer_ind_black_hispanic=1), and two continuous variables, standardized test score and high school grade point average. Multiple linear regression assumptions were tested. A review of Cook's distance, centered leverage values, and DFBETA values suggests that no data points have undue effect on the regression model. Initial review of scatterplots show a reasonable degree of linearity between the independent variable (time-to-degree) and the five dependent variables (gender, ethnicity, standardized test score, and high school grade point average). The scatterplot of the independent variables did not indicate a strong linear relationship between the variables, suggesting that multicollinearity was not an issue.

To test the assumption of normality, unstandardized and studentized residuals were reviewed. Skewness (1.370 and 1.371, respectively) statistics indicated normality, however residuals were leptokurtic (3.882 and 3.888, respectively) despite being roughly symmetric. The Shapiro-Wilks test also suggested non-normality, as the observed

probability values indicated statistical significance for both unstandardized and studentized residuals ($W = .904$, $df = 1444$, $p = .000$). In reviewing the histograms and Q-Q plots, the leptokurtic nature was similarly apparent. A multitude of outliers (1.6%) appeared on the boxplots, which possibly affected normality. The researcher decided to keep these outliers, as there were quite a few and seemed to form meaningful clusters. Based on these indices, the assumption of normality may have been violated.

The scatterplots for the dependent to the continuous independent variables (standardized test score and high school grade point average) indicated that the variables are linearly related. Scatterplots of unstandardized residuals to predicted values and to each independent variable suggested that the assumption of linearity was met, as the majority of values fell within the range of ± 2 .

A scatterplot of studentized residuals to unstandardized predicted values suggested that the assumptions of homogeneity of variance and independence may have been violated since the studentized residual values decrease slightly with increased unstandardized predicted values. However, scatterplots of the studentized residuals to the continuous independent variables suggest that the assumption of independence was met since there does not seem to be a predominant pattern to the data points.

Of the five independent variables, only high school grade point average and gender are statistically significant. Therefore, these variables are good predictors of time-to-degree among baccalaureate students, $F(5, 1438) = 12.633$, $p < .001$. Parameter estimates are included in Table 18.

Table 18

Time-to-Degree Parameter Estimates

	Unstandardized Coefficients		<i>t</i>	<i>p</i>	Confidence interval	
	<i>B</i>	<i>SE</i>			Lower bound	Upper bound
Intercept	4.743	.218	21.729	<.001	4.315	5.171
Co-op	-.026	.078	-.332	.740	-.180	.128
Gender	.262	.042	6.284	<.001	.180	.344
Ethnicity	-.063	.054	-1.170	.242	-.169	.043
Standardized Test Score	.000	.000	-.917	.359	-.001	.000
High School GPA	-.137	.041	-3.313	.001	-.219	-.056

According to the regression analysis, the equation to predict time-to-degree as a result of gender, ethnicity, standardized test score, high school grade point average, and co-op participation is: Predicted time-to-degree = 4.743 + (.262)(gender) + (-.063)(ethnicity) + (.000)(sat_converted) + (-.137)(high_school_gpa) + (-.026)(co-op_status)

Accuracy in predicting time-to-degree was fairly weak with a multiple correlation coefficient of .205. Approximately 4% ($R^2=.042$) of the variance of time-to-degree was accounted for by the regression model.

When evaluating the time-to-degree variable, the researcher noticed that the length of time a student takes to graduate may be related to co-op only if the student takes longer than four years. It has already been established that for this population, co-op

participation is related to degree completion within 7.67 years. Therefore, a chi square test of association was conducted to evaluate whether participation in cooperative education is related to degree completion within four years, and whether participation in cooperative education is related to degree completion within six years. The assumption of five expected frequencies per cell was met. For degree completion within six years, a statistically significant positive relationship was found, Pearson $\chi^2 (1, N=1879) = 21.17, p = .000, \phi = -.106$. When evaluating degree completion within four years, no statistically significant relationship was found, Pearson $\chi^2 (1, N=1879) = .425, p = .514, \phi = -.015$. Table 19 illustrates the percentage of co-op students and non-participants who graduated in six years and four years. Among students who participated in the cooperative education program, 97% graduated within six years while only 77.6% of students who did not participate in co-op graduated within six years. Among students who participated in the cooperative education program, 50% graduated within four years while only 46.7% of students who did not participate in co-op graduated within four years.

Table 19

Crosstabulation: Degree Completion in Four Years and Six Years for Co-op Students and Non-Participants

	Co-op	Non-Participant
Graduated in four years	50 (50.0%)	830 (46.7%)
Graduated in six years	97 (97.0%)	1381 (77.6%)

For the co-op participants, correlation coefficients were computed to determine the relationships, if any, between time-to-degree and the number of semesters enrolled in co-op, grade point average prior to first co-op semester, and the number of semesters completed prior to the first co-op semester. A review of scatterplots for these variables indicated that linear relationships were feasible, so the researcher proceeded with the planned correlation analyses. Results indicated statistically significant relationships between all variables. The strongest positive correlation was found between time-to-degree and the number of semesters of coursework completed prior to the first co-op semester, $r(97)=.40$, $r^2=.16$, $p<.001$, where a moderate relationship was ascertained. Another positive, moderate relationship was also seen between time-to-degree and the number of semesters enrolled in co-op, $r(97)=.30$, $r^2=.09$, $p=.003$. A moderate, negative relationship was found between time-to-degree and grade point average prior to the first co-op semester, $r(97)= -.41$, $r^2=.17$, $p<.001$. These results indicate that as students complete additional semesters of coursework prior to beginning the co-op program, the time it takes them to graduate is lengthened. Further, increased semesters of co-op is associated with an overall increase in the number of semesters it takes a student to graduate. Finally, as college grade point average decreases prior to the first co-op assignment, the length of time it takes a student to graduate increases. See Table 20 for correlation coefficients for the four variables.

Table 20

Correlation coefficients for Time-to-Degree and Number of Semesters Enrolled in Co-op, GPA Prior to Co-op, and Number of Semesters Prior to Enrolling in Co-op

	Number of Semesters Enrolled in Co-op	GPA Prior to Co-op	Number of Semesters Prior to Enrolling in Co-op
Time-to-Degree	.300	-.411	.403

Summary

Graduation and demographic data were analyzed in this chapter to investigate differences between students who participated in the cooperative education program and those who did not. The population included full-time, FTIC students at the University of Central Florida who began baccalaureate degrees in the Fall semester, 1999, maintained grade point averages of 2.5 or better each semester, and completed at least 20 credit hours. Results indicated several statistically significant relationships, most notably between degree completion and participation in cooperative education. All tests were reported, regardless of statistical significance. The following chapter offers conclusions based on these findings and recommendations for future research.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

Introduction

Divided into five sections, this final chapter will offer the reader a summary and interpretation of the research study. First, the problem statement and purpose of the study are revisited. Then, a description of the methodology is offered, including information about the population, groups, data collection, and data analysis procedures. Next, the research questions are discussed, followed by a summary of findings and recommendations. Finally, the author suggests avenues for future research.

Statement of the Problem

Baccalaureate degree completion statistics are alarmingly low. Berkner, He, and Cataldi (2002) showed the national average for undergraduate degree attainment after six years was 63%. This graduation rate was corroborated by Adelman's longitudinal study (2004), showing that "the bachelor's degree attainment rate for all students who earned any credits from a bachelor's degree granting institution was 66-67%" (p. iv). Further, Adelman showed that these rates have not varied since the early 1970s, and Tinto (1982) asserted that "rates of dropout from higher education have remained strikingly constant over the past 100 years" (p. 694). When reduced to a four-year timeframe, the national graduation rate decreases: only 38% of students who begin four-year degree programs complete their goal (Berkner, et al.). At the University of Central Florida, the numbers are even lower. For the Fall 1999 cohort of full-time, first-time-in-college (FTIC) bachelor's degree seekers, only 57% of students attained their degree within six years and

30% of students completed their degree in four years (Office of Institutional Research, n.d.a).

Literature has emerged which suggests that students who participate in experiential learning programs such as cooperative education may experience increased motivation to continue the formal education process (Avenoso & Totoro, 1994; Schambach & Dirks, 2002; Somers, 1986). However, it is clear that further research in this area is necessary (Somers, 1986; Stull, Crow, & Braunstein, 1997). According to a survey completed by cooperative education students at the University of Central Florida during the 2004-2005 school year, 82% reported an increase in their motivation to persist to graduation, with 42% of students noting a “significant increase” in this area as a result of their co-op experience (Co-op Student Learning Outcomes, n.d.). Two reasons for this increase could be found in Leppel’s research (2001) indicating that a student’s probability of persistence may be a result of his or her level of commitment to a particular occupation or major and their overall interest in the subject area. Cooperative education, with its occupational focus, may enhance commitment and interest. Together, these findings suggest that campus cooperative education programs may offer institutions a way to increase the likelihood that students will persist until graduation.

Methodology

Population and Groups

The population for this study was the cohort of full-time, bachelor’s degree-seeking undergraduate students who entered the University of Central Florida as first-

time-in-college (FTIC) students in the fall semester of 1999. The Co-op group consisted of full-time FTIC students who successfully participated in the University of Central Florida Cooperative Education program at some point during their undergraduate careers (between the Fall 1999 and Spring 2007 semesters) and the Non-Participant group included full-time FTIC students with at least 20 credit hours completed and consistent grade point averages of at least 2.5 who did not participate in the University of Central Florida Cooperative Education program as an undergraduate student (between the Fall 1999 and Spring 2007 semesters). The additional parameters on the Non-Participant group, namely grade point average and completion of at least 20 credit hours, were included to control for any potential differences between co-op and non-co-op students due the fact that participation in the cooperative education program is typically limited to students meeting the following criteria: (a) grade point average of 2.5 or better, (b) completion of at least 20 credit hours, and (c) full-time, degree-seeking status (Experiential Learning, n.d.d). Although certain majors such as Hospitality require participation in co-op and therefore do not limit access to the program, students who did not meet the above criteria were eliminated from the data set to help ensure consistency.

According to the Experiential Learning website at the University of Central Florida, cooperative education is “an academic program that allows students to apply classroom theory in practical work settings and gain personal, academic and work skills over multiple semesters” (n.d.a., para 1). Co-op students are always paid, may or may not earn credit, and complete structured reflection activities designed to enhance learning. Co-op is often mistaken for a part-time job, but the two are vastly different. Though co-

op students are paid and are often expected to produce work for their sponsoring organization, the students' primary goal is increased knowledge and understanding in a particular subject area. As such, co-op is an academic exercise, whereas the primary goal of a part-time job is the students' work output, with secondary importance placed upon opportunities for learning.

Data Collection and Analysis

The data for this study were obtained from the Office of Institutional Research at the University of Central Florida. Appendix D contains the full list of information requested for each full-time, first-time in college (FTIC), Bachelors-degree seeking student who first enrolled at UCF in Fall 1999, with at least 20 credit hours completed and overall grade point averages of at least 2.5 during all semesters. Once the dataset was received, the researcher recoded some of the data into a format more amenable to analysis.

SPSS Version 15.0 was used to analyze the dataset. Descriptive statistics were reported on the two groups to discern and describe the characteristics of co-op and non-co-op students at the University of Central Florida. Several chi-square analyses was generated to determine what relationship, if any, exists between undergraduate student participation in cooperative education and degree attainment. Multiple regression was conducted to determine the extent, if any, to which time-to-degree can be predicted by participation in cooperative education, gender, ethnicity, standardized test score, and high school grade point average. Finally, correlation coefficients were calculated to measure the relationship between time-to-degree and the number of semesters enrolled in co-op,

grade point average prior to first co-op semester, and the number of semesters completed prior to the first co-op semester.

Discussion of Population

The cohort included 1879 students, with 100 who participated in the cooperative education program (two semesters or longer) and 1779 students who did not register for any semesters of co-op. The co-op and non-participant groups were demographically similar in most regards.

Similarities Between the Two Groups

Upon arrival to the university, the choice of college was fairly well-matched between the two groups with a couple of notable exceptions. The largest percentage of students in the co-op and non-participant groups enrolled in the College of Sciences upon arrival to the university, at 28% and 27%, respectively. The colleges of Undergraduate Studies (representing the Interdisciplinary Studies major), Arts and Humanities, Health and Public Affairs, Sciences, and Nursing fell within five percentage points from one another (for example, 1% of co-op students chose the College of Nursing, whereas 2% of non-participants chose the College of Nursing, creating a spread of one percentage point).

Age and ethnicity were also similar for the two groups. In the co-op group, 96% began college at 17 or 18 years of age, and 97.6% of the non-participant group began college at 17 or 18. For purposes of this study, White students and Asian students were grouped together, representing 81% of the co-op group and 80.5% of the non-participant group.

Another similarity between the two groups was in the area of academic credentials prior to enrollment at UCF. The mean standardized test score for co-op students and non-participants was 1139.80 and 1140.48, respectively. Likewise, the mean high school grade point average for co-op students and non-participants was 3.72 and 3.74, respectively.

Differences Between the Two Groups

The most notable differences between the two groups were in the areas of gender and a few academic program choices, though analyses were not conducted to evaluate statistical significance on these factors. In the co-op group, 48% of the students were female whereas 59.4% of non-participating students were female. Further, Co-op students seemed to be more likely to choose the colleges of Engineering (18.0% compared with 9.1%) or Business (27.0% compared with 17.1%) than non-participants. Non-participants chose the college of Education more often (6.4% compared with 1.0%) or did not choose a college at all (19.4% compared with 11.0%).

Characteristics Specific to Co-op Students

Variation was seen among the co-op students. Cooperative education occurs over multiple semesters, and in the 1999 cohort, students completed anywhere from two to nine semesters of co-op courses. Most students (55%) who participated in cooperative education engaged in their first co-op assignment after six, seven, eight, or nine semesters at UCF, though it ranged between one semester and twenty semesters of traditional coursework prior to co-op activity. It should be noted that UCF offers three semesters

each year, so beginning co-op after six semesters is roughly equivalent to starting the experience at the beginning of one's junior year, and beginning co-op after nine semesters is roughly equivalent to starting the experience at the beginning of one's senior year.

Discussion of Findings

Two research questions were developed to guide this study:

1. What is the relationship, if any, between participation in cooperative education and degree completion at the University of Central Florida?
2. To what extent, if any, at the University of Central Florida, can time-to-degree be predicted by participation in cooperative education, gender, ethnicity, standardized test scores, and high school grade point average?

To address the research questions, the author first evaluated the overall relationship between participation in the co-op program and degree completion. The degree completion variable was redefined several times to reflect stopping points at 4 years, 6 years, and 7.67 years (equivalent to 7 years plus 2 semesters). The relationship between participation in co-op (multiple semesters) or an internship (one semester) and degree completion was also analyzed. Then, student characteristics thought to be risk factors (gender, ethnicity, standardized test score, and high school grade point average) were evaluated to determine if there was a relationship between these variables and degree completion for the co-op and non-participant groups. The relationship between degree completion and decisiveness of major was also tested due to the large number of students in the dataset without declared majors. A multiple regression analysis was

conducted to predict time-to-degree from participation in cooperative education, gender, ethnicity, standardized test score, and high school grade point average, and several correlations were run to further analyze the co-op group with respect to time-to-degree. Together, the answers to these questions provide objective, quantitative evidence regarding cooperative education as it relates to degree completion.

Results indicated a statistically significant relationship between undergraduate participation in cooperative education and degree completion with a moderate effect size, consistent with findings by Smith (1965), Lindenmeyer (1967), and Somers (1986). In interpreting this result, one must be careful as to how degree completion is defined. For purposes of this study, it was defined as completing a baccalaureate degree within 7.67 years at the same university at which the student began. When the span of time was reduced to six years, a statistically significant relationship was found again. However, when the time frame was further reduced to four years, no relationship was seen. This suggests that students who complete degrees in four years may do so regardless of co-op participation, but for students who take longer to graduate, co-op seemed to help. When investigating the relationship between cooperative education and degree completion, statistical significance was found at the .001 level, indicating that there is no more than one chance in a thousand that the observed difference in degree completion rates occurred by chance.

When reviewing the risk factors for attrition considered in this study, results indicated that gender did not correlate with degree completion for co-op students nor non-participants, though the observed probability value was close to being significant at

.071. This finding supports Blecher's assertion (2006) that it is unclear whether or not gender is related to graduation rates. Gender did, however, play a role in the length of time a student takes to earn an undergraduate degree, supporting the findings of Peter and Horn (2005).

Ethnicity was found to be related to degree completion, but only for students who did not participate in the cooperative education program. As shown in Table 14, the data suggest that among non-participants, American Indian, Black, and Hispanic students complete degrees at lower rates than Asian or White students. However, no difference in degree completion rates was found among co-op students, regardless of ethnic group. Perhaps certain elements of the co-op experience such as increased faculty contact provided a supplementary support system for American Indian, Black, and Hispanic students and acted as a moderating force. Or, perhaps socioeconomic class is a related variable, and the monetary rewards of co-op helped to defray educational expenses for students with greater financial need. Additional research is necessary to begin to understand the reasons for these findings, but it suggests that students of American Indian, Black, or Hispanic descent may fare better in college by participating in co-op.

Similarly, for non-participants only, a statistically significant association between high school grade point average and degree completion was found. Upon reviewing the percentages of low, moderate, and high grade point averages in Table 16, the data suggest that lower high school grade point averages among non-participants was correlated with lower degree completion rates. No difference was seen in graduation rates among co-op students with varying high school grade point averages. Further, high school grade point

average seems to be a predictor of time-to-degree when gender, ethnicity, standardized test score, and co-op status are held constant. Maybe those who did not succeed academically in high school had a learning style not conducive to a didactic environment, but one that was well-conditioned for experiential education. Or, perhaps a positive co-op experience gave students with lower high school grades the necessary confidence boost to succeed in college. Without additional research, it is difficult to go beyond simple speculation into the reasons. Regardless, these findings imply that co-op may make a difference for students who begin college with lower grades in high school.

Given the relationship identified between high school grade point average and degree completion (Stumpf & Stanley, 2002) it was surprising to find that standardized test scores were related to degree completion only for co-op students. Unfortunately, from the dataset used in this study, it was difficult to gauge whether co-op students with lower test scores graduate at lower rates than students with higher test scores, or whether co-op students with higher test scores graduate at lower rates than students with low test scores. The test scores of non-participants were not associated with degree completion. Lest the reader think that the one co-op student who did not graduate skewed the results, it should be mentioned that the non-graduating co-op subject actually entered UCF with a high standardized test score (defined for this study as between 1300 to 1600 on a 1600-point scale). Additional research in this area would be useful.

While the student's declaration of major was not one of the original four risk factors evaluated in this study, there were sufficient numbers of undeclared students in both groups to pique the researcher's interest. Therefore, a test was conducted to see if

there was a difference in degree completion rates based on the declaration of major upon matriculation to the university among co-op students and non-participants. No statistically significant difference was observed in either group, though the observed probability value for non-participants was .09, suggesting that additional research may be warranted.

The reader is reminded to interpret the findings related to gender, ethnicity, standardized test score, high school grade point average, and declaration of major with caution due to the fact that certain cells within each of these analyses contained less than five expected frequencies. This violates the primary assumption of chi square tests of association, and may increase the likelihood of finding relationships where none exist, or of not finding relationships where one exists.

No statistically significant differences were found among co-op and non-participant students in the length of time a student takes to complete a program of study. This is an interesting finding because it is often thought that participation in a cooperative education program causes a student to graduate later than the student would without co-op. However, parallel co-op positions (which comprise the majority of UCF co-op assignments), in which students attend class full-time and work part-time, may be more immune to this issue than alternating programs, in which students alternate semesters of school and work.

Among the co-op student group, several findings merit a brief mention. Results indicate that the length of time a student takes to graduate is positively correlated with the number of semesters of coursework completed prior to the first co-op semester. Also, as

the number of co-op semesters increase, the length of time to graduation increases.

Additional research would be necessary to determine the ideal number of semesters for either scenario. Finally, a negative correlation was found between grade point average prior to the first semester of co-op and time-to-degree.

Though this study did not specifically assess social and academic integration into university life, these factors should be mentioned, as Astin (1984) and Tinto (1993) consider these elements to be of utmost importance when evaluating persistence. Similarly, Jackson, Smith, and Hill (2003) found that students who interact with faculty members on a regular basis have a lower attrition rate than students without these relationships. Co-op offers students the opportunity to develop close relationships with faculty and other co-op students on campus in a less structured environment than the classroom, and may contribute to a student's persistence as a result of these experiences.

Summary and Recommendations

With approximately a third of baccalaureate students in the United States graduating within four years and two thirds graduating in six years (Berkner, He, & Cataldi, 2002), higher education stakeholders including administrators, faculty, students, parents, and legislators are concerned about degree completion for our nation's students (American Association of State Colleges and Universities, 2004). The results of this study indicated that cooperative education may help to reduce attrition among first-time-in-college (FTIC) students at large, metropolitan research universities similar in characteristics to UCF who begin their studies taking 12 credit hours or more, maintain a grade point average of 2.5 or better, and complete at least 20 credit hours.

Figure 2 illustrates a comparison between the population used for this study, national, and UCF averages. One can observe a clear difference between both the co-op and non-participant groups and the larger population who began at UCF as full-time, FTIC students in Fall 1999. Of the co-op participants in this cohort, 99% of the students graduated within 7.67 years, 97% graduated within 6 years, and 50% graduated within 4 years. Non-participants did not fare as well, with 79.5% of the students graduating within 7.67 years, 77.6% of the students graduating within 6 years, and 46.7% graduating within 4 years. Without the restriction of completing at least 20 credit hours and maintaining an overall grade point average of 2.5 or better each term, only 57% of students graduated within 6 years, and 30% of students graduated within 4 years (Office of Institutional Research, n.d.a).

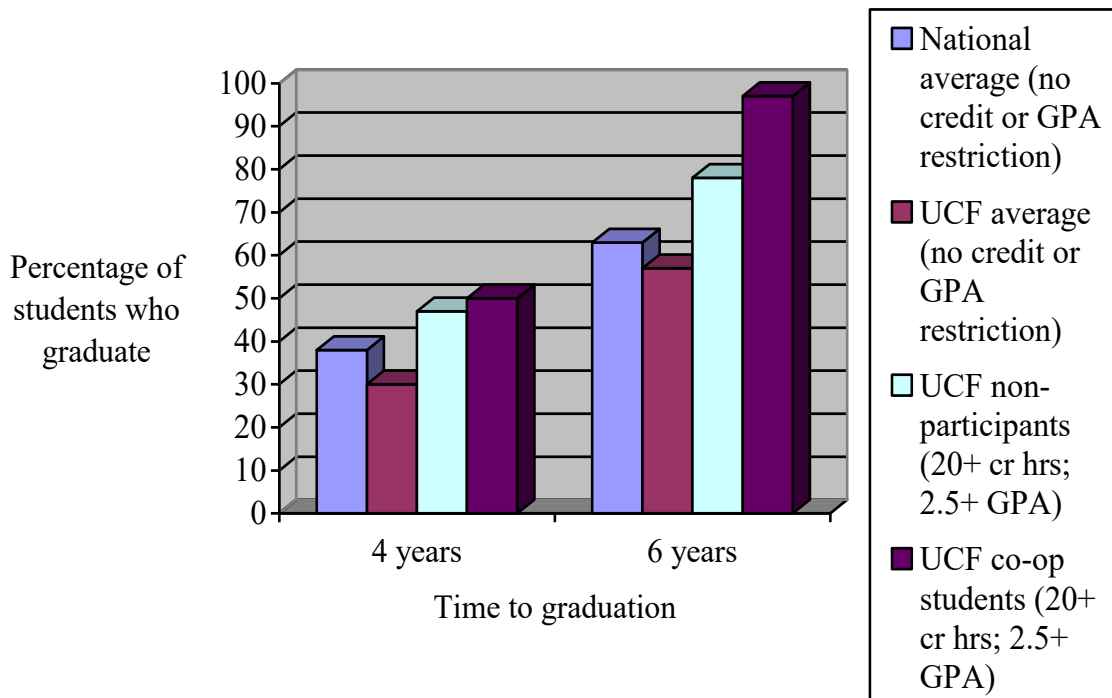


Figure 2

National and UCF Degree Completion Statistics Compared to Degree Completion Statistics Among Co-op Students and Non-Participants

With the two groups matched so closely on standardized test scores and high school grade point average, one can be confident that neither group had a significant academic advantage over the other causing the disparity. Even demographic factors such as age and ethnicity seemed to be fairly well aligned between the groups. Interestingly, students who graduated within four years seemed to do so regardless of co-op participation, but for those who took longer, participation in the co-op program seemed to help. There is some evidence to suggest that internships also are associated with degree completion, though details surrounding this phenomenon were outside the scope of this

study. Further, some of the known risk factors (lower high school grade point averages, male gender, and non-White/non-Asian ethnicity) may be mitigated by the student's willingness to participate in their institution's co-op program. However, it should be emphasized that in this study, only one student in the co-op group did not graduate; consequently the assumption of five expected frequencies per cell was violated during several of the chi square analyses and may be enough reason to question results regarding groups at risk. Further, a limitation in this study was the narrow definition of degree completion. Data were not available on students who transferred to other institutions; consequently, these students were coded as non-completers. According to Tinto (1982), this is a common limitation in studies of this type. In addition, only 7.67 years of data was captured. Though this is longer than many time-to-degree studies (most end at six years), an even larger time frame may serve to capture more completers.

If increasing degree completion rates is one of the goals of the university, it is recommended that cooperative education and/or internships is strongly encouraged for all students in all majors, especially those who are at risk for attrition based on ethnicity or high school grade point average. Further, the cooperative education program should continue to be supported by the administration and faculty and included as an integral component of the academic curriculum. Finally, additional research should be conducted on the relationship between co-op and degree completion for at-risk populations. The following section will offer the reader ideas for related studies.

Thoughts on Future Research

A relationship clearly exists between degree completion and participation in cooperative education, as was seen in the analysis of the first research question. However, this study did not address which elements of cooperative education encourage this phenomenon more than others. While it is prudent to be cautious about assuming causality, it may be helpful to investigate the properties of cooperative education which may be correlated with the enhancement of graduation rates. For example, independent variables could include the type of co-op assignment (alternating versus parallel), the similarity or fit between the student's major and the co-op assignment, the number of students per co-op coordinator, the assignments required of the students, the number of hours worked, or the institutional organization to which the co-op office reports (academic affairs or student affairs). An in-depth investigation of other types of experiential learning such as internships or service-learning as they relate to degree completion might be useful as well. Further, administering questionnaires to both current students and alumni of the co-op program might help to gain an understanding of the underlying motivations behind degree completion.

In addition to the characteristics of the cooperative education assignment, incorporating traits of the students partaking in these experiences as independent variables may yield interesting results. Personality measures (i.e. dimensions from the Myers-Briggs Type Indicator or the DISC assessment), socio-economic status and/or qualification for financial need, first-generation college student status, the need for remediation upon entering the university, and learning styles might all be useful variables

for analysis and discussion.

The results of this study suggest that completing at least 20 credit hours and maintaining a 2.5 grade point average is important to persistence, and once these criteria are met, co-op participation becomes important. However, it is possible that co-op participation may help to protect students from attrition even prior to the attainment of 20 credit hours, and despite a lower grade point average than 2.5. Therefore, future research might focus on institutions that offer co-op to students regardless of the number of credit hours earned or grade point average. If a program like this does not exist (as may be the case, since most co-op offices have instituted credit hour and/or grade point average requirements), perhaps an experimental group could be created to test the hypothesis.

Investigating the issue of transfer students may yield useful results. First, including transfer students in the population studied would add to the knowledge base about this growing community of students and help to increase the numbers in each group, reducing the likelihood of assumption violations during chi square analyses. If a study like this was executed, controls would have to be incorporated to ensure homogeneity between groups. Second, investigating the whereabouts of students who leave the university would be interesting, as some most likely transfer to other institutions and complete degrees elsewhere. If these data were captured, the number of completers would surely increase.

Finally, this study focused on the co-op program at one institution. Examining degree completion data in different educational settings which run similar co-op programs might be useful for purposes of generalizability. Also, using data from several

entering classes will offer a larger co-op group and may help to avoid the issue of assumption violation during the chi square analyses. Finally, including transfer students in the definition of completer might help faculty and administrators to better understand the nuances behind the relationship between co-op participation and degree completion.

APPENDIX A:
COOPERATIVE EDUCATION ACCREDITATION CRITERIA

Criteria for Accreditation

The criteria for accreditation through the Accreditation Council for Cooperative Education have been developed based upon [The Attributes of Cooperative Education Programs](#), a structural model that reflects the founding principles and distinctive definition of cooperative education. They provide a set of standards that are subscribed to by a significant number of programs of cooperative education and a conceptual framework that advances cooperative education as a discipline.

CRITERION ONE: The institution has effectively included cooperative education as an integral part of the academic program and has implemented policies and practices appropriate to achievement of program educational goals.

- A permanent record of student participation in cooperative education work experiences, for each work term, is documented on the official institutional student academic transcript.
- Cooperative education work experiences are formally identified by the institution as part of the curriculum.
- Student work experiences and related learning take place under real-world working conditions.
 - While on cooperative work experience periods students are considered as employees of the hiring organization and subject to the policies and laws that relate to other employees of the organization.
 - Participating students will receive compensation in the form of wages for work performed.
 - Students will be under the supervision of the employing organization and perform work assigned by the employer.
- New students in the program are provided with an orientation to program purposes and policies and the expectations for their participation.
- The institution engages in ongoing assessment to ensure that cooperative education work experiences are related to student academic and/or career goals.
- The program's monitoring practices of student workplace experiences are used to facilitate breadth of practical experiences for students and/or provide for progression to increased responsibilities as they advance in their education program.
- Methods are used to evaluate student performance for each work period.
- Process and methods are used to assist all participating students in assessing their work experiences and in integrating their classroom studies with the practical knowledge obtained.
- Policies and systems are in place for maintaining information on student participation, including employer evaluations of students and student evaluations of each work experience.
- The institution offers a form of academic credit for cooperative education work experiences, i.e. A, B, C and credit hours; substitute for required elective courses; requirement for the degree, Pass/Fail; etc.
- Student learning outcomes have been established for your program and assessment tools are being used to measure the accomplishments of those student learning outcomes.

CRITERION TWO: The institution has a clear and publicly-stated, formalized plan for the alternation, full-time or half-time, of campus-based classroom study with multiple periods of work experiences appropriate to a program of cooperative education.

- Time spent in the work portion of the curriculum should encompass a significant portion of the overall degree program (minimum guideline - 20% of the total time) to be an effective augmentation to the curriculum. (No cooperative education program consists of 100% Summer employment. This is a Summer Employment Program.) Recognized plans include Full-Time Alternating, Parallel, and Combination Alternating / Parallel
- Participating students fulfill a minimum time specified for the work portion of the curriculum for each formalized alternating plans

CRITERION THREE: The Program demonstrates faculty involvement in the cooperative education program.

- Faculty have endorsed the program's fundamental policies, including the methods for awarding credit for periods of cooperative education work experience.
- The opinions and views of faculty about the cooperative education program are discussed and brought forward to the co-op unit.
- The cooperative education program's operating unit maintains a productive relationship with faculty in the involved academic departments.

CRITERION FOUR: The program demonstrates efforts to achieve understandings with employers as to the goals for cooperative education and to encourage agreements on policies and expectations for the cooperative relationship.

- Policies and practices of the program are communicated to employers to help ensure that the employer, students and institution, equally, meet individual objectives from participation in the cooperative education program.
- Institutional written statements include understandings for employer program participation that demonstrate a commitment of cooperation between the employer and the institution to ensure student learning and an agreement on the process for evaluating the student's work experience.

- The program makes efforts to encourage participating employers to maintain an on-going cooperative education employment relationship that lasts beyond a single student's participation and/or beyond the completion of a project.

CRITERION FIVE: The program has been effectively defined in the institution's literature and its mission, goals and policies are appropriate to a program of cooperative education, as defined in the ACCE "Attributes of Cooperative Education Programs."

- Institutional literature includes the mission and goals for the cooperative education program.
- Institutional literature identifies the disciplines in which cooperative education is included in the curriculum.
- Institutional literature includes policies related to student eligibility for program participation that requires the applicant to be classified by the institution as at least a half-time, matriculated student and that the initial cooperative work experience will not precede the student's first academic term, or occur after the final school term.

APPENDIX B:
INSTITUTIONAL REVIEW BOARD EXEMPTION



Office of Research & Commercialization

May 3, 2007

Amanda Pacheco
c/o Dr. Levester Tubbs
University of Central Florida
Department of Educational Research, Technology & Leadership
ED 222H
Orlando, FL 32816-1250

Dear Ms. Pacheco:

The University of Central Florida's Institutional Review Board (IRB) received your protocol IRB #07-4428 entitled, "Cooperative Education as a Predictor of Baccalaureate Degree Completion." The IRB Chair reviewed the study on 4/30/2007 and did not have any concerns with the proposed project. The Chair has indicated that under federal regulations (Category #1, research conducted in established or commonly accepted educational settings, involving normal educational practices, such as: research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods) this research is **exempt** from further review by our IRB, so an approval is not applicable and a renewal within one year is not required.

Please accept our best wishes for the success of your endeavors. Should you have any questions, please do not hesitate to call me at 407-823-2901.

Cordially,

A handwritten signature in cursive script that reads "Joanne Muratori".

Joanne Muratori
(FWA00000351 Exp. 5/13/07, IRB00001138)

Copies: IRB File
LeVester Tubbs, Ed.D.

JM:jm

APPENDIX C:
INSTITUTIONAL REVIEW BOARD ADDENDUM APPROVAL



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice of Expedited Review and Approval of Requested Addendum/Modification Changes

**From: UCF Institutional Review Board
FWA00000351, Exp. 5/07/10, IRB00001138**

To: Levester Tubbs

Date: June 29, 2007

IRB Number: SBE-07-04428

Study Title: Cooperative Education as a Predictor of Baccalaureate Degree Completion

Dear Researcher:

Your requested addendum/modification changes to your study noted above which were submitted to the IRB on 06/26/2007 12:15:57 PM EDT were approved by **expedited** review on 6/27/2007.

Per federal regulations, 45 CFR 46.110, the expeditable modifications were determined to be minor changes in previously approved research during the period for which approval was authorized.

This addendum approval does NOT extend the IRB approval period or replace the Continuing Review form for renewal of the study.

On behalf of Tracy Dietz, Ph.D., IRB Chair, this letter is signed by:

Signature applied by Barbara Ward on 06/29/2007 10:30:20 AM EDT

IRB Coordinator

Internal IRB Submission Reference Number: 000560

APPENDIX D:
COPY OF INSTITUTIONAL RESEARCH DATA REQUEST



OFFICE USE ONLY:
IR _____

UCF Data Request Form

Requester: Amanda Pacheco Date: 5/7/07
 Department: Experiential Learning Phone: 407-408-8574

Type of Request <input type="checkbox"/> Hardcopy report <input checked="" type="checkbox"/> Download to disk Electronic Format <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Text <input type="checkbox"/> Access <input type="checkbox"/> Other: _____	Run Schedule <input checked="" type="checkbox"/> One-Time Only <input type="checkbox"/> Periodic as requested <input type="checkbox"/> Scheduled <input type="checkbox"/> Other: _____ <input type="checkbox"/> Established job: Name: _____	Needed by: <u>5/17/07</u> Department Account #: <u>10340001</u> Contacts and Workgroup Names: <u>Amanda Pacheco</u> Authorized Signature:
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Job Description:

I am conducting a research study investigating the effect of co-op participation on undergraduate degree completion in the context of several risk factors for attrition. IRB approval has been obtained. See attached addendum for the specific parameters requested.

Please note that some data requests may take 1 to 2 weeks to process.

Upon completion of above information, fax to University Data Administrator at 407-823-4769.

-----FOR OFFICE USE ONLY-----			
Data Administrator: _____ / ____ / ____ Authorized Signature Date Comments: _____	Status: <input type="checkbox"/> Approved <input type="checkbox"/> Denied	Priority: <input type="checkbox"/> Emergency <input type="checkbox"/> High <input type="checkbox"/> Normal <input type="checkbox"/> Low	Billable: <input type="checkbox"/> Yes <input type="checkbox"/> No Routing: <input type="checkbox"/> IR <input type="checkbox"/> RO <input type="checkbox"/> CS <input type="checkbox"/> Other
Payment Tracking: _____		CMS Tracking: _____	
Data Source: <input type="checkbox"/> PS <input type="checkbox"/> RDS <input type="checkbox"/> Data Warehouse			
Analyst/Programmer: _____ / ____ / ____ Signature Date Time Spent on Request: _____ <input type="checkbox"/> Comments on Separate Sheet	Manager Approval: _____ / ____ / ____ Signature Date <input type="checkbox"/> Moved to Production	User Acceptance: _____ / ____ / ____ Signature Date	
FILE LOCATION:			

Data Request Form Addendum

5/7/07

Requestor:

Amanda Pacheco, Experiential Learning

(407) 408-8574

apachec@mail.ucf.edu

Please retrieve the following data on all full-time, FTIC, Bachelors-degree seeking students who first enrolled at UCF in Fall, 1999 with at least 20 credit hours completed at UCF and overall GPAs of at least 2.5 during all semesters. Identifying information should be removed, though the statistical analysis I plan to conduct necessitates the linkage between the parameters below. Therefore, an output format such as the one on the next page would be helpful.

- Graduation date (if applicable). If the student did not graduate yet, please state "Did not graduate."
- Overall GPA at graduation
- Major
- College
- Ethnicity
- Gender
- Combined SAT score (Verbal and Math)
- Composite ACT score
- High School GPA
- Birthdate
- Residency status (US Citizen, Permanent Resident, F1 Visa, among others)
- Co-op Student? (Y/N) [Definitions: For purposes of this project, a co-op student is a student who earned a grade of "S" in at least 1 co-op course. A co-op course is any course prefix with the number 2949, 3949, or 4949].
- For co-op students:
 - In which semesters did they enroll and earn an "S" grade in a co-op course?
 - In how many co-op courses did they enroll and earn "S" grades?
 - What was their overall GPA in the semester prior to enrolling in their first co-op course?
 - How many credit hours had they completed in the semester prior to enrolling in their first co-op course?

APPENDIX E:
SAT-ACT SCORE COMPARISON CHART

SAT–ACT Score Comparisons

SAT to ACT		ACT to SAT	
SAT Score Verbal +Math	ACT Composite Score	ACT Composite Score	SAT Score Verbal +Math
1600	36	36	1600
1560–1590	35	35	1580
1510–1550	34	34	1520
1460–1500	33	33	1470
1410–1450	32	32	1420
1360–1400	31	31	1380
1320–1350	30	30	1340
1280–1310	29	29	1300
1240–1270	28	28	1260
1210–1230	27	27	1220
1170–1200	26	26	1180
1130–1160	25	25	1140
1090–1120	24	24	1110
1060–1080	23	23	1070
1020–1050	22	22	1030
980–1010	21	21	990
940–970	20	20	950
900–930	19	19	910
860–890	18	18	870
810–850	17	17	830
760–800	16	16	780
710–750	15	15	740
660–700	14	14	680
590–650	13	13	620
520–580	12	12	560
500–510	11	11	500

Points to Note

- Equivalent scores are those with the same percentile ranks for a common group of test-takers.
- A concordance table is dependent upon the sample used to establish the relationship between two sets of scores. Other available SAT–ACT tables use different samples of colleges and students than this table, resulting in slightly different equivalent scores. For this reason, the best concordance table is one that is established for and used by a specific institution.
- Data in this table are based on 103,525 test-takers who took both the SAT and the ACT between October 1994 and December 1996.
- SAT scores do not cover the full range of the ACT scale due to differences in how percentiles are distributed at the top and bottom of the two scales.
- Although the new SAT will have significant changes that will more closely align the test with current instructional practices, the new SAT field trial research has conclusively demonstrated that scores on the new critical reading section will be comparable to scores on the current verbal section, and scores on the new math section will be comparable to scores on the current math section. Therefore, current concordance tables can still be used to compare new SAT and ACT scores.

Source References:

“Concordance Between ACT Assessment and Recentered SAT I Sum Scores” by N.J. Dorans, C.F. Lyu, M. Pommerich, and W.M. Houston (1997), *College and University*, 73, 24–31; “Concordance between SAT and ACT Scores for Individual Students” by D. Schneider and N.J. Dorans, Research Notes (RN-07), College Entrance Examination Board, New York: 1999; “Correspondences between ACT and SAT I Scores” by N.J. Dorans, College Board Research Report 99-1, College Entrance Examination Board, New York: 1999; ETS Research Report 99-2, Educational Testing Service, Princeton: 1999.

APPENDIX F:
CO-OP AND NON-PARTICIPANT MAJORS AT ENTRY

	Co-op	Non-Participant
Aerospace Engineering	5 (5%)	23 (1.3%)
Anthropology	0 (0%)	6 (0.3%)
Art (BA)	2 (2%)	51 (2.9%)
Art (BFA)	1 (1%)	6 (0.3%)
Athletic Training Pending	2 (2%)	24 (1.3%)
Biology	2 (2%)	91 (5.1%)
Business Pending	27 (27%)	303 (17%)
Cardiopulmonary Sciences	0 (0%)	1 (0.1%)
Cardiopulmonary Sciences Pending	0 (0%)	2 (0.1%)
Chemistry	0 (0%)	12 (0.7%)
Civil Engineering	3 (3%)	14 (0.8%)
Communication Pending	7 (7%)	139 (7.8%)
Communicative Sciences and Disorders	0 (0%)	14 (0.8%)
Computer Engineering	5 (5%)	61 (3.4%)
Computer Science	10 (10%)	89 (5%)
Criminal Justice (BA)	0 (0%)	1 (0.1%)
Criminal Justice (BS)	0 (0%)	10 (0.6%)
Economics	0 (0%)	1 (0.1%)
Electrical Engineering	2 (2%)	14 (0.8%)

	Co-op	Non-Participant
Electrical Engineering Technology	0 (0%)	2 (0.1%)
Elementary Education Pending	0 (0%)	7 (0.4%)
Engineering Technology	0 (0%)	2 (0.1%)
English	0 (0%)	17 (1%)
English Language Arts Education	0 (0%)	1 (0.1%)
Environmental Engineering	0 (0%)	3 (0.2%)
Exceptional Education	0 (0%)	2 (0.1%)
Film Pending	1 (1%)	39 (2.2%)
Forensic Science	0 (0%)	16 (0.9%)
Health Sciences	0 (0%)	1 (0.1%)
Health Services Administration	0 (0%)	10 (0.6%)
History	0 (0%)	7 (0.4%)
Hospitality Management	0 (0%)	1 (0.1%)
Humanities	0 (0%)	1 (0.1%)
Industrial Engineering	0 (0%)	5 (0.3%)
Interdisciplinary Studies (BA)	0 (0%)	1 (0.1%)
Interdisciplinary Studies (BS)	0 (0%)	6 (0.3%)
Legal Studies	3 (3%)	15 (0.8%)

	Co-op	Non-Participant
Management	0 (0%)	1 (0.1%)
Mathematics	0 (0%)	2 (0.1%)
Mathematics Education	0 (0%)	1 (0.1%)
Mechanical Engineering	1 (1%)	14 (0.8%)
Modern Languages Combination	0 (0%)	3 (0.2%)
Molecular and Microbiology	0 (0%)	35 (2%)
Music	0 (0%)	3 (0.2%)
Music Education	0 (0%)	15 (0.8%)
Music Performance	0 (0%)	1 (0.1%)
Nursing Pending	1 (1%)	35 (2%)
Philosophy	0 (0%)	1 (0.1%)
Physical Therapy Pending	0 (0%)	8 (0.4%)
Physics	0 (0%)	4 (0.2%)
Political Science	2 (2%)	35 (2%)
Psychology (BA)	7 (7%)	76 (4.3%)
Psychology (BS)	0 (0%)	9 (0.5%)
Public Administration	1 (1%)	0 (0%)
Radiological Sciences Pending	1 (1%)	5 (0.3%)
Social Science Education	0 (0%)	1 (0.1%)

	Co-op	Non-Participant
Social Work Pending	0 (0%)	4 (0.2%)
Statistics	0 (0%)	1 (0.1%)
Theater	0 (0%)	15 (0.8%)
Theater Pending	0 (0%)	1 (0.1%)
Theater Studies	1 (1%)	10 (0.6%)
Undecided Arts & Humanities	2 (2%)	23 (1.3%)
Undecided Education Pending	1 (1%)	102 (5.7%)
Undecided Engineering	2 (2%)	25 (1.4%)
Undecided Health and Public Affairs	0 (0%)	7 (0.4%)
Undeclared	11 (11%)	345 (19.4%)
Total	100 (100%)	1779 (100%)

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