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A MODEL OF ACADEMIC ENABLERS AND ACADEMIC PERFORMANCE AMONG POSTSECONDARY LEARNERS

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ABSTRACT

The purpose of this study was to determine the most important factors in predicting academic outcomes at the post-secondary level. With an increasing number of students attending college and the spiraling costs of post-secondary education there is a greater need, now more than ever, to discern the most important factors in positive academic outcomes for students. While past research has examined many important variables, the majority of those variables are not amenable to interventions. This research examined several such variables, based on the model of academic competence developed by DiPerna, Volpe, and Elliott in 2002. These include self-efficacy, motivation, study-skills, and academic engagement, together with student ability and reading comprehension, as predictors of academic performance. Data was collected from 252 undergraduate students in an introductory educational psychology class. The participants completed a 1-minute maze probe, the General Self-Efficacy scale, and the Academic Competence Evaluation Scales-College. The academic performance measure was students' final grades in the class and student ability was measured via the SAT Reasoning Test scores. Twelve models were tested using ordinary least squares regression in order to determine the strength of the proposed variables. The resulting data demonstrated that the best predictors were study skills, motivation, and reading comprehension; however, because study skills and motivation were highly correlated, and because the strength of the relationship between grades and study skills was no longer significant once motivation was included, the final model included only motivation and reading comprehension. Limitations with both the hypothesis and the design are discussed, as are possibilities for future research.

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Chapter 1 – Introduction

The 1975 article "Dropout from Higher Education: A Theoretical Synthesis of Recent Research," (Tinto, 1975) spurred more than thirty-five years of dialogue on student retention and persistence in higher education. More than a quarter century later the issues of student retention and persistence are as important as they were when the article was first published. In the 1970s and 1980s, public policy was focused primarily on access to higher education, with federal and state legislation aimed at reducing barriers to attending post-secondary education. By the mid-1990s, the discussion moved from access to the issues of choice, affordability, and persistence (Swail, 2004). Although gaining entry to college is still a dramatic accomplishment for many students, persisting to degree completion is what really matters in the post-college world. Unfulfilled academic goals often result in unfulfilled career realities: lower pay, less security, fewer opportunities, and dreams deferred or abandoned. The issue of retention and drop-out are major problems in higher education, today. For the past 100 years, the institutional graduation rate has remained steady at about the 50 percent mark, with half of all students entering higher education failing to complete their education and realize their dreams and aspirations based on earning a certificate or degree (Swail, 2004). As Tinto stated, "The consequences of this massive and continuing exodus from higher education are not trivial, either for the individuals who leave or for their institutions" (as cited in Swail, 2004; p. 3), as declining enrollment and failure to graduate students at some institutions threaten the institutions' very existence.

And yet America's high school students have higher educational aspirations today than at any other time in our country's history, with 88 percent of eighth grade students indicating that they will attend postsecondary education (Venezia, Kirst, & Antonio, 2003) and 70.1 percent of high school graduates attending college immediately following graduation from high school

(National Center for Education Statistics; NCES, 2011). There is a wide-spread perception in the United States that attaining a college degree is an effective means of raising the economic and social status of youth from disadvantaged families (Horn, Nunez, & Bobbitt, 2000); however, the transition from secondary to postsecondary school can be a challenge for any student. It requires students to make multiple adjustments in their lives that can drastically change the way the student will live, both in the short- and long-term (Wagner, Newman, Cameto, Garza, & Levine, 2005). These changes, as well as other issues, have encouraged some students to forego attending college, altogether (Lindholm, 2006). Still others attend, only to discover that they are unable to succeed at the postsecondary level (Wagner et al., 2005). This last group of students can often face the double difficulty of finding employment without a postsecondary degree and having to repay student loans for an unfinished education. Research has found that financially disadvantaged students often do not have the academic preparation necessary to obtain a postsecondary education, and even academically prepared financially disadvantaged students were less likely than their more financially advantaged classmates to apply to college (Berkner & Chavez 1997; Horn 1997). As a result, both educators and school personnel at secondary and postsecondary institutions, as well as these prospective students themselves, need tools that will help students to achieve at the postsecondary level.

In an attempt to create these tools many student variables have been identified as being positively or negatively associated with academic outcomes. Demographic factors such as a student's race, economic background, parents' college attendance, quality of their primary and secondary schools, gender, and their cultural capital are well documented predictors of whether or not a student attends, or succeeds in, college (Venezia et al., 2003). For instance, 55% of students from low-income families attended college immediately following high school graduation, compared to 67% of students from middle income and 84% of students from high-income families (NCES, 2011). Between 1975 and 2009 immediate college enrollment rates increased for both male and female high school graduates, going from 53% to 66% for males and from 49% to 74% for females (NCES, 2011). There is also evidence that the level of parents' education may affect the amount of guidance parents can offer their children in preparing for higher education (Horn et al., 2000). Even when controlling for characteristics such as socioeconomic status, institution type, and attendance status, not having a parent who had attended college still had a negative effect on first-generation students' college persistence and attainment (Nunez & Carroll, 1998). In addition, over the last decade immediate college enrollment for Asian-American high school graduates increased from 80% to 90%, while white high school graduates' immediate college enrollment increased from 66% to 71%. This compares to the immediate college enrollment for African-American and Hispanic high school graduates, which remained at 60% each over the late decade (NCES, 2011).

In addition, the Consortium for Student Retention Data Exchange reported that minority and low-income students are entering college at significantly higher rates than in previous years (2002; as cited in Seidman, 2005); however, they are more likely to start post-secondary education with academic deficiencies than are those from middle and upper-income backgrounds. This is also true of students with a learning disability (Wagner et al., 2005). In addition, data from the National Center for Educational Statistics (2006, as cited in Engstrom & Tinto, 2008) indicate that 56% of middle and upper income students who begin college will obtain their degrees within six years, but only 26% of low-income students will earn their college degrees within the same time period. Students who begin higher education academically deficient are less likely to complete college, resulting in a higher attrition rate for minority and low-income students (Engstrom & Tinto, 2008). This gap in educational achievement has been a pattern for decades and continues in colleges and universities, today (Wagner et al., 2005). For many disadvantaged students a college education has become an unattainable goal (Engstrom & Tinto, 2008) and research has shown that four-year college completion rates have been declining over the past decade across all racial and ethnic groups, as more students take longer to receive their bachelor's degree (Astin & Oseguera, 2005).

But factors such as race, income, and parental education are, for the most part, immutable. Some assistance can be given to first generation college students. For instance, college students whose parents did not attend college, themselves reported that obtaining the amount of financial aid they needed, being able to complete coursework more quickly, being able to live at home, and being able to work while attending school were very important influences in their decision to attend their particular postsecondary institution and enabled them to remain in school (Nunez & Carroll, 1998). Researchers have also identified other predictors of academic success such as student age, home environment, peer group environment, and even the influence of the media (Walberg, 1981). These factors, however, are also not easily changed.

While many factors that influence post-secondary success are not able to be changed research has also been conducted that supports the idea of predictors of academic success that are more easily influenced by intervention. Factors such as how motivated a student is in his or her school work (Pintrich, 1989; Robbins, Allen, Casillas, Peterson, and Le, 2006), the student's engagement in course materials (Greenwood, Horton, & Utley, 2002), the student's belief that they are capable of attaining an education (Multon, Brown, & Lent, 1991; Silver, Smith, & Greene, 2001), and the student's use of study skills (Gadzella & Williamson, 1984) have all been found to be predictive of academic outcomes.

DiPerna and Elliott examined such predictors with the initial development of the *Academic Competence Evaluation Scales* (ACES; 1999). This scale examined the role of factors such as study skills, interpersonal skills, academic motivation, academic self-concept, and academic skills in predicting academic outcomes, such as academic achievement. The initial development of the ACES was a 95-item teacher rating scale that measured skills, attitudes, and behaviors in elementary grade students (grades 1 through 6). This eventually led to teacher forms for students in kindergarten through 12th grade and self-report scales for students in 6th through 12th grade and in college. The scales are used to screen students and to identify at-risk students in need of intervention and those requiring special education evaluations.

DiPerna and Elliott defined study skills as “behaviors that facilitate the processing of new material” (1999; p. 209), such as preparing for exams, taking notes, and keeping one’s desk organized. Research has found that these study skills are amenable to intervention strategies, and have been the focus of such strategies, in the past (Harvey, 1995). Such study skills are generally seen as prerequisites for learning (Harvey, 1995; Gettinger & Knopik, 1987). For college students study skills often mean reading, reviewing, and rewriting their notes, highlighting sections of text, using flashcards, mnemonic devices, concept checks, and making up examples in order to better understand material (Gurung, 2005).

Academic motivation, according to DiPerna and Elliott, “reflects a student’s approach, persistence, and level of interest regarding academic subjects” (1999; p. 209). These include the student enjoying challenging work and paying attention and being goal oriented. DiPerna and Elliott used these measures as they had been found to correlate well with achievement test scores, ratings of academic performance, and grades (Stinnett, Oehler-Stinnett, & Stout, 1991; Stinnett & Oehler-Stinnett, 1992). At the post-secondary level student motivation has been a common and ongoing concern for both students and faculty (Pintrich, 1994; Pintrich & Zusho, 2007) and has been found to correlate with academic outcomes (Robbins et al., 2006), including exam grades and final grades (Pintrich, 1989).

Interpersonal skills include "the communication and cooperation behaviors necessary to interact with peers and adults" (DiPerna & Elliott, 1999; p. 209). Interpersonal skills include a student's willingness to compromise, express themselves to others, and work well in groups. Such prosocial behaviors have been found to have a direct influence on student's grades and scores on standardized achievement tests (Wentzel, 1991, 1993; Green, Forehand, Beck, & Vosk, 1980).

Finally, DiPerna and Elliott's definition of academic self-concept is "a student's perception of self-efficacy in academic subjects" (1999; p. 209), while self-efficacy can be defined as the beliefs a person has about their ability to produce at certain levels in areas that have influence over, and affect their lives (Bandura, 1994). Self-efficacy involves judgments of the student's ability to succeed in reaching a specific goal. Self-efficacy has been found to correlate with college student GPA (Gore, 2006; Lent, Brown, and Larkin, 1986; Lent, Brown, & Gore, 1997) as well as both academic performance and student adjustment in first-year college students (Chemers, Hu, & Gacia, 2001). The relationship between academic self-concept and academic outcomes is complex and changes with development (Wigfield & Karpathian, 1991). While it has been linked to achievement outcomes, researcher disagree as to how strong of a relationship exists (Scheier & Kraut, 1979; Marsh, 1990).

In addition to the factors originally explored by DiPerna and Elliott (1999; e.g., study skills, interpersonal skills, academic motivation, and academic self-concept), other predictors have been found to correlate well with academic outcomes at the college level. Factors such as a student's engagement with course material, the student's ability to comprehend information he or she has read, and the student's cognitive ability have all been found to correlate with academic outcomes in post-secondary students. Each of these factors should also be taken into account when determining predictors specifically for post-secondary learners.

Engagement with academic coursework generally refers to a specific set of classroom behaviors including writing in the classroom, participating in classroom tasks, reading out loud and/or silently to one's self, talking about academics with peers or instructors, and asking and answering questions in the classroom (Greenwood, Horton, & Utley, 2002). While most academic engagement research has been conducted at the primary and secondary school level, it has been found to correlate with academic performance (Furrer & Skinner, 2003) and is a good predictor of successful school completion for high school students considered "at-risk" for school failure (Finn & Rock, 1997). Engagement with course material can also be affected by interventions (Greenwood et al., 2002).

Reading is a fundamental skill, important for learning in general, and for post-secondary education, specifically (Langan, 2010). Reading can be simply defined as "making meaning out of print" (Anderson, 2008; p. 2). Reading can be broken down into reading fluency and reading comprehension. Reading fluency is defined as "the ability to read at an appropriate rate with adequate comprehension: (Anderson, 2008; p. 3), whereas reading comprehension is a set of skills the enable a reader to gain meaning from written text (Ketterlin-Geller, McCoy, Twyman, & Tindal, 2006). Reading comprehension is complex and requires the reader to interact with the text he or she is reading (National Reading Panel, 2000). At the post-secondary level, much more so than at the elementary level, reading comprehension becomes extremely important. Students are expected to read independently and comprehend material, often without any assistance from the instructor. There is a significant increase in the amount of reading at the post-secondary level, as well, with students spending significantly less time in lecture and significantly more time learning independently (Yaworski, 2006). This puts an enormous emphasis on reading, and comprehension of material read, at the college level. Reading comprehension has also been found to correlate with academic outcomes at the post-secondary level (Wood, 1982) and has been amenable to intervention in college students (Hart & Speece, 1998).

The notion of cognitive ability, or intelligence, has been debated for decades in psychological science, and far longer than that within the field of philosophy. Attempts to measure human cognitive abilities also span back in time, beginning with imperial Chinese civil service tests 4000 years ago. Since early in our history human beings have used the ideas of factors such as memory span and the ability to communicate verbally as signs of *intelligence* (Spearman, 1937; as cited in Horn & Noll, 1997). Modern intelligence tests date to the beginning of the 20th century and the work of Alfred Binet (Thorndike, 1997). While intelligence tests are often criticized as unfair, they are the single best predictor of academic performance in primary and secondary education (Pressley & McCormick, 1995). In addition, general intelligence tests have been found to correlate well with college student grades and grade point averages (Ridgell & Lounsbury, 2004). Other standardized ability tests, such as the SAT Reasoning Test (SAT; formerly known as the Scholastic Aptitude Test) and the American College Test (ACT), are used extensively as measures of student ability in college and university admissions offices across the United States (Harackiewicz, Barron, Tauer, & Elliot, 2002). The SAT has been reported to be a valid predictor of academic performance in college, predicting college grade point averages about as well as high school grades (Pressley & McCormick, 1995).

While cognitive ability, as measured by modern intelligence tests, generally does not fluctuate significantly within an individual (Moffitt, Caspi, Harkness, & Silva, 1993; Sattler, 2001) and therefore would not be affected by intervention, it is still an important variable in predicting academic outcomes.

Being able to determine the factor or factors that not only influence a student's academic outcomes but are also amenable to intervention could help steer the college-bound student to obtain the assistance he or she will need to succeed at the postsecondary level. The purpose of this study is to test the strength of several such factors, in order to determine which factors are most influential on academic outcomes, with the goal of assisting students, faculty, and college administrators in choosing interventions that may assist students in reaching their academic potential. This study will examine six factors that research suggests have an influence on academic outcomes: (a) study skills, (b) academic motivation, (c) academic self-efficacy, (d) academic engagement, (e) reading comprehension skills, and (f) cognitive ability, in order to discover their influence on academic outcomes such as course grade. This study predicts that each of these variables will play an important role in college student academic performance.

Chapter 2 – Literature Review

No single, dominant factor influences learner achievement or academic performance (Walberg, Fraser, & Welch, 1986). While research has shown prior academic skills to be the single best predictor of a student's current achievement (DiPerna, Volpe, & Elliot, 2002; Reynolds & Walberg, 1991) other research suggests that student achievement is also dependent on other factors such as self-efficacy (Multon, Brown, & Lent, 1991; Silver, Smith, & Greene, 2001), motivation (Pintrich, 1989; Robbins, Allen, Casillas, Peterson, and Le, 2006), study skills (Gadzella & Williamson, 1984), and academic engagement (Greenwood, Horton, & Utley, 2002). These non-academic skills, along with others, have been called academic enablers by some researchers (DiPerna & Elliott, 1999). Academic enablers can be defined as "attitudes and behaviors that allow a student to participate in, and ultimately benefit from, academic instruction in the classroom" (DiPerna & Elliott, 2002; p. 294). Assessment of these enablers has been used to facilitate the selection and evaluation of interventions for primary and secondary students (DiPerna, 2006).

Most models of student learning and academic achievement have focused on primary and secondary students; however, it may be possible to extend these models to postsecondary students. Models such as Carroll's (1985) *model of school learning* focus on a student's time-on-task, while Walberg's (1981) *theory of educational productivity* examine variables that include traits which are internal to the learner, instructional factors, and environmental factors. Still other research, such as DiPerna and Elliott's (1999) *academic competence* model, have examined students' interpersonal skills, motivation, study skills, and engagement (DiPerna, Volpe, & Elliot, 2002; 2005). Each of these models include prior achievement as well as non-academic influences in order to predict current student achievement; however, only the DiPerna and Elliott (1999) model include academic enablers which are potentially more amenable to intervention.

The purpose of this study is to test the relationship between specific academic enablers and academic achievement in a college sample. Academic enablers aid students to participate in, and benefit from, academic instruction (DiPerna & Elliott, 2002). Identifying which enablers are the most influential at the postsecondary level could help both students and instructors maximize learning and academic achievement. Knowledge of these enablers could also facilitate the selection of interventions for college students with a disability or any postsecondary student who is facing academic challenges. Research has demonstrated that this assistance is also needed for high-ability college students (Speirs-Neumeister & Rinker, 2006) as well as for minority students (Gandara, 2002) and students with a disability (Madaus & Shaw, 2006). As such, this study will explore models of achievement which use these academic enablers and test their applicability to learning at the postsecondary level.

Theoretical and Empirical Models of Academic Achievement

Several different models have been proposed to explain the direct and indirect influences on student academic outcomes. These models include Carroll's (1985) *model of school learning*, Walberg's (1981) *theory of educational productivity*, and DiPerna and Elliott's (1999) *academic competence*. These models have three aspects in common: they each take into account the characteristics of the learner, the learning environment, and the quality of instruction the learner receives (DiPerna, Volpe & Elliott, 2002).

Carroll and the model of school learning. In 1963, John Carroll published his *model of school learning* (Carroll, 1985), which originated from work on foreign language learning and "showed that persons with low aptitude … generally took longer to achieve a given criterion of learning than persons with high aptitude" (Carroll, 1989; p. 18). This model focused on how much time the learner spends on the act of learning as a determinant of success in learning a given task (Carroll, 1985). Carroll's original model contained five variables: aptitude, opportunity to learn, perseverance, quality of instruction, and ability to understand instruction (Carroll, 1985).

Aptitude, as defined by Carroll (1989), is the "variable or variables that determine the amount of time a student needs to learn a given task, unit of instruction, or curriculum to an acceptable criterion of mastery under optimal conditions of instruction and motivation" (p. 18). Students with higher aptitude need less time to acquire a specific task or unit of instruction; students with lower aptitude need considerably more time (Carroll, 1989). This need for time to learn is independent of the teacher's skills or of the learning environment (Carroll, 1985). For Carroll, aptitude may depend on variables such as prior learning or possibly genetically determined individual traits (Carroll, 1989). Regardless of the variables on which aptitude may rest, Carroll does not define aptitude as prior knowledge, measured intellectual ability or as general intelligence, but purely as time needed to learn a task or learning rates.

Opportunity to learn, or time allowed for learning, was identified by Carroll as a variable that has been neglected by schools (Carroll, 1985). He felt that students' opportunity to learn was often less than what would be required, given a student's aptitude (Carroll, 1989). This is due partly to the great variability that exists in the amount of time students need for learning, even under the best instructional circumstances, and partly as a consequence of the large amount of material which schools are expected to teach (Carroll, 1985). Schools' responses to differences in student aptitude varies from creating uniform time allotted for learning, to ability groupings, to programs that allow students to progress at their own pace (Carroll, 1985).

Carroll (1989) defined perseverance as "the amount of time a student is willing to spend on learning the task or unit of instruction" (p. 18). Perseverance refers not only to tasks that require a great deal of time to complete, but also to those that require very little time. A student who, because of his or her aptitude, may require only a short amount of time to learn a given unit of instruction but still may not take the time necessary to learn the information. For this reason Carroll also referred to this variable as *perseverance-in-learning-to-criterion* (1985). Carroll's definition of perseverance can be seen as an operational definition of intrinsic motivation (Carroll, 1989), though it may also contain elements of emotional variables, such as frustration or distractions from external circumstances (Carroll, 1985).

Quality of instruction is determined by how well the person responsible for the preparation of instructional materials (i.e., teacher) organizes and presents the task to be learned by the student (Carroll, 1985). High quality instruction is organized and presented in such a way that the learner is able to learn as rapidly and as efficiently as his or her aptitude allows. The less optimal the quality of instruction, the more time required for learning (Carroll, 1989). Carroll did not specify what characteristics make up high quality instruction; however, he specified that learners must be clearly told what are to learn, have adequate contact with the learning materials, and that the steps in the learning process must be carefully planned and ordered (Carroll, 1985).

For Carroll (1985), the ability to understand instruction was seen as including the student's ability to infer concepts and relationships inherent in the material to be learned, as well as the ability to grasp the language being used in the instruction. While Carroll (1985) did state that the ability to understand instruction could possibly be measured as some combination of general intelligence and verbal ability, he did not specify these constructs within his model.

Carroll was the first to develop a model of school learning as a multivariate, general, explanatory model of how academic achievement occurs (Keith, 2002). Prior to Carroll, time was not considered as a central variable in school learning (Bloom, 1974). Carroll added this facet, along with the examination of classroom practices, macro-instructional teaching processes, and the micro-processes of cognition (Glaser, 1982). Of Carroll's five variables, three variables, aptitude, ability to understand instruction, and perseverance, reside within the individual; while the other two, time allowed for learning and quality of instruction, come from external sources. Carroll's model could be worked into the following formula:

Degree of learning = f (time actually spent / time needed)

In this formula the degree of learning is a function of the ratio between the time actually spent learning (e.g., the opportunity to learn, perseverance) to the amount of time needed to learn (e.g., aptitude) adjusted for by the quality of instruction and the ability to understand instruction. Other investigators have continued to refine this model, examining variables such as *time-on-task*, *academic learning time*, and *quantity of instruction* (Carroll, 1989).

Walberg and the theory of educational productivity. One variation of the Carroll model is Walberg's (1981) theory of educational productivity (Walberg, 1981). This model includes nine factors hypothesized to affect the learner's cognitive, as well as affective, outcomes. These nine factors include (a) ability or prior achievement, (b) age, (c) motivation or self-concept, (d) quantity of instruction, (e) quality of the instructional experience, (f) the home environment, (g) the classroom or school environment, (h) the peer group environment, and (i) the mass media (Walberg, 1981). Walberg's model extends beyond earlier models of academic learning by examining out-of-school influences and social-psychological variables (Wang, Haertel, & Walberg, 1993). The first five variables that reflect student aptitude and instruction are found in other educational models, including Carroll's (Walberg & Tsai, 1985). The remaining variables involve the educationally stimulating psychological environment, both within and outside the classroom (Fraser, Walberg, Welch, & Hattie, 1987).

The first three variables in Walberg's model (ability, age, and motivation) can each be seen as internal traits to the learner or student aptitude (Fraser et al., 1987). Ability or prior achievement, for Walberg, includes factors that can be measured by "the usual standardized test" (Walberg & Tsai, 1985; p. 159). These factors would include the learner's aptitude, ability, and IQ, as well as previous achievement (Keith, 2002). Walberg has assessed this variable using students' mathematics, science, and reading cognitive subtest scores on the National Assessment of Educational Progress (Walberg et al., 1986; Walberg & Tsai, 1985; Reynolds & Walberg, 1991; 1992).

For Walberg the age variable includes chronological age, but also development and stage of maturation (Keith, 2002). In his research Walberg has attempted to keep the age variable as a constant. Motivation or self-concept, in the Walberg model, is operationalized as scores on personality tests of the student's willingness to persevere intensively on learning tasks (Walberg & Tsai, 1985).

The next two variables, quantity of instruction and quality of the instructional experience, examine instructional factors (Fraser et al., 1987). Quantity of instruction is described as the amount of time students engage in learning (Walberg & Tsai, 1985), including the time scheduled, allowed, or assigned for a given instructional unit by the teacher, as well as the fraction of this time the student actually spends learning the content (Walberg, 1981). Walberg and his colleagues have measured quantity of instruction through reports of weekly homework and class attendance (Reynolds & Walberg, 1991; 1992). In addition, this variable has been measured through effective use of class time, interruptions during class, and teachers' ability to gain students' attention quickly (Parkerson, Lomax, Schiller, and Walberg, 1984). Others have measured quantity of instruction as time on mathematics homework in school and outside of school (Ma & Wang, 2001).

Quality of the instructional experience includes psychological and curricular experiences, and can be seen as the appropriateness of the instructional experience (Reynolds & Walberg, 1992). The quality of instructional experience variable has been measured using a 4-point Likert scale. The scale is used to assess the instructional focus of the teacher in areas such as teaching lab techniques, including conducting experiments, and requiring written reports (Reynolds & Walberg, 1991; 1992). Also assessed are the amount of homework number of semesters of science class (Walberg et al., 1986); if the teacher tells students they are right or wrong, teacher reviews lessons, students report that they understand the teacher (Parkerson et al., 1984); and students report that the teaching is good in their school and that the teacher offers praise (Ma & Wang, 2001).

The final variables: home environment, classroom or school environment, peer group environment, and mass media, are characterized as environmental factors (Fraser et al., 1987). Home environment refers to the support given to students while at home. It has been measured in various ways, including family interest in school and in science (Parkerson et al., 1984), parental education (Reynolds & Walberg, 1991; 1992), number of times the dictionary is used at home (Walberg & Tsai, 1985), and home socioeconomic status (Ma & Wang, 2001; Walberg et al., 1986). Classroom and school environment, including classroom morale (Keith, 2002), refers to the classroom as a social atmosphere and has been measured through access to classroom materials (Walberg & Tsai, 1985) and the percentage of students who continue toward a bachelor's degree or take additional science classes (Reynolds & Walberg, 1991; 1992). Others have measured classroom and school environment through student reports of feeling put-down by the teacher or by other students in the classroom (Ma & Wang, 2001).

Peer group experience refers to how well students get along with each other outside of the school environment (Walberg & Tsai, 1985). Measures have included how important schooling and good grades are among friends (Ma & Wang, 2001), peers seeing themselves are good students, planning on attending college, and doing well in science (Reynolds & Walberg, 1991; 1992). The mass media variable refers to the minimum leisure-time television viewing (Walberg & Tsai, 1985; Ma & Wang, 2001), and the reading of books or magazines (Reynolds & Walberg, 1991; 1992).

Walberg and his colleagues have tested his model in a national sample of high school seniors (Walberg et al., 1986; Reynolds & Walberg, 1991; 1992) and found the included variables to be good predictors of learner achievement across gender and race. While the initial Walberg model of educational productivity involved a simple structure with each of the nine factors independent and in a single order (Walberg, 1981), a more complex distal-proximal model has been found to demonstrate better fit in subsequent studies (Parkerson et al., 1984).

Pintrich, Weinstein, and the self-regulated learning perspective. While previous models for learning, particularly those in the United States, focused on information processing and psychological constructs such as those found in cognitive and educational psychology, in the 1990s other theorists began to include motivational, affective, and social context factors, as well as cognition (Pintrich, 1989). This approach has become known as the *Self-Regulated Learning* (SRL) perspective. The construct of *self-regulation* refers to the degree that the individual is metacognitively, motivationally, and behaviorally an active participant in their own learning

(Zimmerman, 1986). Researchers such as Paul R. Pintrich and Claire E. Weinstein have advanced their ideas through this framework. According to this perspective students need more than general knowledge and basic competencies in math, reading, and writing to be successful academically (Weinstein & Van Meter Stone, 1993). There are four general assumptions shared by most SRL models: (a) the *active, constructive* assumption, (b) the *potential for control* assumption, (c) the *goal, criterion, or standard* assumption, and (d) the assumption that there are *mediators between personal and contextual characteristics and actual achievement or performance* (Pintrich, 2004).

The first assumption, the active, constructive assumption, is also shared with most of the cognitive perspectives. It states that learners are seen as active participants in their own learning process (Pintrich, 2004). Learners construct their own meanings, goals, and strategies from the information available in their environments, as well as the information in their own knowledge-base (Biggs, 1993; Vermunt, 1996). Learners use both these *external* and *internal* environments in order to form their constructs. Learners set goals and activate prior content and metacognitive knowledge, they adopt a goal orientation and judge the value and their interest in the task. The learner also plans their time and develops their perception of both the task and the context (Pintrich, 2004).

Next is the *potential for control* assumption. The SRL perspective assumes that learners can potentially monitor, control, and regulate certain aspects of their own thinking, motivation, and behavior, as well as some features of their own environment (Pintrich, 2004). While this perspective assumes the individual's potential to monitor, control, and regulate these factors, this does not mean that individuals will or can always exert this control at all times or in all contexts. Rather, it is possible that the individual is capable of some monitoring or behavior control and regulation. There are biological, developmental, contextual, and individual difference constraints that can interfere with or impede the individual's efforts at regulation (Pintrich, 2004). This assumption includes the learner's monitoring of their own cognition and their metacognitive awareness, the awareness and the monitoring of their own motivation, affect, effort and need for help, and their monitoring of the changing task and context conditions (Pintrich, 2004).

The *goal, criterion, or standard assumption* states that "there is some type of goal, criterion, or standard against which comparisons are made in order to assess whether the learning process should continue as is or if some type of change is necessary" (Pintrich, 2004; p. 387). This assumes that that the individual can set standards or goals to work for in their learning, that they can monitor their progress towards these goals, and that they can then adapt and regulate their thinking, motivation, and behavior in order to be able to reach their goals (Ridley, Schutz, Glanz, & Weinstein, 1992). The SRL perspective sees learners as can be flexible in their in their ability to combine different goals and strategies in different ways in order to function within different contexts. In this way the perspective allows for the possibility of multiple goals both within and across students (Pintrich, 2004). With this assumption comes the learner's selection and adaptation of cognitive strategies for learning and thinking, as well as for managing, motivation and affect. The learner will increase or decrease their efforts, accordingly, and may change or renegotiate the task (Pintrich, 2004).

The final assumption is that there *are mediators between personal and contextual characteristics and actual achievement or performance*. This assumption states that achievement and learning are not influenced only by the individual's cultural, demographic, or personality characteristics, nor just the contextual characteristics of the classroom environment, but that achievement and learning are also shaped by the individual's self-regulation of their thinking, motivation, and behavior which mediates the relationship between the student, the context, and the eventual achievement (Pintrich & Schrauben, 1992). There is an interaction between contextual factors, the student's processing, and that student's learning and achievement. Cognitive judgments, affective reactions, choice behavior and the evaluation of the task come into play with this assumption (Pintrich, 2004).

Given these assumptions Weinstein found five factors that distinguish successful learners from those who are less successful: (a) knowledge about themselves as learners, (b) knowledge about different types of academic tasks, (c) knowledge about strategies and tactics for acquiring, integrating, applying, and thinking about new learning, (d) prior content knowledge, and (e) knowledge of both present and future contexts in which the knowledge could be useful (Weinstein, 1994). In his model Pintrich includes value factors like *student goal orientation* and *task value*, expectancy factors such as *control beliefs, self-efficacy beliefs*, and *expectancy for success beliefs*, affective factors such as *test anxiety* and *self-esteem*, as well as cognitive, metacognitive and motivational factors (1989). Empirical evidence suggests that there is an interactive effect between cognitive learning strategies and factors such as test anxiety (Cubberly, Weinstein, & Cubberly, 1986), metacognitive awareness and goal-setting (Ridley et al., 1992), and context learning (Wicker, Weinstein, & Eckman, 1975).

Model of academic competence. Building on the work of Carroll and Walberg, and borrowing some aspect of the *Self-Regulated Learning* perspective, DiPerna et al. (2002) proposed and tested a model of learner's achievement using multiple academic enablers: interpersonal skills, motivation, study skills, and engagement (DiPerna, Volpe, & Elliott, 2002; 2005). Academic enablers are non-academic skills that contribute to academic success (DiPerna

& Elliott, 2002). In the academic competence model, these four academic enablers, in conjunction with a student's prior achievement, are used to predict a student's current achievement.

Interpersonal skills involve communication and cooperative learning behaviors that students use in order to interact with others (DiPerna & Elliott, 2000). These include sharing and helping behaviors, initiating a conversation, requesting help from another person, and giving complements (DiPerna, 2006). DiPerna & Elliott (2000) have demonstrated a relationship between interpersonal skills and academic functioning. According to DiPerna and Elliott (2000), motivation is demonstrated by a student's approach, persistence, and level of interest in academic subject. Behaviors which reflect attentive and active participation in classroom instruction are engagement (DiPerna & Elliott, 2000). The construct of engagement comes from the research on students' attention and academically relevant responses and include academic survival skills, academic learning time, and academic responding (DiPerna & Elliott, 2000).

Academic engagement refers to "a composite of specific classroom behaviors: writing, participating in tasks, reading aloud, reading silently, talking about academics, and asking and answering questions" (Greenwood et al., 2002; p. 329). Study skills include behaviors and strategies that facilitate the ability of the student to process new material (DiPerna & Elliott, 2000). These involve a variety of cognitive skills and processes that aid the student to acquire novel information in an efficient and effective manner (DiPerna, 2006). The specific study skills often identified in research include applying, organizing, recording, remembering, and synthesizing information (DiPerna, 2006).

Relationship Between Academic Enablers and Academic Achievement

What variables are important when trying to predict a student's academic achievement and academic success in college? In a review of the literature, Mathiasen (1984) concluded that the most studied variables, historically, have been high school performance, college entrance examinations, study behaviors and attitudes, and personality traits. In general, successful college students excelled in high school, obtained high scores on college entrance examinations, possess good study habits, appear to be more introverted, more responsible, more academically motivated, and more achievement oriented than most college students (Mathiasen, 1984). Mathiasen's (1984) review of the literature included over 60 studies and found that high school GPA and college entrance examinations accounted for the majority of variability in first year college GPA, with high school GPA explaining as much as 50% and college entrance examinations explaining 44% of this variability. While Mathiasen's (1984) review was extensive, none of these studies included a comprehensive model of academic achievement at the college level, nor did they include academic skill variables such as reading comprehension or mathematics performance.

Proposed Models

This study tests several models of academic enablers and academic achievement in a sample of college students. These models include the academic enablers first proposed and tested by DiPerna et al. (2002) in the *model of academic competence*. This model was found to be a good fit when using both elementary reading and language arts achievement (DiPerna et al., 2002) and elementary mathematics achievement (DiPerna et al., 2005) as outcome variables.

As with the *model of academic competence* (DiPerna et al., 2002, 2005), the proposed models each include measures of the student's study skills, motivation and engagement. Because student academic ability (Ridgell & Lounsbury, 2004) and reading comprehension

(Wood, 1982) have been found to be good predictors of college student GPA they have also been included in some of the models. In addition, self-efficacy, another non-academic skill, has been used as a predictor of college achievement level (Silver, Smith, & Greene, 2001). Finally, age and gender have also been included, in order to determine any possible influence they may have on the academic outcomes.

Ability and postsecondary academic achievement. College and university admissions offices across the country often give extra weight to two particular student variables: prior knowledge, as measured by the student's high school grade point average (GPA), and ability, often times measured by standardized tests such as the SAT or ACT (Harackiewicz, Barron, Tauer, & Elliot, 2002). As a result, student ability has been the focus of many studies involving college students and academic outcomes and is this study's first variable of interest.

Harackiewicz et al. (2002), studying first-year undergraduate psychology students, found positive correlations between student's ability (as measured by the SAT or ACT) and semester GPA (.36) and final grades in an Introductory Psychology class (.38). In addition, they found that these abilities scores also correlated with Psychology GPA (.35) for students who went on to continue their psychology studies, as well as subsequent GPA (.24) for all students, in a seven-year follow-up. Other studies involving the SATs and ACTs have found that general ability added significantly to the prediction of academic achievement in an Introduction to Psychology class (Thompson & Zamboanga, 2004).

In addition to SAT and ACT scores, general ability can be measured using standardized cognitive measures pertaining to intelligence. Indeed, the single best predictor of academic achievement at the primary and secondary levels is cognitive ability (Moffitt et al., 1993; Sattler, 2001). Ridgell and Lounsbury (2004), using a standardized general intelligence test measuring verbal and numerical reasoning, found that general intelligence correlated (.41) with course grades in an introductory psychology course and with semester GPA (.39).

While ability has been established as a good predictor of achievement, non-cognitive constructs (e.g., elf-efficacy, motivation, study skills, and academic engagement) have also been found to add in the prediction of academic achievement (Mathiasen, 1984; Shivpuri, Schmitt, Oswald, & Kim, 2006). Another variable that has not been examined extensively at the college level, but should contribute to academic achievement is reading comprehension.

Reading comprehension and postsecondary academic achievement. Reading comprehension is comprised of a variety of skills that work together so that readers are able to acquire meaning from a written text (Ketterlin-Geller, McCoy, Twyman, & Tindal, 2006). The National Reading Panel defined reading comprehension as a "complex cognitive process … that requires an intentional and thoughtful interaction between the reader and the text" (2000, p. 13). As young students move from learning to read into reading to learn reading comprehension becomes more important. Reading comprehension skills have been the focus of school drop-out prevention programs (Espin, Busch, Shin, & Kruschwitz, 2001), and textbooks used for teaching instruction in reading comprehension that run the gamut from elementary school, though secondary, and more recently to the college level (Vacca & Vacca, 1993).

Most reading research focuses on school-age students and yet a significant difference between college and high school is the amount of expected reading (Yaworski, 2006). In high school students spend approximately 25 hours per week in lectures and in-class activities, while college students spend only 12-15 hours in class, often times covering as much as three times the amount of information as a high school class (Yaworski, 2006). This puts an enormous emphasis on reading, and comprehension of material read, at the college level.

Reading comprehension has not been extensively studied at the college level and few studies have demonstrated its impact on academic achievement. When it has been studied, though, researchers have examined reading from the point of view of deficits that hinder achievement in non-native speakers (Richard-Amato, 1990) or students with a disability (Cirino, Israelian, Morris, & Morris, 2005). One exception to the studying of reading deficits at the college level is a study by Wood (1982) that examined the ability of the Nelson-Denny Reading Test (NDRT) as a predictor of first-year undergraduate GPA. The NDRT is a standardized reading test and was observed to correlate (.33) with first-year undergraduate GPA. In addition, a study of a structured reading comprehension technique, reciprocal teaching, was found to help postsecondary students at risk for academic failure improve their academic functioning (Hart & Speece,1998).

Self-efficacy and postsecondary academic achievement. Another variable that has been examined related to academic achievement at the college level is self-efficacy. Self-efficacy can be defined as a person's "beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994; p. 71). Self-efficacy involves an individual's judgment of their own ability to succeed in reaching a specific goal. Self-efficacy has been shown to make a difference in the way people feel, think and act (Schwarzer, Mueller, & Greenglass, 1999). It has been suggested that those with high self-efficacy tend to see difficult challenges as to be undertaken and mastered, rather than threats to be avoided (Bandura, 1994). It has been suggested that self-efficacy is a key construct in explaining academic achievement (Silver et al., 2001) and that it can have a direct influence on choice of activity and setting, as well as effecting coping efforts through expectation of eventual success (Bandura, 1977).

Interest and research in self-efficacy and its role in academic achievement has increased since Bandura’s (1977) seminal article (Schunk, 1991). Since that time researchers have focused on self-efficacy’s role in academic motivation, study skills, and engagement. In addition, other researchers have examined self-efficacy’s effects directly on academic outcomes. A meta-analysis by Multon, Brown, and Lent (1991) investigating the role self-efficacy plays in academic performance found an effect size of .38, suggesting that self-efficacy accounts for 14% of the variance in student’s academic performance.

Schunk (1991) suggested that there are many definitions of self-efficacy and that researchers should try to narrow the definition in their studies. While there are many definitions of self-efficacy, various measures of self-efficacy have been shown to be highly correlated with measures of other traits, such as locus of control (.56), emotional stability (.62), and self-esteem (.85) (Judge, Erez, Bono, & Thoresen, 2002). Judge et al. (2002) suggested that these concepts may not be independent and that there may be a second order factor, which he refers to as generalized self-efficacy that accounts for these high correlations.

More recent studies have focused on academic self-efficacy. Silver et al. (2001) used scores on a study skills self-efficacy scale to distinguish between students with different achievement levels in a sample of 550 community college students. Both Gore (2006) and Lent, Brown, and Larkin (1986) found that their measures of academic self-efficacy accounted for a small, but significant, amount of the variance in college student GPA, above and beyond that which was accounted for by student ability. Self-efficacy accounted for 2% to 3% of variance in first year college student GPA (Gore, 2006) and 3% to 9% of GPA variance when first and second year students were examined, together (Lent et al., 1986). Academic self-efficacy has also been found to predict not only student’s overall GPA, but also class grades in specific content areas (Lent, Brown, & Gore, 1997). In a longitudinal study completed by Chemers, Hu, and Gacia (2001), the authors found that academic self-efficacy was related to both academic performance as well as student adjustment in first-year college students.

Motivation and postsecondary academic achievement. Motivation is the psychological arousal to action toward a desired goal (Gladding, 2006). Ideas about motivation all focus on some type of goal, purpose, or intentionality within the behavior of humans, but these ideas have run the spectrum from the unconscious motivations of psychodynamic theories to today's cognitive theories (Pintrich & Garcia, 1991). Related to both self-efficacy (Dweck, 1986; Linnenbrink & Pintrich, 2002) and engagement (Pintrich, 1989; Pintrich & Schrauben, 1992), motivation is thought to influence a learner's acquisition, transfer, and use of knowledge and skills (Dweck, 1986). Student motivation has been a common and ongoing concern for both students and faculty at all levels of post-secondary education (Pintrich, 1994; Pintrich & Zusho, 2007).

There are many models to explain college student motivation, with nearly all focusing on academic motivation at the course or classroom level (Pintrich, 1994) and with most relying on some adaptation of Eccles' *expectancy-value model* (Pintrich, 1989). This model, and its variations, has three general components (a) students' beliefs about the importance and value of the task at hand, (b) students' beliefs about their ability or skill to perform the task, and (c) students' feelings about themselves or their emotional reactions to the task (Weiner, 1986). These can be conceptualized as a values component (why am I doing this task?), an expectancy component (can I do this task?), and an affective component (how do I feel about this task) (Pintrich, 1989). In addition to these three general components of motivation, intrinsic and extrinsic motivations are also common concepts found in the motivation literature (Linnenbrink

& Pintrich, 2002). Intrinsic motivation has been defined as motivation to engage in a particular activity for that activities own sake (e.g., personal or situational interest), while extrinsic motivation is when one is motivated to engage in an activity as the means to an end (Pintrich & Schunk, 2002).

It is this intrinsic motivation that is seen as an academic enabler (Linnenbrink & Pintrich, 2002) and which will be included in this study, as intrinsic motivation is more closely linked to students' motivational beliefs and self-regulatory strategies in college students than is extrinsic motivation (Pintrich & Garcia, 1991). There have been many studies of motivation at the primary, secondary, and post-secondary school levels; however, academic intrinsic motivation appears to be a stable construct from childhood through late adolescence and becomes more stable with age (Gottfried, Fleming, & Gottfried, 2001). Measures of academic intrinsic motivation tend to have strong reliability in college students, with internal consistency measures averaging .90 in some studies (Garcia & Pintrich, 1996) and test-retest reliability of .68 (Pintrich & Garcia, 1991). Motivation level has been used to distinguish between academic achievers and academic underachievers in elementary school (Carr, Borkowski, & Maxwell, 1991) and scores on motivation self-report questionnaires demonstrated correlations between .20 and .36 with scores on exams, quizzes, and classroom grades in seventh grade science and English classes (Pintrich & De Groot, 1990).

Robbins et al. (2006) found that measures of both general motivation and academic specific motivation predicted academic outcomes. In studies investigating motivation and specific academic tasks and grades, researchers have observed correlations between motivation and exam grades, and motivation and final grades ranging between .22 and .45, while motivation appears to be less correlated with labs (.02 - .39) and papers (.13 - .26) (Pintrich, 1989). These same studies appear to indicate little relationship between motivation and help-seeking behaviors (-.02 - .09) (Pintrich, 1989).

Study skills and postsecondary academic achievement. Also related to self-efficacy and motivation (Braten, Samuelstuen, & Stromso, 2004) are study skills. Study skills include a wide range of behaviors and attitudes, such as the use of time, methods of mentally storing and organizing information, concentration on the task at hand, and possibly, motivation (Gadzella & Williamson, 1984). While there are many different ways of studying, not all methods are equally effective (Gurung, 2005). College students report study methods that range from reading notes and text, highlighting sections of text, and rewriting notes, to flashcards, mnemonic devices, concept checks, and making up examples to understand material (Gurung, 2005).

Assessment of effective study skills have been found to positively correlate with college student grades, with correlation coefficients ranging from .27 to .52 (Gadzella & Williamson, 1984). In addition, a meta-analysis of 109 studies found that self-reports of various study skills produced effect sizes ranging from .30 to .50 in predicting college student GPA (Robbins et al., 2004). Various aspects of study skills, such as use of time, also have been observed to correlate (.12 - .22) with GPA for college students (Hoff-Macan, Shahani, Dipboye, & Phillips, 1990).

Academic engagement and postsecondary academic achievement. The final variable that this study examined was engagement. Academic engagement refers to a group of specific classroom behaviors, such as writing, participating in tasks, reading aloud and silently, talking about academics, and asking and answering questions (Greenwood et al., 2002). It has been suggested that both motivation and study skills directly affect a student’s engagement (Greenwood et al., 2002).

Most academic engagement research has been conducted at the primary and secondary school level. Finn and Rock (1997) describe three levels of engagement. Level 1 engagement involves the students agreement to school and class rules, such as showing up on time, attending to the instructor, coming prepared for class, and responding to direct questions by the instructor. Students who do not engage at this level are likely to experience immediate learning difficulties (Finn & Rock, 1997). Level 2 engagement involves "initiative taking on the part of the student" (Finn & Rock, 1997; p. 222), by initiating questions or a dialog with the instructor, and engaging in appropriate help-seeking behavior when necessary. Level 3 engagement is characterized by extensive participation in the academic work of the school, as well as involvement in social, extracurricular, and athletic aspects of the school (Finn & Rock, 1997).

Academic engagement correlates moderately (.59) with academic performance in the intermediate grades (Furrer & Skinner, 2003). It has also been found to be a good predictor of successful school completion for high school students considered "at-risk" for school failure (Finn & Rock, 1997). While I have not located studies using academic engagement as a predictor for academic achievement at the college level, its importance in the primary and secondary levels of education gives credence to its inclusion as a predictor of learning.

Rationale and Predictions

This study tests models of academic enablers and academic achievement at the post-secondary level. No model of academic achievement involving academic enablers has been tested with college students. Such a model could be used to help students in their preparation for postsecondary education and could assist education professionals in developing assessment batteries and interventions for postsecondary students in need. As noted previously, the proposed models include self-efficacy, motivation, study skills, and engagement. In addition, the models will also examine the role of reading comprehension and ability. In this way these models will use, as their starting point, the model originally developed by DiPerna and Elliot (1999; DiPerna et al. 2002, 2005) for elementary students. It is predicted that the academic enablers self-efficacy, motivation, study skills, and engagement, along with reading comprehension and ability, will make a significant contribution to academic achievement in postsecondary students.

Chapter 3 – Research Design and Methodology

This study is designed to test several models of academic enablers and their influence on academic achievement at the post-secondary level. While there are several models of academic achievement (Carroll, 1985; Walberg, 1981; DiPerna & Elliott, 1999) these models focus on primary and secondary learners. Most prior models have focused on immutable factors such as socioeconomic status, parental education, quality of teachers, etc. Unfortunately, these factors cannot be easily changed and cannot be changed after the fact. What is needed is a model of factors that can be affected by some kind of intervention, so that academic outcomes can be affected.

While cognitive ability has been found to be the single best predictor of academic performance (Pressley & McCormick, 1995), other factors have also been found to be important and some of those are amenable to change. DiPerna and Elliott (1999) called these *academic enablers*. They include a student's study skills, academic engagement, motivation, and academic self-efficacy.

This study examines these academic enablers, along with reading comprehension skills and cognitive ability, in order to determine to what extend these enablers affect academic achievement. It is predicted that each of these enablers, as well as ability and reading comprehension, will have a significant influence on student grades in a classroom. By discovering the most important factors that influence academic outcomes it is hope that this information can be used to direct assessment and intervention for at-risk college students.

Participants

Participants in this study will be 252 undergraduate college students (194 female and 58 male students) enrolled at the Pennsylvania State University. Two-hundred-fifty-two participants will be used because it is recommended that structural equation models be tested on samples of 200 participants at a minimum (Kline, 2005). Participants range in age from 18 years to 39 years, with a median age of 19 years. The racial demographic distribution of the students who participated in this study can be found in Table 1. Sixty-seven percent (169) of the students were education majors and 6.4% (16) of the students reported some participation in special education or disability services for educational assistance. Participants were recruited from a single undergraduate education class. Students from a single class will be used in order to have a standardized outcome measure (total points scored in class). Each student who participated in the study received extra-credit towards their final grade and their name was entered in a raffle for a chance to win 1 of 30 monetary prizes ($20.00 each).

Table 1

Racial Demographic Distribution of Participants

	Frequency	Percentage
African-Americans	5	2.0
Asian-Americans	1	0.4
Latinos	3	1.2
White	239	94.8
Other Races	4	1.6

Materials

SAT Reasoning Test (SAT). The SAT Reasoning Test (formerly the Scholastic Aptitude Test) is a computer-based, individually-administered standardized test that measures skills in three areas: critical reading, math, and writing (Educational Testing Service; ETS, 2006). In this study the SAT will be used as a measure of students' prior ability. Most questions on this test are in a multiple choice format; however, students are also required to write a 25-minute essay. The SAT reports correlations with first-year undergraduate Grade Point Averages (GPA) of .30 for both the verbal and mathematics sections and .35 for the total score (Bridgeman, McCamley-Jenkins, & Ervin, 2000). Other researchers have reported correlations between verbal and mathematics sections and undergraduate GPA to range between .32 and .44, and for combined verbal and mathematics score and undergraduate GPA to be between .40 and .54 (Allalouf, Ben-Shakher, 1998). The SAT is recognized by many college admissions boards as a measure of student ability (Harackiewicz et al., 2002) and was used as the ability measure in this study.

Maze curriculum-based measurement. Curriculum-based measurement (CBM) is a systematic procedure for assessing basic academic skills (Deno, 1989) and has a long history in the research literature (Shapiro, Keller, Lutz, Santoro, & Hintze, 2006). The specific technique to be used in this study is the maze task. The maze task measures aspects of reading comprehension, such as understanding of contextual information, knowledge of syntactic rules, vocabulary, integration of prior learning, and application of reading skills (Fuchs & Fuchs, 1992). The maze task requires the participant to read a passage which has been modified such that, following the first sentence, every seventh word has been replaced with a forced-choice of three possible words (Espin et al., 2001). The passage for use in the study will be from a previous edition of the textbook (Dacey & Travers, 2004) used in the participants' course.

The maze task has been successfully used to assess reading comprehension in secondary students (Ketterlin-Geller et al., 2006) and has been correlated with state accountability test scores, with validity correlations of .54 for seventh graders and .49 for eight graders (Silberglitt, Burns, Madyun, & Lail, 2006). More resent research involving the maze task has established is psychometric properties in a sample of college students (Kuterbach & Haley, 2009). These researchers also reported test-retest scores of .95 in a college sample (Kuterbach & Haley, 2009). In addition, they observed a moderate to high positive correlation (.61) between MAZE scores and a comprehensive measure of reading comprehension, the Nelson-Denny Reading Test (Brown, Fishco, & Hanna, 1993) and was used as this study's measure of reading comprehension.

Generalized Self-Efficacy scale (GSE). The Generalized Self-Efficacy scale (GSE; Schwarzer & Jersalem, 1995) was used as the measure of students' self-efficacy. The GSE is a 10-item paper-and-pencil self-report questionnaire that asks participants to report on their problem solving abilities, their ability to complete goals, and how resourceful they see themselves. The GSE reports internal consistency scores ranging between .77 and .91 (Schwarzer & Scholz, 2000) and has been found to positively correlate with measures of favorable emotions, dispositional optimism, and work satisfaction, while negatively correlating with measures of depression, anxiety, stress, burnout, and health complaints (Luszczynska, Scholz, & Schwarzer, 2005; Schwarzer, 2005; Gravdal & Sandel, 2006; Lightsey, Burke, Ervin, Henderson, & Yee, 2006).

Academic Competence Evaluations Scales – College (ACES-College). The ACES-College is a 66-item paper and pencil questionnaire that asks respondents to reflect on their own learning (DiPerna & Elliott, 2001). The ACES-College is comprised of 2 scales and 7 subscales, with reliability (internal consistency) ranging from .94 to .96 for the scales and .82 and .93 for the subscales (DiPerna & Elliott, 2001). Recent research indicates that the ACES-College moderately correlates with students' current grade point averages (.27 - . 44) and cumulative grade point averages (.28 - .38) (DiPerna, 2004). For this study, participants completed the all 66 items, including those items which make up the Motivation, Study Skills, and Engagement subscales. These subscales have reported correlations with overall GPA ranging from .22 to .35, and correlations with last semester GPA ranging from .38 to .44 (DiPerna, 2004), and were used as the measures for academic motivation, study skills, and academic engagement, in this study.

Procedure

Data was collected during the second semester of the academic year in an introductory education class. The purpose and parameters of the study were explained to each participant, who was asked to complete an informed consent form and a release of information. Participants first complete the maze reading comprehension probe, followed by the GSE, and finally the ACES-College. All instruments were completed in a group setting. The questionnaire and assessments were distributed and collected by the investigator. The assessments and questionnaire took approximately 20 minutes to complete, with 1 minute for the maze task, approximately 2 minutes for the GSE, and 10 minutes for the require sections of the ACES-College, with the balance of the time used to complete the demographic questionnaire and the informed consent procedures. Participant SAT data was collected from the Office of Undergraduate Admissions and final grade total (i.e., the total number of points accumulated) was obtained from the class instructor.

Analyses

The data were analyzed using ordinary least squares (OLS) linear regression, in order to model the relationship between the observed variables and student grades. Ordinary least squares linear regression is commonly used in the social sciences and education, to name just a few fields (Neter, Wasserman, & Kutner, 1989). The OLS method minimizes the sum of squared vertical distances between the observed responses in the data and the responses predicted by the linear approximation (Neter et al., 1989). Ordinary least squares linear regression was used because the resulting estimator can then be expressed as a simple formula:

$$Yi = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \beta_4 X_{i4} + \varepsilon_i$$

In this formula Y represents the outcome variable, while X_{i1} represents the first independent variable, X_{i2} represents the second independent variable, and so on. The parameter β_0 is the Y intercept of the regression plane, e.g., when each of the independent variables equals 0, the Y is equal to β_0. The parameter β_1 indicates the change in the mean response per unit increase in X_1 when all the other independent variables are held constant. Likewise, β_2 indicates the change in the mean response per unit increase in X_2 when all other independent variables are held constant, and so on. The notation ε_i represents random error. Linear regression modeling relies on four basic assumptions: (a) linearity of the relationship between dependent and independent variables, (b) independence of the errors (e.g., no serial correlation), (c) homoscedasticity, or constant variance, of the errors, and (d) normality of the error distribution. If any of these assumptions is violated any predictions made by the regression model may be biased or misleading (Neter et al., 1989).

In this analysis twelve models were explored. These models included each of the academic enablers (self-efficacy, motivation, engagement, and study skills), as well as ability (measured by the SAT Reasoning Test) and reading comprehension (measured by the maze task). Analyses conducted included models with each individual academic enabler individually, all enablers with ability and reading comprehension included, and models which were found to be most parsimonious. In addition, age and gender were controlled for, in some models.

In addition, Structural Equation Modeling (SEM) was used in order to test the DiPerna model (DiPerna et al., 2002) with these data. The DiPerna Model was chosen because it is the most intermediate of the models examined. Structural Equation Modeling (SEM) is a statistical technique which examines the co-variances or correlations among a set of variables to determine if the specified relationship between constructs within a model are plausible. Structural Equation Modeling allows a researcher to gain an understanding of how variables relate to each other with an underlying assumption that a possible causal relationship exists between the variables (Munro, 2001; Maruyama, 1997). There are five steps in the process of SEM (Bollen & Long, 1993) (a) model specification, (b) identification, (c) estimation, (d) testing fit, and (e) re-specification. By including re-specification as a step in the SEM process, the researcher acknowledges that the proposed model may not fit the data; therefore, the model should be modified and retested using the same data. While SEM offers both a confirmatory (i.e., hypothesis-testing) approach to multivariate analysis of a structural theory (Byrne, 1998), as well as being capable of model generation (Joreskog, 1993), this study will not include re-specification.

The first step in the SEM process is the specification or formulation of a model that is based on research findings or on theory. The specified model is a representation of the theoretical relationships between the unobservable or latent concepts (e.g., structural equation components) and the connections between the latent concepts and the measured indicator variables (e.g., the measurement components) (Byrne, 1998). The next step is to determine whether the proposed model is adequately identified. The desired SEM is the over-identified model that estimates fewer coefficients than the number of observed variances and covariances (Kline, 2005).

The third step in the SEM process is to choose what model-fitting estimation method to use. Model parameters will be generated using maximum likelihood estimation, the most commonly used estimation method (Kline, 2005), typically performs better than most other estimation methods (Munro, 2001), and which is recommended for use with missing data (Schafer & Graham, 2002). The final step in this study is testing goodness of fit. Several indices were used to test model fit, including the generalized likelihood ratio (χ^2), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Non-Normed Fit Index (NNFI), and Root Mean Squared Error of Approximation (RMSEA). Each of these indicators assess different aspects of model fit and have different criteria for identifying a model demonstrating good fit. A model demonstrating good fit will yield a non-significant chi square; CFI, IFI, and NNFI > .90; and RMSEA <.08 (Kline, 2005; Bentler, 1990; Waldorp, Grasman, & Huizenga, 2006).

Also, an exploratory factor analysis (EFA) was performed on the ACES-College, to ensure that the individual questions used to measure motivation, engagement, and study skills each formed separate factors. For the EFA initial communalities were estimated by squared multiple correlations. The number of factors to be retained for rotation was guided by three criteria: parallel analysis, Minimum Average Partials, and the scree test. Parallel analysis is an objective method of determining the number of significant components for interpretation. Parallel analysis involves comparing obtained eigenvalues against a set of randomly generated eigenvalues (Thompson, 2004). Minimum Average Partials is based on the matrix of partial correlations. The average of the squared partial correlations is calculated after each of the components has been partialed out, and when the minimum average squared partial correlation is reached no further factors are extracted (Zwick & Velicer, 1986). The scree test is a visual examination of the plot of the eigenvalues associated with a factor versus the number of factors

(Thompson, 2004). Given that it is better to over-factor than under-factor (Wood, Tataryn, & Gorsuch, 1996) a number of factors equal to the largest number of factors indicated by any of these three methods was extracted for the initial analysis, and the number of factors to be extracted were then sequentially reduced in order to find the best fitting model. Factors were extracted using Principle Axis Extraction because of its relative robustness to multivariate non-normality and ability to detect weak factors (Briggs & MacCallum, 2003). Promax oblique rotation was used, as the factors cannot be assumed to be uncorrelated. Loadings with structure coefficients of $\geq .40$ were considered to be salient so as to retain only those loadings that were both statistically ($p < .01$) and practically significant (Stevens, 2002). In addition, 3 or more salient loadings as well as internal consistency coefficients of at least .70 (Salvia & Ysseldyke 2003) were required for each factor.

Chapter 4 – Results and Discussion

In previous research DiPerna and Elliott (2002) defined academic enablers as "attitudes and behaviors that allow a student to participate in, and ultimately benefit from academic instruction in the classroom" (p. 294). They suggested that academic enablers should include broad domains, such as motivation, interpersonal skills, engagement, and study skills (DiPerna et al., 2002). Their model, initially tested in elementary school students, is presented in Figure 1.

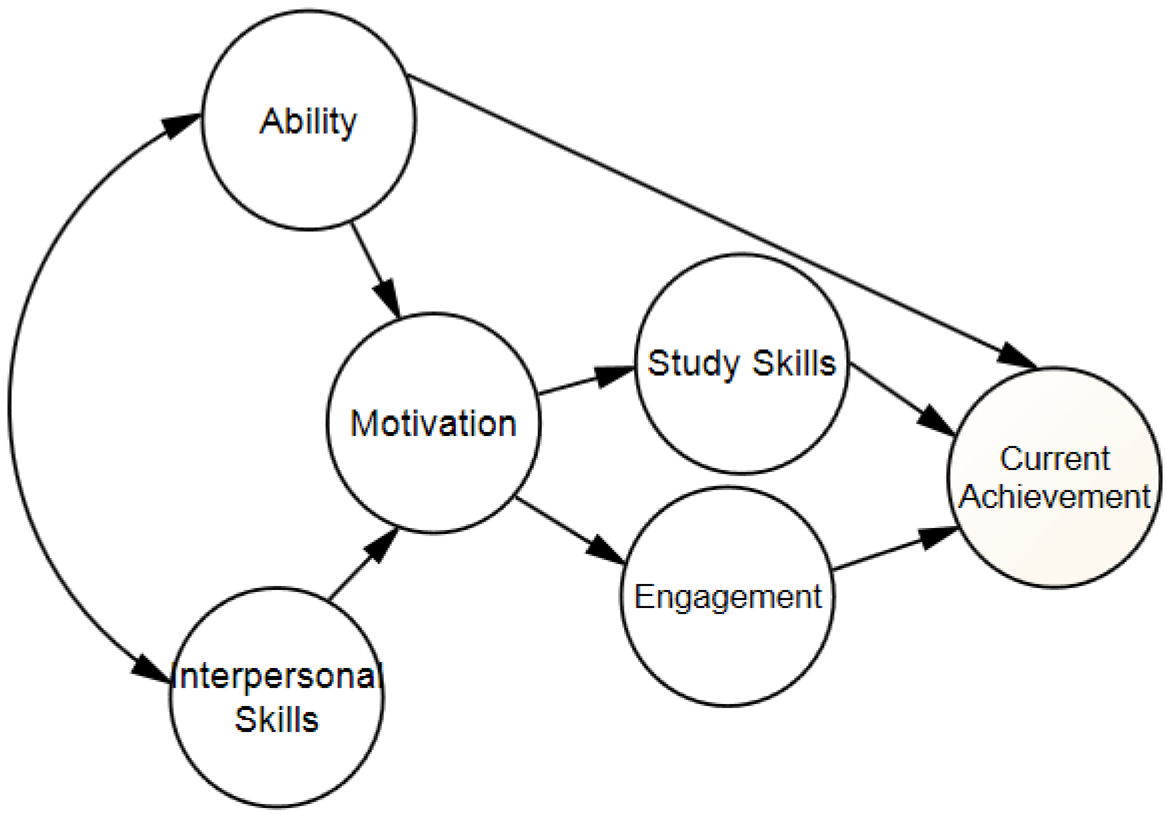

Figure 1. Model of academic enablers and academic achievement tested in DiPerna, Volpe, and Elliott, 2002.

In this study various models of the academic enablers discussed by DiPerna et al. (2002; i.e., study skills, motivation, engagement, and self-efficacy), along with reading comprehension skills and cognitive ability are examined, in an effort to determine their influence on the academic outcome of class grade. Study skills, motivation, and engagement were all measured using the ACES-College, while self-efficacy was measured by the GSES. Reading comprehension was measured by the use of the Maze CBM. Finally, cognitive ability was represented by the total score on the SAT Reasoning Test. Ordinary least squares (OLS) linear regression was used, in order to model the relationship between the observed variables and student grades. This model is presented in Figure 2.

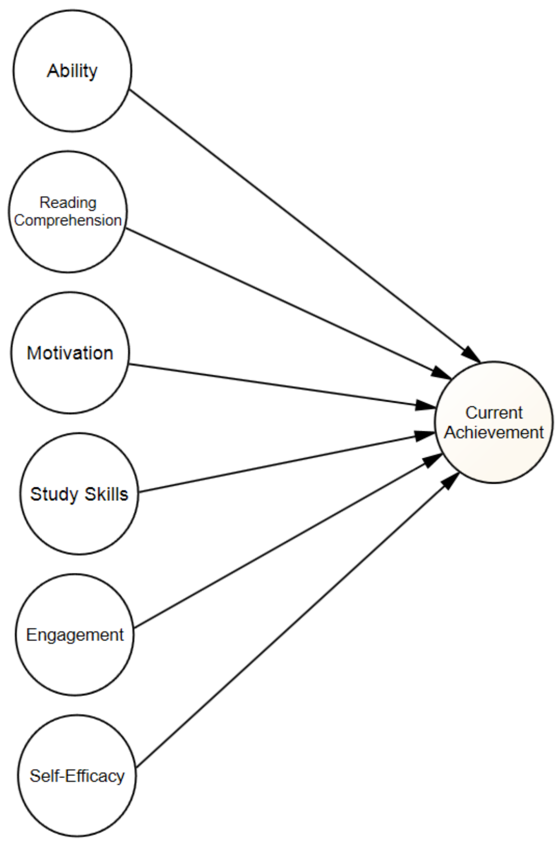

Figure 2. Hypothesized model of academic enablers and academic achievement.

In order to ensure that the data from the ACES-College is structurally valid an exploratory factor analysis (EFA) was performed and the internal consistency of the various scales was identified. Then descriptive statistics and a correlation matrix of the variables examined are presented. Finally, the regression models are conducted and the results are displayed. The implications and limitations of this study are discussed and future research is proposed.

Results

The EFA of the ACES-College revealed the following: the results from Bartlett's Test of Sphericity (Bartlett, 1954) indicated that the correlation matrix was not random ($X^2 = 9527.816$; $df = 2145$; $p < .001$). The Kaiser-Meyer-Olkin (KMO) statistic was .854, above the minimum standard suggested by Kline (2005). Measures of sampling adequacy for each variable were also within reasonable limits. Thus, the correlation matrix was appropriate for factor analysis. The scree plot suggested the retention of 7 factors, while parallel analysis suggested 8 factors and MAP criteria suggested 7 factors. Initially, 8 factors were extracted and the resulting solution was examined for statistical suitability. The 8-factor solution appeared to be inappropriate with only five salient loadings; additional solutions were iteratively considered. All exploratory factor analysis pattern matrices are presented in appendix F through N.

While the 7-, 6-, and 5-factor structures all meet the a priori statistical criteria, the very large residuals of $\geq |.20|$ implied that there were more factors remaining to be extracted from the matrixes of the 6-, and 5-factor models. Therefore, it appears that the 7-factor model is the most statistically appropriate for this sample of postsecondary students.

The 7-factor solution accounted for 30.4% of the total variance and left 49.6% of the residual matrix $\geq |.05|$. In addition, of those residuals $\geq |.05|$ 2.9% were very large, $\geq |.20|$. Appendix D shows the pattern coefficients for the 7-factor solution, revealing that this solution had no complex loadings. Internal consistency coefficients for the 7-factor model ranged from $\alpha = .822$ to $\alpha = .934$, with the data from the Engagement, Motivation, and Study Skills subscales demonstrating internal consistency scores of $\alpha = .822$, .883, and .850, respectively. These reliability scores appear to exceed the requirements for research purposes (Salvia & Ysseldyke 2003). The 7-factor solution appears to be a statistically appropriate solution and the items align themselves in the same manner as described by DiPerna (2004): *Reading/Writing Skills*, *Mathematics/Science Skills*, *Critical Thinking Skills*, *Interpersonal Skills*, *Engagement*, *Motivation*, and *Study Skills*. Because the EFA revealed that the items in the Engagement, Motivation, and Study Skills subtests do appear to constitute their own unique factors, the regression models include each of these subscales including all items.

Descriptive statistics for each variable, including mean, standard deviation, and range is included in table 2.

Table 2.

Descriptive Statistics

Variable	Mean	S D	Minimum	Maximum	Range
Age	19.31	2.082	18	39	21
SAT Reasoning	1130.81	131.962	570	1510	940
Reading Comp.	11.39	3.660	3	22	19
Self-Efficacy	31.96	3.494	19	42	23
Motivation	40.88	5.398	22	50	28
Study Skills	44.88	4.737	29	50	21
Engagement	29.58	5.233	17	40	23
Course Grade	86.94	6.824	45	99	54

Note. Reading Comp. = Reading Comprehension; S D = Standard Deviation

Table 3 displays the correlation matrix for all variables in this study. This matrix shows that several variable are significantly correlated, including many of the Academic Enablers, including Motivation and Study Skills, Motivation and Engagement, Motivation and Self-Efficacy, and Engagement and Study Skills. In addition, course grade is significantly correlated with Reading Comprehension, Motivation, and Study Skills.

Table 3.

Correlation Matrix for All Variables

Variable	SAT Reasoning	Reading Comp.	Self-Efficacy	Motiv.	Study Skills	Engage.	Course Grade
SAT Reasoning	1						
Sig (2-tailed)							
Reading Comp.	0.005	1					
Sig (2-tailed)	0.936						
Self-Efficacy	-0.097	0.128*	1				
Sig (2-tailed)	0.125	0.042					
Motivation	-0.090	0.151*	0.313**	1			
Sig (2-tailed)	0.153	0.016	0.000				
Study Skills	0.003	0.072	0.153*	0.580**	1		
Sig (2-tailed)	0.964	0.256	0.015	0.000			
Engagement	0.094	-0.002	0.203**	0.300**	0.322**	1	
Sig (2-tailed)	0.139	0.972	0.001	0.000	0.000		
Course Grade	-0.043	0.202**	-0.042	0.236**	0.178**	-0.070	1
Sig (2-tailed)	0.492	0.001	0.506	0.000	0.005	0.265	

Note. Reading Comp. = Reading Comprehension; Motiv. = Motivation; Engage. = Engagement. * = Correlation is significant at the 0.05 level (2-tailed); ** = Correlation is significant at the 0.01 level (2-tailed).

Twelve models were tested using OLS linear regression. Table 4 displays the results for models 1, 2 and 3, while table 5 displays the results for models 4, 5, and 6. Table 6 has the results of models 7, 8, and 9, and table 7 displays the results of models 10, 11, and 12. Models 1 through 6 include each academic enabler individually. Self-efficacy does not appear to contribute much to the prediction of grades in these data (Model 1), while both motivation (Model 2) and study skills (Model 3) do contribute significantly. The unstandardized Bs show how much of an increase in the dependent variable (grades) can be expected, given the increase of one in the independent variable. So, for every increase of one point on the ACES motivation subtest you could expect a corresponding increase of 0.299 points in grade. Likewise, an increase of one point on the ACES study skills subtest would give an expected increase of 0.256 points in grade.

Table 4.

OLS Estimates of academic achievement (class grades) regressed on individual academic enablers

	Model 1		Model 2		Model 3	
Characteristics	B	Std. Err	B	Std. Err	B	Std. Err
Self-Efficacy	-0.082	0.123				
Motivation			0.299**	0.078		
Study Skills					0.256**	0.090
Intercept	89.568		74.725		75.433	
R^2	0.002		0.056		0.032	

Note. B = Unstandardized Coefficient; Std. Err = Standard Error; a = Male; * = Coefficient is significant at the 0.05 level (2-tailed); ** = Coefficient is significant at the 0.01 level (2-tailed). N = 252 for all models.

Model 4 shows that engagement was also not a significant influence on grade, nor was ability, as measured by the SAT Reasoning Test (Model 5). However, Model 6 shows that reading comprehension did contribute to grades in a significant way, with an expected increase in grade of 0.337 points in the score for grade for every one point increase on the Maze CBM. While individually motivation, study skills, and reading comprehension each made statistically significant contributions to grade, none of these factors made a large contribution when regressed on grade, by themselves.

Table 5.

OLS Estimates of academic achievement (class grades) regressed on individual academic enablers

	Model 4		Model 5		Model 6	
Characteristics	B	Std. Err	B	Std. Err	B	Std. Err
Engagement	-0.092	0.082				
SAT Reasoning			-0.002	0.001		
Reading Comp.					0.377**	0.115
Intercept	89.664		89.306		82.646	
R^2	0.005		0.006		0.041	

Note. Reading Comp. = Reading Comprehension; B = Unstandardized Coefficient; Std. Err = Standard Error; a = Male; * = Coefficient is significant at the 0.05 level (2-tailed); ** = Coefficient is significant at the 0.01 level (2-tailed). N = 252 for all models.

The next three models, found in table 6, test the academic enablers together, as a group. Model 7 tests the initial enablers self-efficacy, motivation, study skills, and engagement. As model 7 shows, when including all four enablers in the model the influence of motivation increases, but that of study skills decreases. The influence of both self-efficacy and engagement increases, but appear to have a negative effect on grade, with expected decreases in grade of 0.208 and 0.205 points respectively for increases of one point in GSES and ACES engagement scores. Similar results are found when controlling for gender and age, as well as when ability and reading comprehension are included in the model. Reading comprehension was also found to be significantly related to grade in this last model (model 9), with an increase of 0.345 points in grade for every increase of one point on the Maze CBM.

Table 6.

OLS Estimates of academic achievement (class grades) regressed on academic enablers

	Model 7		Model 8		Model 9	
Characteristics	B	Std. Err	B	Std. Err	B	Std. Err
Self-Efficacy	-0.208	0.126	-0.221	0.128	-0.273*	0.128
Motivation	0.333**	0.098	0.341**	0.098	0.304**	0.098
Study Skills	0.133	0.109	0.141	0.115	0.163	0.113
Engagement	-0.205*	0.085	-0.204*	0.085	-0.185*	0.085
Gender[a]			1.233	1.066	1.671	1.061
Age			-0.229	0.208	-0.180	0.206
SAT Reasoning					-0.001	0.003
Reading Comp.					0.345**	0.115
Intercept	80.091		83.913		82.085	
R^2	0.094		0.102		0.135	

Note. Reading Comp. = Reading Comprehension; B = Unstandardized Coefficient; Std. Err = Standard Error; a = Male; * = Coefficient is significant at the 0.05 level (2-tailed); ** = Coefficient is significant at the 0.01 level (2-tailed). N = 252 for all models.

The final three models examine the roles of the two most influential variables: motivation and reading comprehension. These two variables were chosen because they we both found to be significant when included in the regression equation alone, as well as when included with all other predictors. While study skills was found to be significantly related to grade when used as the sole predictor, it lost its significance when included in the larger models. Also, motivation and study skills were for to be fairly highly correlated, with r = 0.58. Engagement and self-efficacy were not included because, even though they had some increased influence when included in the larger model, these variables did not correlate with the outcome measure. Ability as measured by the SAT Reasoning Test was not found to have any influence in the models, and so was also not included. The results can be found in table 7.

Table 7.

OLS Estimates of academic achievement (class grades) regressed on academic enablers

	Model 10		Model 11		Model 12	
Characteristics	B	Std. Err	B	Std. Err	B	Std. Err
Motivation	0.266**	0.078	0.275**	0.079	0.272**	0.079
Reading Comp.	0.318**	0.114	0.327**	0.115	0.319**	0.115
Gender[a]			0.697	1.004	0.987	1.030
Age					-0.254	0.205
Intercept	72.435		71.825		76.874	
R^2	0.084		0.086		0.092	

Note. Reading Comp. = Reading Comprehension; B = Unstandardized Coefficient; Std. Err = Standard Error; a = Male; * = Coefficient is significant at the 0.05 level (2-tailed); ** = Coefficient is significant at the 0.01 level (2-tailed). N = 252 for all models.

As found in table 7, model 10 includes only motivation and reading comprehension, while model 11 includes gender and model 12 includes gender and age. Throughout these three models reading comprehension and motivation continue to be significant predictors of grade. It is also interesting to note that while not significant, age also had some effect on grade, with a drop in grade 0.254 points for every increase in a student's age of one year. The final model, presented in Figure 3, including motivation and reading comprehension, and the control variables for age and gender, appears to be the most parsimonious model.

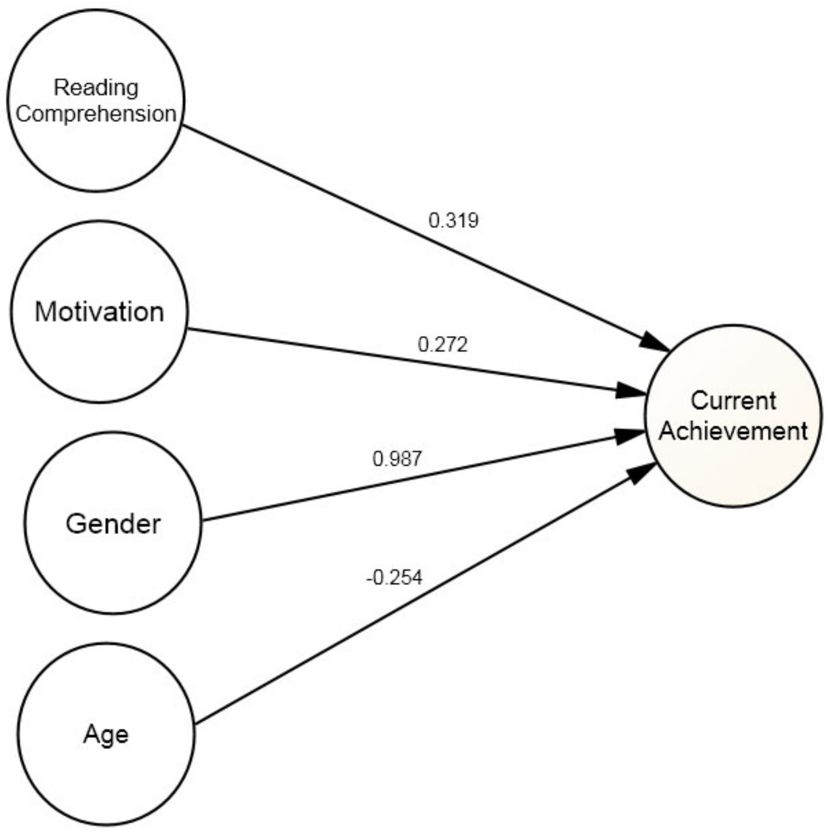

Figure 3. Final model of the relationship between academic enablers and academic achievement.

Finally, the DiPerna Model (DiPerna et al., 2002) was tested using SEM. Table 8 shows that these data do not meet a priori indicators for a good fitting model as described by Kline and others (Kline, 2005; Bentler, 1990; Waldorp, Grasman, & Huizenga, 2006). The data produced a generalized likelihood ratio (χ^2) that was significant at the $\alpha = 0.01$ level, Comparative Fit Index (CFI), Incremental Fit Index (IFI), Non-Normed Fit Index (NNFI) which were all less than 0.90, and a Root Mean Squared Error of Approximation (RMSEA) which was above 0.80.

Table 8.

Fit indices for the DiPerna Model (DiPerna et al., 2002)

	χ^2	CFI	NNFI	IFI	RMSEA
DiPerna Model	29.71**	0.876	0.850	0.881	0.114

Note. * = significant at the 0.05 level (2-tailed); ** = significant at the 0.01 level (2-tailed). N = 252.

Discussion

The relationship between individual academic enablers and academic achievement has been well established (e.g., Silver et al., 2001; Gore, 2006; Carr et al., 1991; Pintrich & De Groot, 1990; Furrer & Skinner, 2003; Finn & Rock, 1997; Gadzella & Williamson, 1984; Robbins et al., 2004), but there have been no studies that have examined the role these academic enablers play as a group in postsecondary academic achievement. This study examined several models that included academic enablers such as self-efficacy, motivation, engagement, and study skills, as well as reading comprehension, and student ability. These models were examined in the hope of determining how much influence each of these variables has on academic outcomes and in the hope that the determination of the most important variables in the prediction of academic achievement could be used to help students in their preparation for postsecondary education, as well as in the development of assessment batteries and interventions for at-risk postsecondary students.

These data indicate that, within the group of academic enablers studied (those that are amenable to intervention, i.e., self-efficacy, motivation, study skills, engagement, and reading comprehension) motivation and reading comprehension have the largest positive effects on grades. In these data self-efficacy, the belief a person has about their ability to produce at certain levels in areas that have influence over their lives (Bandura, 1994), and academic engagement, behaviors ranging from attending to the instructor, to asking questions, to participation in the academic work of school (Finn & Rock, 1997), both had a negative effect on grades. Another interesting finding of this study is that it seems to confirm the Self-Regulated Learning perspective's view that motivation and study skills are strongly related.

The most surprising finding was that ability had no significant effect on academic outcomes, in this sample of postsecondary students. This finding flies in the face of conventional wisdom. While all of the enablers used in this study have been found to have a significant relationship to academic achievement in other studies (e.g., Silver et al., 2001; Gore, 2006; Carr et al., 1991; Pintrich & De Groot, 1990; Furrer & Skinner, 2003; Finn & Rock, 1997; Gadzella & Williamson, 1984; Robbins et al., 2004), ability has been called the single-best predictor of academic achievement (Neisser et al., 1996; Pressley & McCormick, 1995).

This study failed to support the original hypothesis that each of the academic enablers tested: *Self-Efficacy*, *Engagement*, *Motivation*, and *Study Skills*, along with *Reading Comprehension*, and *Student Ability* would have a strong influence on academic outcomes; however, it does confirm the overall idea that academic enablers will have an impact on academic outcomes. This study expected to find a significant and useful relationship between the academic enablers and academic achievement. This, however, was not the case. While a statistically significant relationship did exist between motivation and reading comprehension with academic achievement, that relationship is very small. While the largest unstandardized coefficient for motivation was 0.341, this means that for every increase of one point on the measure of motivation there would be an increase of about one-third of a point in the student's final grade. Even reading comprehension, which had the strongest and most consistent relationship with academic achievement, only showed an increase of between 0.318 and 0.377 points for every one point increase on the reading comprehension measure.

This research suggests that the most parsimonious model for predicting postsecondary student academic achievement would be one that includes measures of student motivation and reading comprehension. As such, the data suggest that parent and student resources may be best expended in increasing a student's reading comprehension skills and in motivating students to achieve. In addition, college and university resources may be best expended on tutoring for reading and by helping the student to motivate him- or herself to do well. These data also suggest that motivation and reading comprehension be assessed as a part of any transition planning for Special Education students planning on continuing their education beyond high school.

Limitations

There is reasonably strong support in the literature for each of the variables used in this study, and their relationship to academic outcomes; the question remains as to why this study produced the above results. This study has a number of possible limitations, both in the strength of the design and weaknesses in the hypothesis, which may have affected these results. The first limitation might be found in the measurement of the enablers. While the subscales of the ACES-College (*Motivation*, *Engagement*, and *Study Skills*) and the GSES all have reliability scores that are adequate or better for use in research (ACES-College internal consistency score range from α = .822 to .883; GSES internal consistency was α = .713), each scale was brief (8 to 10 items per scale), possibly limiting their sensitivity. Although the ACES-College, as a whole, has been found to correlate well with student grades (DiPerna, 2004), the ACES-College subscales used in this study, as well as the GSES, had much lower correlation with course grades than had been expected (between -0.042 and 0.236). It is possible that other measures of motivation, self-efficacy, engagement, and study skills that are more sensitive and more highly correlated with course grades may have had different results. Measures for the predictor variables should have been better tailored to the course from which the participants were recruited. The course was a large survey course which did not lend itself to much class participation or class discussions. Questions from the ACES-College which measure study skills, motivation, and engagement, such as “I participate in class discussions” and “I assume leadership in group discussions” were not relevant to this course.

Another design limitation may have been the narrow sample used in this study. The majority of participants in this study, a full two-thirds, were education majors, with only 4.0% in technical majors such as science, mathematics, or engineering, and 19.5% in the liberal arts. The size of the class (approximately 180 students per section) may have limited student engagement, as measured by the ACES-College. In addition, due to the subject matter the grade in this course would be highly dependent on reading. In a course more focused on mathematics reading comprehension may have played a smaller role in course grade and other factors may have played a larger role. It is clear that a stronger design would have led to more clear results.

The final limitation in this study may have been a lack of variability in the course grades. While the range in all scores in the course grade was 45 to 99, the average grade was approximately 87%, with ± one standard deviation being about 80 to 94. This means that more than two-thirds of all course grades were within 14 points. And while scores ranged as low as 42 points below the average, there was a ceiling affect so that the highest scores were only 12 points above the mean grade. This lack of variability in the outcome measure may have also lead to the low correlations between the independent variables, including ability as measured by the SAT Reasoning Test, and the outcome measure.

If the data are accurate, then it is the hypothesis that must be reexamined. This study hypothesized that each of the academic enablers, *Reading Comprehension, Self-Efficacy*, *Engagement*, *Motivation*, and *Study Skills*, along with *Student Ability*, would all contribute significantly to students' academic outcomes. But that was not the case in these data. The relatively high correlations between *Self-Efficacy*, *Engagement*, *Motivation*, and *Study Skills* may explain why only one of these variables, *Motivation*, contributed to the outcome measure in a meaningful way. The hypothesis assumes that these four factors are reasonably independent from one another, but they may, in fact, be different sides of the same coin. *Motivation* and *Study Skills*, in particular, were highly correlated and it is suggested by the Self-Regulated Learning perspective that these two factors form a package.

The factors chosen for inclusion in this student were picked specifically because they are amenable to intervention. The idea was to create a model using factors that could be affected by intervention in order to establish which areas students, parents, and schools could focus on so as to increase a student's chance of success in college. Other factors, such as student ability (because of its importance in the literature), age, and gender, were also included in this study; however, variable, including race, socioeconomic status, and parents' education level were not included, even though they have a well-established influence on academic outcomes at the post-secondary level. Future models would need to include such variables, in order to control for these factors.

Chapter 5 - Conclusions

Post-secondary education, in general, and a college education, in particular, is the cornerstone of economic and social opportunity in American society, today. In addition, a college education helps to prepare students to become fully involved citizens (Marx, 2006). A college education provides a solid foundation in values which can affect a college graduate's community, as well as the social and economic institutions with which they will interact (Marx, 2006). However, those who want to secure a college education today face many barriers. This is especially true for individuals from educationally and economically disadvantaged backgrounds (Renick, 2006) and for those with special education needs (Wagner et al., 2005). At times these barriers may seem insurmountable: the rising cost of tuition, difficulty navigating applications, and separation from family are just some of the barriers that students seeking a post-secondary education face. The social, environmental, academic, and financial variables documented in the literature are factors that can either support or impede the ambitions of many high school and college students. Research also notes that special education students and lower socioeconomic status and first-generation students face additional barriers to academic success related to their parents' educational achievement, income, and occupational status in the community (Perna, 2002). The transition from high school to college presents many challenges to any student, but can be especially challenging to the proportion of students that have been inadequately prepared for academic achievement and persistence (Drodge & Roundy, 1992).

Today, secondary and postsecondary schools do have many programs to assist students transitioning to, and have arrived at, their post-secondary institution: tutoring, study sessions, precollege programs, disability services (Green, 2006). But are these programs focusing on the most important factors that lead to successful academic outcomes for students? Educating today’s first-generation college students from low income families will help to build cultural capital in future generations of students, but how do we assist today’s students to be successful? How do we direct our limited resources to most effectively and efficiently aid students with postsecondary ambitions?

This study has attempted to identify the most important factors that are also amenable to interventions, so that personal and institutional resources can be focused on those factors in order to assist students to be successful in post-secondary endeavors. Factors such as study skills, motivation, self-efficacy, academic engagement, and reading comprehension skills are all variables that have been found to have an influence on academic achievement. They are also all factors that can be affected by intervention.

Six different influences were examined: the five mentioned above and a sixth, immutable factor, ability (Moffitt et al., 1993). Of the five factors that are amenable to intervention this study found only three that had any positive influence on the outcome of grades: motivation, study skills, and reading comprehension. Academic engagement and self-efficacy were found to have a small negative effect on grades and ability had virtually no effect on grades, in this study. These last three findings are contrary to the bulk of the literature, which finds engagement and self-efficacy to have a positive effect on academic outcomes (Furrer & Skinner, 2003; Gore, 2006; Lent et al., 1986; Finn & Rock, 1997; Multon et al., 1991; Silver et al., 2001) and ability to have a strong influence on grades (Pressley & McCormick, 1995; Harackiewicz et al., 2002; Ridgell & Lounsbury; 2004; Thompson & Zamboanga, 2004). These finding may be more a result of the limitations of the measurements and participants studied, rather than a lack of influence that these factors may actually have.

The factors that did show an influence on the outcome measure demonstrated a small effect. Again, this may be due more to the limitations of measurement, rather than these variables having such a minor influence. Even so, this research does suggest that increases in study skills, motivation, and reading comprehension will result in some increase in students' grades and that an investment in improving these areas for students will have at least a minimal pay off.

This research has demonstrated the importance of reading comprehension skills, motivation, and study skills in post-secondary education. Assisting students to improve in these areas can help them become more prepared for post-secondary education. Students with low preparedness are more likely to not persist in their post-secondary studies (Ozga & Sukhnandan, 1998). Some parts of these skills may be generalizable to other areas, academically. Good reading skills are similar to other types of good information processing and are often times described using the same terms (e.g., strategies, metacognition, nonstrategic knowledge, etc.; Pressley & McCormick, 1995). Study skills such as SQ3R and PRWR have had some success across disciplines (Langan, 2010). Other parts of the skills may need to be honed in specific areas. Reading skills have also been compared to expert problem solving skills in specific domain areas (Pressley & McCormick, 1995) and research suggest that study skills may need to be discipline-based (Durkin & Main, 2002).

While this research indicates the importance of academic enablers in post-secondary education, it is still important to remember that deficits in motivation, study skills, and reading comprehension skills are tied to other factors that are outside the scope of secondary or post-secondary interventions. Tinto (1987) described five elements affecting student academic success and persistence: (a) personal attributes before entering college, (b) personal aspirations and goals, (c) college experiences, (d) external commitments, and (e) degree of social and academic integration. Students fail to achieve academic success for a variety of reasons including lack of academic enablers, but also including external pressures (e.g., family stresses, economic demands) and an inability to cope with college life (Ozga & Sukhnandan, 1998). One of the major challenges of higher education is to provide an education to those individuals who have historically been underrepresented as a result of socioeconomic factors, race, ethnicity, or inadequate academic preparation. This points to the importance of the need for a general policy to help institutions of higher education redirect their focus to improve student enrollment, retention, academic success, and graduation rates among all students, but in particular those studends who are disabled or educationally and economically disadvantaged. This policy should include assessing for a variety of barriers to academic success, including financial, cultural, and academic preparedness. The need for a policy on transition can be summed up in a quote from Ballinger: “First-year [college] students’ needs are heterogeneous, and an awareness and understanding of their educational backgrounds prior to degree highlights the absolute necessity of being sensitive to the transitional process” (2003; p. 107).

Future Research

This research is only one small step in developing a useful model of postsecondary student academic achievement. This study will need to be replicated in different samples, and drawing from different populations of students, in order to determine if the results can be generalized from this sample. The study should be conducted using a sample that is more representative of the racial demographics of college student in the United States. Replications should also include a better representation of different areas of study and using courses that require more mathematical skills.

It would also be helpful for future research into this model to utilize different measures of the variables. Other measures of motivation, such as *The Motivated Strategies for Learning Questionnaire* (Garcia & Pintrich, 1996), and of study skills, such as *Learning and Study Strategies Inventory – College Version* (LASSI; Weinstein & Palmer, 2002) may be more sensitive and may correlate better with course grades. The MSLQ has produced data with internal consistency reliability scores ranging from α = .62 to α = .93 for the subscales (Alkharusi et al., 2012) and α = .73 for the overall scale (Dunn, Lo, Mulvenon, & Sutcliffe, 2012). The MSLQ has also demonstrated good factor structure, both through exploratory (Alkharusi et al., 2012; Dunn et al., 2012) and confirmatory factor analysis (Dunn et al., 2012). The LASSI reports score reliability that is strong for the college version (Mealy, 1998). Coefficients alpha values and test-retest correlations for each of the ten scales range from .68 to .86 and .72 to .85, respectively. The LASSI also boasts good factor structure (Prevatt, Petscher, Proctor, Hurst, & Adams, 2006; Hill, 2012) and was developed, in part, to help identify academically underprepared students who were entering American colleges and universities (Weinstein, Zimmerman, & Palmer, 1988). It has been found to correlate well with American College Testing (ACT) scores (Flowers, Bridges, & Moore, 2012) and to be a significant predictor of college success and retention (Mancuso, 2008). Regardless of the tools used to measure the predictor variables they should be tailored to the course that the participants are recruited from such that the questions asked are relevant to the manner in which the course is presented.

This study found a strong correlation between motivation and study skills. While this strong relationship is predicted by the Self-Regulated Learning perspective we currently do not have enough information with the measures used in order to differentiate between these variables. Future research should be designed such that the tools being used are clearly measuring the two different constructs.

Lack of variability in the outcome measure and a ceiling effect were problems in this study. A pretest-posttest design for collecting the outcome measure may also eliminate some of the problems of a ceiling effect and might add more variability to the outcome data. In addition, if a sample large enough was used, student GPA may also be a valid measure of academic achievement and may give greater variability to the outcome measure.

One of the most important uses for this research may be for its eventual use in developing tools to assist at-risk college students, and future college students, particularly those students with a disability. As noted before high school students are attending college at unprecedented rates, and this is also true of students with a disability (Wagner et al., 2005). Because these students lose most of their academic protections once they leave secondary school, they tend to have a more difficult time in postsecondary study (Wagner et al., 2005). As such, this research should eventually be conducted as a longitudinal study using college-bound secondary students with a disability, in order to determine the variables that might help these students to succeed in the postsecondary setting.

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Appendix A – Recruitment Script

You are being asked to participate in educational research conducted by a graduate student at Penn State University.

The purpose of this research is to examine the relationship between student skills, attitudes, and behaviors and their academic achievement in college.

You will be asked to complete three different tasks. The first task is an assessment of your reading comprehension and involves your reading a brief passage from a textbook. Within this passage certain words have been replaced with three choices. You are to choose the correct word from the options provided. The second task requires you to answer 10 questions about how you might cope with different academic demands. The final task requires you to answer questions about your study skills, motivation in school, and how engaged you are in your classes. In addition to the above tasks you will be asked to sign a release that will allow the investigator to obtain a copy of your SAT scores from the University and your grades in ED PSY 14, including exams, homework, extra credit, etc., from Dr. Stevens.

This research is expected to take approximately 30 minutes to complete. You will be asked to complete these measures only once.

Your participation in this research is confidential. Only the primary investigator will know your identity. Your information will be maintained using a code number. The data will be stored and secured electronically in a password protected file. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared.

Each participant will receive 1 point extra credit in their ED PSY 14 class from Dr. Stevens. In addition, each participant will be entered into a lottery for one of thirty $20.00 prizes. For those students who wish to receive extra credit but do not wish to participate in the research, you will be given the alternative of writing a brief paper relating specific course content to how you would apply it in your work in the field of your major. The specifics of this paper will be negotiated with Dr. Stevens, the course instructor.

Your decision to participate in this research is voluntary. You can stop at any time without penalty. You do not have to answer any questions you do not want to answer. You must be 18 years of age or old to take part in this research.

If you have any questions or concerns about this research please contact James M. Kuterbach at (814) 863-6835.

Appendix B – Demographic Questionnaire

<u>PLEASE DO NOT</u> PUT YOUR NAME OR STUDENT NUMBER ON THIS FORM

Please provide the following information. You do not need to answer any question that you are not comfortable answering.

Age (in years): __________

Gender: _____ Male _____ Female

Ethnicity (please check only one)

_____ African-American (non-Hispanic)

_____ Native Hawaiian/Pacific Islander

_____ Asian-American

_____ White (non-Hispanic)

_____ Hispanic/Latino/Latina

_____ Multi-racial

_____ Native American/Alaskan Native

_____ Other

Educational Experiences
Have you ever received the following services? (please check all that apply)

_____ Special Education in Primary/Elementary School (Grades K-6)

_____ Special Education in Secondary/High School (Grades 7-12)

_____ Accommodations through the Office of Disability Services at Penn State

Major: ____________________

Semester Standing: _____

Minor: ____________________ (if applicable)

Appendix C – Maze Curriculum-Based Measurement

THE INFLUENCE OF PEERS

Do you sometimes wonder if we exaggerate the influence of peers? If you have any doubts, here [is / schools / pass] an example of the far-reaching power [of / happily / development] peer relations, one that should answer [demands / this / satisfy] question. In the 1940s, Anna Freud (Sigmund [barriers / discovers / Freud's] daughter) and Sophie Dan worked with six [nicely / century / German-Jewish] orphans whose parents had died in [the / exciting / cooperation] Nazi gas chambers. The six children [were/ lost / constant] together in a concentration camp for [play / several / tendency] years, enduring horrible conditions and with [go / few / society] adult contacts.

When the war ended, [have / the / peak] children were taken to England to [Anglo / punishment / recover]. It soon became clear to observers [achievement / that / behavior], although the children showed some effects [of / orderly / teachers] their ordeal – thumb sucking, fearfulness, restlessness – they [fulfillment / were / home-school] strongly attached to each other, to [the / when / others] point where they would comfort each [other / kind / cat] if disturbed and become upset if [cow / horse / separated]. With the loving care that the [children / unknown / of] received over the next year, coupled [longer / grades / with] their continued relationships with their peers, [no / they / manner] gradually showed normal patterns of development, [car / a / student] moving example of the strength and [effort / significance / instructional] of peer relationships (Freud & Dan, 1951).

INTERACTIONS, RELATIONSHIPS, AND GROUPS: THE MIDDLE CHILDHOOD YEARS

We typically use [leadership / development / the] word peer to refer to youngsters [who / school / several] are similar in age, usually within 12 [months / parent / due] of each other. But equal in [against / age / yet] does not mean equal in everything – [for / with / several] example, intelligence, physical ability, or social [skills / summarizes / more]. Nevertheless, interactions with peers constitute an [note / important / matures] developmental context for children, providing a [range / girls / skills] of experience that affect their adaptation [balance / size / across] the lifespan (Rubin, Murkowski, & Parker, 1998).

Dacey, J. S. & Travers, J. F. (2004). *Human development across the lifespan*. Boston, MA: McGraw Hill. pp. 253-254.

Appendix D – Generalized Self-Efficacy Scale (GSE)

General Self-Efficacy Scale

Please answer the following questions as they relate to your ***current academic experience***. Answer by circling the response that best describes you:

1 = Not True at all   2 = Hardly True   3 = Moderately True   4 = Exactly True

1 I can always manage to solve difficult problems if I try hard enough.
1 2 3 4

2 If someone opposes, I can find the means and ways to get what I want.
1 2 3 4

3 It is easy for me to stick to my aims and accomplish my goals.
1 2 3 4

4 I am confident that I could deal efficiently with unexpected events.
1 2 3 4

5 Thanks to my resourcefulness, I know how to handle unforeseen situations.
1 2 3 4

6 I can solve most problems if I invest the necessary effort.
1 2 3 4

7 I can remain calm when facing difficulties because I can rely on my coping abilities.
1 2 3 4

8 When I am confronted with a problem, I can usually find several solutions.
1 2 3 4

9 If I am in trouble, I can usually think of a solution.
1 2 3 4

10 I can usually handle whatever comes my way.
1 2 3 4

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, UK: NFER-NELSON.

Appendix E – Academic Competence Evaluations Scales-College (ACES-College)

Engagement		Never	Seldom	Sometimes	Often	Almost Always
1.	I use outlines to organize my written work	1	2	3	4	5
2.	I speak in class when called upon	1	2	3	4	5
3.	I ask questions about exams or other assignments	1	2	3	4	5
4.	I participate in class discussions	1	2	3	4	5
5.	I volunteer answers to questions	1	2	3	4	5
6.	I assume leadership in group discussions	1	2	3	4	5
7.	I initiate conversations appropriately	1	2	3	4	5
8.	I ask questions when I am confused	1	2	3	4	5

Motivation						
1.	I am motivated to learn	1	2	3	4	5
2.	I prefer challenging tasks	1	2	3	4	5
3.	I produce high-quality work	1	2	3	4	5
4.	I critically evaluate my own work	1	2	3	4	5
5.	I attempt to improve on previous performance	1	2	3	4	5
6.	I make the most of learning experiences	1	2	3	4	5
7.	I look for ways to academically challenge myself	1	2	3	4	5
8.	I assume responsibility for my learning	1	2	3	4	5
9.	I pay attention in class	1	2	3	4	5
10.	I am goal-oriented	1	2	3	4	5

Appendix E (cont.) – Academic Competence Evaluations Scales-College (ACES-College)

	Study Skills	Never	Seldom	Sometimes	Often	Almost Always
1.	I complete course assignments	1	2	3	4	5
2.	I edit my work before I submit it	1	2	3	4	5
3.	I finish my assignments on time	1	2	3	4	5
4.	I take notes in class	1	2	3	4	5
5.	I review notes and other class materials	1	2	3	4	5
6.	I use strategies to remember information	1	2	3	4	5
7.	I manage my time effectively	1	2	3	4	5
8.	I prepare for exams	1	2	3	4	5
9.	I prepare for class (e.g., complete readings, review notes)	1	2	3	4	5
10.	I attend class	1	2	3	4	5

DiPerna, J. C. & Elliott, S. N. (2001). *Academic Competence Evaluation Scales* (College ed.). San Antonio, TX: The Psychological Corporation.

Appendix F – Pattern Matrix for the 2-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor	
Item	1	2
1	**.525**	.072
2	**.506**	.154
3	**.563**	.034
4	**.624**	.031
5	**.582**	.043
6	**.431**	.088
7	**.503**	.058
8	**.470**	.100
9	**.532**	.061
10	**.550**	-.005
11	**.614**	-.173
12	**.664**	-.147
13	**.641**	-.159
14	**.639**	-.154
15	**.538**	-.155
16	**.604**	-.200
17	**.631**	-.089
18	**.577**	-.114
19	**.692**	-.129

Appendix F (cont.) – Pattern Matrix for the 2-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor	
Item	1	2
20	**.654**	-.142
21	**.707**	-.024
22	**.705**	-.022
23	**.652**	.124
24	**.617**	.108
25	**.649**	.004
26	**.548**	.042
27	**.544**	-.017
28	**.608**	.024
29	**.632**	.092
30	**.634**	.086
31	-.100	**.449**
32	-.113	**.438**
33	-.102	**.428**
34	-.119	**.461**
35	-.159	**.575**
36	-.115	**.609**
36	-.164	**.549**
38	-.129	**.514**

Appendix F (cont.) – Pattern Matrix for the 2-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor	
Item	1	2
39	-.129	**.514**
40	-.163	**.301**
41	.083	**.340**
42	.071	**.492**
43	.157	.239
44	.148	.261
45	.029	.367
46	.048	**.406**
47	.013	**.556**
48	.104	**.565**
49	.312	.306
50	.285	**.518**
51	.131	**.530**
52	.111	**.583**
53	.188	**.577**
54	.310	**.443**
55	.183	**.501**
56	.103	**.478**
57	-.004	**.655**

Appendix F (cont.) – Pattern Matrix for the 2-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor	
Item	1	2
58	-.004	**.606**
59	.048	**.523**
60	-.067	**.435**
61	-.093	**.624**
62	-.030	**.558**
63	-.051	**.628**
64	-.059	**.581**
65	-.112	**.709**
66	-.111	**.444**

Note: Values in bold met a priori levels for salience (.400).

Appendix G – Pattern Matrix for the 3-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor		
Item	1	2	3
1	-.023	**.730**	-.124
2	.087	**.617**	-.026
3	-.062	**.762**	-.110
4	-.064	**.796**	-.070
5	-.028	**.681**	.000
6	.038	**.496**	.008
7	.002	**.571**	.019
8	.032	**.592**	-.045
9	-.043	**.772**	-.160
10	-.100	**.745**	-.107
11	-.061	.007	.762
12	-.022	-.010	**.841**
13	-.063	.087	**.709**
14	-.056	.075	**.720**
15	-.041	-.055	**.732**
16	-.066	-.084	**.846**
17	.012	.062	**.723**
18	.017	-.093	**.821**
19	-.032	.121	**.736**

Appendix G (cont.) – Pattern Matrix for the 3-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor		
Item	1	2	3
20	-.023	.010	**.808**
21	-.053	**.610**	.232
22	-.075	**.697**	.137
23	.072	**.662**	.107
24	.068	**.591**	.140
25	-.050	**.661**	.106
26	-.020	**.621**	.021
27	-.082	**.628**	.009
28	-.017	**.582**	.138
29	.053	**.597**	.151
30	.054	**.570**	.184
31	**.411**	.089	-.222
32	**.413**	.032	-.179
33	**.403**	.034	-.167
34	**.419**	.087	-.245
35	**.546**	.019	-.222
36	**.591**	.009	-.158
36	**.521**	.010	-.219
38	**.482**	.045	-.213

Appendix G (cont.) – Pattern Matrix for the 3-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

Item	Factor 1	Factor 2	Factor 3
39	.331	-.219	.028
40	.300	.219	-.132
41	**.478**	.119	-.042
42	.195	.284	-.109
43	.216	.283	-.119
44	.351	.093	-.064
45	.354	.245	-.204
46	**.523**	.154	-.152
47	**.586**	.014	.111
48	.339	.106	.275
49	**.516**	.224	.114
50	**.542**	.068	.088
51	**.603**	.024	.110
52	**.599**	.071	.156
53	**.478**	.104	.274
54	**.520**	.076	.145
55	**.509**	-.030	.158
56	**.691**	-.114	.113
57	**.590**	-.020	.064

Appendix G (cont.) – Pattern Matrix for the 3-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor		
Item	1	2	3
58	**.636**	-.092	.089
59	**.537**	-.001	.058
60	**.447**	-.077	-.005
61	**.645**	-.120	.008
62	**.597**	-.151	.121
63	**.656**	-.118	.059
64	**.618**	-.159	.092
65	**.714**	-.074	-.066
66	**.455**	-.105	-.030

Note: Values in bold met a priori levels for salience (.400).

Appendix H – Pattern Matrix for the 4-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor			
Item	1	2	3	4
1	**.757**	-.001	-.155	-.040
2	**.623**	.079	-.043	.029
3	**.765**	-.073	-.124	.028
4	**.826**	-.030	-.105	-.060
5	**.694**	-.015	-.022	-.012
6	**.530**	.081	-.027	-.077
7	**.623**	.076	-.030	-.138
8	**.644**	.098	-.094	-.126
9	**.793**	-.032	-.187	-.023
10	**.761**	-.087	-.130	-.023
11	-.005	-.015	**.763**	-.030
12	-.046	-.010	**.859**	.048
13	.060	-.044	**.721**	.024
14	.061	-.017	**.723**	-.016
15	-.082	-.022	**.747**	.023
16	-.106	-.027	**.856**	-.011
17	.035	.027	**.734**	.035
18	-.133	.021	**.844**	.063
19	.112	.012	**.734**	-.025

Appendix H (cont.) – Pattern Matrix for the 4-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor			
Item	1	2	3	4
20	.011	.043	**.800**	-.065
21	**.596**	-.063	.230	.051
22	**.687**	-.086	.132	.047
23	**.664**	.069	.091	.032
24	**.595**	.072	.123	.019
25	**.633**	-.091	.113	.105
26	**.610**	-.042	.018	.061
27	**.636**	-.074	-.007	-.005
28	**.549**	-.065	.151	.123
29	**.605**	.064	.133	.005
30	**.546**	.021	.187	.098
31	.103	.386	-.239	.045
32	.034	.373	-.186	.078
33	.017	.336	-.161	.136
34	.077	.355	-.244	.125
35	-.049	.387	-.181	.322
36	-.002	**.522**	-.159	.145
36	-.061	.359	-.175	.328
38	-.018	.334	-.175	.300

Appendix H (cont.) – Pattern Matrix for the 4-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor			
Item	1	2	3	4
39	-.224	.306	.030	.059
40	.055	.013	-.021	**.591**
41	-.067	.153	.083	**.679**
42	.024	-.234	.072	**.881**
43	.038	-.192	.050	**.837**
44	-.129	-.022	.088	**.770**
45	.061	.025	-.080	**.671**
46	.007	.246	-.056	**.572**
47	.031	**.582**	.087	.035
48	.118	.356	.255	.002
49	.215	**.474**	.106	.116
50	.078	**.527**	.069	.055
51	.084	**.665**	.054	-.099
52	.102	**.619**	.120	-.009
53	.125	**.499**	.245	-.003
54	.080	**.501**	.130	.069
55	.011	**.552**	.119	-.058
56	-.088	**.695**	.084	.019
57	.046	**.658**	.006	-.117

Appendix H (cont.) – Pattern Matrix for the 4-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

Item	Factor 1	Factor 2	Factor 3	Factor 4
58	-.047	**.670**	.047	-.046
59	.070	**.616**	-.003	-.140
60	.021	**.569**	-.081	-.240
61	-.080	**.666**	-.030	-.027
62	-.135	**.595**	.100	.030
63	-.095	**.654**	.033	.025
64	-.092	**.690**	.035	-.124
65	-.054	**.694**	-.091	.055
66	-.054	**.502**	-.072	-.087

Note: Values in bold met a priori levels for salience (.400).

Appendix I – Pattern Matrix for the 5-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor				
Item	1	2	3	4	5
1	**.772**	.104	-.204	.026	-.192
2	**.631**	.146	-.078	.073	-.108
3	**.776**	.019	-.164	.082	-.164
4	**.824**	-.014	-.103	-.050	-.013
5	**.712**	.123	-.085	.069	-.261
6	**.547**	.197	-.083	-.004	-.219
7	**.635**	.172	-.072	-.077	-.182
8	**.655**	.168	-.127	-.077	-.128
9	**.798**	.008	-.202	.004	-.060
10	**.758**	-.079	-.124	-.020	.001
11	-.021	.035	**.765**	-.030	-.099
12	-.059	.071	**.845**	.063	-.154
13	.036	-.041	**.746**	-.005	.001
14	.047	.045	**.717**	-.008	-.120
15	-.097	.030	**.745**	.024	-.100
16	-.130	-.012	**.877**	-.035	-.029
17	.013	.033	**.752**	.011	-.001
18	-.152	.056	**.848**	.053	-.063
19	.089	.023	**.754**	-.045	-.016

Appendix I (cont.) – Pattern Matrix for the 5-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor				
Item	1	2	3	4	5
20	-.008	.083	.806	-.069	-.078
21	**.585**	-.046	.237	.047	-.012
22	**.667**	-.128	.169	.010	.109
23	**.648**	.019	.122	-.001	.130
24	**.570**	-.025	.179	-.043	.222
25	**.606**	-.182	.173	.039	.212
26	**.585**	-.149	.081	-.009	.240
27	**.609**	-.187	.063	-.079	.246
28	**.519**	-.173	.217	.046	.246
29	**.579**	-.036	.191	-.059	.226
30	**.523**	-.053	.232	.046	.178
31	.069	.107	-.127	-.095	**.592**
32	-.001	.095	-.074	-.064	**.591**
33	-.016	.077	-.058	.003	**.553**
34	.041	.063	-.127	-.025	**.622**
35	-.083	.102	-.077	.175	**.624**
36	-.038	.224	-.048	-.003	**.642**
36	-.089	.113	-.089	.203	**.544**
38	-.047	.085	-.084	.172	**.547**

Appendix I (cont.) – Pattern Matrix for the 5-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor				
Item	1	2	3	4	5
39	-.223	.272	.025	.052	.084
40	.058	.008	-.044	**.588**	.063
41	-.059	.176	.036	**.696**	.018
42	.029	-.188	.029	**.892**	-.028
43	.051	-.111	-.012	**.873**	-.100
44	-.127	-.022	.060	**.763**	.064
45	.049	-.078	-.057	**.611**	.271
46	.017	.251	-.099	**.587**	.053
47	.049	**.636**	.025	.093	-.073
48	.126	**.419**	.210	.047	-.103
49	.228	**.523**	.052	.164	-.056
50	.086	**.535**	.033	.084	.018
51	.101	**.705**	-.001	-.044	-.051
52	.111	**.632**	.080	.025	.010
53	.135	**.556**	.195	.046	-.082
54	.092	**.542**	.080	.113	-.047
55	.023	**.589**	.072	-.013	-.050
56	-.083	**.664**	.057	.032	.099
57	.044	**.585**	.009	-.129	.176

Appendix I (cont.) – Pattern Matrix for the 5-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor				
Item	1	2	3	4	5
58	-.057	**.549**	.071	-.087	.276
59	.062	**.511**	.020	-.173	.237
60	.030	**.555**	-.102	-.216	.039
61	-.077	**.598**	-.037	-.034	.169
62	-.133	**.549**	.088	.028	.125
63	-.080	**.672**	-.018	.068	-.002
64	-.088	**.641**	.022	-.120	.121
65	-.044	**.654**	-.119	.069	.121
66	-.052	**.447**	-.074	-.092	.128

Note: Values in bold met a priori levels for salience (.400).

Appendix J – Pattern Matrix for the 6-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor					
Item	1	2	3	4	5	6
1	.040	-.141	.191	**.656**	.027	-.103
2	.029	.031	.049	**.646**	.074	.046
3	-.009	-.137	.298	**.566**	.082	-.122
4	-.045	-.083	.421	**.527**	-.051	.016
5	.054	-.020	.127	**.648**	.070	-.154
6	-.014	.119	-.252	**.823**	-.001	.066
7	-.008	.096	-.104	**.790**	-.074	.056
8	.038	-.005	.024	**.693**	-.076	.041
9	-.094	-.105	.206	**.687**	.005	.067
10	-.063	-.146	**.487**	.391	-.021	-.030
11	-.091	**.845**	-.166	.176	-.027	.080
12	.007	**.862**	-.083	.052	.065	-.047
13	-.084	**.744**	.094	.006	-.003	.063
14	.007	**.713**	.035	.057	-.006	-.054
15	-.037	**.770**	-.097	.023	.027	.004
16	-.046	**.862**	.020	-.106	-.033	.027
17	.079	**.663**	.251	-.171	.012	-.055
18	.069	**.792**	.063	-.181	.054	-.063
19	-.009	**.739**	.135	.026	-.044	.032

Appendix J (cont.) – Pattern Matrix for the 6-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor					
Item	1	2	3	4	5	6
20	.043	**.797**	.034	.007	-.068	-.014
21	.026	.145	**.552**	.156	.046	-.108
22	-.058	.077	**.661**	.157	.008	.000
23	.033	.086	**.509**	.273	-.002	.092
24	.052	.077	**.658**	.060	-.045	.093
25	-.086	.055	**.733**	.032	.036	.061
26	-.008	-.077	**.805**	-.064	-.012	.027
27	-.040	-.101	**.843**	-.071	-.082	.022
28	-.076	.096	**.706**	-.034	.044	.092
29	.091	.040	**.773**	-.036	-.062	.032
30	.077	.080	**.726**	-.058	.043	-.011
31	-.001	-.032	.062	.071	-.096	**.668**
32	-.033	.040	-.011	.065	-.064	**.695**
33	-.035	.042	-.005	.040	.002	**.644**
34	-.007	-.067	.140	-.030	-.026	**.649**
35	.067	-.048	.126	-.158	.174	**.612**
36	.148	.014	.077	-.056	-.004	**.676**
36	.054	-.035	.030	-.084	.202	**.570**
38	-.047	.040	-.087	.075	.172	**.667**

Appendix J (cont.) – Pattern Matrix for the 6-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor					
Item	1	2	3	4	5	6
39	.327	-.028	-.025	-.224	.051	.007
40	-.078	.050	-.169	.218	**.589**	.181
41	.204	.019	-.045	-.035	**.695**	-.004
42	-.124	-.017	.103	-.077	**.891**	-.085
43	-.094	-.010	-.033	.065	**.872**	-.092
44	.016	.034	-.009	-.136	**.762**	.028
45	-.089	-.039	.090	-.014	**.609**	.272
46	.247	-.082	-.078	.077	**.586**	.064
47	**.691**	-.032	.006	.028	.091	-.141
48	**.461**	.156	.087	.055	.046	-.148
49	**.507**	.062	-.005	.246	.163	-.032
50	**.504**	.058	-.089	.173	.083	.054
51	**.661**	.036	-.162	.247	-.044	.003
52	**.686**	.017	.098	.026	.023	-.066
53	**.620**	.118	.124	.028	.044	-.161
54	**.572**	.044	.018	.074	.111	-.084
55	**.590**	.064	-.086	.095	-.013	-.051
56	**.687**	.028	-.054	-.043	.031	.057
57	**.519**	.062	-.108	.161	-.130	.236

Appendix J (cont.) – Pattern Matrix for the 6-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor					
Item	1	2	3	4	5	6
58	**.568**	.038	.068	-.105	-.089	.219
59	**.504**	.012	.073	.020	-.174	.212
60	**.525**	-.076	-.118	.135	-.217	.063
61	**.677**	-.119	.096	-.175	-.036	.044
62	**.611**	.019	.033	-.175	.026	.031
63	**.756**	-.100	.006	-.113	.065	-.113
64	**.741**	-.082	.120	-.210	-.122	-.026
65	**.680**	-.142	-.050	-.014	.067	.071
66	.393	-.023	-.164	.096	-.092	.181

Note: Values in bold met a priori levels for salience (.400).

Appendix K – Pattern Matrix for the 7-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor						
Item	1	2	3	4	5	6	7
1	**.505**	-.182	-.337	-.119	-.223	.106	-.082
2	**.543**	-.117	-.270	-.060	-.160	.233	.053
3	**.512**	-.224	-.308	-.051	-.183	.037	-.045
4	**.564**	-.258	-.380	-.138	-.029	.054	.003
5	**.535**	-.228	-.302	-.076	-.266	.130	.037
6	**.434**	-.132	-.207	-.127	-.252	.334	.114
7	**.477**	-.185	-.239	-.181	-.202	.364	.120
8	**.474**	-.139	-.279	-.180	-.159	.254	.152
9	**.504**	-.193	-.333	-.115	-.105	.203	-.039
10	**.471**	-.245	-.338	-.092	-.010	-.051	-.102
11	.319	**.410**	.356	.051	.028	.304	.090
12	.383	**.418**	.326	.131	-.026	.161	-.002
13	.348	**.404**	.378	.083	.118	.111	.053
14	.349	**.499**	.388	.048	.003	.086	-.002
15	.360	**.453**	.352	.093	.018	.150	-.041
16	.391	**.425**	.349	.087	.121	.096	-.012
17	.388	**.452**	.307	.083	.110	-.082	.088
18	.326	**.450**	.344	.137	.061	-.017	-.042
19	.315	**.410**	.387	.031	.103	.085	.012

Appendix K (cont.) – Pattern Matrix for the 7-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor						
Item	1	2	3	4	5	6	7
20	.374	**.405**	.385	.017	.053	.098	.030
21	.396	-.332	**.436**	.005	.026	-.152	-.036
22	.398	-.332	**.437**	-.015	.132	-.151	-.028
23	.352	-.206	**.518**	-.056	.103	-.022	.110
24	.309	-.201	**.467**	-.057	.204	-.152	.066
25	.368	-.289	**.436**	.029	.227	-.184	.143
26	.303	-.214	**.462**	-.015	.233	-.278	.105
27	.360	-.254	**.582**	-.063	.258	-.294	.129
28	.343	-.255	**.474**	.050	.246	-.182	.028
29	.314	-.221	**.468**	-.070	.225	-.270	-.009
30	.311	-.225	**.435**	.022	.176	-.283	-.119
31	.220	.347	-.108	**.682**	.359	.221	-.052
32	.201	.346	-.058	**.545**	.361	.260	-.075
33	.203	.332	-.054	**.402**	.326	.223	-.141
34	.212	.366	-.120	**.422**	.382	.145	-.196
35	.258	.366	-.062	**.532**	.368	.099	-.094
36	.320	.374	-.015	**.423**	.302	.174	-.153
36	.235	.346	-.059	**.544**	.291	.136	-.113
38	.240	.308	-.076	**.524**	.302	.284	-.106

Appendix K (cont.) – Pattern Matrix for the 7-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor						
Item	1	2	3	4	5	6	7
39	.064	.266	.143	.010	**.405**	-.073	.236
40	.303	.195	-.127	.301	**.474**	.192	.058
41	.302	.312	-.012	.296	**.548**	-.024	.163
42	.307	.102	-.169	.360	**.542**	-.109	-.028
43	.313	.120	-.170	.303	**.623**	-.005	.007
44	.279	.242	-.031	.289	**.468**	-.034	.108
45	.319	.258	-.174	.348	**.492**	.063	.040
46	.394	.380	-.086	.366	**.544**	.033	.118
47	.379	.345	.135	-.072	-.225	**.457**	-.254
48	.384	.072	.162	-.052	-.171	**.443**	-.292
49	.301	.229	.036	-.011	-.190	**.414**	-.059
50	.373	.301	.089	-.056	-.125	**.439**	-.118
51	.309	.355	.133	-.198	-.214	**.445**	-.237
52	.363	.318	.141	-.121	-.149	**.460**	-.250
53	.380	.171	.184	-.085	-.192	**.496**	-.322
54	.300	.260	.117	-.036	-.169	**.492**	-.176
55	.312	.275	.164	-.119	-.153	**.424**	.007
56	.348	.354	.206	-.101	-.087	**.473**	-.177
57	.324	.374	.122	-.206	.004	.133	**.541**

Appendix K (cont.) – Pattern Matrix for the 7-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor						
Item	1	2	3	4	5	6	7
58	.312	.315	.172	-.147	.094	-.034	**.480**
59	.337	.331	.101	-.212	.075	.008	**.471**
60	.236	.318	.082	-.260	-.074	.041	**.447**
61	.351	.376	.141	-.139	-.005	-.157	**.488**
62	.355	.331	.208	-.064	-.022	-.114	**.506**
63	.389	.357	.170	-.084	-.166	-.177	**.542**
64	.350	.328	.203	-.205	-.026	-.209	**.589**
65	.391	.343	.086	-.088	-.097	-.058	**.451**
66	.205	.340	.082	-.135	-.014	.086	**.467**

Note: Values in bold met a priori levels for salience (.400).

Appendix L – Pattern Matrix for the 8-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor							
Item	1	2	3	4	5	6	7	8
1	.174	-.128	.168	**.636**	-.091	-.051	-.015	-.116
2	.039	.075	-.041	**.721**	.083	.065	.041	-.121
3	.286	-.122	.105	**.556**	-.078	-.080	.047	-.133
4	**.435**	-.085	.019	**.471**	-.085	.002	-.043	.055
5	.130	.000	.062	**.652**	.008	-.148	.059	-.051
6	-.242	.155	-.117	**.875**	.055	.036	.001	.020
7	-.088	.126	-.115	**.823**	.056	.018	-.063	.056
8	.044	.031	-.139	**.739**	.136	-.005	-.059	.060
9	.220	-.116	.045	**.600**	-.186	.052	.013	.089
10	**.492**	-.170	.145	.283	-.208	-.014	-.026	.029
11	-.154	**.846**	-.127	.222	-.004	.047	-.011	.043
12	-.086	**.851**	.059	.074	-.036	-.041	.059	-.023
13	.102	**.740**	-.091	.037	-.010	.042	.008	.014
14	.027	**.711**	.049	.090	-.016	-.036	-.020	-.062
15	-.121	**.776**	.036	.087	-.039	.048	-.010	-.145
16	.006	**.863**	-.015	-.046	-.009	.050	-.052	-.092
17	.266	**.656**	-.009	-.146	.107	-.084	.033	.048
18	.060	**.765**	.140	-.192	-.038	-.051	.052	.011
19	.150	**.713**	.030	-.004	-.057	.005	-.022	.108

Appendix L (cont.) – Pattern Matrix for the 8-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor							
Item	1	2	3	4	5	6	7	8
20	.043	**.781**	.032	.011	.009	-.034	-.052	.070
21	**.555**	.132	.128	.108	-.064	-.092	.039	-.023
22	**.676**	.056	.058	.079	-.113	-.008	.019	.050
23	**.558**	.064	-.043	.188	.021	.004	.060	.268
24	**.689**	.063	-.014	.006	.052	.043	-.008	.162
25	**.757**	.072	-.191	.056	.101	.020	.059	.006
26	**.823**	-.061	-.124	-.044	.135	.000	.003	-.008
27	**.865**	-.082	-.177	-.047	.145	-.014	-.059	.002
28	**.717**	.096	-.069	-.046	.002	.081	.050	-.005
29	**.775**	.039	.072	-.053	.065	.043	-.068	-.008
30	**.709**	.069	.202	-.093	-.047	.046	.006	-.102
31	.091	-.072	-.031	-.042	-.086	**.599**	-.051	.390
32	.001	.013	-.045	-.005	-.086	**.656**	-.046	.283
33	-.011	.014	.050	-.033	-.150	**.645**	-.006	.186
34	.080	-.037	.038	.046	-.013	**.754**	-.121	-.188
35	.075	-.001	-.037	-.027	.152	**.693**	.089	-.200
36	.047	.017	.098	-.040	.051	**.719**	-.051	.051
37	-.023	.007	.002	.031	.099	**.656**	.115	-.203
38	-.085	.015	.007	.011	-.128	**.650**	.171	.203

Appendix L (cont.) – Pattern Matrix for the 8-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor							
Item	1	2	3	4	5	6	7	8
39	.014	.004	-.172	-.127	**.496**	-.094	.111	.184
40	-.126	.017	-.032	.121	-.124	.097	**.641**	.244
41	-.032	.045	-.009	.037	.260	-.036	**.698**	-.022
42	.095	-.016	.049	-.073	-.115	-.054	**.858**	-.203
43	-.026	-.018	.053	.039	-.119	-.092	**.862**	-.093
44	.020	.024	-.036	-.153	.051	-.031	**.793**	.080
45	.114	-.052	-.072	-.054	-.053	.225	**.630**	.103
46	-.080	-.044	.023	.168	.280	.057	**.568**	-.064
47	-.028	-.076	**.760**	-.082	.073	-.053	.042	.083
48	.012	.101	**.866**	-.074	-.231	.037	-.066	-.152
49	.010	.018	**.463**	.123	.083	-.051	.182	.280
50	-.071	-.012	**.530**	-.010	-.012	.030	.113	.384
51	-.172	-.030	**.727**	.073	.000	.039	-.055	.297
52	.059	-.016	**.717**	-.055	.115	.029	-.035	.053
53	.038	.108	**.794**	.016	.047	.033	-.087	-.261
54	-.010	.013	**.609**	-.002	.082	-.012	.068	.058
55	-.081	.050	.374	.063	.276	-.063	-.003	.208
56	-.072	-.013	**.627**	-.137	.157	.100	.008	.203
57	-.050	.062	-.003	.156	**.465**	.094	-.040	**.487**

Appendix L (cont.) – Pattern Matrix for the 8-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor							
Item	1	2	3	4	5	6	7	8
58	.134	.003	.124	-.189	.395	.071	.018	**.586**
59	.125	-.001	.063	-.017	**.401**	.090	-.091	**.469**
60	-.074	-.083	.110	.107	.388	-.040	-.145	**.410**
61	.124	-.049	-.097	.008	**.832**	-.046	.005	.164
62	.049	.056	.070	-.065	**.605**	-.022	.050	.150
63	.009	-.043	.149	.038	**.721**	-.141	.068	.057
64	.127	-.017	.043	-.031	**.797**	-.069	-.110	.084
65	-.068	-.078	.154	.152	**.639**	.083	.036	-.024
66	-.174	.013	.064	.190	.363	.178	-.106	.053

Note: Values in bold met a priori levels for salience (.400).

Appendix M – Pattern Matrix for the 9-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor								
Item	1	2	3	4	5	6	7	8	9
1	.159	-.117	.160	**.592**	-.082	-.039	.014	-.029	-.177
2	.042	.072	-.038	**.715**	.092	.081	.044	-.077	-.116
3	.253	-.096	.084	**.478**	-.073	-.064	.099	.042	-.273
4	**.441**	-.090	.023	**.468**	-.086	-.007	-.049	.025	.004
5	.122	.006	.059	**.622**	.008	-.140	.078	-.008	-.104
6	-.210	.129	-.096	**.924**	.055	.033	-.033	-.098	.096
7	-.059	.103	-.097	**.865**	.052	.011	-.093	-.052	.085
8	.066	.014	-.125	**.768**	.129	-.009	-.081	-.016	.050
9	.230	-.123	.051	**.604**	-.189	.036	.001	.030	.053
10	**.456**	-.142	.120	.203	-.217	-.020	.022	.176	-.189
11	-.145	**.838**	-.125	.239	-.014	.041	-.019	.025	.037
12	-.101	**.862**	.046	.046	-.044	-.036	.084	.056	-.076
13	.102	**.740**	-.096	.036	-.016	.041	.011	.041	-.017
14	.023	**.714**	.044	.080	-.014	-.029	-.009	-.020	-.063
15	-.110	**.766**	.042	.109	-.022	.062	-.019	-.151	-.025
16	.000	**.867**	-.023	-.055	-.005	.060	-.040	-.019	-.095
17	.265	**.657**	-.012	-.148	.098	-.082	.035	.053	.024
18	.047	**.775**	.130	-.214	-.045	-.050	.071	.061	-.024
19	.168	**.699**	.040	.028	-.064	-.009	-.045	.013	.144

Appendix M (cont.) – Pattern Matrix for the 9-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor								
Item	1	2	3	4	5	6	7	8	9
20	.036	**.787**	.025	-.002	-.007	-.039	-.039	.103	-.011
21	**.547**	.139	.123	.082	-.059	-.089	.052	.007	-.057
22	**.662**	.067	.047	.043	-.116	-.014	.035	.102	-.061
23	**.549**	.072	-.051	.162	-.012	-.021	.068	.270	.064
24	**.706**	.051	-.003	.029	.043	.028	-.035	.070	.137
25	**.779**	.056	-.179	.088	.111	.021	.027	-.065	.065
26	**.816**	-.054	-.131	-.066	.137	.007	.011	.055	-.091
27	**.839**	-.060	-.198	-.104	.137	-.007	-.026	.156	-.199
28	**.754**	.068	-.045	.016	.023	.079	-.003	-.155	.160
29	**.812**	.011	.099	.007	.085	.045	-.119	-.161	.149
30	**.731**	.052	.221	-.060	-.017	.056	-.025	-.188	.062
31	.053	-.042	-.061	-.109	-.144	**.556**	-.013	**.556**	-.035
32	-.024	.033	-.066	-.047	-.128	**.622**	-.023	**.419**	-.029
33	.003	.002	.058	-.002	-.162	**.617**	-.036	.143	.146
34	.053	-.018	.019	.000	.000	**.773**	-.089	.070	-.313
35	.098	-.020	-.020	.021	.183	**.716**	.053	-.173	-.034
36	.047	.017	.099	-.035	.045	**.715**	-.058	.128	-.023
37	-.011	-.004	.011	.058	.126	**.679**	.094	-.135	-.079
38	-.072	.004	.013	.039	-.143	**.622**	.142	.161	.171

Appendix M (cont.) – Pattern Matrix for the 9-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor								
Item	1	2	3	4	5	6	7	8	9
39	.051	-.023	-.144	-.053	**.478**	-.097	.059	.000	.280
40	-.143	.032	-.046	.085	-.154	.072	**.655**	.259	.136
41	-.048	.059	-.019	.003	.254	-.016	**.717**	.053	.000
42	.070	.004	.032	-.125	-.090	-.029	**.885**	-.093	-.081
43	-.054	.005	.034	-.020	-.110	-.077	**.894**	.004	-.038
44	.048	.004	-.017	-.103	.058	-.034	**.746**	-.097	.325
45	.151	-.080	-.048	.013	-.043	.213	**.568**	-.089	.332
46	-.087	-.038	.022	.151	.281	.080	**.576**	-.010	-.007
47	-.040	-.067	**.766**	-.109	.063	-.049	.060	.067	.072
48	-.013	.119	**.862**	-.127	-.212	.054	-.027	-.067	-.121
49	.034	.000	**.488**	.161	.061	-.071	.149	.077	.337
50	-.021	-.051	**.574**	.080	-.033	-.007	.041	.031	**.541**
51	-.142	-.055	**.762**	.127	-.019	.013	-.096	.047	.383
52	.052	-.011	**.726**	-.073	.109	.036	-.022	.042	.050
53	.025	.117	**.800**	-.014	.076	.071	-.060	-.183	-.151
54	-.007	.011	**.623**	-.001	.079	-.008	.066	-.006	.116
55	-.091	.059	.375	.041	.242	-.068	.013	.205	.079
56	-.036	-.041	**.665**	-.069	.149	.089	-.042	-.031	.359
57	-.089	.095	-.028	.083	.378	.066	.012	**.625**	.001

Appendix M (cont.) – Pattern Matrix for the 9-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor								
Item	1	2	3	4	5	6	7	8	9
58	.135	.005	.129	-.185	.320	.028	.009	**.488**	.314
59	.069	.045	.026	-.122	.314	.063	-.018	**.681**	-.087
60	-.068	-.086	.120	.120	.331	-.067	-.153	.316	.216
61	.134	-.056	-.083	.030	**.797**	-.030	-.006	.143	.083
62	.073	.038	.095	-.017	**.584**	-.014	.018	.038	.193
63	-.005	-.031	.149	.011	**.693**	-.113	.094	.137	-.055
64	.122	-.011	.047	-.039	**.767**	-.044	-.096	.145	-.044
65	-.069	-.076	.163	.150	**.627**	.114	.043	.034	-.051
66	-.210	.042	.042	.124	.331	.190	-.053	.264	-.215

Note: Values in bold met a priori levels for salience (.400).

Appendix N – Pattern Matrix for the 10-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
1	-.088	.069	.143	**.722**	-.006	-.024	-.011	-.037	-.101	-.135
2	.094	-.019	-.050	**.773**	.149	.090	.025	-.084	-.025	-.083
3	-.083	.186	.081	**.593**	-.064	-.058	.086	.035	.019	-.224
4	-.076	.385	.013	**.528**	-.036	.003	-.060	.025	-.077	.032
5	.044	.020	.034	**.750**	.122	-.118	.045	-.015	-.167	-.091
6	.128	-.208	-.099	**.856**	.054	.030	-.034	-.097	.115	.194
7	.056	.025	-.068	**.689**	-.112	-.019	-.055	-.046	**.420**	.254
8	-.031	.143	-.095	**.612**	-.034	-.038	-.044	-.010	**.409**	.193
9	-.109	.176	.037	**.654**	-.131	.047	-.012	.029	-.074	.110
10	-.112	.354	.103	.372	-.136	.000	-.003	.169	-.162	-.187
11	**.846**	-.145	-.130	.197	.007	.045	-.023	.025	.008	.052
12	**.867**	-.105	.047	.046	-.051	-.035	.082	.054	.034	-.057
13	**.735**	.116	-.089	-.004	-.042	.037	.017	.042	.063	-.009
14	**.712**	.029	.048	.063	-.036	-.032	-.005	-.021	.055	-.039
15	**.798**	-.160	.021	.157	.091	.078	-.044	-.155	-.203	-.061
16	**.872**	-.001	-.022	-.063	-.003	.060	-.041	-.022	.005	-.104
17	**.659**	.264	-.011	-.155	.097	-.082	.036	.055	-.019	-.009
18	**.772**	.058	.134	-.221	-.069	-.052	.075	.061	.025	-.022
19	**.712**	.150	.028	.021	-.006	.001	-.053	.016	-.122	.129

Appendix N (cont.) – Pattern Matrix for the 10-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
20	**.786**	.043	.027	-.028	-.028	-.040	-.035	.103	.054	.006
21	.155	**.489**	.114	.175	-.010	-.080	.039	.006	-.129	-.073
22	.072	**.620**	.046	.116	-.105	-.010	.031	.101	-.057	-.066
23	.069	**.531**	-.049	.176	-.033	-.018	.071	.273	.042	.078
24	.045	**.700**	-.001	.022	.036	.027	-.029	.076	-.020	.123
25	.048	**.777**	-.172	.074	.101	.015	.035	-.060	-.014	.029
26	-.059	**.798**	-.121	-.030	.109	.002	.017	.056	.015	-.135
27	-.060	**.805**	-.188	-.036	.112	-.009	-.024	.154	.019	-.254
28	.059	**.761**	-.042	-.010	.028	.073	.005	-.148	-.065	.129
29	-.007	**.833**	.109	-.034	.050	.032	-.102	-.154	.011	.144
30	.024	**.767**	.239	-.097	-.096	.037	.000	-.182	.083	.088
31	-.032	.024	-.068	-.065	-.140	**.569**	-.023	**.551**	.044	-.036
32	.038	-.038	-.070	-.031	-.130	**.631**	-.030	**.414**	.063	-.023
33	.007	.001	.047	-.016	-.127	**.624**	-.043	.142	-.039	.149
34	-.006	.019	.018	.072	.007	**.775**	-.100	.057	.045	-.327
35	-.025	.117	-.016	-.010	.172	**.706**	.054	-.178	.057	-.064
36	.016	.051	.099	-.042	.031	**.713**	-.060	.123	.075	-.022
37	-.019	.026	.023	.011	.070	**.663**	.104	-.140	.152	-.073
38	.006	-.066	.005	.013	-.121	**.627**	.136	.161	-.007	.177

Appendix N (cont.) – Pattern Matrix for the 10-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
39	-.002	.035	-.162	-.076	**.565**	-.085	.043	.004	-.160	.175
40	.049	-.181	-.061	.141	-.097	.089	**.634**	.258	-.101	.123
41	.060	-.052	-.015	.028	.234	-.019	**.711**	.051	.046	-.034
42	-.014	.093	.050	-.099	-.162	-.042	**.893**	-.093	.084	-.079
43	-.013	-.032	.050	-.002	-.183	-.088	**.901**	.004	.109	-.015
44	-.001	.070	-.020	-.134	.079	-.035	**.743**	-.090	-.094	.277
45	-.067	.135	-.065	.019	.049	.224	**.551**	-.084	-.214	.269
46	-.027	-.109	.018	.192	.297	.082	**.563**	-.014	.000	-.039
47	-.060	-.063	**.756**	-.038	.062	-.045	.055	.065	-.019	.120
48	.129	-.053	**.852**	-.008	-.203	.058	-.035	-.073	-.055	-.050
49	-.026	.084	**.494**	.079	-.021	-.083	.169	.086	.157	**.432**
50	-.059	.008	**.561**	.010	-.021	-.005	.046	.042	-.045	**.605**
51	-.064	-.119	**.751**	.084	-.036	.013	-.090	.054	.033	**.485**
52	-.016	.051	**.724**	-.039	.066	.032	-.018	.041	.071	.112
53	.109	.025	**.805**	.040	.015	.059	-.053	-.189	.106	-.071
54	.001	.007	**.623**	.001	.032	-.014	.074	-.004	.079	.182
55	.030	-.037	.392	-.029	.107	-.085	.038	.208	.294	.165
56	-.021	-.064	**.637**	-.041	.238	.104	-.059	-.028	-.191	.354
57	.098	-.100	-.028	.080	.323	.072	.010	**.622**	.203	.014

Appendix N (cont.) – Pattern Matrix for the 10-Factor Solution for the Academic Competence Evaluations Scales-College (ACES-College)

	Factor									
Item	1	2	3	4	5	6	7	8	9	10
58	.024	.107	.109	-.174	.369	.047	-.006	**.492**	-.076	.261
59	.031	.082	.040	-.131	.191	.059	-.005	**.679**	.306	-.058
60	-.064	-.105	.099	.134	.393	-.049	-.171	.317	-.065	.194
61	-.050	.135	-.084	-.002	**.782**	-.033	-.008	.143	.090	.009
62	.085	-.001	.060	.053	**.737**	.011	-.019	.036	-.269	.068
63	-.032	-.001	.155	.009	**.631**	-.121	.097	.135	.173	-.080
64	-.006	.118	.049	-.044	**.731**	-.049	-.096	.143	.124	-.102
65	-.067	-.082	.160	.162	**.613**	.111	.036	.029	.099	-.078
66	-.030	-.075	.098	-.050	.014	.142	.006	.264	**.708**	-.070

Note: Values in bold met a priori levels for salience (.400).

Vita

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Education

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Community College of Allegheny County – Clearfield, PA 16830

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Publications

Kuterbach, J. M. (2007) Factor structure of the new imaginary audience scale in a sample of female college students. *College Student Journal, 41*, 813-822.

Arthur, A.G., FitzGerald, J. L., Kuterbach, J. M., Morgan, R. J., & Worrell, F. C. (2004). Reliability and validity of the school climate and safety survey. *Pennsylvania Educational Leadership, 23 (2)*, 42-49.

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Awards

Educator of the Year – 2012 – DuBois Educational Foundation

Excellence in Academic Advising - 2009-2010 – Penn State DuBois