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The Effect of Locus of Control on Choice of Academic Major

Jessica Kirschten
Carroll College, Helena, MT

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The Effect of Locus of Control on Choice of Academic Major

Jessica Kirschten

Carroll College
This thesis for honors recognition has been approved for the Department of Psychology by:

Thomas Hamilton, Director
Associate Professor of the
Department of Psychology

Joy J. Holloway, Ph.D.
Assistant Professor of the
Department of Psychology

Jacqueline Brehe, Ph.D
Associate Professor of the
Department of Natural Sciences

April 13, 2010
Abstract

The purpose of this research was to study the relationship between the personality dimension locus of control and choice of academic major. One-hundred-and-seventeen college students voluntarily responded to a locus of control survey. Based on their academic major, students were placed in three categories: natural science, social science, and professional science. The initial hypothesis was that due to research opportunities, expectation of future education, and rigorous undergraduate coursework, students with an internal locus of control would have a greater tendency towards choosing a natural science major. The data analysis showed there were no statistically significant differences in the distribution of frequencies across categories of locus of control and academic major.
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The Effect of Locus of Control on Choice of Academic Major

For decades there has been an interest in the power of positive thinking to promote, maintain, and ensure a sense of overall well-being. Only recently, however, has scientific attention been devoted to the possibility that personality characteristics can have beneficial effects on an individual. Individual characteristics, such as locus of control (which is the extent to which an individual attributes the outcome of events to factors under his or her control) are elements that not only have historic value and continue to be common in research, but also have been found to be connected to specific life style habits, individual personality traits, and overall health and wellness (Scheier & Carver, 1987). These characteristics can also affect life choices, such as academic major. This research project focuses on how an individual’s personal tendency towards internal or external locus of control can be related to his or her choice of academic major.

The original locus of control theory was created by researcher Julian B. Rotter in 1966. Rotter defined this personality characteristic as follows:

When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him (p. 1).

Since Rotter’s study, locus of control has been redefined to provide a more thorough understanding. This personality characteristic refers not only to a person’s belief about who or what controls the outcome of events, but locus of control also indicates whether or not people believe they have control of their own destiny (Mirels,
1970). Essentially, this term refers to who or what is responsible for the happenings in an individual’s life.

The original definition has been expanded further by indentifying two main personality categories. Those individuals who consider events to be under their own control are known as “internals,” while those who attribute life events to circumstances beyond their control are referred to as “externals” (Nowicki, Duke, & Couch, 1978, p. 482). In general, people with an internal locus of control perceive themselves as having control over various outcomes in their lives, while people who are externally controlled typically perceive things to happen by luck (Mirels, 1970).

Those who used Rotter’s methods were among the first to apply a behavioral construct, such as locus of control, to an objective outcome, such as success or academic major. However, the locus of control theory was not the first attempt to correlate behavior with a personality construct. Social Learning Theory (SLT) was the main foundation for studying human nature prior to locus of control research (Rotter, 1982). SLT was developed as an attempt to account for human behavior in relatively complex social situations. To further understand and explain these complex social environments, various areas including social influence, parental control, health, and values were studied. Over the course of these studies, scientists began to notice a pattern. During several studies, an individual’s response to a situation appeared repeatedly, often depending on the nature of a situation. For example, if a student studied one hour for an exam, he or she was likely to study the same amount of time regardless of the subject. Furthermore, individuals tended to have the same reaction over time when the study was repeated. For example, if
a student studied one hour for a history test in 1999 and performed well, he or she was likely to study one hour in 2009 for a comparable test (Rotter, Chance, & Phares, 1972).

The Social Learning Theory research was the basis for what is now termed Locus of Control. The Social Learning Theory principles were used to create a scale that measured an individual’s level of internal or external tendency. Developed by Phares in 1957, a likert-type scale containing 13 questions measured external attitudes and 13 items focused on internal attitudes (Gurin, Gurin, & Morrison, 1978). Building on the original scale, W.H. James expanded the test to a 26-item likert format scale. The final and most complete scale was developed by Rotter and Seeman. In order to produce more statistically significant results, the scale contained subscales for different areas such as achievement, affection, political ideas, and general social attitudes (Rotter, 1966). Currently the scale remains one of the most widely used scales and has been used to compare a variety of variables.

After a concrete definition and formal scale was developed, locus of control rapidly gained popularity in the scientific field. Due to the common terms and ability to apply the locus of control concept to a large variety of topics, researchers soon began to explore how the locus of control trait helps those who display the internal characteristic (Scheier & Carver, 1987). Among the popular areas of study were: coping methods, personality traits, health and overall well-being.

Coping methods, or how people overcome difficulties, such as a family death, loss of a job, or moving to a new town, have become a common psychological research topic. Researchers have found that whether or not a person feels in control over a situation, or attributes outcomes to an internal factor, are not only are more likely to
overcome obstacles, but are also more likely to display confidence in learning (Shell & Hunsman, 2008). In order to expand on the effects of locus of control on coping mechanisms, Shell & Hunsman polled 397 undergraduate students at a large southwestern university. Participants received the Rotter Locus of Control Scale, as well as an Expectancy for Success Measurement. The participants were asked to rate their confidence in receiving an “A” in an upper division psychology course on a scale of 0 (no chance) to 100 (complete certainty). Those who scored high on this scale were said to have “high self-efficacy” (or the belief that one is in control) for learning strategies, and a high outcome expectancy for learning. This indicates that there is a correlation between students who believe they are in control, and those who can adapt to any learning environment.

Continuing studies elaborated on this topic and have shown that internality can be a factor in the use of more effective coping mechanisms. In Shell and Hunsman’s study (2008), participants were given a packet containing the Life Orientation Test (designed to measure optimism) and a coping checklist. The coping checklist provides a self-report measure of two different coping strategies. The first strategy, known as problem-focused coping, focuses on removing a stressful event or the source of stress. The second strategy, termed emotion-focused coping, focuses on removing the emotional distress caused by a stressful event. For example, in a situation with a student preparing for midterm exams, problem-focused coping would search for the item causing stress, such as the upcoming exam, and work to resolve the issue, perhaps by studying for the exam. Emotion-focused coping, however, removes the symptoms, such as a headache produced by the pressure of an exam. Results showed that those with an external locus of control tend to disengage or
exhibit a “giving up” response and move on to a new goal, while internals use a problem-focused coping method and eliminate the cause of the stress. Moreover, internals were more likely to seek social support when needed (Scheier, Weintraub, and Carver, 1986).

Successful coping methods are determined not only by an individual’s thought process, but by his or her actions as well. Liu, Kurita, Uchicama, Okawa, and Ma, (2000) studied the effects of locus of control on behavior, by having Chinese adolescents complete various scales to measure the relationship of behavior problems to internal characteristics. The self-report scale measured behavioral problems, negative life events, locus of control, and demographic variables. The study showed that the risk for behavioral problems increased significantly with a greater external tendency. Furthermore, the researchers hypothesized that having an internal locus of control served a protective function by altering how an individual perceived and reacted to a situation. For example, individuals with internal locus of control may be more likely to believe they can control the outcome of negative events, and work to reduce or avoid negative effects.

Along with life style habits, the fields of psychology and sociology have used the locus of control continuum to study the differences in individual personality traits, including motivation, goal orientation, and social skills. Motivation has recently been identified as an important research topic as well as a critical component of academic success. In a 1999 study by Wang, Kick, Fraser, and Burns, 1927 participants were given Rotter’s Locus of Control Scale and the Rosenberg Self-Esteem Scale. Information about academic aptitude, gender, education, social class, and race was also collected. The researchers discovered that those with an internal locus of control showed higher self
motivation, superior academic performance, higher social maturity, and greater
independence in academic settings.

In addition to the above results, academic success and locus of control have been
extended beyond K-12 education, into college and university systems. In order to expand
research on the locus of control theory to collegiate settings, Ozmete (2007) surveyed 240
university students using Rotter’s Locus of Control Scale. During personal interviews,
Ozmete found that college students with a strong internal locus of control believe their
grades are determined by their own abilities and efforts. Essentially, internal students
believe the more they study, the better they will perform in a class. Therefore, if an
internal individual performs poorly on a test, he or she is more likely to accept
responsibility, discover weaknesses, and change study strategies to be more successful.
Because of this determination, internal individuals tend to have higher academic
achievement. Conversely, students with an external locus of control believe their grades
are based upon luck, and believe that working hard is pointless since they have no control
over the situation (Ozmete, 2007).

Goal orientation is a second personality trait that has been associated with locus
of control. The ability of an individual to achieve a goal depends on how he or she
interprets a situation, and then chooses to continue with the goal, or give up and turn his
or her focus to something else. During a 2008 study, achieving a goal was linked to an
internal locus of control, while a more external locus of control was linked to strategies
such as self-handicapping (so that the circumstances, rather than lack of ability, are seen
as the cause of a poor performance), and pessimistic attitudes (believing an individual
will never achieve the set goal). Furthermore, an individual with an internal locus of
control also shows a tendency to remain focused on his or her goals and strives to achieve set guidelines (Shell & Husman, 2008).

To achieve a goal, many people use a concept known as life management (the process of using available resources to achieve a goal). The life management concept states that while each individual has his or her own resources, attitudes, talents, and skills that can be used during a situation, it is how an individual uses these resources that determines whether or not he or she will be successful. Research also shows that internal individuals are more likely to use available resources, such as the life management idea, to take steps and work toward a goal (Ozmete, 2007). For example, individuals with an internal locus of control not only identify a time period for when they would like to accomplish a task, but also create concrete steps that they need to complete before the task can be accomplished.

Social interactions are a third variable that has been explained in the locus of control research library. Individuals generally believe that their ability to establish and maintain effective relationships is at least partially under their control (Long, Williams, Gaynor, and Clark, 1988). To explore the difference in social interactions among internal and external subjects, Lefcourt, Martin, Fick, and Saleh (1985) paired 42 students who had not previously met, and observed their interactions. The participants watched a film and then discussed the different aspects of the movie. During this study it was observed that those with an internal locus of control were more observant and were more likely to actively engage in conversation. Non-verbal social interactions were also studied in this research. Individuals who had an internal locus of control were found to nod more often while listening to their peers. Researchers even stated that “it is evident that persons who
are external with respect to affiliation are less apt to be socially skillful, are less attentive to and communicative with others — behaviors that probably restrict their likelihood of learning about how social interactions transpire” (p.758-759). Building on this research, Geist and Borecki (1982), studied the degree of social discomfort as a result of an individual’s tendency towards internal or external locus of control. Introductory Psychology students at the University of Alaska were given the Social Avoidance and Distress scale, as well as Rotter’s Internal-External Control of Reinforcement Scale. Researchers found that subjects who reported high social avoidance and distress, and perceived that they had less control over the rewards in life, were significantly more externally oriented.

Locus of control affects not only life style habits and personality traits, but also plays a role in physiological health. In a study by Sheier & Carver (1987), a group of college students was observed during the final four weeks of their academic semester, a time that is normally very stressful for college students. Students were asked to submit a locus of control scale as well as a physical symptom checklist at the beginning and end of the four weeks of study. This study found that internal locus of control was negatively associated with symptom reporting during both assessment periods. More importantly, internal locus of control and symptom reporting were negatively correlated across time. That is, persons who reported an internal tendency at the start of the study were those who reported fewer symptoms weeks later. Scheier, Weintraub, and Carver (1968) continued this research and found that there is a significant interaction between locus of control and systolic blood pressure. Hospital patients were given a locus of control scale and then had their blood pressure measured twice per day. Daily checks occurred twice a
day and were used to measure the patient’s vitals, give necessary medications, and answer any questions or concerns the patient or family might have had. The patients were in the hospital for a variety of reasons and different lengths of time. Patients who held an internal locus of control had lower blood pressure and were more likely to maintain the low scores over a period of time.

Another important consideration is that the locus of control characteristic does not simply develop with one experience. Rather, people develop personality characteristics over the course of their lifetimes (Ozmete, 2007). An internal or external locus of control is reinforced when a person has had more than one successful outcome, in which he or she had obvious control over the situation (Fontaine, Manstead, & Hugh, 1993). For example, if a student received a high score on a paper, he or she may have developed an internal tendency, or attribute this successful outcome to him- or herself. If the student continued to produce high scores, this reinforced an internal locus of control, and developed a stable internal pattern over time.

Additionally, an individual’s belief about a situation is perhaps the most critical concept behind locus of control research. Results depend on how a person perceives the environment, not necessarily how the environment actually is. This means that an individual does not need to actually have control over a situation. Rather, the individual needs to believe he or she has control over the situation (Rotter, 1966). Stated another way, Rotter’s studied showed that in order for change to occur, the individual must value the reinforcement presented. For example, when people with an internal versus external locus of control are reinforced, an internal locus of control has a more meaningful reaction because they believe they had control over the situation, and therefore caused the
positive action to happen. Conversely, externals were not likely to change their actions since they did not believe they personally influenced the outcome or reinforcement (Ozmete, 2007).

Since locus of control is a personality characteristic that is exhibited throughout all ages, scientists have recently explored the idea of how locus of control affects life decisions, such as choosing an academic major in college. Selecting a major may be one of the most important factors in determining a student's future. After surveying 111 college students in areas of decision-making and academic major, Galotti (1999) discovered that the decision to choose an academic major is not based only on geographical area and parental influence, but also depends on important characteristics such as gender, interests, values, and abilities. Students were randomly surveyed approximately 16 months before an academic major was chosen. They were then contacted again eight months after declaring an academic major. During this time, students were asked to list criteria they used to select their academic major. Researchers found that students were not actually aware of a formal decision-making process, but instead used memories, past experiences, and values to influence their decisions. Basically, Galotti identified intrinsic values, such as locus of control, as a contributing factor in choosing an academic major.

To support this finding, a 1990 study of 900 students sought to measure whether or not values correlate with academic major. Standardized questionnaires were given during three different semesters, and the participants were randomly selected from a campus of about 22,000 students. Researchers found that an individual’s values differ depending on academic major. Moreover, because of individual differences, students are
naturally drawn to intellectual classrooms, problem solving situations, or artistic environments. For example, if students are in an intellectually challenging classroom, they may be more adept at the sciences, while those who enjoy ceramics may be inclined to practice music (Biddle, Bank, Slavings, 1990).

The above study stated that different educational environments may also affect a student’s success in a given academic major. It is no secret that different majors offer different research opportunities, varying expectations for future education, and more demanding coursework. At Carroll College, a small private Catholic college of approximately 1500 students, all students are given the option of completing a research project as part of a senior thesis in order to graduate with honors. However, over the past five years, 122 students in the natural sciences (Biology, Chemistry, Nursing, and Engineering) have completed a research project, while only 54 in the social sciences (Psychology, Sociology, Theology, Philosophy and History), and 13 in the professional sciences (Business, Communications, Public Relations, and Literature) have completed a project. Moreover, students in the natural science departments have a greater expectancy for graduate school. During the past three years, 14 natural science students have continued on to graduate schools, while seven social science students and four professional science students have pursued post-baccalaureate education (Gallinger, 2009-based on limited data). Additionally, the majority of the post-baccalaureate natural science students are headed to medical, dental, or other highly selective programs. In order to prepare for such rigorous coursework, students in the natural science majors are also faced with more intense undergraduate courses.
Hypothesis

Due to the research opportunities, expectation of further education, and rigorous undergraduate courses, students with an internal locus of control have a greater tendency towards choosing a natural science major. To test the above hypothesis, this study titled *The Effects of Locus of Control on Choice of Academic Major* determined the relationship between choice of academic major and the locus of control personality characteristic of a college student. This project was developed to confirm whether or not an individual’s locus of control can shape a life decision such as academic major.

Method

Participants

The applicants in this study were 178 college students attending Carroll College, a small, private, Catholic college located in Helena, Montana, with an enrollment of approximately 1,500 students. 56 surveys were removed because they were completed by a student of freshman or sophomore status. A total of 117 people participated in the study including 54 juniors (60-90 credits) and 63 seniors (90+ credits), with 75 being female and 42 being male. The participants completed an online survey measuring locus of control. The students participated in the study on a voluntary basis and were in no way influenced by their class standing or grade to participate in the study. The results of the survey were anonymous and in no way linked with the student who completed the survey.

Materials

The materials for the present study consisted of the Nowicki-Strickland Locus of Control Scale for Adults (Nowicki & Duke, 1974). Traditionally a paper-based form, the
survey was converted into an electronic document that reported the results to the researcher. The participants were asked to list their academic major, grade level, and gender (Appendix A). Students were asked 40 questions and asked to respond either yes or no by clicking the appropriate button on the screen. This survey was originally created to measure the extent of internal or external locus of control as defined by Julian B. Rotter. Satisfactory reliability and validity for the use of this scale with this population are reported elsewhere (Nowicki & Duke, 1978). Test-retest reliabilities sampled with children at three grade levels were .63 for the third grade, .66 for the seventh grade, and .71 for the tenth grade. (Nowicki & Strickland, 1973). Additionally, when the scale was altered to eliminate previous flaws, and focus on college adults, the analysis of data suggested that the scale was psychometrically sound with the test-retest reliability being $r = .83$, $N = 48$, while the split-half reliability ranged from .74 to .86, $N = 158$ (Nowicki & Duke, 1984). Further analysis of data supported the validity of the scale due to the following results:

a. Positive correlations between the scale and Rotter ($r = .68$, $df = 47$, $p < .01$),

b. Significant relations with the Eysenck Neuroticism Scale (males, $r = .36$, $df = 35$, $p < .05$; females, $r = .32$, $df = 46$, $p < .05$),

c. Significant relations with the Taylor Manifest Anxiety scale (males, $r = .40$, $df = 46$, $p < .05$; females $r = .40$, $df = 46$, $p < .05$).

The experimenter of this study was a Caucasian, female, college student.

To interpret the results, the Nowicki-Strickland guidelines (Table 1) were used. Total scores on this instrument indicated either an internal or external locus of control.
Participants were categorized by the following criteria: External (12-40) Internal (0-11) (Nowicki & Strickland, 1973).

Procedure

With the help of the Carroll College IT department (Campus Computing and Information Technology), an online survey was formed using the Google-docs program (GoogleDocs). This program provides various survey templates that can be altered for personal use. The survey mirrored the Nowicki-Strickland questions, and included additional questions regarding academic major, gender, and grade level. The survey was then linked to the Carroll College students' webpage and was available to the public for 11 days beginning November 5, 2009 and ending November 15, 2009. Carroll College webpage is a public Internet site that is not restricted to any persons. The following directions were posted on the top portion of the survey:

Thank you for participating in this survey. This survey will be used for a senior level honors thesis and will be anonymous. Your name will not appear in any of the results or research and this will have no effect on your classes or grades.

Please answer the questions honestly and accurately.

Once the data were collected, 56 surveys were removed because they were completed by a student of freshman or sophomore status. Three were removed because the academic major was listed as undeclared, and two were removed because they were incomplete. One-hundred and seventeen surveys were sorted into one of the following three main categories based on academic major (Figure 1):

2. Natural Sciences: Biology, Chemistry, Physics, Nursing, Engineering, and Health and Physical Education


The scores were totaled using the Norwicki-Strickland standards (Table 1). The total score indicated either internal (0-11) or external (12-40). Data were organized in categories including internal and external social science, natural science, and professional science majors. A chi square data analysis was conducted to determine differences in major choice related to internality and externality.

Results

The data were organized in categories including internal social science, professional science, and natural science majors, and external social science, professional science, and natural science majors. For each given category the total number of internal or external locus of control scores were totaled (Figure 1). The mean, median, maximum, and minimum scores for each category were determined (Table 2). Frequency data were organized for analysis using the chi square statistic for independence (Tables 3 & 4). The data analysis indicated that there were no statistically significant differences in the distribution of frequencies across categories of locus of control and academic major, 1, p>.01 (Table 5).

Discussion

The purpose of this study was to examine the relationship of locus of control on choice of academic major. The initial hypothesis was that due to research opportunities, expectations of further education, and rigorous undergraduate courses, students with an internal locus of control have a greater tendency towards choosing a natural science
The data collected in this study did not support the initial hypothesis. Rather, it was found that, although the natural science majors had slightly more internal responses, there was not a statistically significant relationship.

Testing factors such as college size, testing environment, and survey length may have been some of the reasons to explain the outcome of the present study. Even though smaller sample sizes have been used successfully in previous research studies, the scores might have been more representative of the hypothesis with a larger sample size. The college size may have also been a factor that contributed to the sample size issue. For example, a small college such as Carroll often specializes in a particular field or group of majors such as pre-medicine. This may attract students who naturally tend to have an internal locus of control. A study performed by Nowicki and Strickland (1973) exemplified this statement. When 1017 students from a large metropolitan area were measured with an identical scale, their locus of control scores averaged 12.255, while Carroll College students averaged 11.5. This indicates that Carroll College students tended to score more towards the internal end of the locus of control scale.

How the participants were selected may have also affected the results of this study. Participants were obtained on a voluntary basis through an online Internet website. The survey was available to any individual who could access the Carroll College student webpage. This form of recruiting presents two possible problems: non-Carroll students filling out a survey, and a non-formal setting not encouraging students to take the survey seriously. Since the study focused on Carroll College students in particular, the involvement of non-Carroll students may have altered the results. Perhaps Carroll College students are more likely to have an internal locus of control versus non-Carroll
students. Secondly, students accessed the survey during spare time without supervision or guidelines. This allowed students the freedom to select any answer without regard to their honest opinion. Perhaps if they were in a more controlled setting such as a classroom, students would feel more obligated to take the survey seriously and respond accordingly. Additionally, the Nowicki-Strickland survey was 40 questions long. This may have been too long to retain a subject’s attention and focus, producing results that were not well thought out and accurate.

How the actual scores were divided into internal or external categories could be another contributing factor affecting the results. For the present study, any scores ranging from 12-40 were considered external locus of control, while any scores ranging from 0-11 were considered internal scores. In the original study performed by Nowicki and Strickland (1973), the following numbers were used to interpret an individual’s locus of control scores: External (16-40), Intermediate (7-15), and Internal (0-6). The internal and external scores provide concrete examples for how an individual interprets a situation. A score above 15, or external score, suggests that one has a fairly strong belief that events are beyond one’s control. In other words, the participant believes there is not much connection between an individual’s behavior and the outcomes of an event. In contrast, internal scores, or those below seven, indicate that an individual has a firm belief in his or her ability to influence the outcomes. The intermediate category was removed for this study because items in this range are frequently selected, and are difficult to interpret. Intermediate individuals have inconsistent views about the degree to which they can control their own fate. For example, in some situations, such as preparing dinner regularly for a family, the person perceives him- or herself to be in control. However,
other areas, such as dealing with confrontations at work, may feel uncontrollable for the same individual. If this intermediate category had been included in the study, it may have affected the distribution of results across majors. Perhaps fewer students would have been in the external or internal category, and instead would have centralized more toward the intermediate category. Further research would identify whether the intermediate category is necessary for accurate results.

In addition to redefining the score categories, reorganizing how the academic major categories were arranged might have affected the results as well. The original categories were based on similarities between majors (such as similar coursework and hours spent on homework). However, if the categories were based on concrete definitions, perhaps the results of the current study would have been different. For example, if the professional sciences were defined as those majors that typically enter the workforce immediately after graduation, majors such as Nursing would have been added to the professional science category, while Literature and English would have been removed. Moreover, a fourth category might have been beneficial to the divisions among majors. This category could have been titled “Arts and Humanities” and consisted of majors such as Literature, English, Philosophy, and Theology. The possibilities for more appropriate categories are numerous, and only further research will help identify the optimal arrangements of majors.

A fourth element that may have affected the results was the method used to analyze the data. Although the majority of locus of control research has divided groups into external and internal categories, it may have been useful to analyze individual scores and compare the three groups to one another. Rather than using mean values from each
group, analysis between individual scores may have provided additional information that would help validate this study. Future research could explore and exhaust all the statistical analysis options.

A final factor that affected the results of the present research is that this study focused only on junior and senior college students. This was done to ensure that the students had not only finalized their choice of academic major, but also had enough experience to have concrete personal beliefs and values such as locus of control. The original data suggested that students with an internal locus of control who performed poorly on an exam were more likely to alter their study habits to succeed in a particular course, while those with an external locus of control who had performed poorly, had a tendency to blame the system, teacher, or other entity. This could lead to the external students experiencing poor grades, failure, and possibly switching their major. Moreover, if a student is not comfortable with his or her grades, he or she may choose to leave a particular setting and choose a new environment where he or she may be more successful. For example, if a student with an external locus of control attended Carroll College and did poorly in a biology course, he or she might have decided to change to a major in Psychology. This change would typically be made during the freshman or sophomore years. However, if this explanation were valid, students with an external locus of control would be found in other major categories defined by this study. Since this was not the case, and very few students had an external locus of control regardless of major, it may be that the external locus of control students not only changed majors, but possibly transferred out of Carroll College to another institution.
This view is supported by data produced by Dawn Gallinger of the Institutional Effectiveness office on Carroll College campus (Gallinger, 2009). According to her data, an average of 71 students transfer out of Carroll College between the freshman and sophomore years. This pattern continues over the course of four years, during which each class loses an average of 157 students from the freshman to senior years. For example, 308 students entered Carroll College in 2003, while only 158 students graduated after four years of education. This indicates a loss of 49.7% of the students attending Carroll College. Rather than specific academic majors simply lacking the external locus of control variable, perhaps the students who left the college were the students who possessed the external locus of control trait. Additional studies focusing on different age or class categories, as well as surveying students who are leaving or transferring out of Carroll College, may provide alternate results.

Although the effects of locus of control play an obvious role in an individual’s academic achievement, there may be other factors that contribute to an individual’s choice of academic major. Galotti (1999) stated that on a self-reporting survey, students list up to seven criteria when choosing their academic major. Parental influence, and personal interests, such as enjoying working with numbers versus being around people, are just two of several factors that can influence a college student’s choice of an academic major. Additionally, Cebula and Lopes (1982) identified possible reasons for a student to select a particular academic major. After surveying students and comparing the results to average salaries, researchers identified both financial and non-monetary reasons for students to select an academic major. Non-monetary reasons consisted of the teaching quality in the department, a department’s reputation, and the approachability of the
department’s professors, while financial reasons consisted of both how much money could be made in a future career, as well as how much money would be spent to achieve a particular degree (Cebula & Lopes, 1982).

In addition to the above factors, internal motivation may be another contributing factor when a student chooses an academic major. Intrinsic motivation comes from a simple desire to perform a behavior, rather than gaining something from the process (Meyers, 2007). Bowling, visiting family, or crossword puzzles are activities that are often considered to be intrinsically motivating. However, if education itself or a particular subject matter were considered to be intrinsically motivating, students might be more likely to not only choose a specific major, but also to graduate with a degree in that major (Gottfried et al., 2009).

On a practical level, there are techniques that teachers could use to ensure the subject matter they are teaching is intrinsically motivating for students. For example, when students are rewarded for successfully solving a problem, the students are more likely to be motivated and to continue learning more about the subject. However, students who perform poorly on an exam or in a classroom activity may feel discouraged and discontinue the subject. One possible way to avoid this feeling of failure and increase internal motivation is to encourage a classroom setting in which students are able to work at their own pace and move on when they have mastered the necessary skills. Cameron, Pierce, Banko, and Gear (2005) have studied schools in Canada that have great success when teachers provide an individualized educational plan for each student. The plan outlines class objectives based on a student’s skill level, and then provides feedback throughout the course.
Although this form of education may be time consuming, and impractical for a collegiate environment, it may be beneficial to incorporate pieces of the individualized educational plan in class assignments. Additionally, Perry and Penner (1990) identified using an “Expressive Style” as an effective way for students to maintain personal control and responsibility in a class. The expressive style involves the teacher interacting one-on-one with the students, encouraging more class involvement, incorporating group activities, and providing feedback throughout the semester. Researchers found that students who receive feedback from an expressive instructor not only reported more control in a testing environment, but also performed better on the exam (Perry & Penner, 1990).

Discipline may be another effective technique that helps students with an external locus of control tendency to take more responsibility and gravitate towards an internal focus. In a study by Parent, Forward, Canter, and Mohling (1975), 700 students were asked to complete a locus of control survey and were exposed to either a high or low level of class discipline. Researchers found that students who have an external locus of control tendency performed better in the classroom with a higher level of discipline. However, a classroom with a high discipline level is effective only when professors are consistent. For instance, if a teacher requires all assignments be turned in by a specific date, he or she must enforce this rule with all students and provide punishment (such as a “zero grade”) every time the case presents itself. Although it may be difficult for teachers to completely alter their classroom, using the internal and external locus of control information to teach study habits and encourage responsibility has the potential to improve a student’s academic success.
The present study explored the importance of personal characteristics, such as locus of control, in major life decisions such as academic major. The original hypothesis was that due to research opportunities, expectation of further education, and rigorous undergraduate courses, students with an internal locus of control have a greater tendency towards choosing a natural science major. By distributing the Nowicki-Strickland locus of control survey to 117 college students, this study found that there was no statistical significance between locus of control and academic major. However, future research focused on reorganizing the major categories, providing optimal testing conditions, and incorporating an intermediate range into the locus of control analysis may provide more data on this subject.
References


http://virgil.azwestern.edu/~dag/lol/ControlLocus.html

of parental motivational practice and developmental decline in math and science.

*Journal of Educational Psychology*, 101, 729-739.


roles of locus of control and self-esteem in education and occupational outcomes.

Table 1

*Norwicki-Strickland Scoring Key*


*Note:* The above table is the Norwicki-Strickland scoring key. Each time an individual responded to an answer matching the above score key, he or she received a point. The points were totaled at the end of the survey, and the total value was the locus of control score.
Table 2

*Mean Locus of Control Scores Based on Academic Major*

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Science</td>
<td>10.57</td>
<td>10</td>
<td>22</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>Professional Science</td>
<td>11.83</td>
<td>11</td>
<td>24</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Social Science</td>
<td>12.2</td>
<td>11</td>
<td>24</td>
<td>4</td>
<td>43</td>
</tr>
</tbody>
</table>

*Note:* The mean value denotes the average locus of control score in a particular academic major category. This was calculated by adding the locus of control and dividing the total amount by n, and then multiplying by 100.
Table 3

Contingency Table of Observed Frequencies

<table>
<thead>
<tr>
<th>Locus of Control</th>
<th>Academic Major</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Natural</td>
<td>Professional</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Locus of Control</td>
<td>Internal</td>
<td>32</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>Control</td>
<td>External</td>
<td>12</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Tendency</td>
<td></td>
<td>n = 44</td>
<td>n = 30</td>
<td>n = 43</td>
</tr>
</tbody>
</table>

Note: The above values were obtained from the original data source.
Table 4

Contingency Table of Expected Frequencies

<table>
<thead>
<tr>
<th>Academic Major</th>
<th>Natural</th>
<th>Professional</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locus of Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>(74x44)/117 = 27.83</td>
<td>(74x30)/117 = 18.97</td>
<td>(74x43)/117 = 27.20</td>
</tr>
<tr>
<td></td>
<td>(43x44)/117 = 16.17</td>
<td>(43x30)/117 = 11.02</td>
<td>(43x43)/117 = 15.80</td>
</tr>
<tr>
<td>External</td>
<td>n = 74</td>
<td>n = 73.8</td>
<td>n = 43</td>
</tr>
</tbody>
</table>

**Tendency**

n = 44  
n = 29.99 = 30  
n = 43  
N = 117

Note: The expected scores were calculated by using the following equation: \( E_{xy} = \frac{n_{x} \times n_{y}}{N} \). In other words, the frequency (n) of a row multiplied by the frequency (n) of a column, divided by the total sample size gives the expected frequencies for each cell of the table (Abrami, Cholmsky, & Gordon, 2001).
Table 5

Chi-Square Worktable: Test of Independence: Locus of Control and Academic major

<table>
<thead>
<tr>
<th>Values</th>
<th>O</th>
<th>E</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural (I)</td>
<td>32</td>
<td>27.83</td>
<td>4.17</td>
<td>17.39</td>
<td>0.62</td>
</tr>
<tr>
<td>Natural (E)</td>
<td>12</td>
<td>16.17</td>
<td>-4.17</td>
<td>17.39</td>
<td>1.08</td>
</tr>
<tr>
<td>Professional (I)</td>
<td>17</td>
<td>18.97</td>
<td>-1.97</td>
<td>3.88</td>
<td>0.23</td>
</tr>
<tr>
<td>Professional (E)</td>
<td>13</td>
<td>11.02</td>
<td>1.98</td>
<td>3.93</td>
<td>0.36</td>
</tr>
<tr>
<td>Social (I)</td>
<td>25</td>
<td>27.2</td>
<td>-2.2</td>
<td>4.84</td>
<td>0.18</td>
</tr>
<tr>
<td>Social (E)</td>
<td>18</td>
<td>15.8</td>
<td>2.2</td>
<td>4.84</td>
<td>0.31</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>116.99</td>
<td></td>
<td></td>
<td>2.78</td>
</tr>
</tbody>
</table>

*Note:* The values were analyzed using 2 degrees of freedom and $a = 6.63$, $X^2 = 2.78, p > .01$
Figure Caption

*Figure 1.* Total internal and external scores for each of the following categories: natural sciences, professional sciences, social sciences.
Appendix A

Locus of Control Survey

Thank you for participating in this survey. This survey will be used for a senior level honors thesis and will be anonymous. Your name will not appear in any of the results or research, and this will have no effect on your classes or grades. Please answer the questions honestly and accurately.

* Required

Academic Major * Biology, Psychology, Communications, etc.

Year in School * Freshman, Sophomore, Junior, Senior.

Gender

1. Do you believe that most problems will solve themselves if you just don't fool with them? *
   - Yes
   - No

2. Do you believe that you can stop yourself from catching a cold? *
   - Yes
   - No

3. Are some people just born lucky? *
   - Yes
   - No

4. Most of the time do you feel that getting good grades means a great deal to you? *
   - Yes
   - No

5. Are you often blamed for things that just aren't your fault? *
   - Yes
   - No

6. Do you believe that if somebody studies hard enough, he or she can pass any subject? *
   - Yes
   - No
7. Do you feel that most of the time it doesn’t pay to try hard because things never turn out right anyway? *
   - Yes
   - No

8. Do you feel that if things start out well in the morning that it is going to be a good day no matter what you do? *
   - Yes
   - No

9. Do you feel that most of the time parents listen to what their children have to say? *
   - Yes
   - No

10. Do you believe that wishing can make good things happen? *
    - Yes
    - No

11. When you get punished, does it usually seem like it’s for no good reason at all? *
    - Yes
    - No

12. Most of the time do you find it hard to change a friend’s opinion? *
    - Yes
    - No

13. Do you think that cheering more than luck helps a team win? *
    - Yes
    - No

14. Did you feel that it was nearly impossible to change your parents’ mind for anything? *
    - Yes
    - No

15. Do you believe that parents should allow children to make the most of their own decisions? *
    - Yes
    - No

16. Do you feel that when you do something wrong, there is very little you can do to make it right? *
    - Yes
    - No
17. Do you believe that most people are just born good at sports? *
   - Yes
   - No

18. Are most of the other people your age stronger than you are? *
   - Yes
   - No

19. Do you feel that one of the best ways to handle most problems is just not to think about them? *
   - Yes
   - No

20. Do you feel that you have a lot of choice in deciding whom your friends are? *
   - Yes
   - No

21. If you find a four leaf clover, do you believe that it might bring you good luck? *
   - Yes
   - No

22. Do you often feel that when a person your age is angry at you, there is little you can do to stop him or her? *
   - Yes
   - No

23. Do you often feel that whether or not you do your homework has much to do with what kind of grades you get? *
   - Yes
   - No

24. Have you ever had a good luck charm? *
   - Yes
   - No

25. Do you believe that whether or not people like you depends on how you act? *
   - Yes
   - No
26. Did your parents usually help you if you asked them to? *
   - Yes
   - No

27. Have you felt that when people were angry with you, it was usually for no reason at all? *
   - Yes
   - No

28. Most of the time, do you feel that you can change what might happen tomorrow by what you do today? *
   - Yes
   - No

29. Do you believe that when bad things are going to happen, they will happen no matter what you do to stop them? *
   - Yes
   - No

30. Do you think that people can get their own way if they just keep trying? *
   - Yes
   - No

31. Most of the time do you find it useless to try to get your own way at home? *
   - Yes
   - No

32. Do you feel that when good things happen, they happen because of hard work? *
   - Yes
   - No

33. Do you feel that when somebody your age wants to be your enemy, there is little you can do to change this opinion? *
   - Yes
   - No

34. Do you feel that it is easy to get friends to do what you want them to do? *
   - Yes
   - No

35. Do you usually feel that you have little say about what you get to eat at home? *
36. Do you feel that when someone doesn't like you, there is little you can do about it? *
   - Yes
   - No

37. Do you usually feel that it is useless to try in school because most other children are just plain smarter than you are? *
   - Yes
   - No

38. Are you the kind of person who believes that planning ahead makes things turn out better? *
   - Yes
   - No

39. Most of the time do you feel that you have little to say about what your family decides to do? *
   - Yes
   - No

40. Do you think that it is better to be smart than to be lucky? *
   - Yes
   - No