

Correlated Factors of Success: Personality, Creativity and Academic Achievement Among IS Students

Michael A. Hignite
John W. Satzinger
Thomas M. Margavio

Computer Information Systems Department
Southwest Missouri State University
Springfield, MO 65804
mah985f@mail.smsu.edu
417-836-6893

ABSTRACT

Escalating demand for emerging IS personnel and a rapidly changing technological environment currently challenge many academic institutions attempting to attract, retain, and properly prepare the next generation of IS professionals. While in some instances attractive salaries and increased recruiting have attracted more students to the major, many academic programs still struggle with retaining and properly educating tomorrow's IS employees. With that in mind, this study is designed to take a fresh look at today's IS student in an attempt to identify some of the more significant factors related to success in the field. Specifically, factors related to personality, creativity, and other student attributes are studied to determine their relationship to a student's success in the IS major. Results of the effort indicate that while personality type does play a role in the success of students, the aspects of creativity studied here are not significantly related to achievement. Additional analyses provide insight into other characteristics that are related to academic achievement or success in the study of information systems. (Keywords: IS students, personality, creativity, achievement)

INTRODUCTION

Preparing prospective information systems (IS) professionals remains a challenge. In addition to reacting to the changing demands of industry and its technology, programs charged with educating tomorrow's IS professional must also struggle to attract and retain qualified students. Historical data collected at the site of this study, for example, would indicate that fully one third of the students who declare information systems (IS) as a major will not complete the degree program [1]. This trend persists despite the increasing

popularity of the major and the high demand for the program's graduates.

IS faculty members often discuss various ideas related to identifying the characteristics that contribute to student success in the major (success being defined as either academic achievement in a course, or series of courses, or completion of the IS degree). The idea being that identification of these factors could lead to better advisement and/or improvements in the curriculum thereby resulting in greater student retention and success rates. This discussion, however, often becomes a debate

over what types of factors play a significant role in students' success.

Prior research in the field of study indicates that certain types or styles of personality and creativity may be associated with success in given areas of academic study and their related professions. This study is designed to: (1) assess IS students' personality type; (2) assess the level and types of creativity found among majors; (3) collect other data related to student characteristics; and (4) determine the relationships that exist between these data and success in the IS major.

Further, by comparing the creativity styles and personality types of students having recently entered the major with the scores of upperclassmen emerging from the program, it was also believed that any contrasting styles or types could be readily identified. In this manner, it may be possible that efforts aimed at increasing student retention and success in the major may be made more effective through the information gained from the research.

Related Studies

A review of research indicates that a significant number of studies related to student achievement in computer science were performed during the early to mid 1980's. More recent studies and specifically studies in the field of information systems are more limited in number.

In one study of some 92 information systems students, Carland and Carland [2] found great diversity among student personality profiles as measured by the Myers-Briggs Type Indicator (MBTI), the MBTI being one of the most commonly used personality assessment tools. (Myers, & McCaulley, [3]). Unfortunately, the study by Carland and Carland [2] was simply an assessment of personality types and given the highly varied

scores, no conclusions can be drawn regarding the existence of a typical personality profile. No effort was made to determine whether personality was related to achievement or success in the major.

In a study of the relationship between personality and the specific task of computer programming, Bishop-Clark and Wheeler [4] found certain aspects of personality type to be positively related to success on certain class assignments. No relationship, however, was found to exist between personality and overall course achievement nor was any effort made to determine whether a common profile existed for successful students.

Creativity levels of both information systems and computer science students were assessed in a study by Wynekoop and Walz [5]. The results of this research indicate that students in the two majors tended to have higher levels of creativity than the general student population. Creativity levels among students completing their course of study were found to be the same as, or lower than, those of entering majors.

In an earlier study, one aspect of personality (identified as cognitive style) was found to have a limited relationship with achievement in a single computer course according to Evans and Simkin [6]. Again, as in more recent studies, no attempt was made by these researchers to develop broader knowledge of the characteristics of successful IS majors or to relate personality to persistence or success in a series of courses or completion of the IS degree.

Given the limited number and scope of the recent studies in the field, it would appear entirely appropriate to pursue a study whose purpose is to identify characteristics of the successful IS student. An investigation of the relationship among the factors of personality type, creativity level,

and other demographic characteristics could provide information valuable to students, IS academic programs and the IS profession.

RESEARCH DESIGN AND METHODS

It is important to note that this research effort was designed to be exploratory and descriptive in its nature. The specific research issues designed to be addressed by this study included: (1) The nature of the relationship between personality and persistence or success in the IS major; (2) the type of creativity most prevalent among successful students and its relationship to achievement; and (3) personality differences that might exist between students entering the major and those completing their program of IS study.

Assumptions

With regard to personality, the assumption of the researchers was that the changing nature of the IS program (with an increased emphasis on communication skills and teamwork, for example) may have resulted in a more extraverted type of student being attracted to, and successful in, the major. If this assumption were correct it should be possible, therefore, to discern differences in terms of personality between recently arrived majors and those successfully completing the program.

Our assumption regarding creativity was that the majority of our more successful students were of the adaptive creativity type, a student who is likely to modify standardized solutions to fit current needs, as opposed to the innovative student who is more likely to create new solutions to problems. (This model of adaptive creativity being the model often employed and encouraged in many IS courses.) The authors believed that the nature of the

relationship between the adaptive creativity type and success would be positive.

Finally, the researchers theorized that a “new” more extraverted type of student may have been recently attracted to the major, and that as a result, personality types of entering majors would differ from those of students preparing to complete their studies.

A Presentation of Research Procedures

The approximate 200 students who participated in this study came from a pool of some 800 students declared as IS majors at a large mid-western university. Two different assessment instruments were used to assess (1) personality type and (2) type and level of creativity that existed among the students. Data related to student demographic characteristics (grade point averages and ACT scores, for example) were also collected.

Method of Data Collection

The Myers-Briggs Type Indicator (MBTI) was the instrument utilized to assess personality. This is an instrument widely known, utilized and repeatedly validated as an appropriate means of assessing personality. The Myers-Briggs test has been used extensively in both academic and business settings and profiles for certain occupations have been established (Myers & McCaulley, [3]; Jacobson, [7]; Bishop-Clark & Wheeler, [4]).

The MBTI is an instrument designed to identify a test subject's preferences directing their use of perception and judgment. These preferences indicate not only what a person would be most attentive to in a given situation, but also the way in which that person would draw conclusions from what was observed.

The four categories of preferences are Extraversion or Introversion (EI),

Sensing or Intuitive perception (SN), Thinking or Feeling judgment (TF), and Judgment or Perception (JP).

Extraverts are characterized as individuals who gather information or perceptions from the external world by observing outside individuals or events. Introverts' perceptions, conversely, are shaped largely through internal or inner thought processes and ideas.

The SN preference index indicates how an individual gathers information, either through use of the five senses, Sensing (S) or through intuition (I).

Thinking-Feeling (TF) refers to the manner in which an individual reaches conclusions regarding a given situation. A Thinking (T) individual would rely most heavily on logical processes to make a judgment, while a Feeling (F) individual would rely more on personal values or feelings.

The Judgment and Perception category (JP) speaks to an individual's manner of interacting with the outside world. A person with a J preference score would deal with the world from a judging perspective, regardless of whether those judgments are derived either through thinking or feeling (TF). They would seek closure and tend to make decisions as soon as possible and could, therefore, tend to be viewed as decisive. An individual with a P preference score would interact with the world from a basis of using some process of perception and would be characterized as open, adaptable, and not necessarily decisive in nature. (Myers & McCaulley, [3]).

It is possible through the use of these four preferences and the alternatives within those preferences to derive a possible sixteen (16) combinations or profiles of personality type; each of these profiles having a distinct personality pattern. In this study, however, given the large number of

subjects required to investigate such a broad spectrum of types, the focus is primarily on the major categories of preference (EI, SN, TF, JP).

KAI

Although possibly less well known than the MBTI, the Kirton Adaption-Innovation (KAI) Inventory is an instrument that has also been utilized in both business and academic environments to assess creativity. This test is designed to assess a subject's level of creativity but more significantly to categorize the specific type of creativity possessed by an individual.

The KAI distinguishes between two types of creative personalities known as adaptors and innovators. Adaptors, for example would possess the characteristics of "...precision, reliability, efficiency, methodicalness, prudence, discipline, conformity" (Kirton, [8], p. 10). Innovators would, then, be characterized as "...undisciplined, thinking, tangentially approaching tasks from unsuspected angles" (Kirton, [8], p. 10). Research using the KAI has indicated that certain types of creativity might be more appropriate for specific tasks and types of tasks found in given academic endeavors and business professions. (Foxall & Payne, [9]; Riley, [10]; Prather, [11]).

Data Analysis

The data were analyzed primarily through the use of correlational studies performed on the variables associated with creativity and personality and factors related to success in the major (GPA in the major, grade in a course). Additional analyses were performed in order to investigate the relationship(s) that existed between certain demographic variables and personality/creativity variables or success variables.

STUDY RESULTS

Data was collected from 214 study participants, the subjects being students enrolled in current information systems major course offerings.

Student Attributes

With regard to student characteristics, some 70% of the subjects were male, with the mean age of the entire group being 23. A slight majority, (57%) were from the senior class; 42% were either sophomores or juniors. Some 33% of the subjects were working at least part-time at the time of the study. The mean ACT score of the students was 23. The average number of hours taken in the CIS curriculum by all students was 15.

Personality

Overall, approximately 56% of study participants were identified as Extravert versus 44% Introvert; 64% were identified as Sensing, 36% Intuitive; 61% identified as Thinking, as opposed to 39% Feeling; 50% identified as Judging, with 50% identified as Perceiving.

Initial analysis of scores from the Myers-Briggs Type Indicator (MBTI) reveals some consistency in the pattern of distribution of the various personality profiles. The two most frequently occurring profiles were ESTJ (Extravert, Sensing, Thinking, and Judging) and ISTJ (Introvert, Sensing, Thinking, and Judging). These two profiles describe approximately 28% of the tabulated responses (14% and 14% respectively). ESFJ (Extravert, Sensing, Feeling, and Judging) is the profile associated with approximately 9% of the participants. The ESFP (Extravert, Sensing, Feeling, Perceiving) type was associated with

approximately 8% of the subjects. The ENTP (Extravert, Intuitive, Thinking, Perceiving) profile was associated with approximately 9% of the participants.

Creativity

The mean score on the KAI creativity test was 94.3, with a score about 96 indicating an innovator style of creativity. Some 56% of the students could be categorized as adaptors, with 44% identified as possessing an innovative style of creativity. Again, this adaptive type of creativity refers to subjects' preference for modifying existing or previously developed solutions to solve new problems rather than developing new or original solutions.

Table I contains the correlations found to exist between the variables investigated. (All correlations contained in both Table I and Table II are significant at the .05 level).

Personality and Achievement

Achievement or success is measured within the realm of this study by a student's cumulative grade point average (GPA) in information systems coursework. The mean GPA in IS courses for all study participants was 3.3 (on a 4 point scale). A .29 correlation was found to exist between the personality category of Introvert (I) and GPA. This was the only statistically significant relationship discovered between personality type and achievement.

Combinations of personality variables were also investigated with regard to their correlation to achievement. Unfortunately, with 16 profiles possible, many such combinations often had so few subjects associated with the profile that no meaningful relationships were able to be identified.

Creativity and Achievement

Neither of the two styles of creativity as measured by the KAI (adaptors or innovators) was found to be significantly

correlated with any of the variables associated with achievement (GPA in CIS or overall GPA, etc.).

Table I - Correlations (on a continuous scale)

Attribute	GPA in IS Major	ACT Score
Extravert/Introvert	.29 (Introvert)	.23 (Introvert)
Sensing/Intuition	--	.21 (Intuition)
Thinking/Feeling	--	-.17 (Feeling)
Judging/Perceiving	--	.19 (Perceiving)
KAI	--	--
ACT	.29	

Additional Correlations

As also noted in Table 1, another significant correlation found to exist was between the variables of ACT score and a student's GPA in IS coursework. The .29 correlation is equal to that found to exist between the EI personality attribute and GPA in IS.

Other correlations found to exist between ACT score and other attributes and

scores collected can be found in Table 1. In general, students with an Introverted, Intuitive, and Perceiving personality types had higher ACT scores. Scores on the KAI were also positively correlated with ACT score.

Table 2 contains the results of correlational analyses performed on personality, creativity, and abstract problem-solving ability.

Table 2 - Correlations Between Personality, Creativity & Abstract Problem Solving Attributes

Attribute	KAI
Extravert/Introvert	-.26 (Extravert Scores Higher)
Sensing/Intuition	.57 (Intuition Scores Higher)
Thinking/Feeling	--
Judging/Perceiving	.55 (Perceiving Scores Higher)

From Table 2 it can be seen that certain aspects of personality were correlated with creativity scores. The EI personality category was negatively correlated with achievement on the KAI creativity test. The SI personality attribute was positively correlated with the measure of creativity. A positive relationship was found to exist between the JP personality characteristic and the KAI creativity test.

DISCUSSION

One of the primary purposes of this study was to investigate the type(s) of personality that was most prevalent among a group of emerging IS professionals - the assumption being that despite public perceptions, today’s students are largely a much more extraverted group than many would expect.

In this regard the results of the study support the researchers’ assumptions. A majority of the students participating in the study were extraverts. These findings are interesting especially when compared to some early industry “baseline” data gathered from some 338 professionals (Myers &

McCaulley, [3]). When compared to “computer specialists”, a job category that includes other subcategories such as programmers and systems analysts, the difference between the percentage of extraverts is rather large. In the earlier study only 42% of the respondents were characterized as Extraverts while, again, in the current study some 56% indicated this preference.

Regarding the relationship between extraversion and success, the results of the research are somewhat mixed. While the data does suggest that extraverts may persist in the major (thereby satisfying one success related criteria) introverts may achieve higher grades in the courses in which they do participate. These results are similar to other studies that indicate that while introverted students may not persist in college or their coursework as steadfastly as their counterparts, their grades tend to be higher (Anchors, Robbins, & Gershmah, [12]).

The preliminary ideas regarding the type of creativity most prevalent among IS students were supported by the study results. The majority of the students were found to

be adaptive in nature. Unfortunately, no direct support was realized regarding the assumptions related to creativity type and achievement.

Finally, when examining the idea of whether a “new” type of student is being attracted to the major, results of the study while interesting are mixed. Some 54% of students with less than 15 hours in the IS major are characterized as extraverted, while 59% of more senior students are so categorized. And while 46% of the students having recently entered the major are identified as introverts, only 41% of the students with more than 15 hours in the IS major were associated with this personality characteristic.

With a larger percentage of introverts found among students recently entering the major, the findings may not support the idea that a different type of student is being attracted to the study of IS. However, the findings may again support the previously mentioned studies in which extraverts persisted in greater numbers both within college and their respective majors ultimately emerging in greater numbers than their counterparts.

RECOMMENDATIONS

It is generally accepted that student characteristics, in terms of creativity and personality, may not be altered by standard academic experiences. Therefore, we should not expect to be able to change students to make them more successful. With the information gained from this study, however, we might be able to modify students' academic experience to better accommodate personality and creativity styles (much as learning styles must be accommodated) and thereby allow more students to be successful in their pursuit of an IS degree.

Obviously, though, this study is simply a first step in the investigation of factors possibly associated with academic success. In the future, additional studies possibly of an experimental nature, should be considered. For example, follow-up study could be performed in an attempt to determine if persistence rates could be manipulated for introverted students through the use of altered instructional techniques or experiences. If as a discipline we can someday begin to positively affect the success rates of students by modifying curriculum and/or the advisement process then the resulting benefit to academic programs and the information systems profession would be significant.

REFERENCES

- [1] Hignite, M. A. Attrition rates among SMSU's CIS majors. Unpublished manuscript, 1998.
- [2] Carland, J. C., & Carland, J. W. “Cognitive Styles And The Education Of Computer Information Systems Students,” *Journal of Research on Computing in Education*, 23(1), 1990, pp. 114-126.
- [3] Myers, I., & McCaulley, M. A Guide To The Development And Use Of The Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press, 1985.
- [4] Bishop-Clark, C., & Wheeler, D. “The Myers-Briggs Personality Type And Its Relationship To Computer Programming,” *Journal of Research on Computing in Education*, 26(3), 1994, pp. 358-370.

- [5] Wynekoop, J., & Walz, D. "Educating Software Development Professionals: Does Instruction Affect Creativity?" *Journal of Information Systems Education*, Spring, 1996, pp. 11-15.
- [6] Evans, G., & Simkin, M. "What Best Predicts Computer Proficiency?" *Communications of the ACM*, 32(11), 1989, pp. 1322-1327.
- [7] Jacobson, C. "Cognitive Styles Of Creativity: Relations Of Scores On The Kirton Adaption-Innovation Inventory And The Myers-Briggs Type Indicator Among Managers In The USA," *Psychological Reports*, 72(3), 1993, pp. 1131-1138.
- [8] Kirton, M. *Adaptors and Innovators*, London and New York: Routledge, 1994.
- [9] Foxall, G., & Payne, A. "Adaptors And Innovators In Organizations: A Cross Cultural Study Of The Cognitive Styles Of Managerial Functions And Subfunctions," *Human Relations*, 42(7), 1989, pp. 639-649.
- [10] Riley, M. "Organization And Creativity: A Replication Of The KAI Test," *Journal of Managerial Psychology*, 8(6), 1993, pp. I-III.
- [11] Prather, C. "Creation Theory (How Creativity Styles Affect Job Performance And Business Productivity)," *CIO*, 7(21), 1994, pp. 24-25.
- [12] Anchors, S., Robbins, M., & Gershman, E. "The Relationship Between Jungian Type And Persistence To Graduation Among College Students," *Journal of Psychological Type*, 17, 1989, pp. 20-25.



STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©1999 by the Information Systems & Computing Academic Professionals, Inc. (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to the Editor-in-Chief, Journal of Information Systems Education, editor@jise.org.

ISSN 1055-3096