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An Investigation of the Perceptions Influencing the Intention to Major in Information Technology

Kenneth Sousa
Bryant University

Talented and experienced personnel are essential to maintain an organization's capacity to implement information technology initiatives. The demand for technology personnel relative to the supply of skilled personnel has formed a challenge with the recruiting and retention of technology personnel. This research study has compiled the perceptions and attitudes associated with information technology careers over five years. The study provides empirical insight into various factors which could influence the intention to select information technology as a higher education major. The results of this study found that aptitude and subjective norms are the most influential factors in the intention to major in technology. While resulting in a smaller influence, the regression model found two other significant factors including personal image and media. The personal image was the only negative influence on the intent to major. While this subject has been studied through various research studies, the outcomes reiterate the continuing disconnection related to career information and stereotypes associated with business technology professionals. The results of this research will offer employers and educational institutions (K-12 through higher education) various strategies to increase interest in business information technology careers. The challenges associated with increasing technology majors to fulfill market demand will continue without the implementation of new and refined strategies coupled with continuing assessment and published research.

Introduction

It is rather impossible to identify any medium to large-scale business without considerable technology integration into their operations. The integration of customer-facing technologies such as web-based/mobile applications, social media, and hardware devices (IoT) provide a sustainable value proposition for business stakeholders to gain or maintain a competitive market advantage. The availability, access, and popularity of technology applications are prevalent across all age groups. With the consistent appetite for technology among younger adults, it may be easy to believe that establishing a career in technology would be more appealing. For example, a student interested in athletics or finance would lead to a career in sports or as a stockbroker. However, the correlation between young adult technology engagement and technology careers is not as successful.

Studies have found that the attitude and interest in some STEM careers (science, engineering, and technology) have decreased (Johansson, 2009; Lindahl, 2007). Intrinsic motivators can provide a strong influence on a career selection. Chipidza et al. (2019) found that interest and a satisfying experience as the strongest characteristics for choosing a technology career. The attitude of the student has also been identified as a strong predictor (Chipidza et al., 2019; Moore & Burrus, 2019). Wang et

al. (2017) asserted that experiences and interactions will expand to influence the development of cognitive ability and motivational beliefs (e.g., interest, value, ability self-concept), which in turn influence career decisions.

These factors could provide the foundation for an increasingly negative trend associated with students deciding to change from a technology major. More than half of the STEM students have changed majors within three years while 28% of computer and information sciences majors dropped (National Center for Educational Statistics, 2017). Other research studies have identified various factors affecting information technology majors including gender (Ardies, De Maeyer, & Gijbels, 2015; Ardies et al., 2015) and family factors (Valentino et al., 2016). The selection of a college education major is analogous to purchasing a car. To change the dynamic of a consumer purchase or selection of a major, it is important to understand the factors which influence the decision. Therefore, an exploration of the influences can provide a foundation to develop strategies that may reverse the decreasing number of entrants into technology careers. The demand for information technology professionals is clear. Recent data from The U.S. Bureau of Labor Statistics (2020) illustrates this demand. The employment projections for several computer occupations over the next ten years will increase between 6% – 21%, with an increase of over six hundred million jobs. To explore the reality of these statistics, it would be important to gather objective data on open technology positions. An analysis of the open technology positions of a large financial services firm was completed in August 2021 and February 2022. In six months, the number of open positions increased to 549, a 41% increase (from 389). Anecdotally, there are many reasons for this trend: availability of new hires, normal (or early) retirements, and the "*Great Resignation*". Regardless of the cause, the demand for technology positions vs. the supply of personnel is not progressing in a positive trend for businesses to recruit and retain qualified personnel.

The purpose of this research is to investigate the effect of various attitudes and perceptions of first-year undergraduate students on the intention to select an information technology major. Furthermore, identify any changes or strategies to align with these perceptions to increase interest in technology careers and the availability of skilled labor. These strategies will assist high schools, colleges, and businesses to implement strategies that could increase the labor population of technology professionals.

Literature Review

Factors for Education Major Decision

Decisions are generally formed through the gathering of information, data, and conversations. Saleem et al. (2014) indicate that there is a significant list of factors that influence an individual's career selection such as parent's profession, mass media, and personal choice. Based on research exploration, a list of several factors has been compiled to explore the influence on the intent to major in technology. This study focused on nine factors that will be included in the research model. The factors identified in this research have also been explored in several published research studies as outlined in Table 1 below. The table also outlines the statistical method utilized for the research outcomes.

Table 1 – Research Studies and Factor Matrix

Factor	(Zhang, 2007)	(Kuechler et al., 2009)	(Heinze, 2009)	(Joshi & Kuhn, 2011)	(Chipidza et al., 2019)	(Vainionpaa et al., 2019)
Aptitude to study information technology	✓	✓		✓		
Interesting to use; complete work with technology	✓	✓	✓	✓		✓
Interest in information technology	✓	✓			✓	✓
Availability of job positions	✓	✓	✓		✓	✓
Gaining a high starting salary	✓	✓				✓
Influence of media						
Importance of self-image; image of information technology professionals	✓	✓		✓	✓	✓
Influence of family, friends, professors, advisors, and peers	✓	✓	✓	✓	✓	
Work environment	✓	✓		✓		
Theoretical framework	Theory of Reasoned Action	Theory of Reasoned Action	Theory of Planned Behavior / Social Cognitive Career Theory	Theory of Reasoned Action	Theory of Reasoned Action	Qualitative, Interviews

Aptitude

Aptitude is an assessment of the human potential to be successful in specific occupations (McCloy et al., 2020). Joshi and Kuhn (2011) believed that, through self-efficacy, one's ability to complete a behavior or task is created from the ability to organize and execute a given course of action. Ultimately, confidence in the belief that someone has the skills to accomplish an outcome will influence the selection of a major and career. This belief was also explored by Epsztajn (2019) specific to the self-confidence in their skills and abilities for a promotion or completing an exam. Self-belief is a powerful influence in major and career selection as well as in life.

H1. Aptitude is a significant predictor of intention to major in information technology

Attitude

Perceived Behavioral Control (PBC) is influenced by various control beliefs (Ajzen, 1991). These beliefs could either enable or hinder the behavior (or outcome). Joshi and Kuhn (2011) studied the individual feelings associated with selecting an IS-related career. Their research found that career attitude is a significant determinant of the intent (to major). The attitude was found a strong predictor for the STEM major and career decisions (Moore & Burrus, 2019).

H2. Attitude is a significant predictor of intention to major in information technology

Interest in IS

Self-efficacy affects individual choices, either directly or indirectly, through interest (Joshi & Kuhn, 2011). Chipidza et al. (2019) found that the "Lack of Interest" is both an attitude and a perceived obstacle that students believe is difficult to change. Furthermore, this study believed that interest, as an intrinsic influence, has a strong impact on a student's attitudes toward an MIS career or major. The research by Lent (1994) supports that efficacy is the central instrument of personal agency and fundamental to the decision on a career choice. A focus on the improvement associated with math skills should increase the prospect of a STEM-based profession in a student's future (Wang et al., 2017). Furthermore, their research found that when improving science interest and realigning STEM with communal or altruistic goals may increase the likelihood of a future STEM professional. Walstrom et al. (2008) found that interest in the subject matter was the highest-ranking factor associated with career interest. Unfortunately, particularly girls seem to have a very negative perception of IT careers believing that IT careers are not interesting and cannot fulfill their work values; even with the use of video games and social media which are used daily (Vainionpää et al., 2019).

H3. Interest in IT is a significant predictor of intention to major in information technology

Job Opportunities

Chipidza et al. (2019) discussed the research of Ajzen (1991) that some factors that are non-motivational could have an impact on decision-making. One of these factors relates to the availability of positions within a major. Chipidza et al. found that job availability and salaries would "make it easy or less costly" to major in MIS. Several research studies have included the job opportunities factor to determine its influence on MIS majors and career choices (Heinze & Hu, 2009; Joshi & Kuhn, 2011; Walstrom et al., 2008; Young et al., 2018; Zhang, 2007).

H4. Job availability is a significant predictor of intention to major in information technology

Job Salary

As previously discussed, Chipidza et al.(2019) research included salary as one of the non-motivational influences as defined by Ajzen. Joshi and Kuhn (2011) believed that high income may influence to be attracted to a technology career and was proven to be accepted as a positive factor. The salary associated with technology-based jobs has been explored by (Walstrom et al., 2008). Kuechler et al. (2009) did not find job salary and security significantly affected student selection of an IS major. Moore and Burrus (2019) asserted that a limitation of their research is that salary may be a factor to choose a STEM career that affects males rather than the interest itself. Career salary was found to be a high fourth highest importance in a career interest (Walstrom et al., 2008).

H5. Job salary is a significant predictor of intention to major in information technology

Media Influence

The influence of media on consumers has been studied for decades in a variety of research studies. The selection of a higher education institution, major, and career is a form of consumer decision. Over the last decade, the impact of media has expanded and transformed with the adoption of social media. Additionally, the use of social media by young people has significantly reduced the

influence on traditional media (broadcast television, magazines, newspapers, etc.). The transformation of new and additional media influences coupled with societal dynamics has been affirmed by the research of Apostol and Nasi (2014). Their research found that the depiction of various characters in media (such as commercials, movies, and series) can influence the perception of professions. In addition, Bakshi and Joshi (2014) state that "Youth can only select an occupation from the range of occupations that they know about. Their self-exploration and self-development vs. future careers are enhanced or limited depending on the range of occupations to which they are exposed" (p. 186). Based on the research outlined, media influence was added to the research model to extend the research model and add value by exploring this new factor on the intent to major in a technology career.

H6. Media influence is a significant predictor of intention to major in information technology.

Personal Image

The image of technology majors being "nerdy" has a significant influence on the perceptions of undergraduate students. Zhang (2007) related the perceptions of both accounting and IS students. An accounting career may be considered too abstract or impersonal currently by high school and college students. Information technology careers often tend to focus on characteristics associated with an accounting career coupled with the "geek" stereotype. Other research studies investigated the influence of image on the attitude toward pursuing an IS career (Joshi & Kuhn, 2011; Kuechler et al., 2009).

H7. Personal image is a significant predictor of intention to major in information technology

Subjective Norm

A broad definition of a subjective norm is the perceived expectations of a user to perform a specific behavior (Ajzen, 1991). Finlay et al. (1999) further described a subjective norm as an individual's perception or "opinion about what important others believe the individual should do". Saleem et al. (2014) stated that students' choices can be prompted to perform behavior based on the influence of others including parents' profession, mass media, and personal choice. Several research studies have explored the influence of others on the selection of a college major and career choices. Young people sometimes confine and limit their career exploration and knowledge gathering to the adults closest to them (parents, family, and extended family). The research of Dasgupta & Stout (2014) found that parents can motivate their children and subsequent selection of a major and career choice (Dasgupta & Stout, 2014). This influence could also limit their choices and exploration of other majors. Other research studies support the parental influence on their children (Joshi & Kuhn, 2011; Nugent et al., 2015). The research of Bright et al. (2005) extended these studies to include the influence of teachers. The various sources of influence can develop a student's STEM identity as a result of their surroundings as well as whether or not they fit the in the STEM community (Dasgupta & Stout, 2014; Kim et al., 2018).

H8. Subjective norm is a significant predictor of intention to major in information technology

Work Environment

Joshi and Kuhn (2011) believed that several areas are associated with work values including technological focus, leadership, high income, variety, security, flexibility, social responsibility, social interaction, and work-family balance. Valentino et al. (2016) found that students that considered family flexibility important were less likely to select a STEM major. In addition, their research found that students with these perceptions were more likely to leave a STEM field for a non-STEM field. Joshi and Kuhn (2011) found that work-life balance was not a significant influence on the attitude toward an IS career. With the generational and societal changes over the last several years, this factor will be important to explore.

H9. Workload environment is a significant predictor of intention to major in information technology

Research Methodology

To complete the objective of this study, the research model includes ten factors: nine independent and one dependent variable. The listing of the factors, factor abbreviations, and the number of survey questions are outlined in Table 2.

Table 2 – Research Factor Summary

Factor Name	Variable Type	Number of Questions
Aptitude (AP)	IV	2
Attitude (AT)	IV	2
Interest in IT (IN)	IV	5
Job Availability (JA)	IV	2
Job Salary (JS)	IV	2
Media Influence (MI)	IV	5
Personal Image (PI)	IV	2
Subjective Norm (SN)	IV	5
Workload Environment (WE)	IV	5
Intent to Major (IM)	DV	2
		32

Legend: IV = Independent Variable; DV = Dependent Variable

The objective of this research is to investigate the influence of various factors on the intent to select information technology as a major. The independent variables and dependent variables representing the factors comprise the proposed regression formula:

$$\text{Intent to Major} = \beta 0 + \beta 1*\text{Aptitude} + \beta 2*\text{Attitude} + \beta 3*\text{Interest} + \beta 4*\text{Job Availability} + \beta 5*\text{Job Salary} + \beta 6*\text{Media Influence} + \beta 7*\text{Personal Image} + \beta 8*\text{Subjective Norm} + \beta 9*\text{Workload Environment}$$

Survey Instrument

A survey instrument was developed based on the compilation of research studies identified in the literature review in Table 1. The survey consisted of 32 questions assigned to one of the ten factors outlined in Table 2. To increase construct and response validity, each factor was designed to include at least two questions from the listed research that included the survey document. Three questions

were added to the survey including gathering categorical data values including gender, class standing (first-year, sophomore, junior, senior), and grade point average. Except for the media influence question, factor questions were separated to prevent the same factor question (reworded) to be displayed in sequential order. The media influence question was provided as one table to reduce the complexity of the question and responses. The response scale was defined using one of two Likert scales: 1) strongly disagree vs. strongly agree (SD/SA) and 2) not important vs. extremely important (NI/EI). A numerical value of one (1) was assigned to the strongly disagree and not important responses. Comparably, a value of seven (7) was assigned to the strongly agree and extremely important responses. The responses associated with the media influence questions were gathered using an extremely important vs. not important scale. All remaining question responses were gathered using a strongly agree vs. strongly disagree scale.

Higher education institutions accept students using several admission strategies. In general, institutions accept students using three categories: 1) directly into a specific college (architecture, business, engineering, arts & sciences, etc.), 2) assigned to a "university college" without a program or allow the selection or 3) allow the students to elect a major. In some cases, students also elect to be undecided in terms of a program of studies or major. One study found that between 20 – 50% of students are undecided (Gordon, 2007). For those students that elected a specific major, some decide to change their original selection. Within three years of entering the institution, 30% of two-year and four-year undergraduates changed their major at least once (National Center for Educational Statistics, 2017). The number of STEM majors that changed their majors was 35% compared to 29% for non-STEM majors.

This research study compiled the perceptions of first-year undergraduate students at one institution. This population was selected to explore attitudes and insights before they begin selecting courses associated with their major; generally, in the second or third year depending on the program of studies. Survey responses were gathered during eight semesters between Fall 2016 and Fall 2021 at a four-year university. Each survey was administered in a required course for all first-year students in the university. For the five years and eight semesters, a total of 1,139 valid responses were collected.

Assumptions

Independence of Observations

All administrations of the survey were administered in a specific course. Therefore, no students would have been able to complete the survey more than once during the semester administration. All first-year and transfer students are required to complete this course. Students were asked to complete a survey during a class session proctored by a faculty member.

Homogeneity of Variance

The population consisted of a particular group of first-year and transfer students in a required one-hundred-level core course. Both categories of students would not be able to complete upper-level courses (those associated with major classes) until this foundation course was completed successfully. Therefore, the evaluated population has similar characteristics throughout all survey administrations for this research study.

Findings and Results

Reliability Analysis

As outlined in Table 2 above, the perceptions were compiled with 32 questions (observed variables) assigned to the ten factors based on the literature review. It is important to ensure that the observed variables can accurately calculate and measure the assigned factor. To complete this test, the most widely used measure for reliability and scale consistency is Cronbach's Alpha (Hair et al., 1998). The Cronbach's Alpha test results are compiled in Table 3.

Table 3 – Cronbach's Alpha Test of Reliability

Factor	Number of Items	Cronbach's Alpha	Removed	Number of Items	Adjusted Cronbach's Alpha
Aptitude	2	0.786			
Attitude	2	0.806			
Interest in IT	5	0.724			
Job Availability	2	0.830			
Job Salary	2	0.803			
Media Influence	5	0.777			
Personal Image	2	0.804			
Subjective Norm	5	0.702	SN3	4	0.819
Workload Environment	5	0.772	WE1	4	0.796
Intent to Major in IT	2	0.891			

The initial reliability test resulted in all factors scores over 0.70. However, two of the factors provided increased alpha scores when one of the items was deleted. Consequently, it is appropriate to continue with the statistical tests using the 30 items (after removing the two items noted above). With the successful completion of the Cronbach's Alpha test, it was necessary to prepare for the regression analysis. At this point, each of the remaining items associated with the factor was averaged to provide one value for the ten factors for all 1,139 records. These composite averages would be used as the input to the regression model, and the analysis was performed in SPSS.

Correlation Analysis

A correlation analysis was completed as a component of the regression analysis. The results of this analysis are compiled in Table 4.

Table 4 – Correlation Analysis of Factor Variables

Factor	1	2	3	4	5	6	7	8	9	10
1. Intent Major	1.00	0.70	0.37	0.42	0.37	0.29	0.11	-0.13	0.68	0.37
2. Aptitude		1.00	0.55	0.55	0.43	0.38	0.06	-0.02	0.70	0.47
3. Attitude			1.00	0.62	0.30	0.33	0.06	0.05	0.41	0.48
4. Interest				1.00	0.24	0.26	0.14	0.04	0.42	0.40
5. Job Avail					1.00	0.58	0.01	0.01	0.47	0.48
6. Job Salary						1.00	0.06	0.09	0.36	0.56
7. Media							1.00	-0.08	0.10	0.14

Factor	1	2	3	4	5	6	7	8	9	10
8. Pers Image								1.00	-0.13	0.10
9. Subj Norm									1.00	0.41
10. Work Env										1.00

In reviewing the correlation values, the largest correlation value for all variables was 0.702. Therefore, the analysis calculated scores that eliminated the possibility of correlation in the model.

Regression Results

The mean and standard deviation scores have been compiled in Table 5. The mean values are based on scales discussed in Table 3. The scales are identified as strongly agree or extremely important (value of 7) to strongly disagree/not important at all (value of 1).

Table 5 – Mean Scores Summary Results

Factor	Overall Mean	Std. Dev.
Avg Aptitude	3.43	1.41
Avg Attitude	4.92	1.33
Avg Interest IT	4.78	1.12
Avg Job Avail	4.68	1.20
Avg Job Salary	4.84	1.13
Avg Media Influence	4.33	1.24
Avg Personal Image	5.54	1.20
Avg Subjective Norm	2.94	1.17
Avg Workload Env	4.87	0.88
Avg Intent Major	2.54	1.43

The regression analysis was completed using a stepwise logistic regression method. The nine independent variables and one dependent variable were used as the input to determine the influence on the intention to major in technology. The regression analysis was completed using SPSS. Of the nine independent variables, four factors remained in the final regression model. The four models and the associated statistics are compiled in Table 6. The total degree of freedom (df) is 1,134. For regression model #4, the regression model calculated a strong goodness of fit (R^2 = .567). This measure indicates that 57% of the variance in the dependent variable was explained by the independent variables (factors).

Table 6 – Regression Overall Model Summary

Model	R^2	Adjusted R^2	Std. Error	Durbin-Watson	F	Sig
1	0.489	0.489	1.023		1086.35	.000
2	0.559	0.559	0.951		718.90	.000
3	0.565	0.564	0.945		489.88	.000
4	0.567	0.565	0.944	1.752	369.34	.000

It is important to validate the existence of any autocorrelation in a regression model by determining that there is no correlation between the consecutive residuals proving that the residuals are independent. The Durbin-Watson test detects the existence of autocorrelation issues (Tabachnick & Fidell, 1996). The output from the regression model calculated a Durbin-Watson value of 1.752. The generally accepted range for this test is between 1.50 and 2.50. Therefore, no autocorrelation issues have been identified in the final model. The final stepwise regression model resulted in four independent variables remaining as significant. A summary of the hypotheses results associated with model #4 is compiled in Table 7.

Table 7 – Results of Regression Hypotheses Testing

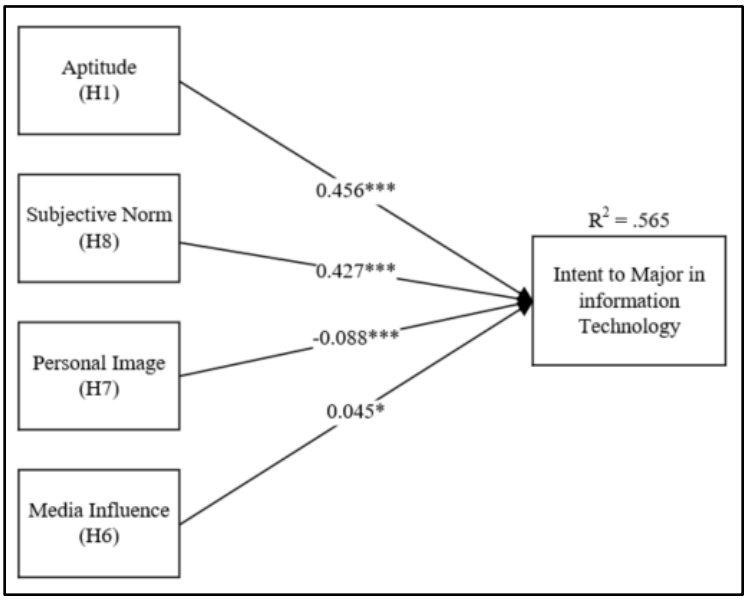
Hypotheses	**Result**
H1: Aptitude is a significant predictor of intention to major in information technology	Supported
H2: Attitude is a significant predictor of intention to major in information technology	Not Supported
H3: Interest in IT is a significant predictor of intention to major in information technology	Not Supported
H4: Job availability is a significant predictor of intention to major in information technology	Not Supported
H5: Job salary is a significant predictor of intention to major in information technology	Not Supported
H6: Media influence is a significant predictor of intention to major in information technology	Supported
H7: Personal image is a significant predictor of intention to major in information technology	Supported
H8: Subjective norm is a significant predictor of intention to major in information technology	Supported
H9: Workload environment is a significant predictor of intention to major in information technology	Not Supported

The results of the regression statistical analysis calculated the coefficients, significance, t-score, and VIF values for the four independent variables. The results supported by the final model are compiled in Table 8 and Figure 1.

Table 8 – Regression Model Factor Summary

Factor	**Coefficient (B)**	**Std. Error**	**t-value**	**Sig.**	**VIF**
(constant)	0.008	0.188	0.040	0.968	
Avg Aptitude	0.456	0.028	16.284	0.000	1.987
Avg Subjective Norm	0.427	0.034	12.560	0.000	2.031
Avg Personal Image	-0.088	0.024	-3.691	0.000	1.029
Avg Media Influence	0.045	0.023	1.980	0.048	1.016

Figure 1 – Research Model Results



Legend: *: p-value ≤ 0.05; **: p-value ≤ 0.01; ***: p-value ≤ 0.001

It is also important to evaluate the existence of any multicollinearity in the research model. Multicollinearity represents the degree to which any variable's effect can be predicted by other variables in an analysis (Hair et al., 1998). To assess any multicollinearity in a model, it is important to calculate the Variance Inflation Factor (VIF). The VIF value is an indicator of the effect that other independent variables have on the standard error of a regression coefficient (Hair et al., 1998). An acceptable value for VIF should be less than 5. As compiled in Table 8, the current regression model does not include any effects of multicollinearity.

The regression analysis also included the evaluation of Mahalanobis Distance (D^2). This value will measure the uniqueness of each observation based on the differences between each observation's values (factor average) and the mean values for all other cases for the independent variables (Hair et al., 1998). Ultimately, this measurement will determine whether the research data contains any outliers. The results of the Mahalanobis Distance are compiled in Table 9.

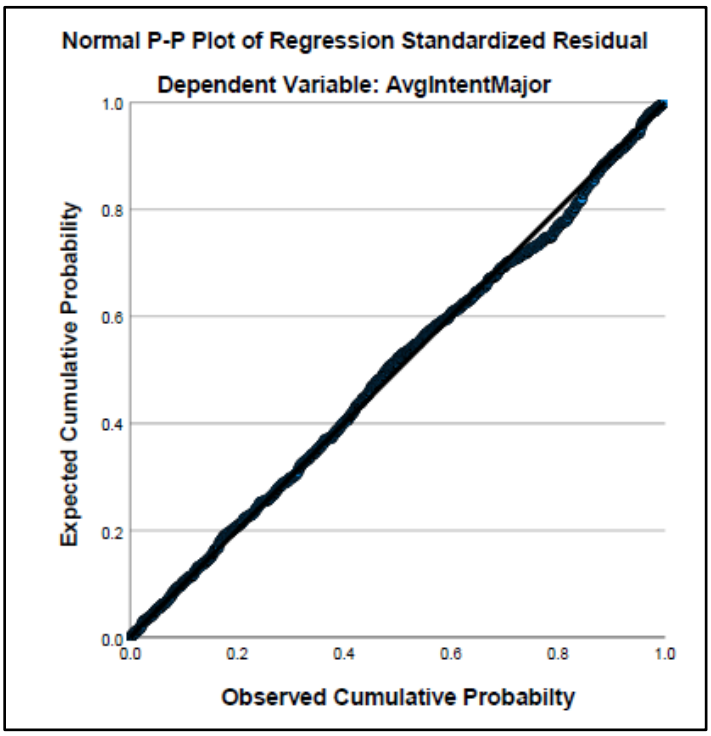
Table 9 – Mahalanobis Distance Results

Minimum Value	Maximum Value	Mean	Standard Deviation
0.015	24.774	3.996	3.220

A maximum D^2 larger than the critical value for four degrees of freedom is 18.47. After reviewing each of the individual record D^2 values, only six records were over the critical value (0.53%). An additional regression analysis was completed with the removal of the six outlier responses (> 18.47). The regression model significance value remained at 0.000. The changes to the remaining model outcomes (Tables 8 and 9) were small. Therefore, the six records remained in the published model.

To evaluate the accuracy of the dependent variable (Average Intent to Major) between the observed and expected cumulative probabilities, a chart has been provided in Figure 2. The plot line illustrates a nearly perfect linear and normal relationship between the observed and expected values.

Figure 2 – Plot of Regression Standardized Residual – Observed vs. Expected



Therefore, the final regression equation is compiled as follows:

Intent to Major = 0.008 + (0.456) *Aptitude + (0.427)*Subjective Norm – (.088)*Personal Image + (0.045)*Media Influence

Discussion

The overall model summary provided a strong goodness of fit predicting the proportion of the variance that can be explained (R^2 = 0.567) as well as a statistically significant p-value (p <0.00). The results of the regression model indicate a moderate influence for both the aptitude and subjective norm (β = 0.427) factors. Each of these factor coefficients was highly significant in the final regression model (p < 0.00). The remaining factor coefficient values were significantly less than the aptitude and subjective norm coefficients. Personal image and media influence resulted in a significantly lower influence on the intent to major.

Aptitude is an assessment of the skills required for occupations and careers which can relate to a level of confidence. Aptitude resulted in the highest influence on the intent to major (β = 0.456, p < 0.000) measuring the level of confidence and self-assurance associated with a career in technology. The mean value of the population (3.43) is below the benign Likert scale value (4) and toward the "somewhat disagree" perception. The results of various research studies contradict the outcome of this research finding that aptitude was not statistically significant on the intent to major (Joshi & Kuhn, 2011; Kuechler et al., 2009; Rattan et al., 2018; Zhang, 2007).

This research study indicated a moderate influence of the subjective norm (β = 0.427, p < 0.000) on the intention to major. While lower than the influence of aptitude, the impact of people

around students is quite clear. The perceptions associated with this research were measured with four groups for the subjective norm factor (family, friends, professors, and advisors). Vainionpää et al (2019) stated that parental support is important; fathers, male peers, and male siblings have a significant influence in motivating women to engage in tinkering activities. Two research studies supported the results of this research with statistically significant influence on subjective norms (Chipidza et al., 2019; Kuechler et al., 2009; Zhang, 2007). However, other studies resulted in finding any statistical significance for the subjective norm influence (Heinze & Hu, 2009; Moore & Burrus, 2019).

The remaining two factors, personal image, and media influence remained in the final model, although the coefficient values were significantly lower than both the aptitude and subjective norm factors. Not surprisingly, personal image perception resulted in the only negative influence ($\beta = -0.088$, $p < 0.000$) on the dependent variable. Three research studies found that personal image had no significant effect on the intent to major (Joshi & Kuhn, 2011; Kuechler et al., 2009; Zhang, 2007). Even though the value is small, the results do indicate some perceptions of anti-social, geeky, and nerdish individuals by majoring in a technology career. Media influence was the smallest influence on the dependent variable ($\beta = 0.045$, $p < 0.05$). As shown in Table 1, no research studies have integrated the influence of media on the decision to major in a technology career. However, similar research studies did not find an influence on the selection of accounting majors (Ali & Tinggi, 2013; Rababah, 2016). While media influence did remain in the final regression model, the factor p-value was close to the threshold limit.

It was disappointing that none of the remaining five factors did influence the intent to major in technology. Anecdotally, it was unexpected that several factors (attitude, social image, and interest) did not result in any significant influence on the intent to major in a technology career. Conversely, it was expected that the model's results illustrated a moderate influence for both aptitude and subjective norm.

Theoretical and Practical Implications

Skills can be assessed through the attainment of certification as well as formal education coursework through final grades. However, for many students, the level of attained skills is sometimes based on perceptions, which may or not be accurate. Formation of career interests in technology is formed through coursework in math and science coursework (Green & Sanderson, 2018; Vela et al., 2020; Wang et al., 2017). The formation of students' abilities can be formed before their college experience. Simpkins et al. (2006) believe that the crucial time is during junior high (grades 7 – 9) when fostering math and science self-efficacy will influence a student's competency and career interest development. However, it could be argued that the students (from junior high through college) are radically different than in 2006. Subsequent research found that science self-efficacy impacts the student's selection of science-based activities which translates into increased interest (Parker et al., 2014; Richardson et al., 2012). Akbulut-Bailey (2012) contends that social support augments self-efficacy and outcome expectations which will increase student interest.

Therefore, to change the trajectory of increasing interest in technology-based positions, more intervention is required before students enter a higher education institution. Co-curricular activities can provide support to connect and support academic activities. Eccles (1994) asserts that career exploration and interests are formulated in adolescence and shape subsequent pathways to STEM. Junior and senior high schools have an infrastructure of activities (academic, social, and athletic) for students. College athletes develop their interests, skills, and talent from their high school experience. Technology, as well as STEM-based careers, require the same formation and self-confidence to ignite their interest as well as develop the necessary skills.

Strategic partnerships and co-curricular activities can provide an influential foundation for career exploration and subjective norms. Public and private schools need to promote and integrate business partnerships to offer advocacy, role models, and activities that will support this formation process. Young et al. (2018) asserted that both career optimism and career planning ability are crucial factors in determining the strength of a student's commitment to a technology career path. Therefore, these activities may subtly form the support and factual narratives to increase the influence identified by this subjective norm factor associated with role models, advisors, and professors/teachers.

The successful integration of these activities will support the advice and influence of the student's teachers as well as family (Rezayat & Sheu, 2020). Technology educators can compile and communicate various information directly to parents on technology careers including job growth, various position definitions, growth opportunities, salaries, and co-curricular activities to educate parents with important, accurate influence for their children (Walstrom et al., 2008). These strategies will also counteract the various negative stereotypes formed by young people (Xuefei et al., 2022). Business and education partnerships can be formed to conduct STEM camps. This influence of this type of strategy was found to improve the perception of STEM careers through a one-week informal camp (Baucum & Capraro, 2021; Vela et al., 2020). Students do not fully understand the role of business technology professionals (Vainionpää et al., 2019). The integration of industry professionals, through business partnerships, will provide a targeted, accurate narrative through role models dispelling the "geek" stereotype and reinforcing the business technology professional paradigm.

Akbulut-Bailey (2012) suggested that self-efficacy leads to stronger outcome expectations to find the value rewards associated with a major in information systems. Furthermore, this research contends that, with an increased emphasis on social support, a positive relationship connection between students' interests and choice will occur, leading to a stronger possibility of selecting an information systems major. Rezayat and Sheu (2020) found that participating in playing games and STEM clubs correlates with positive perceptions of STEM careers among American students. The positive relationship connection from students needs to be recognized and targeted by employers (from strategic partnerships). In the post-Covid period, McCloy et al. (2020) found that education needs to collaborate for a more long-term and inclusive view of talent development as the outcomes associated with proficiency from postsecondary education are questioned.

It should be expressly noted that this discussion is not limited to the high school environment. These strategies can and must be replicated at the higher education level to continue the engagement on the influential factors recognized in this research along with the various strategies outlined.

These initiatives will provide an impact by increasing self-belief and confidence (aptitude). The less influential factors identified in this research will be supported (or negated as it relates to the personal image) by social and activity support. The integration of business professionals into all education levels will provide a realistic view of a business technology career. Hands-on activities to integrate technology concepts in the areas of mobile application design and business strategy will provide a definitive, accurate perspective of these technology careers. The interaction with these industry practitioner role models will add value to dispel the "*computer science*" and engineering stereotypes associated with business technology professionals.

The continual (or maybe increasing) gap between supply and demand for IT personnel coupled with the value-proposition ascribed to technology initiatives will only continue to challenge business leadership in the future. The continual need for increased and expanded organizational technology portfolios is not affected by the reduction in labor availability of staffing levels thereby overburdening personnel with additional responsibilities and workload.

Limitations and Further Research

The completion of this research uncovered several limitations. While the surveys were completed with a consistent population (first-year students), some semesters did not provide a consistent response rate over the research period. However, it is unknown whether the availability of additional survey submissions would alter the results. In retrospect, it may have been important to gather data on whether the first-year students have selected a major or remain undecided. Additionally, if the student had selected a major, it would be important to gain a level of certainty about their decision. This data would have provided an important narrative to supplement the intention to major in a technology career qualitative data.

The results of this five-year study have provided interesting thoughts and questions which affect the perception of the major, career, and activities of information technology majors. Additional questions have been formulated for potential exploration.

- Do they view technology skills as a "trade school" mentality rather than a higher education model?
- Are students aware of business leaders who gained their leadership positions through a successful career in a technology position?
- Has the influence of the research factors changed over the research period by calendar year?
- Are there any differences between the perceptions of high school students versus college students? A comparison between high school students and first-year college students in the same period would be useful.

This research confirmed the direct relationship between the confidence and perception of student's aptitude as well as subjective norm influence on the intent to major. The lack of an accurate perspective could be erroneously deflecting students from a successful and enjoyable technology career. While the current group of high school and college students believe that they are experienced and skilled in the use of technology, there is also a clear disconnect with their perception associated with their technology aptitude. Or it is a simple disconnect in the interest in the development of technology? Students may view technology as an appliance. A simple view is an example that young people enjoy driving a car. However, they have no interest in understanding the design and mechanical operation of an automobile. That responsibility is aligned with an engineer that requires higher math and science aptitude and not with a business professional educated with a business technology curriculum.

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