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Information Technology and Student Engagement

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Information Technology and Student Engagement

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements
for Graduation in the College Honors Program

By

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*Educational use of this paper is permitted for the purpose of providing future
students a model example of an Honors senior thesis project.*

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Abstract

This study examines the effects of information technology use on overall student engagement. The independent variables examined include age, ethnicity, gender, transfer status and parent's education. It is hypothesized that younger, traditional students have a higher level of information technology use than non-traditional, older students. The hypotheses that relate to ethnicity are that Caucasian students will have a higher level of information technology use than Minority students. Data has been examined from the 2008 National Survey of Student Engagement (NSSE). Final results show that age, ethnicity, gender, and transfer status does not yield a statistically significant difference. However, Mother's level of education is statistically significant. When analyzed, findings reveal that the lower the Mother's level of education, the higher the level of information technology use. Overall findings suggest that additional research be done to increase validity.

<div align="center">I.) Introduction and Research Problem</div>

Statement and Justification of the Research Problem

The topic addressed in this research is the usage of information technology within the college community in relation to age (traditional/non-traditional) and race (Caucasian/Minority). This study seeks to determine if the College at Brockport's investment in additional classroom technology and pedagogical flexibility within new technologically enhanced classrooms positively relates to student engagement.

Research studies show that there is a strong positive relationship between students' use of information technology for educational purposes and student engagement as well as academic achievement. The research question for this study is; how does race (Caucasian/Minority), and age (traditional/non-traditional) relate to students' use of information technology?

Literature Review

Students' use of information technology for academic work, classroom instructions, and communication with their instructors and peers have been studied. Some studies have focused on how certain factors may influence use of information technology in the undergraduate setting.

Overall Information Technology Usage

Given the short period of time which information technology has been integrated into college and university life, some students and faculty question whether these technological advances have educational benefits. The studies to date, done mostly from a classroom level, suggest that student's use of information technology has a positive impact on several important

educational outcomes. A study by Twigg (2004), where course redesigns at several institutions suggests that the "incorporation of technology into a course results in greater learning." Correspondingly, studies on college populations (not at the classroom level) show that student use of information technology positively affects outcomes such as student self-reported gains in general education, intellectual development and personal development (Hu and Kuh, 2001; Kuh and Hu, 2001; Kuh and Vesper, 2001).

Conversely, other studies have shown mixed results. For example, Flowers, Pascarella and Pierson (2000), found that the use of information technology positively influenced cognitive development for two year college students but not necessarily for four year college students. This research team concluded that the mixed findings may be the result of socio-economic status. Those at a two year college are on average from a lower socio-economic status and therefore benefitted cognitively through use of information technology.

Researchers have also questioned the positive result of student's use of information technology. In a study by Reisberg (2000), he suggests that the use of information technology distracts students from participating in traditional and empirically confirmed effective teaching practices. While many technological devices focus on entertainment value, such as video games or mp3 players, it is undeniable that information technology also allows students and faculty to collaborate on assignments through email communication. Alavi (1994) found that email encourages collaboration among students. Email has also been found to result in "more frequent contacts between students and faculty" (Hu and Kuh, 2001; Kuh and Hu, 2001).

Kuh and Hu (2001) examined the "best wired campuses," which is defined as the higher level institutions that have made large investments in technology. This study found that students

reported "somewhat more frequent contact with faculty," and were found to participate more in active learning activities as compared to students at less wired campuses. These results show that there is indeed a positive link between information technology and student engagement. "Used appropriately and in concert with powerful pedagogical approaches, technology is supposed to enhance student learning productivity" (Kuh and Vesper, 2001, p. 87).

In a study by Nelson Laird and Kuh (2005), with a sample of over 60,000 students from more than 420 four-year colleges and universities across the country who completed the online NSSE 2003 survey, found that in general, "students' responses to the technology items suggest that many students use information technology regularly for personal and academic uses and to communicate with other students and instructors" (p.219). For example, 73% of first year students and 69% of fourth year students spend more than 5 hours per week online for any reason. Almost two-fifths of first and senior year students spent more than 5 hours per week online doing academic work. Results from this study also show that over half of all students frequently communicated with classmates online in order to complete academic assignments.

Nelson Laird and Kuh (2005), also found that of the students that "frequently use information technology for classroom-related activities or assignments are more likely than their counterparts to report that their courses frequently emphasize higher order thinking skills" (p.220). Another positive result was that students who frequently communicated with classmates online to complete academic work were more likely to report more frequent interactions with faculty.

In a study by Carle, Jaffee, and Miller (2009), created a research study by comparing two classes taught by the same faculty member and of the same subject to see whether

technologically oriented pedagogical changes led to positive outcomes among students. One classroom was a technology enhanced research methods class and the other was taught under normal circumstances. The technology enhanced classroom students showed statistically significant increases in student engagement and improved academic achievement.

<u>Ethnicity</u>

Chen, Lambert and Guidry (2009), considered the increase of online learning in their study of student engagement and information technology. Their study found that hybrid courses, one that blends both web and face-to-face components, and online courses were more likely to use "internet technologies and to enhance their learning and communication with faculty and other students" (p.1229). This study found that part-time and ethnic minority students were more likely to take online courses. Results from this study also show that students that took hybrid courses were more likely to use the library web services. Students who use information technology in their learning were found to score higher than the traditional student engagement measures. They were also more likely to make use of "deep approaches to learning like higher order thinking, reflective learning, and integrative learning" (p. 1230). These students reported higher gains in general education, practical competence, and social and personal development.

Messineo and DeOllos (2005) studied reported experience, comfort level and perceived skill to determine how to best approach the use of information technology within departmental curriculum. Findings show that students view their computer competence in different ways which depend on whether they are using technology for personal or course related tasks (p.50). Results show that a digital divide exists: minority students were significantly less likely to have computers when growing up than white students. Minority students also had less online library

experience and were significantly less likely to self-identify as skilled at email for class purposes and less likely to use their university email account (p.52).

Interestingly, minorities were significantly more likely to identify as skilled as compared to white respondents (19.2 percent compared to 5.2 percent). When considering the lack of early exposure to computers, Messineo and DeOllos suggests that this puts minorities at a disadvantage in courses early in their academic career. Due to this low exposure, authors suggest that the higher reported skill by minority students could be due to how "minorities perceive the abilities of those in their comparison group (p.53)." Minority students view their skill level greater than their peer group in the community (p.53). It is suggested that special attention by departments be paid to those groups that may be at a technological exposure disadvantage, such as minorities, while using instructional technology and while having expectations of information technology competence from their students to complete assignments (p.54).

Ching, Basham and Jang (2005), also found disparities that exist among information technology usage and exposure in college students. Results state that male students from higher family income levels who had access to a computer at home before age 10 show statistically significant higher levels of technology use than other demographical groups. Ethnicity was not a predictor of technology use whereas family income was (p.405).

Age

In a longitudinal survey of first year students' frequency and competence in the use of information and communication technology, Hosein, Ramanau and Jones (2010) found that younger, traditional students' usage was higher for social and leisure purposes. Older, non-

traditional students were found more likely to use information and communication technology for academic study purposes (p. 403). Younger students rated themselves as being more competent than older students in maintaining their own blog, using a search engine, word processing program, presentation program, and spreadsheet program (p.409).

Also in this study by Hosein, Ramanau and Jones (2010), the frequency of using information and communication technology had a weak but highly significant positive relationship to overall competence in information and communication technology use. As frequency of use increased, so did self-reported competence (p. 410). Younger students did not have any advantage, in fact, the older students were more likely to increase their competence in presentation software the more frequently they used it. Which suggests that students who were first time users of a learning technology have a faster increase in competence the more frequently they use it, but this may depend on the difficulty level of the technology being used. In conclusion, age is not a simple predictor of technology use (p.415). The younger students' advantage of competency in learning technology diminishes as the academic year progresses and the older students become more competent (p.416).

After reading several studies that were conducted to view how certain variables may affect students' use of information technology, there were many studies that confirm the positive relationship between the use of information technology and overall student engagement. There are many more studies on information technology, although the above studies support this study as well as the variables.

Hypothesis

The purpose of this study is to explore if there is a relationship between age and ethnicity and the use of information technology at the College at Brockport. Therefore, the two hypotheses are:

1.   Younger traditional students, have a higher level of engagement with information technology than non-traditional, older students.

2.   Caucasian students will have a higher level of engagement with information technology than Minority students.

II.) Research Methods

Operationalized Variables

The topic being addressed by this research study is the level of information technology usage within The College at Brockport and how it relates to age and ethnicity. The variables for the study are: the level of use of information technology (dependent variable), age and ethnicity (demographic/independent variables). According to the NSSE (2008), the operational definition of age is year of birth. For ethnicity, the operational definition in the NSSE (2008) is measured by identifying racial or ethnic identification by marking one of the following: American Indian or other Native American; Asian, Asian American or Pacific Islander; Black or African American; White (non-Hispanic); Mexican or Mexican American; Puerto Rican; Other Hispanic or Latino; Multiracial; Other; or I prefer not to respond.

The attributes of the independent variable age is a nominal level of measurement in years since birth. The attributes for ethnicity is also a nominal level of measurement of racial or ethnic identification by picking a category. The attribute of dependent variable is how much students

use information technology. The dependent variable is measured by the amount of students'

reported use of information technology. The independent variables (age and ethnicity) were

chosen for this research study because of the possibility of yielding significant results and overall

interest in disparities that may exist between groups.

Reliability and Validity

Based on previous research, the NSSE has developed a validated an efficient survey. The

survey items are directed at a variety of student behaviors and experiences related to student

engagement. Specific questions from the NSSE that relate to the use of information technology

were focused on for this research study.

The four types of validity are face, content, criterion and construct. Face validity refers

to the extent to which the measure is appropriate taken as a singular item. Content validity refers

to whether or not the instrument measures cover a full range of the concept's meaning. Criterion

validity addresses whether the scores obtained with one measure be accurately compared to those

obtained using another measure. Construct validity refers to whether the measure is related to

other measures as specified by the theory (Engel & Schutt, 2009).

There are three ways to determine an instrument's reliability: test-retest, split-half, and

alternate forms. Reliability refers to whether or not the measurement yields consistent scores

(Engel & Schutt, 2009). By using test-retest in the NSSE, the survey would be completed by the

same student two times under the same condition. This researcher would then look and see what

the variation of scores between the test and the retest. If there was very little variation between

the scores then it would be concluded that the instrument is reliable.

Research Design

This analysis of the 2008 NSSE data uses a repeated cross-sectional research design. A repeated cross-sectional research design focuses on data measurable from a single snapshot in time. Conversely, a longitudinal design collects data at two or more points in time (Engel & Schutt, 2009, pp. 153). Examples of longitudinal studies include trend studies, and event-based or cohort design (Engel & Schutt, 2009, pp.155). An example of a cross-sectional would measure a static set of data: a student's overall stress level versus their GPA in the Fall 2011 semester at The College at Brockport.

Sampling Methodology

The units of analysis in this study are individual students. The characteristics of the population are that they are students of SUNY Brockport, at least the age of eighteen years old, and are eligible first year or senior year students. The first year student sample also includes new transfer students with less than twenty four credits. The senior year students are measured by accumulated credit hours. The time of data collection was in February- May of 2008 and the geographical location is the students enrolled at the College at Brockport.

The sampling methodology used for this study was a random sample of first year and senior year students at the College of Brockport in February-May 2008. The selected students received an e-mail asking them to participate in the NSSE survey. The NSSE picked a random sample of 1,324 first year students and 1,352 senior year students. A total of 812 students filled out the survey; 370 were first year students and 455 were senior students (Dauenhauer, J., & Aponte, C, 2011). Other students included in the data are juniors enrolled in the three sections of SWO 310.

One advantage of the random sampling methodology used by the NSSE is that the survey could be taken at the student's convenience. Students who may have been studying abroad at the time could also take the survey since the survey itself was sent out electronically. A disadvantage of the methodology is that a student may just click random answers on the survey without reading the questions or answers just to receive the free t-shirt or cash prize.

Data Collection

The survey was administered electronically to the students at The College at Brockport who were randomly chosen by the NSSE. The selected students received an e-mail asking them to participate in the NSSE survey. The data was collected electronically because then it would be easier to calculate the results with so many students participating in the survey. This data was collected to measure the extent to which first-year and senior students engage in activities associated with high levels of learning and development. The 2008 survey is the 5th consecutive year that The College at Brockport has participated.

The selected students at The College at Brockport were contacted by e-mail asking them to participate in the NSSE survey. If they did not respond they were then contacted two more times. Several different incentives were used to coerce students to participate, such as apparel from the college bookstore and cash prizes.

There were very minimal ethical issues in the NSSE survey, because it was completely voluntary, involved no minors and the data was used by students in their classroom research project and will not be used in any research study conducted by a faculty member. Therefore

there will be little to no risks to the participants since the survey was conducted electronically and there was no threat to the participant's well-being.

Ethics

Informed Consent Process:

The NSSE survey acknowledges these guidelines of informed consent by providing an informed consent statement prior to the beginning of the survey, using reassuring language to state that there is no consequence should a student selected to take the survey decline his/her participation and that participation is on a voluntary basis only (NSSE, 2008, pp.1).

When it comes to research in the social sciences, there are numerous precautions researchers must take to make sure that their research procedures follow ethical guidelines when it comes to using human subjects. In the social work field, if a researcher from an institution wants funding for their study, the researcher must send his/her proposed methods of conducting the research to an institutional review board (Engel & Schutt, 2009, pp.61). Sieber (1992) says that the institutional review board, or IRB, is mainly responsible for making sure that the proposed research procedures follow the standards of ethics that is relevant to the IRB's parent institution (as cited in Engel & Schutt, 2009, pp.61). Entities like the IRB and documents such as the Bellmont report take into account the importance of ethics in research studies that deal with people.

One particular application of these ethical standards is known as informed consent. The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research [NCPHSBR] (1979) describes informed consent in the Bellmont report as, "Respect for

persons requires that subjects, to the degree that they are capable, be given the opportunity to choose what shall or shall not happen to them (pp.1)." The Bellmont report then lists three guidelines that are used to ensure that informed consent is properly acknowledged and these include voluntariness, information and comprehension (NCPHSBR, 1979, pp.4). The human subject has the right to know and understand the research procedure they are thinking of volunteering for and they also must have the right to be able to back out of the research if they feel uncomfortable in participating.

Ethical Issues:

The NSSE survey acknowledges these guidelines of informed consent by providing an informed consent statement prior to the beginning of the survey, using reassuring language to state that there is no consequence should a student selected to take the survey decline his/her participation and that participation is on a voluntary basis only (NSSE, 2008, pp.1). This statement shows that the researchers of NSSE have made it a priority to make their random sample of students comfortable and the language within the consent statement indicates that acknowledgment of the three guidelines from the Bellmont report used to analyze informed consent. Along with the informed consent statement, the NSSE also elaborates on the ethical issues it is trying to prevent within the survey. Ethical issues are always considered in the analyzing of proposed research studies and the NSSE acknowledges two main ethical issues.

The first issue that is examined is known as undue influence. The NSSE ethics (2008) describes undue influence as the action in which multiple attempts of persuasion to do the research study are the main reason why a participant is present (pp.1). This shows that the participant came not on their own free will, but by the constant messages of persuasion given to

them by the researcher or the institution. The NSSE avoided this tactic in their informed consent

statement by indicating the voluntary nature of the survey and how not taking the survey

wouldn't have any negative effect on the participant. The second issue touched upon is coercion.

Coercion is the action of attempting to force human subjects to participate in a research study

(Engel & Schutt, 2009, pp.63), which goes against the clause of informed consent in the

Bellmont report. The NSSE (2008) indicated that a potential example of coercion that could have

occurred in their survey is language that is forceful in nature, such as, 'you have to do this survey

or else' or 'you won't be considered a great student unless you do this survey (pp.1). Again, the

NSSE reiterates that the survey is voluntary and using the word 'voluntary' in their informed

consent statement is enough evidence to suggest that there is no coercion.

<div align="center">III.) Results</div>

Instrument

Four items on the NSSE 2008 survey defined information technology use:

- Used an electronic medium (listserv, chat group, Internet, instant messaging, etc.)
  to discuss or complete an assignment

- Used e-mail to communicate with an instructor

- Institutional emphasis: Using computers in academic work

- Institutional contribution: Using computing and information technology

These items were measured on a 4 point Likert Scale with the maximum score for each

items being 16:

- 4= very much/very often

- 3= quite a bit/often

- 2= some/sometimes

- 1= very little/never

Findings

Data findings according to the demographics of the sample were traditional age students

(17-22) comprised 26.7% (n=586) of the sample where non-traditional age students (23 +)

comprised of 73.3% of the sample. For ethnicity, Caucasian students comprised 76.6% (n=623)

of the sample, and Minority students comprised 23.4% (n=190) of the sample.

The sample was analyzed using SPSS to find statistically significant results. The

following graphs are a summary of the results from analysis:

Does the level of information technology use differ between Caucasian and Minority students?
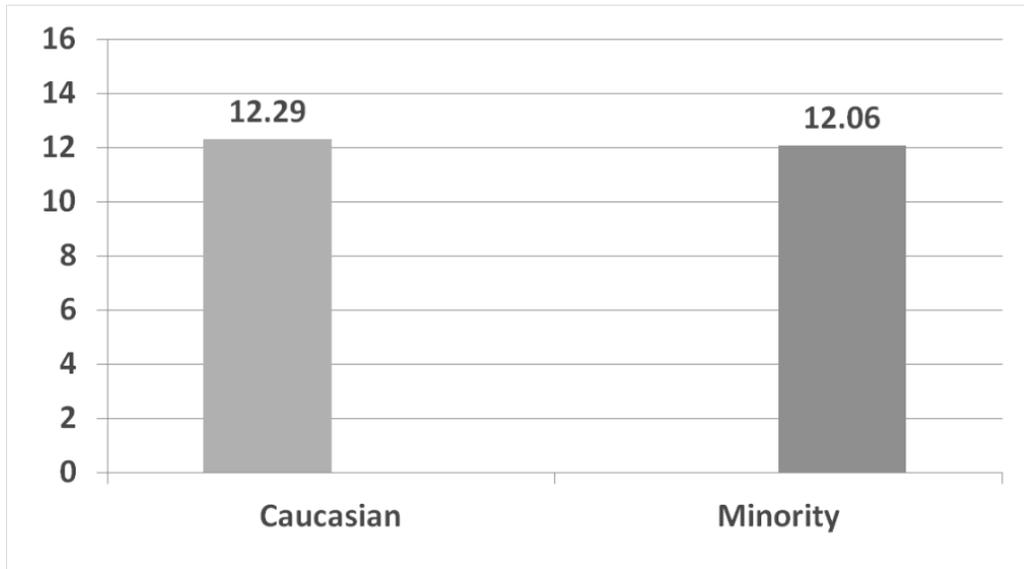

Findings: The mean score for Caucasian students (n=623) was 12.29 (SD=2.63) and the mean score for Minority students (n=190) was 12.06 (SD=2.95). Not statistically significant [t (811) = -1.02, p=.308].

Does the level of information technology use differ between traditional and non-traditional aged students?
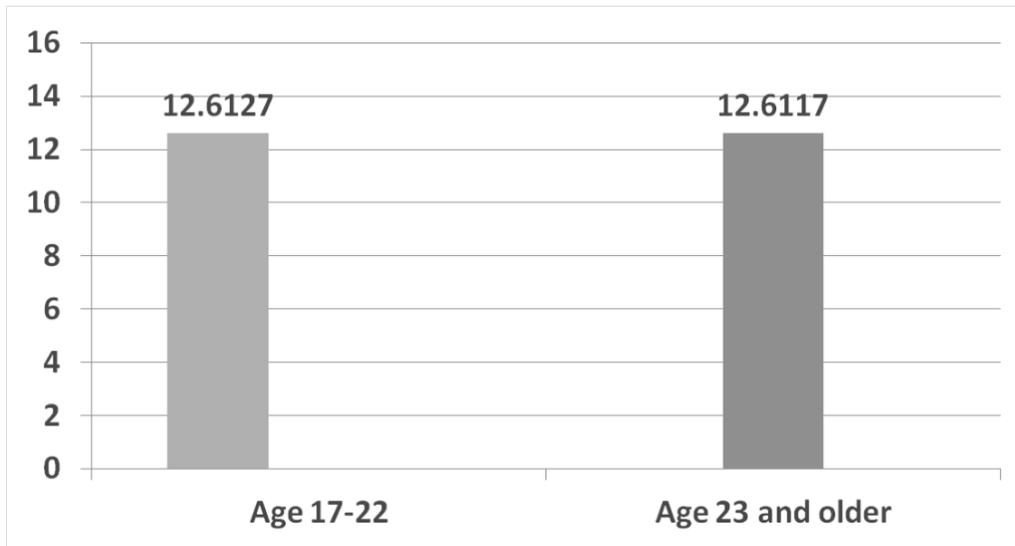
Findings: The mean score for traditional age students (n=568) was 12.6127 (SD=2.33), while the score for non-traditional age students (n=206) was 12.6117 (SD=2.26). An independent samples t-test revealed that this difference was not statistically significant t (772) = .005, p=.996.

Since the hypothesized demographics did not yield any statistically significant results, additional demographics were explored: gender, transfer status, and parent's level of education.

Does the level of information technology use differ between Male and Female students?
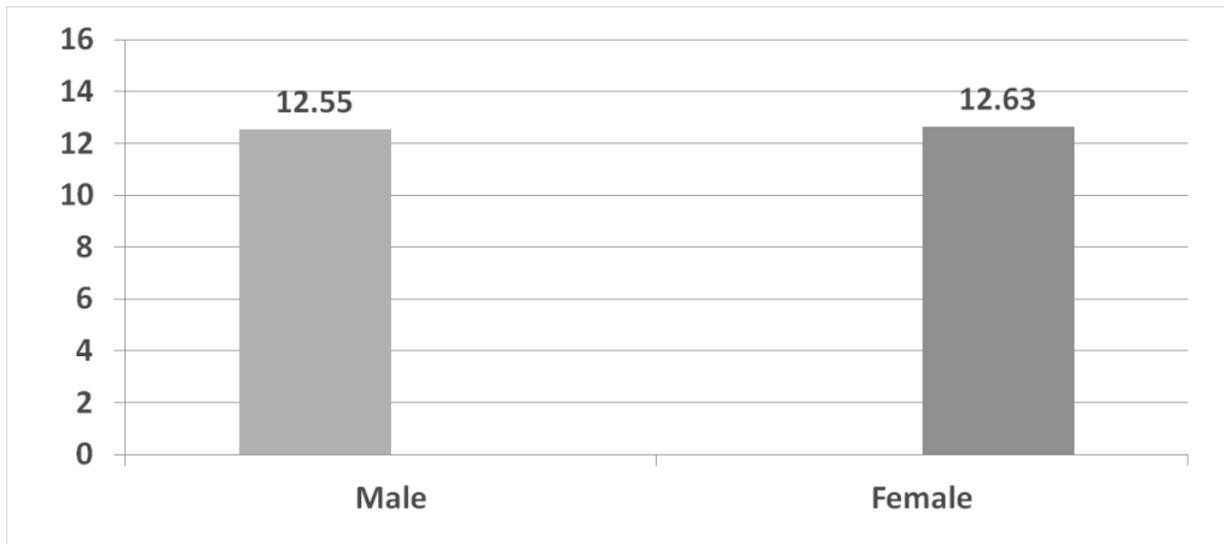

Findings: A one-way ANOVA was conducted to determine the differences of information technology use mean score between students from two different genders. The average level of information technology use for Male students (n=232) was 12.55 (SD=2.29), while the average level of information technology use for Female students (n=543) was 12.63 (SD=2.33). These differences were not statistically significant (p=.643).

Does the level of information technology use differ between transfer and non-transfer students?
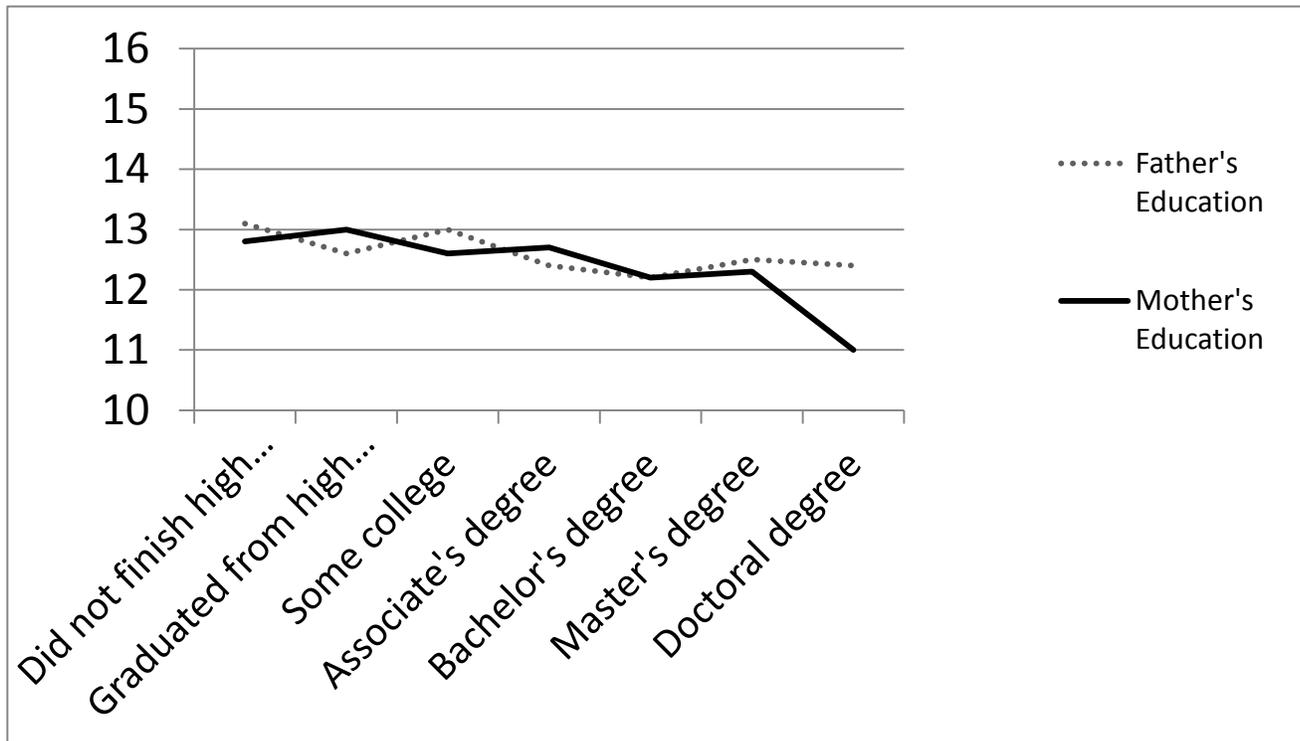

Findings: The average level of information technology use for transfer students (n=390) was 12.68 (SD=2.34), while the average level of information technology use for non-transfer students (n=384) was 12.54 (SD=2.28). A one-way ANOVA revealed that these differences in mean score were not statistically significant (p=.416).

Does the level of information technology use differ between Father's education level and Mother's education level?
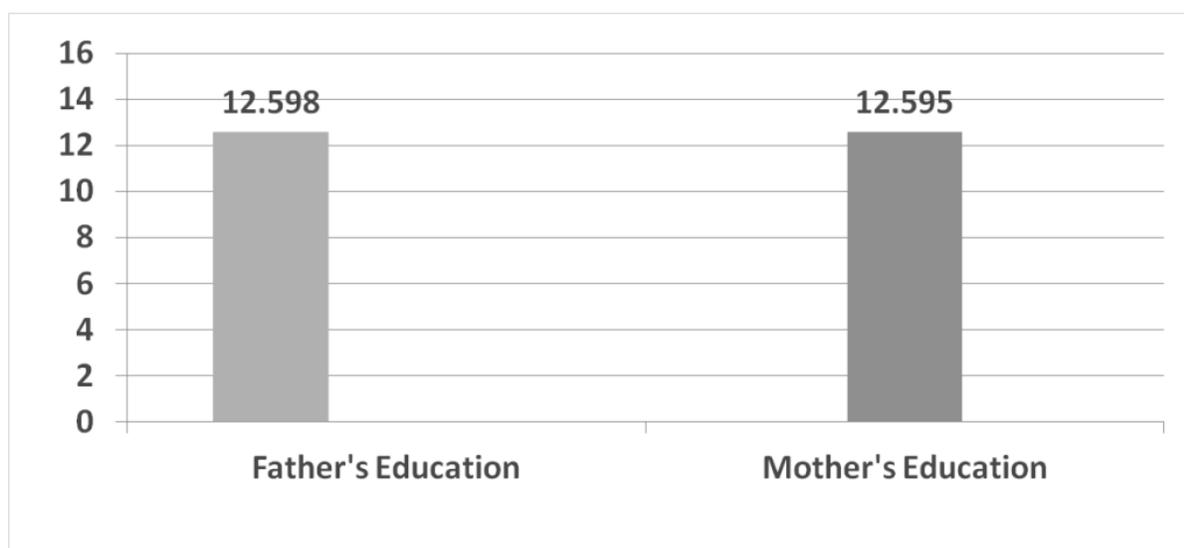
Findings: The mean score for students who answered what the highest level of education that your father completed (n=756) was 12.598 (SD=2.3), while the mean score for students who answered what the highest level of education your mother completed (n=758) was 12.595 (SD=2.3). A one-way ANOVA revealed that Father's education was not statistically significant (p=.10), while Mother's education was statistically significant (p=.043).

How does the level of information technology use differ between Father's education and Mother's education?

Statistically Significant Findings: The lower the Mother's education, the higher the level of information technology use.

IV.) Discussion

These findings have given this researcher some interesting results when compared to the initial hypothesis. When it came to the dependent variable of information technology use, it was difficult, as well as disappointing; to continue analyzing different demographics until there was a statistically significant result. After analyzing age, ethnicity, gender, and transfer status, it was

Mother's education level that yielded statistically significant results. Which proposes the question: What is the link between information technology use and mother's education level?

While analyzing the NSSE 2008 data, it was clear that the sample size was small. Response rate for NSSE 2008 was low and a suggestion for future studies should include a larger sample size. Perhaps if the survey was done in class, instead of being administered electronically, there would be a higher response rate.

An implication of this research is that it will inspire further research into the field of information technology use in a college setting. By identifying additionally significant differences of the level of information technology use between different demographics, further research can be done to determine validity.

The overall mean of information technology was 12.72, it should be a 16; meaning very much/very often. Another research study could be done to compare other college's technology budget and compare mean scores of technology use to see if there is a connection. An overall suggestion to the College at Brockport is that they should continue to support an increase of technology across campus. Research evidence concludes that there is a strong connection between information technology and overall student engagement which is a measure of academic quality.

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