

A Study on Internet and Mobile Communication Technologies and Academic Success in College

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Abstract

College persistence has been a much studied subject. Tinto's (1993) college persistence theory reported the need for students to separate from communities of their past in order to persist in school. Yet, with the pervasiveness of technology today and the capability for students to remain in contact with past ties, this study challenged Tinto's theory on separation.

Using data collected on second year college students, this study compared various types of technologies used by students to their GPA. This study used descriptive statistics and simple regression analysis to determine if there was significance in the type of technologies students used when communicating with various relationships (parents, siblings, and friends) to improving their GPA. The findings of this study showed that GPA increased when students used mobile voice technology when communicating with parents and siblings. There was no significance when using technology for communicating with friends from home.

INTRODUCTION

College persistence is one of the most widely studied phenomena in higher education (Barefoot, 2004; Tinto, 2006; Tierney, 1992). The U.S. Department of Education (2007) estimates that 63.9% of students who begin college to attain a four year degree fail to do so in those four years. Yet, as to the reasons why some students persist in college while others drop out is still unclear. Prior studies have shown a variety of factors that influence college persistence. Some of these factors include post-secondary preparation, high school grade point average (GPA), parental involvement, institutional fitness, and socioeconomic status (SES), such as parental income, education, and occupation (Hodge, 2009).

Vincent Tinto (1993), a renowned expert on college persistence theory, observed that students who are able to separate from the communities of their past (such as family, neighbors, and hometown friends) are better able to persist in college as they advance towards degree completion. According to Tinto, this is a necessary step for students in order for students to shed the norms and values of their past and adopt the norms and values of their new college life.

Yet, separating from one's home can be stressful and not without physical and emotional pain for both the student and his or her family (Tinto, 1993). London (1992) wrote, "such passages inevitably call into question the very meaning of allegiance and love, over which people can intensely disagree" (p. 6). According to Tinto, family members who cannot fully accept the changes in behavior and values taking place in the student's new life can potentially sabotage the student's efforts at succeeding in college.

Since the time when Tinto first observed the need for separation from past relationships, there has been a steady rise in the use of Internet and mobile communication technologies (I/MCTs) among college students (PEW, 2002). The growing pervasiveness of technology has increased opportunities for college students to remain connected with family, neighbors, and hometown friends (Wang, 2007). For example, most students today enter college owning cell phones and have a computer with an Internet connection in their dorm room (Hoffman & Blake, 2003). According to PEW (2010), "college students [*sic*] are more likely than those who have no college experience to be online, use social networking sites, watch and post video online, connect to the internet wirelessly, and send and receive text messages" (p. 25).

Prior studies have shown that having technology has improved academic performance (Duggan, 2005). For example, Duggan found that students with email accounts persisted in school more so than students without email accounts. Hodge (2009) found that students who entered college with more prior years of computer experience were more likely to persist in college. These studies suggest that through the use of I/MCTs, students are able to perform well in spite of maintaining close contact with person's from their past. Therefore, separation may not be as important a step in Tinto's (1993) college persistence theory as once thought.

The pervasive use of I/MCTs by today's college students are challenging Tinto's (1993) theory that students need to separate from past ties in order to successfully transition into college life. The next sections will discuss the various types of I/MCTs.

INTERNET/MOBILE COMMUNICATION TECHNOLOGIES

The Internet has provided faster and more affordable communication options for millions of consumers worldwide (Lin, 1999). The massive development of I/MCTs has led to a significant increase in the range of interpersonal interactive methods people use to communicate (Gordon, Juang, & Syed, 2007; To, Liao, Chiang, Shih, & Chang, 2008). Gordon et al. observed that, "College students use the Internet more than any other group and have been raised in a computer-oriented society" (p. 682). Wang (2007) reported that 86% of college students are online users, compared with 59% of the general population. Today, some of the more popular ICTs used by students attending colleges in the U.S. include email, social networking Web sites, blogs, IM, and chat rooms (Gooding & Morris, 2008; To et al.).

There are two broadly defined types of I/MCT delivery methods—synchronous and asynchronous (Kirkwood & Price, 2005). According to Kirkwood and Price, synchronous methods of communication occur in near real-time as participants exchange messages back and forth. Mobile voice, IM and chat rooms are examples of synchronous communication technologies. On the other hand, asynchronous methods of communication do not require both parties to be present during the transmission (Hampton & Wellman, 2001).

Asynchronous Communication

Asynchronous communication is communication that does not occur in real time. According to Hampton and Wellman (2001), in asynchronous communication, messages can be stored so that they can be viewed, retrieved, and attended to at a more convenient time. Text messaging, email, blogs, and social networking Web sites are examples of asynchronous communication technologies. Examples of asynchronous communication are the focus of discussion in this next section.

Email

Email allows students to communicate to family, friends, and neighbors through email client software that can access the Internet. Email provides flexibility to both the sender and receiver of the email by allowing both to attend to written communication at their own conveniences (Nie, 2001). According to Nie, email can be superior to other forms of

communication when it becomes necessary to send the same message simultaneously to a large number of people.

Research has shown that email remains a popular I/MCT, even among college students (Chen, Yen, Hung, & Huang, 2008). PEW (2002) reported that 62% of a nation-wide sample of college students identified email as their primary Internet medium. Chen et al., found that when compared to using IM, students who used email performed better when it came to expressing their views and position on a task to resolve an equivocal situation. The email group reported higher communication quality and effectiveness than the IM group did.

Debrand and Johnson (2008) examined gender differences when it came to the use and perceived usefulness of email and IM. Debrand and Johnson had mixed results. When it came to the perceived usefulness of email and IM for communicating with persons who were geographically close, there was no significant difference between men and women. However, when communicating with persons who lived at a geographic distance, female students perceived email to be more useful than the male students did. Debrand and Johnson concluded “male and female college students use and perceive email and instant messaging in a similar manner” (p. 20). Other studies, such as Boneva, Kraut, and Frohlich (2001) also found that women spent more time communicating with family and friends through email, than men did.

Social Networks

With advances in Internet technology, such as the authoring capabilities of Web 2.0, social networking Web sites have become another popular communication medium among students (e.g., Facebook.comTM, Myspace.comTM, Xanga.comTM, and Friendster.comTM) (Fu, Liu, & Wang, 2008; Hinduja & Patchin, 2008). Social networking Web sites represent online spaces that allow individuals to meet, share information, and keep in touch. Students use social networking Web sites to communicate with people whom they know from an offline context and with new people, they meet online. Students can be selective in who they will allow to access their Web space (Mayer & Puller, 2008). That is, students can restrict access to their personal information to a narrow set of close friends and family and they can allow widespread public access to potential weak-tied relationships. In general, students tend to restrict access to their social network Web site to the closest of friends (PEW, 2002).

Weblogs

A Weblog, or blog for short, is a frequently modified Web page generally ordered in reverse chronological sequence (Herring, Scheidt, Wright, & Bonus, 2005). Fu et al. (2008) described a blog as an interactive online Web page that acts much like a journal, which is frequently updated by the blogger. Bloggers can add text, images, and links to other Web pages to their personal blog page. Blogs can be set up to allow for a running

conversation with other people who have access to the blog. According to Fu et al., blogs are one of the fastest growing applications on the Internet and are often included as a feature in social networking sites. Herring et al. noted that blog Web sites have increased in popularity among all age groups. The National Institute for Technology and Liberal Education (NITLE) (2008) Web site reported that there are currently 2.8 million likely active blog Web sites.

Mobile Text Messaging

Similar to email and blogging, students can use mobile phone devices to send and receive text-based messages, as well as pictures, at their own convenience. PEW (2009) reported that 38% of teens surveyed sent text messages on a daily basis compared to 36% who talked on the phone. According to PEW, text messaging by teens increased “both in overall likelihood of use and in frequency of use” since 2006 from 51% to 58% by 2008 (p.11). In a recent PEW (2010) report, today’s college students use cell phones for text messaging more than any other generation.

Synchronous Communication

Synchronous methods of communicating through I/MCTs have become increasingly popular (PEW, 2002; To et al., 2008). Mobile phones, chat rooms and IM allow students to communicate in near real-time.

Mobile phones

Mobile phones have enabled persons to reach family, friends, and services from just about anywhere at any time. PEW (2002) reported that the ubiquitous nature of the cell phone has made it a primary choice for students’ social communication (p. 15). According to a CTIA and Harris Interactive (2008), four out of every five teens (79%) carry a wireless device, like a cell phone.

Chat Rooms

Chat rooms are text-based interactive applications that typically address dedicated topics (Subrahmanyam, Greenfield, & Tynes, 2004). As with other types of I/MCTs, users can interact anonymously. Wang (2007) wrote, “Chats are real-time communication that requires the coordination of time for all the participants” (p. 286). Subrahmanyam et al. noted that users can enter chat rooms as themselves, under aliases, or even pretend to be someone other than whom they actually are. Subrahmanyam et al. found chat rooms to be more public in nature allowing for groups of users to join in the threaded conversations. Additionally, chat rooms are used to discuss sensitive topics such as sexuality. Subrahmanyam et al. found participants to go to great lengths to overcome the

“facelessness” and “placelessness” of the medium in order to present themselves and learn the identities of others (p. 663). PEW (2002) reported that 2% of college students use online chat rooms for communicating with others. Although less popular than other forms of online media, online chat is doubly as common among college Internet users as the public (PEW).

Instant Messaging

Like chat rooms, IM is another I/MCT used for sending and receiving messages between mutual subscribers in near-real time (To et al., 2008). IM programs tend to be more private by nature than chat rooms. Where a chat room can have many users viewing and interacting in the same chat window, IM tends to be used for exchanging text-based messages between two online users (Faulhaber, 2002). Additionally, IM allows users to build and confirm a list of persons they wish to include in what is referred to as a *buddy list* (Faulhaber; To et al.). IM has become one of the more popular applications among Internet users (PEW, 2005; To et al.). PEW found that almost half of online teens preferred using IM to email or text messaging when communicating with their friends. PEW also reported that two-thirds of all teenagers in the U.S. use IM and 32% of these use IM daily.

RESEARCH QUESTIONS, METHOD AND STUDY DESIGN

For purposes of this study, college GPA was used as a measure of college success. According to DesJardins, McCall, Ahlburg, and Moye, (2002), cumulative GPA is commonly used as an indicator of college persistence. This study obtained the data set from a study by Hodge (2009) on technology use and college persistence. The Hodge study collected data on the types of I/MCTs students used, and which ones used most often, when communicating with family, siblings, friends, faculty, college administrators/staff, and other students. Hodge did not analyze the data on these two specific survey questions. Therefore, this study will extend Hodge’s research by exploring the significance of I/MCT on college GPA; as well as this study will exam the types of I/MCTs students used when communicating with persons from back home. The specific research questions this study will address are:

- RQ1 Do students use different I/MCTs based on their relationship to the receiver?
- RQ2 Is there any significance in the type of I/MCT used by students when communicating with persons from their past in order to predict cumulative college GPA?

The dependent variable (DV) for this study is college GPA. College GPA was collected as continuous data using a Likert scale in which “< 2.0” = 1, “2.0 – 2.499” = 2, “2.5 – 2.999” = 3, “3.0 – 3.499” = 4, and “3.5 or higher (on a 4.0 scale)” = 5. Students were

asked to identify which I/MCT they used when communicating with their parents, siblings, and friends from home (see question D15). Students were also asked to identify which I/MCT they used most when communicating with parents, siblings, and friends from home (see question D16). For question D15, each type of I/MCT data was collected as a binary value, where 0 = not used and 1 = used. For question D16, students were to pick only one choice. The I/MCT categories included:

- 1 = Face-to-face (scale = 0 or 1)
- 2 = Mobile, Voice Contact (scale = 0 or 1)
- 3 = Mobile, Text (scale = 0 or 1)
- 4 = Internet, Email (scale = 0 or 1)
- 5 = Internet, Social Networking (scale = 0 or 1)
- 6 = Internet, IM or Chat (scale = 0 or 1)

Descriptive statistics were used to identify frequencies of each I/MCT used when communicating with parents, siblings, and friends from home. Simple regression analysis was used to identify significance of any I/MCT to GPA based on the relationship of the person communicating with the student (parent, sibling, and friends from home).

Model

The study used a multi-linear regression setting to determine the strength of the relationship between the dependent and independent variables and if that relationship was positive. Multi-linear regression is also utilized here in order to control for moderating variables, which may have an effect on GPA. The study used the multivariate linear regression model of the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \varepsilon$$

Where:

X_1, X_2, \dots, X_k are the k independent (predictor) variables and ε is the error associated with this model. The study includes the error term just to provide deviations about the deterministic component.

B_j is the amount by which Y changes when that particular X_j increases by one unit, with the values of all other independent variables held constant. Note that the subscript j is simply a label that helps to identify each independent variable.

Specifically, the model is as follow:

$$GPA_1 = \beta_0 + \beta_1 X_1(ff_1) + \beta_2 X_2(mpv_1) + \beta_3 X_3(mpt_1) + \beta_4 X_4(ie_1) + \beta_5 X_5(sns_1) + \beta_6 X_6(im_1) + \varepsilon$$

$$GPA_2 = \beta_0 + \beta_1 X_1(ff_2) + \beta_2 X_2(mpv_2) + \beta_3 X_3(mpt_2) + \beta_4 X_4(ie_2) + \beta_5 X_5(sns_2) + \beta_6 X_6(im_2) + \varepsilon$$

$$GPA_3 = \beta_0 + \beta_1 X_1(ftf_3) + \beta_2 X_2 (mpv_3) + \beta_3 X_3 (mpt_3) + \beta_4 X_4 (ie_3) + \beta_5 X_5 (sns_3) + \beta_6 X_6 (im_3) + \varepsilon$$

To determine whether face-to-face (FTF), mobile phone voice (MPV), mobile phone text (MPT), Internet Email (IE), Social Networking Sites (SNS), and Instant Messaging (IM) or other variables are significant predictor of the GPA, in order to evaluate RQ2, the present study tested the following hypothesis:

$$H_0: \beta_1 = \beta_2 = \dots \beta_k = 0$$

The alternate hypothesis is:

$$H_1: \text{at least one of the } \beta\text{'s } \geq 0 \text{ or } H_1: \text{Not all the } \beta\text{'s are 0}$$

If the H_0 is true, the study will conclude that the regression coefficients are all zero and that, logically, they are of no use in determining if the independent variables including the FTF, MPV, MPT, IE, SNS, and IM significantly contribute to the prediction in change in the GPA. The study uses the F distribution to test the null hypothesis that the coefficients of the regression are all zero at the 0.5 level of significance.

Validity and Reliability

This study used survey data obtained from a study by Hodge (2009), in which an expert panel of higher education professionals had validated the survey instrument. Additionally, Hodge conducted a pilot study to address questions that could not be answered by the expert panel, such as the participants' perception of complexity, ambiguity of questions, protocols for administering, and anticipated response rate (Dillman, 2007; Van Teijlingen et al., 2001). Hodge also used the Cronbach's alpha scores on the data collected to determine the reliability of the constructs measured in the study. Cronbach's alpha scores of .70 or higher were obtained on all constructs.

Population and Sample

This study used a data set taken from a prior study by Hodge (2009) in which full-time first-year students from a small private 4-year college in Midwestern United States were invited to participate in a Web-based survey in the fall of their second year. This was a non-probabilistic, convenience sample since Hodge was associated with the school. The population size was comprised of 316 potential survey participants. All members of the population were invited to respond to the Web-based survey. In total, 166 surveys were returned. Of these 156 were completed by students who self-reported persisting at the same or another institution; while 10 reported that they dropped out of college. Upon further inspection of the survey data relevant to this study, two cases were dropped due to missing data.

RESULTS

Frequencies were obtained on each type of I/MCT students' used in order to evaluate the first research question (RQ1 - Do students use different I/MCTs based on their relationship to the receiver?). Table 1 shows the results (as measured by percentage) of each I/MCTs students used most when communicating with parents, siblings, and friends back home. Figure 1 displays a graphical representation of these findings.

	F2F	MPV	MPT	IE	SNS	IM
Parents	32 (19.5%)	108 (65.9%)	13 (7.9%)	8 (4.9%)	0 (0%)	3 (1.8%)
Siblings	28 (17.1%)	55 (33.5%)	50 (30.5%)	7 (4.3%)	15 (9.1%)	9 (5.5%)
Friends	20 (12.2%)	22 (13.4%)	57 (34.8%)	9 (5.5%)	45 (27.4%)	11 (6.7%)

Table 1. Frequency of I/MCT by past relationship

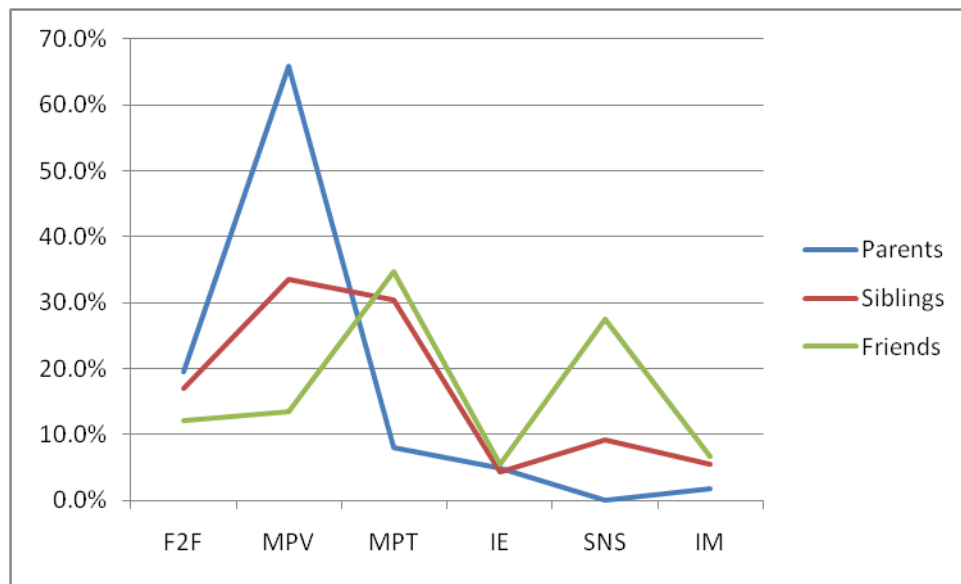


Figure 1. Chart of frequency of I/MCT by Relationship

The results show that students most often used MPVs when communicating with parents (nearly 70%). Students are nearly equally distributed between using MPV (33.5%) and MPT (30.5%) when communicating with siblings. When it comes to preferred mode of I/MCTs for communicating with past friends, 34.8% of the students selected MPT and 27.4% selected SNS.

Preliminary results for addressing RQ2 and the posed hypotheses are found in Tables 2, 3, and 4. These tables demonstrate that R^2 values are all positive and greater than 50%, except for that of SNS for the parent and siblings' group. This result indicates that all the proportion of the total variation in the GPA is explained, or counted for by the variation in the independent variables. For instance, the value of 0.79 (or 79%) in Table 2 indicates that 79% of the variation in the GPA is accounted for by the variation in IM. It is worth mentioning that SNS displays a weak R^2 in Table 3 and 4.

Because R^2 is not 100%, this finding indicates that there exist some other factors that explain the variation in GPA other than I/MCT. Furthermore, the results of the regression analysis show that all coefficients are positive. This finding indicates that when examining the concentrations of communicating with friends back home, IE (email) has actually greatly affected the students GPA followed by FTF, IM, MPV, and SNS. MPT, however, displays the least amount of impact on a student's GPA. In looking at the chart for siblings, the study notes that, similar to the friend chart, IE also had the most impact on GPA. The results also shows that MPV is the factor with the least amount of impact on a student GPA. Looking at the final area of concentration, the parents, and the study finds that MPT displays the greatest impact on student GPA, with the least impact going to MPV.

It is plain that IE exhibits the highest contribution to the change in GPA when one looks at the communication relationship with friends and sibling groups. In other words, the coefficients of IE in Table 2 (79%) and Table 3 (89%) are the highest

Despite the positive impacts of these modes of communication on the variation of GPA, the *P-Values* for some independent variables are greater than 5% significance level indicating that they are not statistically significant. Table 2 shows that all variables have a *P-Value* greater than 5% except IM.

There are however two different modes of communicating with siblings that are statistically significant. These include IE and IM.

In the group of parents, the study found three modes of communicating with *P-Values* of less than five percent. These are FTF, MPV, and IM. This result means that FTF, MPV, and IM significantly impacts students' GPA.

	R Square	Adjusted R Square	Coefficients	P-Value
FTF	0.704166667	0.605555556	0.541666667	0.075546375
MPV	0.520325203	0.360433604	0.325203252	0.169010226
MPT	0.720588235	0.62745098	0.147058824	0.068903509
IE	0.556818182	0.409090909	0.795454545	0.147502112
SNS	0.726744186	0.635658915	0.290697674	0.066481791
IM	0.794117647	0.725490196	0.441176471	0.042408927

Table 2: Friends

	R Square	Adjusted R Square	Coefficients	P-Value
FTF	0.709359606	0.612479475	0.295566502	0.073416931
MPV	0.764649682	0.686199575	0.156050955	0.052389553
MPT	0.739622642	0.652830189	0.264150943	0.061535891
IE	0.892857143	0.857142857	0.892857143	0.015392438
SNS	0.16	-0.12	0.4	0.504631576
IM	0.89893617	0.865248227	0.691489362	0.014073251

Table 3: Siblings

	R Square	Adjusted R Square	Coefficients	P-Value
FTF	0.89893617	0.865248227	0.345744681	0.014073251
MPV	0.784414372	0.712552497	0.095660289	0.045600844
MPT	0.695652174	0.594202899	0.869565217	0.079095699
IE	0.532608696	0.376811594	0.760869565	0.161593684
SNS	0	-0.25	0	n/a
IM	0.78125	0.708333333	1.5625	0.046661882

Table 4: Parents

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Conclusions

In this section, we will look at the research questions asked in this study, as well as a review of the analysis with the conclusions drawn. A section with the implications of this study and its contributions that it offers to the body of research will be discussed. In addition, it will conclude with a discussion of its recommendations for further research.

This research study explored whether or not students indeed needed to separate from the communities of their past in order to succeed in college. The premise of this study was that the technology is now so pervasive that today's students have easier access through I/MCTs to maintain close communication with family and friends back home. This study hoped to show that the use of I/MCTs increased GPA, which was used as a measurement for success. This study was inconclusive in determining if I/MCTs contributed to higher GPA. Although this study did find interesting results within the study that shows there are I/MCT's that have a large impact on a student's GPA especially when communicating with certain groups of people from home.

Implications

This investigation has several implications to add to the existing bodies of knowledge on college persistence theory and technology use. First, this study showed that when students used FTF, MPV, and IM for communicating with their parents, their GPA tended to improve. This finding suggests the importance for students to maintain communication ties with their parents to improve upon their academic performance. College administrators, and others responsible for student success, would be interested in these findings in the event there is programming or policies that might be developed that address I/MCT usage. For example, first-year student orientation may include programming on how to effectively use I/MCTs to improve academic performance.

This study also showed that students with lower GPAs tended to list SNS as their preferred method for communicating with friends back home, until it came to students with the highest GPA (See Table 5). This finding suggests that further research is needed to explore SNS on academic performance. This was also true when for students who used SNS most when communicating with siblings. Therefore, college administrators, and those interested in the academic success of students will want to pay close attention to how students engage in SNS.

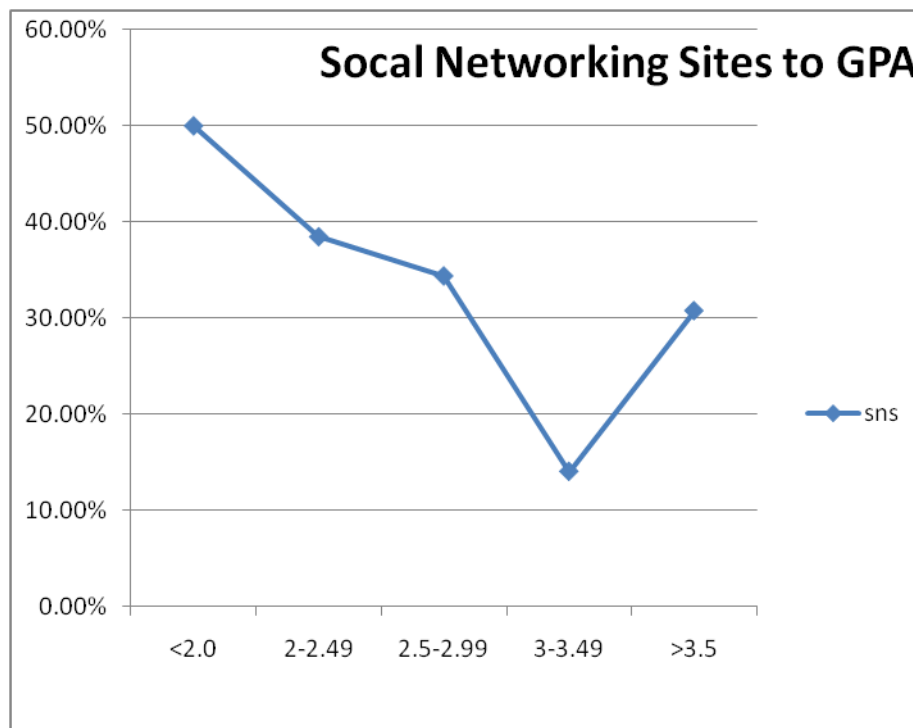


Table 5. Impact of SNS on GPA when communicating with Friends

Recommendations

More research is needed on how technology impacts academic performance of college students. Specifically, more research is needed to explore other factors, such as the amount of time students spend using I/MCTs that might affect their GPA. Those wishing to explore these findings may wish to adapt this study to include a question on the amount of time students spend using each type of I/MCTs. For example, if students are spending excessive amounts of time using I/MCTs to communicate with others, it may be detrimental to the success of their completing their studies.

Additionally, it is recommended that future research examine the impact of I/MCTs on the other two stages of Tinto's (1973) college persistence model: transition and incorporation, in order to determine if I/MCT usage impacts college GPA as students become more incorporated into the norms and values of college life.

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