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# Influence of perceived technology use of university students on academic and social performance in college.

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**Influence of Perceived Technology Use of University Students on Academic and Social Performance in College**

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## **Abstract**

Many believe we are in the midst of one of the most dramatic technological revolutions in history. As such, education is evolving to meet the demands of a global society. Colleges and universities act as a cultural bridge to those new literacies empowering individuals and groups traditionally excluded from education thereby reconstructing the classroom to make it responsive to the challenges of an ever-changing society. A convenience sample of 390 students was surveyed to investigate the perceived influences of technology on relationships, including preferences, usage and time with technologies. Results of this study suggest positive influences of technology on academic work, performance and maintenance of relationships, but disadvantages such as increased stress, addictive feelings toward technologies, and increased misunderstandings in relationships and conflict. These findings suggest technology has a mixed impact on students. Although technology will continue to be a significant influence in the lives of individuals, we need to consider how these forms of communication are best used in university classrooms. Discussion and recommendations to university instructors include suggestions on facilitating the use of technology to connect with college students in positive ways, while ameliorating the negative influences in the college classroom.

## **Key Words**

Technology, communication, university students, relationships, higher education, learning

# **Influence of Perceived Technology Use of University Students on Academic and Social Performance in College**

## **Introduction**

Technology in the everyday world is rapidly changing the way people interact with one another. No group is more impacted by technology than college age students (Junco and Cole-Avent 2008; Quan-Haas 2007). They are often the early adopters of new technologies (Emanuel 2013). In the college settings, the role of technology is varied. Technology is at the core of instruction, with some college courses delivered entirely online or in courses that are hybrid. That is, both in person formats and online formats. Many college instructors used technology to share course content (Geary, 2010), to communicate with students (Quan-Haase 2007), and to deliver, grade, and archive coursework (Fallon, Wright, and Lalonde 2013). However, little is known about the impact of technology use from the perspective of college students. This study was undertaken to investigate what are the positive and negative impacts of access to and actual use of technology in personal and classroom communication.

## **Review of Literature**

Ecology of technology use is rapidly changing. With increasingly diverse college classroom, technology integration is both a challenge and an opportunity. Technology is used in college classrooms as an instructional tool and as a means of communication. This means that instructors and students have to maintain a personal and a classroom communication style, depending on the purpose of the communication. Technology is used in college classrooms, in online and hybrid courses. The use of technology in personal and classroom communication styles has positive and negative impacts. As we have seen technology changing and becoming more integrated into our lives over the past 20 years, we must begin to think about the impact.

Technology has created many opportunities with regard to education and interpersonal communication, but these opportunities may bring challenges.

The internet and technology has promoted and reinforced social interactions and created an environment of sharing and openness. Adolescents' academic communities and social networks are more immediate physical and virtual interactions. Some teens report spending more time in the physical presence of their friends, rather than interacting through technology (Lenhart, Madden, and Hitlin 2005); while others report meaningful interactions through texting or cell phones (Oblinger and Oblinger 2006). With this in mind, it raises the question: What are the positive and negative impacts of increased technology use?

As university instructors consider the use to technology in the classroom, it is important they consider the role culture plays. The rich diversity of students may impact university instructors' assumptions that all students bring the same skill sets to university classrooms, particularly in terms of reading or language ability. The challenge is to understand all students' communication patterns and find effective teaching methods.

The use of information technology in higher education has a mixed impact. It may distract students from participating in empirically proven educational practices (Reisberg 2000), but it can also promote collaboration and increase student-faculty engagement through purposeful educational practices like emailing faculty members or other students (Nelson Laird and Kuh 2005). Information technology may also be a vehicle to increase academic challenge and student engagement in the classroom (Nelson Laird and Kuh 2005). Nelson Laird and Kuh (2005) found students who reported using technology for classroom related activities or assignments were more likely to report that their courses emphasized higher order thinking skills, active and collaborative learning, and faculty-student interaction.

However, faculty members are faced with students in the classroom who expect constant and immediate feedback that technology allows (Oblinger and Oblinger 2006). For students today, technology is perceived as a way of life and they express a need to feel connected at all times. Students are use to multitasking and spend a significant amount of time each day using these technologies. Students report issues related to on-line technologies and cell phone use result in class tardiness and loss of sleep (Massimini and Peterson 2009; Horne 2006). They also desire engaged and authentic learning with on-line connections and community (Horne 2006). Students may experience stress and anxiety when those around them are not responding within the immediacy they expect or technology is unavailable to them (Horne 2006; Massimini and Peterson 2009). There seems to be an almost addictive relationship with technology for students because they develop a dependency to the technology, but that creates an intrusion in their lives (Crittenden 2002; Campbell, Cumming and Hughes 2006).

It is important for faculty to consider the use and role of technology in the classroom. Dolstrom (2012) found that students are quite clear on how they view the use of technology in the classroom. It is up to faculty then to understand what technologies are most motivational and effective for students, so they can be used effectively within their classes to assist students in their learning. Most students want and anticipate some use of technology in the classroom, but see technology as a tool to supplement their learning. Students continue to appreciate interpersonal interaction with faculty in the classroom (Flippin-Wynn 2013) and technology is no substitute.

## **Methods**

The purpose of this study was to investigate the overall influence of technology on frequency and maintenance of communication with friends and family, as well as the perception

these technologies have on forming relationships. The research question investigated was: Given the gender and year in college of students, what are the positive and negative impacts of access to and actual use of technology in personal and classroom communication?

### *Participants*

A total number of 390 undergraduate students enrolled in introductory family studies courses from a public university located in northeast of the United States participated in the study by filling out an online survey. Among 390 participants, majority were females ( $n = 345$ , 88.5%) while 44 were males (11.3%). Most of them were traditional college students, ranging from 18 to 23 years of age ( $n = 376$ , 96.4%); and only 10 participants were 24 years of age or older (2.6%). One hundred and twelve participants reported as freshman (28.7%), 116 sophomores (29.7%), 108 juniors (27.7%), and 53 seniors (13.6%). All participants voluntarily completed the survey.

### *Survey Instrument Development*

A survey instrument was developed to understand the usage of current and available technology devices for college students, and impact communicative technologies have on college students' relationships. Survey items were selected from a variety of instruments measuring technology use, including the Princeton Survey, Research Associates International for The Pew, Internet and American Life Project, with adjusted wording to better fit for the age of participants and/or use of technology.

### *Reliability and Validity*

After data collection, a standardized Cronbach's alpha for the internal consistency among all the survey items, and the reliability was .714 for total survey was computed. To increase content validity, expert appraisal of the survey instrument was sought. A three member panel of

experts in education and technology examined the face and content validity of the final version of the survey instrument. Their comments were incorporated into the discussion section of this paper. No additional pilot testing of the instrument was completed.

## **Results**

The following research question was asked: Given the gender and year in college of students, what are the positive and negative impacts of access to and actual use of technology in personal and classroom communication? Descriptive analyses results with the frequency and percentage of the survey items were reported. In addition, a one-way Analysis of Variance (ANOVA) to see if there was any significant difference within different variables was conducted. Furthermore, correlation coefficient was used to find out whether or not different variables were correlated with each other.

### *Descriptive Analyses*

As for the actual possession of different types of technology, majority of the participants reported to have a laptop computer (n = 364, 93.3%) and a cell phone (n = 380, 97.4%). Accordingly, majority of the participants primarily used a laptop computer to send and receive emails (n = 309, 79.2%). They made most of their phone calls using a cell phone (n = 378, 96.9%), and sent or received text messages on their cell phones (n = 371, 95.1%).

When asked about technology's impact on their productivity, majority of the participants believe that they were more productive because of all their electronic devices (n = 274, 70.3%). One fifth of the participants reported improved ability to do their job well (n = 84, 21.5%). Two fifths reported improved ability to learn new things (n = 148, 37.9%). One third reported improved ability to share ideas and creations with others (n = 119, 30.5%), while over one fourth reported improved ability to work with others (n = 107, 27.4%). Despite the benefits of



technology bringing into people's life, however, more than half of the participants reported that the use of technology became addictive (n = 240, 61.5%).

Insert Table 1 here.

When communicating, a majority of the participants preferred face-to-face (n = 312, 80%) to using electronic devices (n = 74, 19%). Yet almost half of them spent most of time communicating through technology devices (n = 182, 46.7%), compared to 205 through face-to-face (52.6%). Similarly, almost half of the participants believed that a cell phone was the easiest way to communicate (n = 190, 48.7%), followed by 149 face-to-face (38.2%).

When asked about technology's impact on their communication, majority of the participants believed that the use of technology devices changed the way they communicate (n = 280, 71.8%). Technology made communication easier (n = 327, 83.8%), and people felt more connected because of technology (n = 280, 71.8%). Majority of the participants agreed that technology allowed them to be more available to others (n = 380, 97.4%), helped them stay in touch with more people (n = 358, 91.8%), improved a lot their ability to keep in touch with friends (n = 327, 83.8%) and family (n = 254, 65.1%). One third of the participants felt that they had more privacy when using the technology devices (n= 125, 32.1%). However, in the meanwhile, majority of the participants also felt that the use of technology made too easy to misunderstand what others meant (n = 273, 70%). With that being said, as one participant commented: "Technology has changed the way people communicate nowadays. One day without technology would be easy to deal with; a couple days to a week or longer would negatively impact my life and probably create some type of issues..."

Insert Table 2 here.

### *Inferential Analyses*

A one-way ANOVA was used to investigate gender differences, however, these results were cautiously interpreted since the majority of the sample was females. Females and males responded significantly differently when using a cell phone to text as a primary way to communicate with friends ( $F = 9.30^{**}$ ,  $p = .002$ ), using a cell phone to text as a primary way to communicate with parents ( $F = 5.06^*$ ,  $p = .025$ ), using a desktop computer ( $F = 4.81^*$ ,  $p = .029$ ), making most of the phone calls via a land line phone or a cell phone ( $F = 5.79^*$ ,  $p = .017$ ), and using a cell phone to send and receive e-mails ( $F = 4.34^*$ ,  $p = .038$ ). In addition, significant differences were found when the females and males were asked if they agreed with the descriptions of “when I get a new electronic device, I need someone else to set it up or show me how to use it” ( $F = 6.53^*$ ,  $p = .011$ ), “if my electronic devices are not available, I feel stressed” ( $F = 5.25^*$ ,  $p = .022$ ), “communicating is easier when using technology” ( $F = 6.94^{**}$ ,  $p = .009$ ), “most of my time is spent communicating face-to-face” ( $F = 4.64^*$ ,  $p = .032$ ), “technology helps me stay in touch with more people” ( $F = 10.78^{**}$ ,  $p = .001$ ), “technology becomes addictive” ( $F = 7.30^{**}$ ,  $p = .007$ ), and “technology causes too many distractions” ( $F = 6.31^*$ ,  $p = .012$ ).

One-way ANOVAs were used to see if there are any significant differences among the students by their years at college. Significant differences were found among groups regarding using cell phone to text to parents ( $F = 3.30^*$ ,  $p = .021$ ), owning a laptop computer ( $F = 3.39^*$ ,  $p = .018$ ), primarily using a desktop computer when sending and receiving e-mails ( $F = 3.60^*$ ,  $p = .014$ ), and using a cell phone to send or receive text messages ( $F = 3.64^*$ ,  $p = .013$ ). Students with different years in college also had significant differences on the statements of “I like that cell phones and other mobile devices allow me to be more available to others” ( $F = 5.19^{**}$ ,  $p = .002$ ), and “I feel lonely even though connected online” ( $F = 2.92^*$ ,  $p = .034$ ).

A one-way ANOVA was used to investigate whether or not the college students feel more productive due to technology, and significant difference between whether or not the participants feel more productive caused by technology regarding using cell phone when sending and receiving e-mails ( $F = 2.58^*$ ,  $p = .037$ ). One-way ANOVA was also used to analyze whether or not the college students feel technology helps communication. There are significant differences between whether or not the participants feel technology helps communication regarding (1) the way they prefer to communicate ( $F = 14.53^{**}$ ,  $p = .000$ ); (2) whether or not the use of a computer, cell phone, and/or email changed the way they communicate ( $F = 9.78^{**}$ ,  $p = .002$ ); and (3) primarily using a blackberry or PDA ( $F = 3.94^*$ ,  $p = .048$ ), or cell phone ( $F = 4.09^*$ ,  $p = .044$ ) when sending and receiving e-mails.

Insert Table 3 here.

Furthermore, correlation coefficient was used to find out whether or not different variables were correlated with each other. Once again, the data of correlations by gender should be cautiously interpreted since the majority of the sample population was females. More female students were at the higher grade level ( $r = .11^*$ ,  $p = .035$ ), used a desktop computer ( $r = .11^*$ ,  $p = .029$ ), primarily used a cell phone when making phone calls ( $r = .12^*$ ,  $p = .017$ ), used a cell phone ( $r = .11^*$ ,  $p = .038$ ) or a desktop computer ( $r = .12^*$ ,  $p = .022$ ) when sending and receiving emails, and went face to face when communication ( $r = .11^*$ ,  $p = .032$ ). On the other hand, more male participants used a cell phone to text friends ( $r = .15^{**}$ ,  $p = .002$ ) or text parents ( $r = .11^*$ ,  $p = .025$ ), felt stressed when their electronic devices were not available ( $r = .12^*$ ,  $p = .022$ ), and agreed with the statements that “when I get a new electronic device, I need someone else to set it up or show me how to use it” ( $r = .13^*$ ,  $p = .011$ ), “Communication is easier with the use of technology” ( $r = .13^{**}$ ,  $p = .009$ ), “Technology helps stay in touch with more people” ( $r = .17^{**}$ ,

$p = .001$ ), “Technology becomes addictive” ( $r = .14^{**}$ ,  $p = .007$ ), and “Technology causes distractions” ( $r = .13^*$ ,  $p = .012$ ).

The higher the grade level was, the more likely the participants used a cell phone to text friends ( $r = .15^{**}$ ,  $p = .003$ ), used a desktop computer when sending and receiving emails ( $r = .15^{**}$ ,  $p = .004$ ), agreed with the statements that “I feel annoyed by having to respond to intrusions from my electronic devices” ( $r = .11^*$ ,  $p = .036$ ), and “Technology increases my ability to learn new things” ( $r = .10^*$ ,  $p = .049$ ). Yet the lower the grade level was, the more likely the participants used a cell phone talking ( $r = .10^*$ ,  $p = .043$ ) or texting ( $r = .15^{**}$ ,  $p = .004$ ) with parents, used a laptop computer ( $r = .13^{**}$ ,  $p = .009$ ), used a laptop computer when sending and receiving emails ( $r = .12^*$ ,  $p = .022$ ), agreed with the statements that “I like that cell phones and other mobile devices allow me to be more available to others” ( $r = .19^{**}$ ,  $p = .000$ ), “If my electronic devices are not available I feel stressed” ( $r = .11^*$ ,  $p = .030$ ), “Technology increases my ability to keep in touch with friends” ( $r = .11^*$ ,  $p = .038$ ), “Technology increases my ability to keep in touch with family” ( $r = .12^*$ ,  $p = .016$ ), “Communicating is easier with the use of technology” ( $r = .12^*$ ,  $p = .023$ ), “Technology helps feel more connected” ( $r = .14^{**}$ ,  $p = .007$ ), and “Technology becomes addictive” ( $r = .12^*$ ,  $p = .025$ ).

Insert Table 4 here.

Improved productivity due to technology was positively correlated with using a cell phone to send and receive e-mails ( $r = .12^*$ ,  $p = .023$ ), feeling more connected ( $r = .21^{**}$ ,  $p = .000$ ), staying in touch with more people ( $r = .15^{**}$ ,  $p = .004$ ), “Cell phone and other mobile devices allow me to be more available to others” ( $r = .27^{**}$ ,  $p = .000$ ), and “Communicating is easier” ( $r = .18^{**}$ ,  $p = .000$ ). On the other hand, improved productivity was negatively correlated with the statements of “technology makes too easy to misunderstand what others

meant” ( $r = -.11^*$ ,  $p = .028$ ), “I feel lonely even though connected online” ( $r = -.20^{**}$ ,  $p = .000$ ), and “technology causes too many distractions” ( $r = -.12^*$ ,  $p = .017$ ).

Improved communication due to technology was positively correlated with using cell phone to talk with friends ( $r = .13^*$ ,  $p = .014$ ), “I like cell phone and other mobile devices allow me to be more available to others” ( $r = .26^{**}$ ,  $p = .000$ ), and “Communicating is easier” ( $r = .15^{**}$ ,  $p = .003$ ). However, improved communication due to technology was negatively correlated with using e-mail to talk with friends ( $r = -.12^*$ ,  $p = .017$ ), preferred way to communicate ( $r = -.12^*$ ,  $p = .022$ ), and the statements of “too easy to misunderstand what others meant” ( $r = -.19^{**}$ ,  $p = .000$ ), “more misinformation about others” ( $r = -.16^{**}$ ,  $p = .002$ ), and “technology causes too many distractions” ( $r = -.18^{**}$ ,  $p = .000$ ).

Insert Table 5 here.

## **Discussion**

The research question investigated in this study was: Given the gender, year in college, and major of college students, what are the positive and negative impacts of access to and actual use of technology in personal and classroom communication? Using a survey approach, the researchers in this study investigated the perceptions of 390 college students regarding their technology use both in and outside of the college classroom setting. The results of this study are important to college students and their instructors for a variety of reasons. As technology itself changes, its use is rapidly increasing. In order to be effective for college classrooms, it is critical to understand the impacts of technology use for college students. There are many positive aspects to technology as consistently identified in this study and others, such as increasing student engagement in the classroom (Nelson Laird and Kuh 2005), improved access and communication between students and faculty (Oblinger and Oblinger 2006), and increased

student collaboration in class (Horne 2006), and increased perception of productivity (Emanuel 2013) and learning. However, there is a mixed message for students as they report technology increasing their feelings of addiction, stress and anxiety.

### *Limitations*

A variety of limitations exist within the results of this study. The study participants were primarily female college students. Differences in the results may have become evident if more participants had been males. Additionally, all of the college students were volunteers. While participants had the option not to volunteer for the study, a majority of college students who were asked to volunteer for the project agreed to participate. It was the intent of the researchers to use only college students for this study. However, participants of a different age group may well respond very differently to the study questions. The final limitation of the study is that all of the participants were majors with child and family studies, food and nutrition, fashion, family and consumer science education, psychology, communication studies and a mixture of majors such as biology, music industry, or undeclared. The college course in which the survey took place used an in-person format. The perceptions of the participants in this study might have differed with majors in technology or in a course that was delivered either online or as a hybrid course.

### *Positive Impacts of Technology Use*

A number of positive impacts to communication and productivity in the college classroom were found. Access to and use of technology improved the students' perceptions of their own productivity and communication in this study. These participants believed that their technology use did support their communication with friends and connections with family members. They also believed that they were able to share ideas, increased their learning, and

improved their ability to work with others as a result of using technology in and outside of the college classroom. Understanding and utilizing these positive impacts of technology is critical for college instructors who wish to connect with and instruct their students.

### *Negative Impacts of Technology Use*

A number of negative impacts to technology use were perceived by the participants in this study. Many participants found that misunderstandings can occur in the communication process as a result of using technology. This may be a result of communication patterns in emails, texts, or other abbreviated online formats. Many of the participants found that their technology use caused too many distractions. These study participants felt that monitoring and maintaining their use of technology caused lack of focus. Understanding this distractibility is critical for college students who need to develop routines in technology use and also to set boundaries for being offline.

### *Recommendations*

The results of this study can be used to inform college instructors and their use of technology in the classroom. As indicated by Levine and Dean (2013), there is a disconnect between today's undergraduate students and universities related to use of technology. Technology allows students to operate around the clock from any location, whereas university calendars and faculty and class schedules are fixed; technology emphasizes group and shared work products, whereas universities emphasized individual work products; and technology allows for multitasking, individualized and interactive learning with content and modes of learning that were concrete and active, whereas faculty emphasized sequential tasking and passive and abstract learning (Levine and Dean 2013).

Technology should be used with the needs of the learners in mind and with the goal of improving student learning as the single focus. This may mean that college instructors utilize a variety of communication styles in the classroom, including face-to-face formats, along with online and hybrid formats. College instructors should utilize interpersonal communication in particular in the classroom, particularly when delivering complex information or clarifying instruction.

Many participants in this study preferred face to face interactions. Online and hybrid college instructors should encourage and maintain online interactions, communication, and discussions, while also recognizing the needs of some students for in-person interactions. Managing various and multiple technology devices can be “disturbing” for some students. This study, similar to others (Baker, Lusk, and Neuhauser 2012), found that female students reported technology to be more disruptive compared to male students. College instructors should recognize and balance information access between in-person and online, maintaining an interpersonal learning community.



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**TABLE 1.**  
*Descriptive Analyses by Possession and Use of Technology, and Technology's Impact on Productivity*

Variable		Frequency	Percentage (%)
<i>Possession of Technology</i>			
Desktop Computer		170	43.6
Laptop Computer		364	83.3
Cell Phone		380	97.4
PDA		76	19.5
<i>Use of Technology</i>			
To e-mail	Laptop Computer	309	79.2
	Desktop Computer	42	10.8
	Cell Phone	14	3.6
	PDA	13	3.4
To call	Cell Phone	378	96.9
To text message	Cell Phone	371	95.1
<i>Technology's Impact on Productivity</i>			
"I am more productive because of all my electronic devices."	Yes	274	70.3
	No	113	29.0
"Technology improves my ability to do my job well ...."	A lot	84	21.5
	Some	126	32.3
	A little	70	18.0
	Not at all	78	20.0
"Technology improves my ability to learn new things ...."	A lot	148	37.9
	Some	143	36.7
	A little	54	13.8
	Not at all	37	9.5
"Technology improves my ability to share ideas and creations with others ...."	A lot	119	30.5
	Some	168	43.1
	A little	67	17.2
	Not at all	19	4.9
"Technology improves my ability to work with others ...."	A lot	107	27.4
	Some	141	36.2
	A little	69	17.7
	Not at all	46	11.8
"The use of technology becomes addictive."	Yes	240	61.5
	No	148	38.1

**TABLE 2.**  
*Descriptive Analyses By Technology's Impact on Communication*

Variable	Frequency	Percentage (%)	
Preference of Communication	Face-to-Face	312	80.0
	Use Technology	74	19.0
Primarily Used Method to Communicate	Face-to-Face	205	52.6
	Use Technology	182	46.7
“... is the easiest way to communicate.”	Cell Phone	190	48.7
	Face-to-Face	149	38.2
	E-mail	22	5.6
	Other	17	4.2
“The use of technology devices change the way I communicate.”	Yes	280	71.8
	No	58	14.9
	Unsure	49	12.6
“Technology makes communication easier.”	Yes	327	83.8
	No	61	15.7
“Technology makes me feel more connected.”	Yes	280	71.8
	No	108	27.8
“Technology allows me to be more available to others.”	Yes	380	97.4
	No	8	2.1
“The use of technology helps me stay in touch with more people.”	Yes	358	91.8
	No	30	7.7
“Technology improves my ability to keep in touch with friends ....”	A lot	327	83.8
	Some	46	11.8
	A little	12	3.1
	Not at all	1	0.3
“Technology improves my ability to keep in touch with family ....”	A lot	254	65.1
	Some	89	22.8
	A little	34	8.7
	Not at all	10	2.6
“I have more privacy when using the technology devices.”	Yes	125	32.1
	No	150	38.5
	Unsure	113	29.0
“The use of technology makes too easy to misunderstand what others meant.”	Yes	273	70.0
	No	115	29.7

**TABLE 3.**  
***One-Way ANOVA Analyses by Gender, Year in School, Technology's Impact on Productivity and Communication***

Variable	F	p
<i>by Gender</i>		
Primarily used a cell phone to text when communicating with friends	9.30**	.002
Primarily used a cell phone to text when communicating with parents	5.06*	.025
Used a desktop computer	4.81*	.029
Made most of the phone calls via a land line phone or a cell phone	5.79*	.017
Used a cell phone to send and receive e-mails	4.34*	.038
“When I get a new electronic device, I need someone else to set it up or show me how to use it.”	6.53*	.011
“If my electronic devices are not available, I feel stressed.”	5.25*	.022
“Communicating is easier when using technology.”	6.94**	.009
“Most of my time is spent communicating face-to-face.”	4.64*	.032
“Technology helps me stay in touch with more people.”	10.78**	.001
“Technology becomes addictive.”	7.30**	.007
“Technology causes too many distractions.”	6.31*	.012
<i>by Year in School</i>		
Used a cell phone to text parents	3.30*	.021
Owned a laptop computer	3.39*	.018
Primarily used a desktop computer when sending and receiving e-mails	3.60*	.014
Used a cell phone to send or receive text messages	3.64*	.013
“I like that cell phones and other mobile devices allow me to be more available to others.”	5.19**	.002
“I feel lonely even though connected online.”	2.92*	.034
<i>by Improved Productive due to Technology</i>		
Used a cell phone when sending and receiving e-mails	2.58*	.037
<i>by Improved Communication due to Technology</i>		
Preferred way to communicate	14.53**	.000
“The use of a computer, cell phone, and/or email changed the way I communicate.”	9.78**	.002
Primarily used a blackberry or PDA when sending and receiving e-mails	3.94*	.048
Primarily used a cell phone when sending and receiving e-mails	4.09*	.044

Note: \* indicates that there is a significant difference from each other within the category ( $p < .05$ );

\*\* indicates that there is a significant difference from each other within the category ( $p < .01$ ).

**TABLE 4.**  
*Correlation Analyses by Gender and Year in School*

Variable	<i>r</i>	<i>p</i>
<i>by Gender</i>		
Year in school	.11*	.035
Using a desktop computer	.11*	.029
Primarily using a cell phone when making phone calls	.12*	.017
Using a cell phone when sending and receiving emails	.11*	.038
Using a desktop computer when sending and receiving emails	.12*	.022
“Most of my time spent communication goes face to face.”	.11*	.032
Using a cell phone to text friends	-.15**	.002
Using a cell phone to text parents	-.11*	.025
“When my electronic devices are not available, I feel stressed.”	-.12*	.022
“When I get a new electronic device, I need someone else to set it up or show me how to use it.”	-.13*	.011
“Communication is easier with the use of technology.”	-.13**	.009
“Technology helps stay in touch with more people.”	-.17**	.001
“Technology becomes addictive.”	-.14**	.007
“Technology causes distractions.”	-.13*	.012
<i>by Year in School</i>		
Used a cell phone to text friends	.15**	.003
Used a desktop computer when sending and receiving emails	.15**	.004
“I feel annoyed by having to respond to intrusions from my electronic devices.”	.11*	.036
“Technology increases my ability to learn new things.”	.10*	.049
Used a cell phone to talk with parents	-.10*	.043
Used a cell phone to text parents	-.15**	.004
Used a laptop computer	-.13**	.009
Used a laptop computer when sending and receiving emails	-.12*	.022
“I like that cell phones and other mobile devices allow me to be more available to others.”	-.19**	.000
“If my electronic devices are not available I feel stressed.”	-.11*	.030
“Technology increases my ability to keep in touch with friends.”	-.11*	.038
“Technology increases my ability to keep in touch with family.”	-.12*	.016
“Communicating is easier with the use of technology.”	-.12*	.023
“Technology helps feel more connected.”	-.14**	.007
“Technology becomes addictive.”	-.12*	.025

Note: \* indicates that there is a significant difference from each other within the category

( $p < .05$ );

\*\* indicates that there is a significant difference from each other within the category

( $p < .01$ ).

**TABLE 5.**  
***Correlation Analyses by Technology's Impact on Productivity and Communication***

Variable	<i>r</i>	<i>p</i>
<b><i>by Improved Productive due to Technology</i></b>		
Used a cell phone to send and receive e-mails	.12*	.023
“Cell phone and other mobile devices allow me to be more available to others.”	.27**	.000
“Technology makes me feel more connected.”	.21**	.000
“Technology helps me stay in touch with more people.”	.15**	.004
“Communicating is easier.”	.18**	.000
“Technology makes too easy to misunderstand what others meant.”	-.11*	.028
“I feel lonely even though connected online.”	-.20**	.000
“Technology causes too many distractions.”	-.12*	.017
<b><i>by Improved Communication due to Technology</i></b>		
Used a cell phone to talk with friends	.13*	.014
“I like cell phone and other mobile devices allow me to be more available to others.”	.26**	.000
“Communicating is easier.”	.15**	.003
Used e-mails to talk with friends	-.12*	.017
Preferred way to communicate	-.12*	.022
“Technology makes too easy to misunderstand what others meant.”	-.19**	.000
“Technology makes more misinformation about others.”	-.16**	.002
“Technology causes too many distractions.”	-.18**	.000

Note: \* indicates that there is a significant difference from each other within the category

( $p < .05$ );

\*\* indicates that there is a significant difference from each other within the category

( $p < .01$ ).