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Personality, Technology, and Learning

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ABSTRACT

PERSONALITY, LEARNING, AND TECHNOLOGY

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Computers continued encroachment on today's society can be seen in a college lecture hall, where a growing number of students use laptops for their academic needs. Current academic laptop use research predominantly makes broad generalizations across users, indicating that laptop use in the classroom has negative influences on academic outcomes. However, this research neglects to take into account possible individual differences in the users. It is hypothesized that students' levels of conscientiousness and impulsivity would moderate the relationship between laptop use and academic performance, while a student's multitasking experience would mediate this same relationship, forming a moderated mediation model. Using an online sample of college aged students (N= 195), the hypothesized moderated mediation model was not supported. Students' levels of conscientiousness or impulsivity do not moderate the relationship between laptop use and academic performance, and a student's multitasking experience does not mediate this same relationship.

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Introduction

In today's technology-driven era, student use of laptops in the classroom has become the rule, rather than the exception. Because the stereotype of the modern college student is one of habitual unfocus in the classroom, instructors and professors can attempt to ban laptops, hoping that absence of electronics will help focus their students, increasing their learning potential. Yet, as computing technology advances, and prices continue to fall for capable laptop options, more and more students rely on computers for academic needs both inside and outside of the classroom.

Though common sense and empirical evidence dictates that laptops may induce distractions, causing detriments to academic performance, there may exist situations in which laptop use is beneficial for a student's academic performance. With laptops becoming an ever-present aspect of a student's life, a goal of the current study is to examine and identify these beneficial situations. If these situations do in fact exist, certain explanatory variables may help to describe these situations in which use of a laptop could promote successful academic performance. The identification of these variables could shed light onto situations in which laptops could be viewed as beneficial learning tools, rather than distractions for students. More specifically, individual differences in conscientiousness, impulsivity, and multitasking experience may all help to explain situations in which use of laptops could yield positive academic performance by a student. In short, certain individual personality and cognitive differences may moderate and mediate the relationship between laptop use in the classroom and academic performance.

Influences of Laptop Use on Academic Performance

Negative influences. Current trends in the literature have identified numerous negative relationships between laptop use and academic performance. To begin, an overall negative relationship has been established between in-class laptop use and academic performance (Aguilar-Roca, Williams, & O'Dowd, 2012; Fried, 2008; Ravizza, Uitvlugt, & Fenn, 2016). Of these studies, the findings of Fried have been particularly influential. Through the use of survey and open-ended questions, Fried found that students reported the use of laptops by others around them as being the most distracting, closely followed by their own laptop use. Fried used regression analysis to account for differences in academic aptitude and preparation of the participants. Once accounting for these differences, Fried found a significant negative relationship between laptop use and course grade. Follow up correlational analysis found a significant negative relationship between laptop use and student-reported levels of attention.

Beyond correlational findings, experimental evidence shows that students who use their laptops in the classroom perform significantly worse than students who do not use their laptops (Mueller & Oppenheimer, 2014). Briefly, Mueller and Oppenheimer had projected a prerecorded lecture and had students either take notes via laptop or by hand. Next, the participants performed two distractor tasks, and took an exam based on the lecture. Mueller and Oppenheimer describe the possible cause for this relationship as one pertaining to issues in depth of processing (Craik & Lockhart, 1972). Mueller and Oppenheimer describe that the verbatim notes of laptop users limit the depth in which these individuals process the information, negatively influencing learning.

Through both these correlational and experimental findings, researchers have generally concluded that students' use of laptops in the classroom have negative influences on their academic performance. Students seem generally more distracted by both their neighbor's laptops and their own (Fried, 2008), while depth of processing issues lead to very real detriments to retained conceptual material from lecture (Mueller & Oppenheimer, 2014). Yet, approximately 65% of students bring their laptops to class (Fried, 2008). Though laptops clearly have detrimental influences on student academic outcomes, the frequency of use by students in the classroom is apparent. Thus, it is important to understand any potential benefits that stem from an individual's use of the laptop in the classroom and explore situations in which students can use laptop devices in a way to positively influence their academic performance.

Positive influences. Limited studies have shown that laptops can have positive influences on academic performance. Laptops can help to increase student motivation, improve their ability to apply knowledge, and improve engagement in course material (Mackinnon & Vibert, 2002; Samson, 2010; Zhu, Kaplan, Dershimer, & Bergom, 2012). Outside of the relationship to academic performance, students view their laptops as valuable learning tools, having positive influences on their learning experience (Demb, Erickson, & Hawkins-Wilding, 2004). Although students seem to regard laptops as key in their learning experience, as far as we have found, no research has thoroughly explored individual differences of users and how these differences could foster a positive relationship between laptop use and academic performance.

Conscientiousness, impulsivity and multitasking experience are potential explanatory

variables that could have an influence on the laptop use and academic performance relationship. To examine these influences, a conditional process model was tested as outlined by Hayes (2013). This model attempted to establish a moderated mediation relationship in which conscientiousness and impulsivity act as moderators whereas multitasking experience acted as a mediator on academic performance.

Potential Explanatory Variables

Conscientiousness. Conscientiousness describes individuals who are goal oriented and readily able to control their impulses (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009). Additionally, conscientiousness has been identified as the best predictor of academic performance (Chamorro-Premuzic & Furnham, 2005), while longitudinal findings indicate that conscientiousness is associated with an individual's academic performance (Heaven & Ciarrochi, 2008). With high levels of conscientiousness identifying an individual who could stay on task and is goal-oriented, conscientious individuals will be better prepared to suppress impulses (e.g., visit Facebook during class) and stay on task while using a laptop within the classroom. Individuals who maintain a high level of conscientiousness, while keeping impulsive behaviors in check, may be more readily able to successfully use laptops in the classroom. Specifically, an individual's impulse control ability can be thought of as one of the many facets that characterize conscientiousness (Jackson et al., 2009).

Impulsivity. Impulsivity has been found to be negatively associated with conscientiousness (e.g., Bucourt et al., 2017; Whiteside & Lynam 2001). Based on the definitions of Roberts, Jackson, Fayard, Edmonds, and Meints (2009) and Jackson et al.

(2009), low levels of conscientiousness are associated with lower levels of impulse control. While individuals may possess both conscientious and impulsive qualities, those high in impulsivity may be prone to be distracted by a laptop, indulging impulses that direct attention to activities other than lecture or other class activities (e.g., visit Facebook during class, message friends). For example, high levels of impulsivity are associated with negative academic outcomes (Spinella & Miley, 2003). Additionally, impulsivity is positively related to a student's academic failure (Vigil-Colet & Morales-Vives, 2005). With impulsivity serving as a clear predictor of an individual's academic performance, these impulsive characteristics may help to explain the relationship between laptop use and academic performance.

Multitasking experience. Beyond personality characteristics such as conscientiousness and impulsivity, an individual's multitasking experience may have positive influences on the laptop and academic performance relationship. Individuals who have a large amount of multitasking experience may be better capable of using their laptop in the classroom to achieve positive academic performance. Because laptops are associated with general shifting of tasks (e.g., listening to a lecture, then switching to look at laptop notes), cognitive overload may result due to this attentional shifting (Fried, 2013). However, individuals who have high experience in multitasking may be better suited to this attentional shifting.

Experience with multitasking may promote successful laptop use in the classroom. Although heavy multitaskers have been shown to struggle at filtering out irrelevant environmental stimuli (Ophir, Nass, & Wagner, 2009), Alzahabi and Becker (2013)

found that individuals who are well-experienced in multitasking are better able to switch between two discrete tasks compared to those who have low multitasking experience. Additionally, Alzahabi and Becker found that those who were well-experienced with multitasking showed no difference in performing two tasks in parallel when compared to those with low multitasking experience. The findings of Alzahabi and Becker provide evidence for how multitasking experience can potentially positively influence an individual's ability to perform two tasks simultaneously.

Individuals with high levels of multitasking experience may be able to utilize their attentional capacity differently. According to Watson and Strayer (2010), approximately 2.5% of individuals can truly multitask without observable performance decrements. Although the ideal individual to successfully use a laptop in the classroom would fall within this 2.5%, this may not be an absolute requirement for successful classroom laptop use. Recently, Yap and Lim (2012) found that individuals who multitask often are able to more readily utilize split modes of attention while completing tasks, avoiding the deficits associated with attentional shifting. Relying on these skills, individuals who are experienced in multitasking may be capable of using laptops in the classroom to achieve positive academic performance. Furthermore, individual's dual-tasking capabilities positively influence the relationship between social media use and academic performance (Rouis, 2012).

Such results implicate the importance of multitasking capability in understanding of the laptop use and academic performance relationship. As shown, recent research has indicated the capability of high multitasking individuals to avoid the deficits associated

with attentional shifting/switching that are often cited as the negative influences on academic performance due to laptop use. If these individuals could avoid these deficits, the laptop could potentially be used as a positive classroom learning tool, rather than a detriment to learning.

Although the findings presented here seem to contradict the initial findings of Ophir, Nass, and Wagner (2009), they do provide foundation for a potential positive relationship between higher levels of multitasking experience and positive academic performance. Due to high levels of multitasking practice, highly experienced multitasking individuals may be more readily able to maintain attention on both their instructor and what is occurring on their laptops, being able to switch attentional focus from laptop to instructor with minimal cost. Additionally, high levels of conscientiousness and low levels of impulsivity may allow these experienced multitaskers to filter out and ignore irrelevant information that is not goal related, potentially allowing them to avoid the detriments observed by Ophir, Nass, and Wagner.

Current Deficiencies in the Literature

The literature has made a broad generalization establishing a negative relationship between a student's laptop use and academic performance. This general relationship has been established through the measurement of direct influences of laptop use on academic performance, potentially missing individual differences between participants that could promote positive academic use of laptops. Although these general findings are consistent, and evidence for positive use of laptops remains correlational at best, little research has established which variables explain this relationship and the potential situations in which

laptops can be used to achieve positive academic performance. Rather than further generalize the negative influences of laptop use on academic performance, individual differences of academically successful students who use laptops should be documented to better understand the intricacies of this relationship. With conscientiousness, impulsivity, and multitasking experience having clear implications for the laptop use and academic performance relationship, this research aims to explore the extent to which these personality and cognitive variables act to moderate and mediate the relationship between laptop use in the classroom and academic performance.

Implications for the Future

Moving forward, this research has implications for future empirical work by examining the relationship between laptop use and academic performance in greater detail. Instead of further generalizing findings of laptop influences on academic performance across all individuals, future researchers could potentially utilize these explanatory variables to better understand the impact individual differences have on the use of laptops in the classroom. The identification of these explanatory variables may simply be the beginning, with additional unknown variables having significant influences on this relationship. The approach taken here could spur future research examining potential explanatory variables to further understand why laptops are having such an influence on academic performance of students, and potential situation in which laptops could be used as a positive academic tool. With laptops seemingly here to stay, future research should explore the intricacies of individual users. While a general negative relationship has been established between laptop use and academic performance, students

depend on these devices to complete their school work both inside and outside of the classroom at an increasing rate.

Statement of Purpose and Hypotheses

The purpose of this research is to describe the relationship between explanatory variables of conscientiousness, impulsivity and multitasking experience in the relationship between laptop use and academic performance. The research will build on and supplement the identified negative relationship between laptop use and academic performance (i.e., Fried, 2008; Mueller & Oppenheimer, 2014), in the hopes of understanding how and whether student laptop use may have positive influences on academic performance.

As Figure 1 depicts, a moderated mediation model will be examined that investigates the mediating influence multitasking experience has on the laptop use and academic performance relationship, while additionally showing the moderating influence of conscientiousness and impulsivity on this same laptop use and academic performance relationship. In short, the model makes the following hypotheses:

H1: Conscientiousness and impulsivity will moderate the relationship between laptop use and academic performance, such that the relationship between laptop use and academic performance will be stronger among individuals with high levels of conscientiousness and lower for individuals with high levels of impulsivity.

H2: Multitasking experience will mediate the relationship between laptop use and academic performance, such that there will be a positive indirect effect of laptop use on academic performance through multitasking experience.

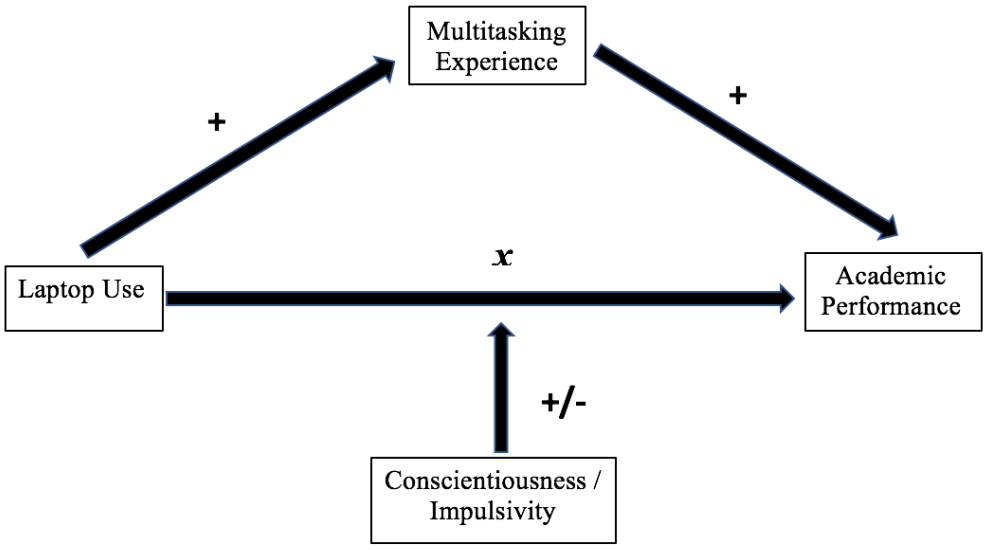

Figure 1. Moderated mediation of laptop use and academic performance by conscientiousness, impulsivity and multitasking experience.

Method

Participants

Students were recruited using the San José State University SONA participant recruitment system. To be included, participants were required to be currently enrolled in college level courses. Participants were removed if they completed the complete survey under ten minutes (M = 41.41), or reported an unrealistic amount of hours (165) spent on a primary media activity per week. This limit was based on the threshold used by Alzahabi and Becker (2013). Finally, four participants were removed from the final analysis because they were deemed as outliers on any one of the included measures.

A total of 240 participants responded to the survey questions. Of those 240 participants, 25 participants were removed for exceeding the unrealistic hour threshold

and 20 were removed for completing the survey under 10 minutes. In total, 195 participants were included in the final analysis. Participants were on average 19 years old, $M = 19$, $SD = 1.91$. In total, 41.5% indicated their ethnicity as Hispanic, 21.5% as Caucasian/European, 19% as Asian, and the remaining 18% of participants as African American, American Indian, Filipino, Pacific Islander, or Other/Not Stated.

Design

A self-report approach was utilized for the proposed research. All participants were given a series of online self-report surveys in which conscientiousness, impulsivity, multitasking experience, and laptop use were measured. For academic performance, students self-reported their current college grade point average (GPA). The participants were recruited to participate in the study via the San José State University SONA participant recruitment system. From the SONA system, potential participants received a Qualtrics link to participate in the study. Once data were collected, the proposed moderated mediation model was tested using the approach outlined by Hayes (2013).

Materials

Conscientiousness. To measure conscientiousness and impulsivity, two different scales were utilized. To measure conscientiousness, the conscientiousness portion of the Big Five Factor Inventory (BFI) was used (John, Donahue, & Kentle, 1991). The BFI is a 44 item survey, which uses a 1-5 Likert rating scale. The conscientiousness portion of the BFI consists of nine items, each with the same 1-5 Likert scale response. The BFI has a high test-retest reliability of .83, and high convergent validity of .81 with the unipolar trait descriptive adjectives developed by Goldberg (1992; John & Srivastava, 1999).

Impulsivity. Impulsivity was measured using the Brief Barrett Impulsivity scale (BBIS) described by Morean et al. (2014). The Brief Barrett Impulsivity scale consists of eight items, measured on a 1-4 Likert scale. The Brief Barrett Impulsivity scale has two subscales, self-regulation and impulse behavior. Both the self-regulation ($\alpha = .75$) and impulse behavior subscales ($\alpha = .72$) have acceptable levels of inter-item reliability, and high levels of validity with factor loadings of .5 or greater (Morean et al., 2014).

Multitasking experience. We used a shortened version of the Media-Multitasking Index (MMI; Ophir, Nass, & Wagner, 2009) to measure every-day multitasking experience. For each media task (e.g., reading print media, watching television, watching video content on the computer), individuals reported to what extent they perform a second media task concurrently. This evaluation was done via twelve individual items, in which participants were asked to report to what extent they perform a secondary task, while performing a primary task. For example, when asked about their multitasking behavior when reading print material, participants reported the extent to which they concurrently read other print material, watch television, watch video on their computer, listen to music, listen to non-musical audio, among many other media tasks. Due to this level of detail, participants would have been asked to answer 185 individual items to complete the MMI. Because of concerns of participant fatigue, and the need for only a general understanding of the extent of an individual's multitasking experience, the twelve concurrent secondary task questions for each section of the MMI were collapsed into a single item. For example, when students were asked about their multitasking behavior when reading print media, they rated to what extent they were generally engaged in a

secondary media task during this time, no matter what the task. By collapsing these questions, this shortened version of the MMI consisted of 57 items.

The MMI has both high reliability and validity. Ophir, Nass, and Wagner (2009) found the MMI to be a valid measurement of multitasking experience, finding a strong correlational relationship between media multitasking and number of hours spent on media use of .46. Wiradhany and Nieuwenstein (2017) found the MMI to have high test-retest reliability of .93 (see also Baumgartner, Lemmens, Weeda, & Huizinga, 2016). Additionally, the MMI has been used in numerous studies exploring media multitasking behavior (e.g., Alzahabi & Becker, 2013; Ophir et al., 2009; Yap & Lim, 2012). Alzahabi and Becker used the MMI to discover that high media multitaskers were more readily able to switch between two discrete tasks compared to light media multitaskers. Ophir, Nass, and Wagner (2009) utilized the MMI to find that high media multitaskers were more prone to distraction from irrelevant stimuli. As discussed earlier, Yap and Lim (2012) used the MMI to find that high media multitaskers were more readily able to utilize split modes of attention when completing tasks. Because the MMI measures the extent to which an individual generally multitasks, we believe it served as an accurate measurement of multitasking experience. With that said, the internal reliability of the shortened MMI used here was shown to be somewhat lacking in the current sample (Cronbach's $\alpha = .63$) potentially undermining the power of the MMI measurement.

Laptop use. Laptop use by participants was measured using The Laptop Use Scale (Kay & Lauricella, 2015). The Laptop Use scale consists of 45 items, with both open ended typed questions and 1-5 Likert rating scale. The laptop-use scale has four subscales

all with high internal reliability: in-class academic use (Cronbach's α = .80), in-class non-academic use (Cronbach's α = .87), outside class academic use (Cronbach's α = .87), and outside class non-academic use (Cronbach's α = .77). The Laptop Use scale exhibits modest to high construct validity, with correlations between constructs ranging between .20 and .57 (Kay & Lauricella, 2015).

Academic performance. As discussed, academic performance was measured by student's self-reported grade point average. Exploring accuracy of self-reported grade point averages, Cassady (2001) found a high correlation (r = .97, p < .001) between self-reported grade-point average and actual grade-point average.

Procedure

Using the San José State University SONA participant pool, participants were able to access the series of surveys from their own computers. Students completed surveys series from their own computer and submitted their responses online. Prior to completing the surveys, all participants received informed consent via the first page of the survey series, indicating they were able to cancel their participation in the study at any point without penalty. Additionally, demographics of the participants were collected, including gender, and grade level. There was no time duration for completion of the surveys, though it was generally expected for participants to complete the study in under one hour.

Results

Descriptive Statistics

Table 1 displays the means and standard deviations of all included variables. In terms of the sample's academic performance, participants maintained high GPA's, M = 3.19.

Table 1

Descriptive Statistics for Conscientiousness, Impulsivity, Laptop Use, and Academic Achievement, N = 195

Variable	Mean	Standard Deviation
Conscientiousness	32.37	5.77
Impulsivity	16.59	3.88
Laptop Use	81.15	15.44
Multitasking Experience	.71	.18
Academic Performance	3.19	.48

Planned Analyses

Beyond meeting the requirements of not reporting spending more than 165 hours per week on any primary media activity and spending more than ten minutes to complete the survey, if the included participants failed to report their GPA, the mean of the participant's grade level was substituted for any missing values. Table 2 displays the results of the moderated mediation model that was used to determine if multitasking experience mediated the relationship between a student's laptop use and academic performance, while impulsivity moderated the relationship between laptop use and academic performance.

The moderating influence of impulsivity on the relationship between laptop use and academic performance was tested. To test all models, the SPSS PROCESS module developed by Hayes (2013) was used. The model testing the moderating influence of impulsivity on the relationship between laptop use and academic performance was

significant, $R^2 = .05$, $F(3, 191) = 3.48$, $p < .05$, with 5% of GPA being accounted for by laptop use, impulsivity, and the product predictor of these variables. However, impulsivity was found to not moderate the relationship between laptop use and academic performance, $c_3 = 0$, *n.s.*, indicating that the moderating influence of impulsivity on the relationship between laptop use and academic performance was not significantly different than zero.

Table 2

Outcomes for Models with Impulsivity as a Moderator.

	Outcome											
	Y Academic Performance Hypothesis 1				*M* Multitasking Experience				*Y* Academic Performance Hypothesis 2			
Predictor		Coeff	SE	*p*		Coeff	*SE*	*p*		Coeff	*SE*	*p*
X (Laptop Use)	c_1	.00	.00	>.05	*a*	.00	.00	>.05	c'_1	.00	.00	>.05
M (Multitasking Experience)		-	-	-		-	-		*b*	.20	.18	>.05
W (Impulsivity)	c_2	-.04	.05	>.05		-	-		c'_2	-.04	.04	>.05
X x W	c_3	.00	.00	>.05		-	-		c'_3	.00	.00	>.05
		$R^2 = .05$ $F(3, 191) = 3.49, p < .05$				$R^2 = .00$ $F(1, 193) = .01, p > .05$				$R^2 = .06$ $F(4, 190) = 2.92, p < .05$		

Multitasking experience was then examined as a potential mediator of the relationship between impulsivity, laptop use, and academic performance. The overall moderated mediation model with multitasking experience as a potential mediator and impulsivity as a potential moderator reached significance, $R^2 = .06$, $F(4, 190) = 2.92$, $p < .05$, with 6% of a GPA being accounted for by laptop use, impulsivity, the product of laptop use and impulsivity, and multitasking experience.

The indirect effect of laptop use on GPA through multitasking experience can be characterized as the product of the effect of laptop use on media tasking experience and the effect of media tasking experience on GPA (e.g., Hayes, 2013). The product of these effects did not reach significance when introduced to the model with impulsivity as a potential moderator, *ab* = .00, lower limit CI = -.0006, upper limit CI = .0005. As outlined by Hayes (2013), because the confidence interval contains zero, one cannot conclude that the effect is statistically different than zero. Finally, the relationship between laptop use and GPA again did not depend on impulsivity, c_3' = .00, *n.s.*, indicating the effect was not different than zero.

Table 3 displays the results of the moderated mediation model used to determine if multitasking experience mediated the relationship between laptop use and academic performance, while conscientiousness moderated the relationship between laptop use and academic performance. Following impulsivity, conscientiousness was separately tested to determine if this variable had any moderating influence on the relationship between laptop use and academic performance. The overall model also failed to reach significance, R^2 = .02, $F(3, 191) = 1.05$, *n.s.*, with only 2% of GPA being accounted for by laptop use, conscientiousness, and the product predictor of these variables.

The mediating influence of multitasking experience was then examined with conscientiousness serving as a potential moderator. With conscientiousness as a potential moderator, and multitasking experience as a potential mediator, the model did not reach significance, R^2 = .02, $F(4, 190) = 1.03$, *n.s.*, with 2% of GPA being accounted for laptop use, impulsivity, the product of laptop use and impulsivity, and multitasking experience.

Table 3

Outcomes for models with conscientiousness as a moderator.

	Outcome											
	Y Academic Performance Hypothesis 1				*M* Multitasking Experience				*Y* Academic Performance Hypothesis 2			
Predictor		Coeff	SE	*p*		Coeff	*SE*	*p*		Coeff	*SE*	*p*
X (Laptop Use)	c_1	.00	.01	>.05	*a*	.00	.00	>.05	c'_1	.00	.01	>.05
M (Multitasking Experience)		-	-	-		-	-		*b*	.18	.19	>.05
W (Conscientiousness)	c_2	.02	.03	>.05		-	-		c'_2	.02	.03	>.05
X x W	c_3	.00	.00	>.05		-	-		c'_3	.00	.00	>.05
	R^2= .02 $F(3, 191) = 1.05, p > .05$				R^2 = .00 $F(1, 193) = .01, p > .05$				R^2 = .15 $F(4, 190) = 1.03, p > .05$			

The indirect effect of multitasking experience did not reach significance when introduced to the model with conscientiousness as a potential moderator, *ab* = .00, lower limit CI = -.0005, upper limit CI = .0005. Finally, the relationship between laptop use and GPA again did not depend on conscientiousness, c_3'= .00, *n.s.*, indicating the moderating influence of conscientiousness was not different than zero.

In summary, an attempt was made to establish two moderated mediation models to outline the influences of multitasking experience, conscientiousness, and impulsivity on the relationship between laptop use and academic performance. First, impulsivity and conscientiousness were shown to not moderate the relationship between laptop use and academic performance. Next, multitasking experience was shown to not mediate the relationship between laptop use, conscientiousness and academic performance, or the relationship between laptop use, impulsivity and academic performance. However, the model that included impulsivity as a moderating variable was found to be significant,

indicating that laptop use, multitasking experience, and impulsivity could be used as predictors of academic performance. Though significant, this finding should be interpreted with caution, due to the small effect size found.

Unplanned Analyses

As always, some statistically significant results were unplanned and unexpected. Several significant correlations were found, as displayed in Table 4. For instance, impulsivity was associated with lower GPA, $r = -.22$, $p < .01$, such that the more impulsive behaviors individuals reported, the lower their GPA. Impulsivity was also negatively related to conscientiousness, $r = -.54$, $p < .01$, such that the more individuals are able to control their impulses, the less impulsive behavior they exhibit. With that being said, impulsivity was not related to multitasking experience, $r = .001$, *n.s.*, nor laptop use, $r = -.06$, *n.s.*, indicating no relationship between these variables. Conscientiousness was positively related to laptop use, $r = .15$, $p < .05$, such that the more participants were goal oriented and able to stay on task, the more they used laptops both inside and outside of the classroom. Finally, multitasking experience did not share any significant relationship with any other variables. Though strong relationships exist within the variables, no variance inflation factors exceeded 1.00.

Because several models that included impulsivity reached significance during planned analyses, multiple regression was used to explore the unique predictive capabilities of impulsivity, laptop use, and multitasking experience for a student's academic performance. As found earlier, a student's multitasking experience, laptop use, and impulsivity were related to academic performance, $R^2 = .06$, $F(4, 190) = 2.86$, $p <$

.05, with 6% of GPA being accounted for by laptop use, impulsivity, and multitasking experience. Impulsivity made a significant contribution, $\beta = -.22$, $t = -3.12$, $p < .01$, such that higher impulsivity scores are associated with lower GPA.

Table 4

Pearson Correlations for Conscientiousness, Impulsivity, Laptop Use, Multitasking Experience and Academic Performance

Variable	1	2	3	4	5
1. Conscientiousness	--				
2. Impulsivity	-.54**	--			
3. Laptop Use	.15*	-.06	--		
4. Multitasking Experience	.06	.00	.00	--	
5. Academic Performance	.12	-.22**	.06	.08	--

*$p < .05$ **$p < .01$

Discussion

In the present study, multitasking experience, conscientiousness, and impulsivity were examined as potential explanatory variables in the relationship between laptop use and academic performance. We hypothesized that students' conscientiousness and impulsivity levels would moderate the relationship between laptop use and academic performance. Additionally, we hypothesized that a students' multitasking experience would mediate the relationship between conscientiousness or impulsivity, laptop use, and academic performance. Both hypotheses were not supported.

Though no moderation or mediation were found, several significant overall models emerged, indicating the capabilities of these variables to predict a student's academic performance. In a follow-up multiple regression analysis, impulsivity was predictive of academic performance. Higher levels of impulsivity had negative influences on a student's academic performance, confirming the negative relationship between these two variables. Though found not to moderate the relationship between laptop use and academic performance, impulsivity serves as an established negative predictor for academic performance.

To explore the influence of the participant exclusion criteria, the planned analyses were conducted including all participant responses. Once all participants were included, the once significant impulsivity models observed became non-significant. The inclusion of the participants identified as completing the survey set in under ten minutes or reporting an unrealistic number of multitasking hours per day therefore has an influence on the predicative capability of academic performance exhibited by the impulsivity models observed above. However, these data were deemed unreliable and originally excluded, for completing the survey set under ten minutes or reporting an unrealistic number of hours was interpreted as the participant not thinking critically about the questions being asked.

Several significant correlations were also found. First, conscientiousness was negatively correlated with impulsivity. As discussed earlier, conscientiousness and impulsivity are closely related personality characteristics. As individuals are deemed more conscientious, they are more able to control their impulsive behavior, and thus

exhibit less impulsive behaviors. Impulsivity was also negatively related to a student's GPA, such that higher levels of impulsive behaviors indicated lower academic success.

Additionally, conscientiousness was positively related with laptop use, such that the more goal-oriented students were, the more they used their laptops. Although when combined with the null effect of impulsivity on the relationship between laptop use and a student's GPA, the positive relationship between conscientiousness and laptop use indicates that the students who may be more readily prepared to use them effectively are already doing so.

Another unexpected non-significant finding should be mentioned. Conscientiousness was not related to student's self-reported GPA. As outlined earlier, conscientiousness is closely related to a student's academic performance, with conscientiousness being identified as a key personality trait associated with academic performance (e.g., Chamorro-Premuzic & Furnham, 2005; Heaven & Ciarrochi, 2008). Those who are more goal-oriented and detailed should have better studying habits and perform well in their academic endeavors. Although unexpected, this finding indicates that in at least the current sample, conscientiousness fails to act as an appropriate predictor of academic performance.

Limitations

No relationship was found between conscientiousness and GPA. Though no conclusions can be drawn from this, the lack of relationship between conscientiousness and GPA could potentially be due to the self-report nature of the GPA measurement. More conscientious individuals could have given thought to their self-reported GPA

more, while more impulsive individuals may have given the response little thought, leading to an inflation in reported GPA scores. A more objective measure of GPA may have yielded a more accurate measurement of academic performance, and potentially the expected positive relationship between conscientiousness and GPA.

Though the test-retest reliability of the MMI shows the MMI to be reliable over time, the internal reliability was found to be less than adequate. Lack of internal reliability on the MMI indicates the items included may not all consistently be measuring the multitasking behaviors of the participants, potentially undermining the power of the study. Although the MMI has frequently been used in more recent literature, the uncertainty of the reliability of the measurement may help to explain the absence of a relationship between laptop use, multitasking, and academic performance.

Due to concerns of participant fatigue, several questions were eliminated from the MMI. The shortening of the MMI likely altered the psychometrics of the measurement, limiting the measurement capability of multitasking experience. The exclusion of these items may have had negative influences on measurement validity, yielding an inaccurate measure of multitasking experience. Intuitively, an individual who uses a laptop more often should have more experience with multitasking. Laptop users have more opportunities to have multiple applications open (e.g., streaming music while doing homework), be performing other tasks outside of the computer workspace, or be interacting with another device concurrently. Yet, no correlation was found between these variables, bringing into question the instruments used to measure these phenomena.

Additionally, a large portion of participants were deleted during the data cleaning

process. Those individuals who completed the survey under ten minutes, and those who gave an unrealistic number of hours per week spent on any given one primary activity, were excluded from the analysis. In total, 65 participants were removed from the sample for data cleaning related reasons. Though having some individuals too quickly complete the survey may be unavoidable, the overestimation of hours spent on a primary activity could have been avoided through proper limiting of responses. Rather than freely giving participants the opportunity to enter any response they deemed fit, this particular question could have been limited to the cut off well below 165 hours per week since that is 23.5hrs/day, clearly an impossible number.

The large portion of participants being excluded from the planned analyses also could have resulted from the format in which the responses were obtained. With online survey data collection, risk is naturally involved. The conditions in which the participant completes the survey is unable to be monitored, and participant motivation is not able to be observed. Individuals who were excluded from the analysis may have been multitasking when completing the survey itself, potentially limiting the thought going into each question.

Other factors may influence the relationship between laptop use and academic performance that were not measured here. The two largest factors that may influence this relationship that were not measured are distraction and notetaking strategy. As found by Fried (2008), neighbor's laptop use in the classroom is a substantial distraction for the notetaking student. Additionally, the strategy that the student uses to take their notes significantly influences learning potential (e.g., Mueller & Oppenheimer, 2014). While

the relationship between laptop use and academic performance may not be influenced and explained by the variables outlines here, a further look into distraction and notetaking strategies may begin to explain the intricacies of this relationship.

Future Directions

The laptop computer has changed how school work is done in today's era. Students are accessing information via the internet on laptop computers, completing and turning in assignments online, and communicating with one another with ease. Although no evidence was found in the current study for multitasking experience, conscientiousness, and impulsivity influencing the relationship between a student's laptop use and their academic performance, successful students continue to utilize computers without the detriments that have been associated with laptop use in the classroom. With this in mind, future research should continue to explore how individual differences in users influence the relationship between laptop use and accomplishments.

Although no significant findings were found here to support the hypotheses, future research should continue to explore how the individual user can influence outcomes associated with laptop use. With individual laptop users being unique, just as their personalities are unique, broad generalizations must end and individual characteristics of users should be identified that are related to positive laptop use for productive outcomes. This research not only has implications for the classroom, but for all laptop use. As technology continues to impede on and become more and more central to daily life, some users of laptops (and other forms of technology) will efficiently utilize this technology better than others. If these individual differences could be identified, this not only has

ramifications for the users themselves (e.g., altering use to better fit their individual characteristics) but also on how software on these devices are designed and executed. Software could be tuned and altered to fit the identified characteristics of the user. However, none of this progress can be made without the continued attempt to identify which individual differences influences how laptops are used. As technology continues to encroach on daily life, how the unique characteristics of individuals influence the use of this technology should be identified.

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Appendix A

Welcome Screen/Introduction

Hello! Thank you for choosing to participate in this study. Please click here to review the informed consent form. As outlined in the consent form, selecting "agree" below will indicate your voluntary participation in this study.

If you do not wish to participate in this study, simply close the browser window. You will not be penalized for choosing not to participate.

- ○ I have viewed, read, and understood the informed consent. I agree to participate in the research. Continue to survey.
- ○ I do not agree to participate in the research. Exit.

SUBMIT

Appendix B
Consent Form

REQUEST FOR YOUR PARTICIPATION IN RESEARCH

TITLE OF THE STUDY
Personality, Technology, and Learning

NAME OF THE RESEARCHER
Dr. Greg Feist, San José State University
Andrew Guydish, San José State University Graduate Student
Department of Psychology

PURPOSE
You are being asked to participate in a study investigating the relationship between personality, use of technology, and learning. If you choose to participate, you will complete a series of surveys as well as self-report your current grade point average.

PROCEDURES
The survey will be completed completely online. The survey will be accessed through the SJSU SONA participant system. The procedures will take approximately 45 minutes.

Please understand that evidence of your speeding through the survey without reading the questions carefully will result in less than 1 hour credit (minimum of .25 hr). So please take the surveys seriously, read the questions carefully, and answer honestly.

The following information outlines risks associated with participation in the current research, and outlines your rights as a research participant. If you agree to participate, please hit the agree button at the bottom of this page.

POTENTIAL RISKS
There are no direct risks anticipated with your participation beyond the risks associated with normal daily computer use.

POTENTIAL BENEFITS
There are no foreseeable benefits associated with the current research.

COMPENSATION
Upon completion of the survey, you will be given 1 research credit via the SONA system.

Again, please keep in mind that compensation will reflect observed effort. Please honestly answer each question thoughtfully. If it is deemed that effort was not fully given throughout the survey, your reflected compensation may be less.

CONFIDENTIALITY
Although the results of this study may be published, no participant identifying information will be included. Your responses will be associated with a random participant number, and stored on a password protected, encrypted computer.

PARTICIPANT RIGHTS
Your participation in this study is completely voluntary. You can refuse to participate in the entire study or any part of the study without any negative effect on your relations with San José State University. You also have the right to skip any question you do not wish to answer. This consent form is not a contract. It is a written explanation of what will happen during the study if you decide to participate. You will not waive any rights if you choose not to participate, and there is no penalty for stopping your participation in the study.

QUESTIONS OR PROBLEMS

- For further information or questions regarding the study, please contact Andrew Guydish (andrew.guydish@sjsu.edu).
- Complaints about the research may be presented to Dr. Lynda Heiden (Chair, Department of Psychology, 408-924-5647, lynda.heiden@sjsu.edu).
- For questions about participants' rights or if you feel you have been harmed in any way by your participation in this study, please contact Dr. Pamela Stacks, Associate Vice President of the Office of Research, San José State University, at 408-924-2479.

AGREEMENT TO PARTICIPATE
Please return to the survey and indicate whether you would like to participate or not participate at this time. By indicating your desire to participate, you are additionally indicating your informed consent. Please print and keep this information for your records, and do not indicate any information that could potentially identify you in the following surveys.

Appendix C
Participant Demographics

What is your age?

_____

What year of university are you currently in?

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5 or more

What is your gender?

- ○ Male
- ○ Female
- ○ Transgender Male
- ○ Transgender Female
- ○ Gender Variant / Non-Conforming
- ○ Not Listed, describe here: _____
- ○ Prefer Not to Answer

What is your ethnicity?

- ○ Caucasian/European
- ○ Asian
- ○ Filipino
- ○ African American
- ○ Pacific Islander
- ○ Hispanic
- ○ American Indian
- ○ Other/Not Stated

Appendix D
Shortened Media Multitasking Index

The following questions pertain to READING PRINT MEDIA. This would include books, newspapers, magazines, traditional mail, etc. [If you do not read print media, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are reading print media, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to WATCHING TELEVISION. This would include watching network, cable, on-demand, or on-demand streaming programs, as well as watching videos and/or DVDs on a TV (as opposed to a computer). [If you do not watch television, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are watching television, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to WATCHING VIDEO ON A COMPUTER. This would include watching YouTube, watching television episodes on your computer, DVDs, online lectures, video streaming, etc. [If you don't watch video on a computer, answer N/A for each of the questions below]

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are watching video content on a computer, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to LISTENING TO MUSIC. This would include listening to an MP3 player (such as an iPod), listening to music on CDs, on the radio, on the Internet or on your computer, etc. [If you do not listen to music, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are listening to music, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to LISTENING TO NON-MUSICAL AUDIO. This would include news/sports/talk radio, podcasts, webcasts, audio books, etc. [If you do not listen to non-musical audio, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count

all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are listening to non-musical audio, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to PLAYING VIDEO OR COMPUTER GAMES. This would include online role-playing multi-player games, console games, portable games, any computer games, etc. [If you do not play video or computer games, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are playing a video game, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to TALKING ON THE PHONE. This would include both land-line and mobile phones, as well as computer based voice-calls and video conferencing calls using such services as Skype or Apple. [If you do not talk on the phone, answer N/A to the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are talking on the phone, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to USING INSTANT MESSAGING. This would include text-based instant messaging programs such as Facebook Messenger, Google Hangouts, WhatsApp, or Line (NOT voice or video calls). DO NOT INCLUDE MOBILE-PHONE TEXT-MESSAGING, SMS, OR MMS. [If you do not use instant messaging, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are using instant messaging, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to SENDING/RECEIVING TEXT MESSAGES/SMS USING A MOBILE PHONE. This would include MMS (Multiple Messaging Service - such as picture messages). [If you do not send/receive text messages/SMS using a mobile phone, answer N/A for each of the questions below].

Approximately how many text messages do you send and receive on an average day?

_____

Describe your use of mobile-phone texting. Do you use it for continuous conversations, simple questions and answers, or just to send out an occasional piece of information?

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are using mobile text messaging, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to READING/WRITING E-MAIL. This would include regular e-mail and webmail. [If you do not read/write e-mail, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are reading and/or writing e-mail, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to SURFING THE INTERNET. This would include reading websites, PDFs and/or other electronic documents. [If you do not surf the internet, answer N/A for the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are surfing the internet, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

The following questions pertain to USING OTHER COMPUTER APPLICATIONS (that have not already been asked about) This would include word processors (e.g., Apple Pages, Microsoft Word), spreadsheets (e.g., Apple Numbers, Microsoft Excel), programming, or other applications. [If you do not use other computer applications, answer N/A for each of the questions below].

Approximately how many hours a week do you spend doing this activity? Please count all hours spent doing this activity, whether you are doing this activity only or doing additional things at the same time.

_____

At what age (in years) did you first start doing this activity?

_____

Has your time spent doing this activity INCREASED, DECREASED, or STAYED THE SAME in the past:

	Increased	Decreased	Stayed the Same	N/A
6 Months	○	○	○	○
1 Year	○	○	○	○
2 Years	○	○	○	○
5 Years	○	○	○	○
10 Years	○	○	○	○

When you are using "other" computer applications, how often are you also doing another task?

- ○ Never
- ○ A little of the time
- ○ Some of the time
- ○ Most of the time
- ○ N/A

Appendix E
Brief Barrett Impulsivity Scale

Section 2 of 5

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Select the most appropriate response. Do not spend too much time on any statement. Answer quickly and honestly.

	Rarely/Never	Occasionally	Often	Almost Always/Always
I plan tasks carefully.	○	○	○	○
I am self-controlled.	○	○	○	○
I concentrate easily.	○	○	○	○
I am a careful thinker.	○	○	○	○
I do things without thinking.	○	○	○	○
I don't pay attention.	○	○	○	○
I say things without thinking.	○	○	○	○
I act on the spur of the moment.	○	○	○	○

Appendix F
Laptop Use Survey

Section 3 of 5

Academic use DURING class How often do you do the following activities DURING this class?

	Never	Rarely	Sometimes	Frequently	Very Frequently
Take notes on my laptop.	○	○	○	○	○
Use the notes posted by the instructor.	○	○	○	○	○
Search the web for academic purposes.	○	○	○	○	○
Use online interactive tools (e.g., learning objects, applets).	○	○	○	○	○
Participate in online surveys.	○	○	○	○	○
Follow a PowerPoint presentation on your laptop computer.	○	○	○	○	○
Communicate with peers for academic reasons (e.g., instant messaging, email)	○	○	○	○	○
Use a software program for academic purposes (e.g., Word, Excel, Access)	○	○	○	○	○

Overall what (if any) do you see are the biggest benefits to having a laptop IN class? Why?

_____

Non-academic use DURING class. How often do you do the following activities DURING class?

	Never	Rarely	Sometimes	Frequently	Very Frequently
Play games.	○	○	○	○	○
Watch movies.	○	○	○	○	○
Watch short video clips for personal use (e.g., YouTube)	○	○	○	○	○
Search the web for personal reasons.	○	○	○	○	○
Go on Facebook	○	○	○	○	○
Use Twitter	○	○	○	○	○
Use instant messaging for personal reasons (for example MSN, Skype)	○	○	○	○	○
Use email for personal reasons.	○	○	○	○	○

Overall what (if any) do you see are the biggest distractions to having a laptop IN class? Why?

_____

Academic use OUTSIDE of class. How often do you do the following activities on a laptop OUTSIDE of class?

	Never	Rarely	Sometimes	Frequently	Very Frequently
Organize course notes and materials.	○	○	○	○	○
Search the web for academic purposes.	○	○	○	○	○
Online interactive activities (e.g., learning objects, applets).	○	○	○	○	○
Using a software program for academic purposes (e.g., Word, Excel).	○	○	○	○	○
Sharing notes and course and course resources.	○	○	○	○	○
Communicate with peers for academic purposes (e.g., instant messaging, e-mail).	○	○	○	○	○
Working with peers on assigned group work.	○	○	○	○	○
Getting help from peers on computer related tasks.	○	○	○	○	○
Searching the university library databases for articles/books.	○	○	○	○	○

Overall what (if any) do you see are the biggest benefits of having a laptop OUTSIDE of class? Why?

_____

Non-academic use OUTSIDE of class. How often did you do the following activities DURING class in this course?

	Never	Rarely	Sometimes	Frequently	Very Frequently
Play games.	○	○	○	○	○
Watch movies.	○	○	○	○	○
Watch short video clips for personal use (for example YouTube).	○	○	○	○	○
Search the web for personal reasons.	○	○	○	○	○
Go on Facebook.	○	○	○	○	○
Use Twitter.	○	○	○	○	○
Use instant messaging for personal reasons (e.g., MSN, Skype.	○	○	○	○	○
Use e-mail for personal reasons.	○	○	○	○	○

Overall what (if any) do you see are the biggest distractions to having a laptop IN class? Why?

_____

Overall what (if any) do you see are the biggest distractions to having a laptop OUTSIDE class? Why?

_____

Appendix G
Conscientiousness Portion of Big Five Inventory

Section 4 of 5

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please select the response to indicate the extent to which you agree or disagree with that statement.

	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
Does a thorough job.	○	○	○	○	○
Can be somewhat careless.	○	○	○	○	○
Is a reliable worker.	○	○	○	○	○
Tends to be disorganized.	○	○	○	○	○
Tends to be lazy.	○	○	○	○	○
Perseveres until the task is finished.	○	○	○	○	○
Does things efficiently.	○	○	○	○	○
Makes plans and follows through with them.	○	○	○	○	○
Is easily distracted	○	○	○	○	○

Appendix H
Self-Report GPA

GPA

Section 5 of 5

Please report your current grade point average.

_____