**The Impact of Video Gaming and Social Media Activity on Academic Performance: Evidence from an Introductory Finance Class**

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Introduction

There is much speculation in the popular media about the influence of video games and social media on academic performance. The potential impact on academic success is significant as video games and social media have been ubiquitous during the formative years of today's typical college student. Using a sample of 1,881 students at a large university, we assess the impact of time spent playing video games and social media involvement on outcomes in both an introductory finance class and a marketing class. Following Brau, Brau, Rowley, and Swenson (2017), this analysis includes an extensive set of control variables to allow a clearer picture of the impact of video gaming and social media involvement.

There is robust literature on the impact of video gaming. Anand (2007) reports that in the United States, at least 90% of households with children have access to video games. Some researchers, including Anand (2007), Skoric et al. (2009), and Wright (2011), find evidence that time spent playing video games negatively impacts student performance. However, there is also evidence that video gaming can enhance academic performance. Smyth (2007) suggested that complex games may lead to academic success by engaging players in problem-solving, critical thinking, and creativity. Skoric et al. (2009) found that while game addiction can lead to deterioration in academic performance, moderate engagement in gaming can lead to improved performance in an academic setting.

Similarly, existing research also reports conflicting results on the impact of social media engagement. The potential positive effects of social media on academic performance are highly varied. Deng and Tavares (2013) conclude that social media usage may enhance critical thinking ability, facilitating improved academic performance. Apeanti and Danso (2014) report that students themselves perceive contacting professors through social media as a positive factor in the learning process. Yunus and Salehi (2012) show that social media usage improves students' vocabulary and writing ability. Conversely, Junco (2011) and Kirschner and Karpinski (2010) show that increased social media involvement negatively correlates with academic performance.

A plausible explanation for the conflicting evidence on the impact of video games and social media usage is that the skill set required for academic success varies across disciplines. After all, English classes and engineering classes demand different learning approaches and may reward different skills. In this paper, we specifically examine the impact of video gaming and social media involvement on success in introductory business classes to refine an understanding of student performance and to more effectively counsel students.

Our sample of 1,881 university students is drawn from the Fall 2019 and Winter 2020 semesters. We gather data from an extensive survey of 131 questions. We extend the methods of Brau et al. (2017), who also study factors that influence student performance in an introductory finance class.

Our survey instrument includes all of the questions from Brau et al. (2017), along with 16 multi-part video game questions and five multi-part social media questions. When the multi-part questions are expanded, we have over 150 factors that may provide explanatory power on student grades. Our methods also follow and extend Brau et al. (2017). These methods include factor analysis; univariate Spearman correlation tests; the difference in means and median t-tests based on upper and lower deciles of grades and based on whether a student earns an A or not; multivariate ordinary least squares regressions, and logistic regressions, also based on whether the student successfully earned an A. We also extend the study to an introductory finance class and include an introductory marketing class. This extension to Brau et al. (2017) explicitly tests whether the type and amount of video games and social media impact student grades in university introductory business classes.

Factor Analysis

For our study and analysis purposes, we have grouped many of the individual variables into factor groups. We construct factors to capture multiple dimensions within a single construct and test for the significance of a factor, which the individual variable may not wholly measure. Each of the following sections contains a description of the individual variables that compose the factor groups.

Drive

The Drive factor includes individual variables that describe a student's belief of how much they strive toward learning, academic goals, and career goals. Researchers in many educational disciplines have found that these three variables correlate positively with student's academic success (Cole et al., 2004; Loo & Choy, 2013; Phan, 2012;). Although little research has been done regarding recreational video gaming and academic motivation, there is some evidence that using educational video games can increase motivation in students (Ebrahimzadeh 2017). However, Zusho et al. conversely found insufficient evidence that video games provide any motivational pull (2014).

Based on the research done by Cole et al., Loo & Choy, and Phan, we predict that the Drive factor will correlate positively with academic success. Whether there is any difference between those students who play video games and those who do not remains to be seen.

Sleep

The Sleep factor comprises two variables: the time the student generally goes to bed and the time the student generally wakes up. Many researchers have found that appropriate sleep schedules (time) correlate with academic success (Howell 2004, Taylor 2013, Wolfson 2003). However, Eliasson suggests that sleep efficiency is better than total sleep time when predicting sleep's effect on academic success (Eliasson 2010). Tracker et al. (2000) found that later wake-up times are the most significant predictors of grade point average in college students in sleep-related variables. Therefore, we predict that length of sleep correlates positively with student's success.

Self-Belief

This factor includes the student's self-assessment of the following variables: personal handling of difficult situations, personal handling of many things at once, and self-belief. This factor has been studied before (Brau et al. 2017), where it was found to have a slightly negative effect on course success outcome in a Tobit model. Brau et al. suggested that this could be due to the overconfidence of the student. As Brau et al. discusses, studies have found that high schools do not prepare students adequately (e.g., Nonis & Hudson, 2006), with 69% of high school students indicating that they were achieving their academic potential contrasted with faculty only reporting 22% of students were. This statistic is evidence of an unrealistic expectation, which Brau et al. found negatively impacted student success. We predict a similar result as Brau et al. here.

Subject Matter

The subject matter factor measures two variables: the student's interest in the class subject matter (marketing or finance), and their self-assessed skill in the classes' material. Many previous studies (including Brau et al. 2017) have examined student's skills and interest in finance, and the outcome of both variables on course outcome. However, because our design includes observations from both introductory finance and marketing classes, we surveyed the students on their interest and skill in their respective class.

Several studies have shown that interest in a course subject is significant to student performance in that course. (e.g. Kara et al., 2009; Loo & Choy, 2013). Brau et al. (2017) found this variable (which they called the Finance something assessment) to positively affect students' grades.

Math

The Math factor is comprised of the student's confidence in math, as well as their skill in math. We follow the example of Brau et al 2017 in constructing this factor, using the student's self-assessed confidence and skill in math, as measured by a seven level Likert scale. This differs from the methods of previous studies where researchers have used ACT math scores (Uyar and Gungormus, 2011; Trine and Schellenger, 1999), and previous math class outcomes. (Kirk and Spector, 2006)

As Brau et al point out in their 2017 paper, the advantage of allowing students to self-report their math skills and math confidence is that we can overcome the measurement limitation explained by Ballard and Johnson (2004) that no single variable can exemplify math skills sufficiently (Ballard and Johnson, 2004).

Previous research has shown that there is a significant correlation between gender and math. Hyde et al. (2008) show that although the gap is shrinking, men tend to be better at math than women. Although women generally have lower math SAT scores than men, Odell et al. [1998] reported that women do not rate their math ability lower than men. A similar study at a business school found that men and women have a significant difference in math ability and recommended that colleges use different grade prediction scales for men and women [Odell et al. 1998]. Because of the previous research, and the links found between math and gender, we control for gender in our model.

Intelligence

The Intelligence factor is comprised of three variables: (1) whether or not the student has previously been granted an academic scholarship, (2) the student's score on the ACT, on the traditional 36-point scale, (3) and the student's SAT score on a 33 point scale. Most students have taken either the ACT or the SAT, not both.

ACT/SAT scores have long been accurate predictors that researchers have used when studying class success outcomes. (e.g., Coyle and Pillow, 2008; Betts and Morrell, 1999). Brau et al. used whether a student has received an academic scholarship as part of an Intelligence predictor in their 2017 study and found that their intelligence variable was indeed a significant variable, thus we have included it here.

Athlete

The athlete factor is made up of the three variables: (1) whether the student has received an athletic scholarship, (2) whether they are a collegiate athletes, and (3) whether or not they attended any or all of their sport's games during the semester in question.

Purdy et al. studied over 2,000 college athletes over ten years and found that college athletes were generally less prepared for college and achieved less academically than other students (Purdy et al. 1982). In addition, Adler and Adler found that while most college athletes begin college with optimistic attitudes toward their academic goals, they become detached from their academic goals because of their athletic, social, and academic experiences. This journey generally leads them to lower their expectations and achieve less academically (Adler & Adler 1985). Based on these findings, we predict a negative effect from this variable.

Notes

The Notes factor includes the self-reported variable of whether the students take good notes and whether they believe that notes improve their success in the class. A study performed in Taiwan found that most students had unsatisfactory notes and that notes taken in class were a significant factor in students' success in the course (Chen 2013). In addition, Baker and Lombardi (1985) reported a "strong[er] relation between note-taking and test performance." Because test performance is a significant part of students' grades in both the introductory finance and marketing classes, we expect that their grades will be positively correlated with their note-taking beliefs and skills.

Study Group

The Study Group factor includes variables of whether the student is in a study group and the number of students in the study group, or 0 if indicated that they were not in a study group. Saleem (2001) states that “interacting with friends provides mutual circles which may enhance their interest in instructional and non-instructional activities.” This seems to suggest that students who do participate in study groups with their friends, and classmates are going to be more engaged with the class material. However, when Brau et al. (2017) studied a factor that also contained variables relating to study groups, they addressed the following:

However, there is a nuance with this factor. It may be the case that students who grasp the material quickly or have a natural knack for the material do not need to seek outside help. If this is the case, only those students who need outside help will seek it, and on

average, these may be weaker students. If this is the case, then ceteris peribus, we

predict the Outside Help factor will have a negative correlation with grade.

However, when Brau et al. tested this factor, it came back non-significant in both models. We can only assume that this factor will have a similar effect in our model.

Parents Limit Video Games

Sharif and Sargent [2006] conclude that limiting the screen time of adolescence can indeed improve school performance. However, little research has been done on college-age individuals and what impact limits in their youth have on their academic success. The Parents Limit Video Games factor includes whether a parent limited video games and how many ways the parent limited the student's gaming habits. Most of the students currently do not have external limits set on their gaming, so this factor measures parents' effect on their child's academic future based on gaming.

Video Game Type

This factor measures how many different genres of video games a student plays. For example, the different genres could be First Person shooter (such as Halo or Overwatch), Sandbox (such as Minecraft), or Online Role-Playing (such as World of Warcraft). Notice that this factor does not distinguish whether playing a specific type of game significantly influences grade but whether or not playing multiple types of games influences grade outcome.

Early Morning Game Play

This Factor contains the variables of whether the student plays video games in the early morning (4 AM – 8 AM) on weekdays, and whether the student plays video games in the early morning on weekends. Triberti et al. [2018] found that there is a relationship between when individuals play video games and video game addiction. Video game addiction could potentially have impact on course outcome.

Nighttime Game Play

This factor contains the variables of whether the student plays video games at night (8 PM – 12 AM) during weekdays, and whether the student plays video games at night during weekends. We again reference Triberti et al. like above and expect that the time of play is related to video game addiction, and that this type of media compulsion is negatively correlated with course performance.

Time and Type of Video Game Console

We do not believe that this type of variable has been studied before. This variable is comprised in part by when the students generally play video games (excluding early morning play, and nighttime play as outline above), and what type of console the student uses.

Emotional Factors in Playing Video Games

Wang et al. found that mobile game addiction was positively correlated with social anxiety, depression, and loneliness (Wang 2019). Thus, this variable is constructed by variables related to video game habits as they relate to emotional duress (loneliness, depression, stress, boredom).

TV and VG Interferes with Homework

This factor consists of a number of variables where the students indicated whether their video game/television habits interfere with their homework. This could potentially be an indication of significant time spent using video games/media, which researchers have found is negatively correlated with academic performance (Anand 2007).

Data and Methods

Our data sample from this project consists of 1505 observations. Observations were student's responses to survey questions at a large, private university. The students were prompted to answer according to the class they were in-either an Introduction to Marketing class or an Introduction to Finance class. The students were offered extra credit to complete the 122 item questionnaire. The response rate was high, with an 80% response rate. Our response rate was high compared to other studies: e.g., Graham and Harvey [2001], 8.5 percent response rate; Trahan and Gitman [1995], 12 percent response rate; Brau and Fawcett [2006], 18.8 percent response rate; Grgman, Shaw and Womack [2001], 34 percent response rate; Brau, Ryan, and Degraw [2006] 44.5 percent response rate, Brau et al. [2017], 60.4 percent response rate.

Our survey questions were derived using academic literature, recommendations from professors and students, and our ideas of what could be especially applicable to both a marketing and a finance class. The survey is available upon request.

Empirical Results

Correlation Results

Table 3 reports the significant Spearman correlation coefficients for each of the survey variables as they correlate with the student’s course grade. The first two columns of the table report the variables that have significant and negative coefficients. Each variable reports the name of the variable, the estimated correlation coefficient, the p-value and the number of observations. Although there is a high probability that these correlations suffer from omitted variable bias, the correlations are included as several interesting patterns can be seen from this table.

As an example of , Brau et al. (2016) suggests that the variable Children in the upper cell of the second column of Table 3 could be argued, a priori, for either a negative or positive sign of the correlation. For example, relative to a grade in the class, having a child may help a student be more mature and driven with the added responsibility; or conversely, having a child may hurt a student by resulting in less sleep, and energy: one of these predicts a positive correlation, while the other predicts the opposite. The correlation observed in this study is -0.074 which is consistent with the second explanation.

Many correlations in the negative category are unsurprising, but confirming in nature, such as Hours at a Paid Job, Hours spent doing religious service, and hours spent on social media. Other variables, such as whether a student is retaking finance (-0.141, p-value <0.001), are surprising. It seems unintuitive that a student taking an Introductory Finance class for the second time would be negatively correlated with grade. At this university, because the grade in the prerequisites are so crucial for program admission, some student choose to retake the class in an effort to earn an A. Regardless of the fact that these students are already familiar with the course material, and have sit through the lectures twice, these students are negatively correlated with course grade. This suggests that students who do not do well enough the first time they take the class have some inherent, persistent reason that continues to challenge them the second time.

Both transfer students (-0.116, p-value < 0.001) and students who report to have experienced some sort of serious trauma during the semester (-0.159, p-value < 0.001) correlate negatively with course outcome. Both correlations confirm anecdotal evidence among faculty.

Many of the social media variables are negatively correlated with course grade, the most interesting being whether a student uses any sort of social media (-0.076, p-value=0.009), the hours the student spends on social media every day (-0.078, p-value=0.01) and whether the student uses social media during class (-0.096, p-value=0.002).

A few business majors are negatively correlated with grade: Experience Design (-0.094, p-value = 0.001), Marketing (-0.071, p-value=0.011), and Supply Chain (-0.073, p-value=0.01), are all negatively correlated with course grade. It is unsurprising that the two most difficult majors to gain admissions to, Accounting (0.144, p-value < 0.001) and Finance (0.228, p-value < 0.001) are positively correlated with course grade.

Also positively correlated with course grade are many variables we expect to see in this category: Whether the student has previously been on academic scholarship, whether the student is currently on academic scholarship, ACT score, the student’s level of class attendance, College GPA, High School GPA, and the amount of reading the students do before class. More surprising are variables such as the amount of credit hours that students are enrolled in, non-business major, and whether the student is a collegiate athlete.

It is worth noting that our binary variable of whether a student plays video games is non-significant, perhaps suggesting that it does not hurt nor help the student’s grade on average.

T-Test Results

We divide the sample between those students who earned an A, and those who did not, and perform t-tests which are reported in table 4. For each variable, there is a column corresponding to the number of observations for the variable for students who earned an A (denoted as “A Students), and those who did not (Non-A Students). There are also two columns showing the mean of the group of students, and a column for the p-value of the corresponding t-test. The last column shows the difference between the mean of A students and the mean of non-A students.

Perhaps the most striking part of this table is that the vast majority of the differences are statistically significant. (The p-values have been adjusted for sample size and variance.) The results that are significant in table 4 are consistent with those in the table 3 correlations.

Much like the correlations in table 3, we have interesting (but expected) results are observed. A-students have higher ACT/SAT scores, higher GPA’s, spend less time at a paid job, and have trauma and are transfer students less frequently. We also observe that the p-value for the t-test on the video game variable is non-significant, again indicating that there is no difference in students who play video games compared to those who do not.

In contrast to the correlations above, we see that while whether a student is on social media is significant, the t-tests report that the hours an A student spends is no different than the hours a non-A student spends on social media. Whether students use social media in class is also insignificant.

Ordinary Least Squares Regression Results

Table 5 reports the results of a regression model that includes the variables grouped by our factor analysis. The variable “Section” indicates that there was an effect between the two sections. This could be for several reasons including time of day, structure of class, and which semester the student took the class. (This survey does not allow us to discern the significant reasons between different sections and classes.)

Drive, Subject Matter, and Intelligence are all consistent with theoretical predictions. However, the factor “Self Belief” is somewhat surprising, and negatively impacts the student’s grade on average. Brau et al. (2016) attribute to this over-confidence, which seems to fit in this instance as well. Another interesting variable in this model is the Hours that students studied during exam week—this variable is statistically significant, while the variable that represents the number of hours that students study during a non-exam week is non-significant. Without implying causation, it could mean that students who are more anxious about the class, who study more, still tend to do worse than students who are more comfortable with the material.

Logit Regression Results

We model the data using a logistic regression model for robustness. The Logistic model has a binary response variable of whether the student received an A in the class—in this financial management class a 94% is considered an A.

Not very many variables changed from significant to non-significant and vice versa in this model, but some did. The Drive factor, the variables Friend Help, and Facebook both became insignificant, and the factor Intelligence, as well as the variables Previous Academic Scholarship, Attending Class, Equal Large and Small Classes, Hours Studied during exam week, trauma, YouTube, Hours of Social Media per day and a number of the major variables (Marketing, Supply Chain, and Entrepreneurial Management) became significant, after they weren’t in the OLS regression.

It is worth noting that in neither of these models have video games as a significant variable. Although some of the social media variables significantly affect the model, video games do not show up as a significant part of any model throughout this study.

Implications for Practice and Conclusion

In this paper we have given examples of variables and factors that contribute to the course grades of undergraduate students in an undergraduate introduction to financial management class. Although we are not the first researchers to study this type of question, our study is the first to test the effect of video games on academic success in an introductory financial management class. Along with demonstrating that several of the Harris variables are still robust today (which Brau et al. (2016) also showed), we demonstrate the impact of dozens of individual factors and variables. Using both univariate and multivariate models, we show robustness for a set of variables to contribute to the discussion on how students learn in an introductory finance class. Our paper has implications for not only professors on how to help their students, but also for students who desire to succeed in their classes.

Of our primary findings, the most nuanced for our study is that of the video games and social media variable. There is some evidence that the amount daily social media use does impact the academic performance in introductory finance classes, but we found no evidence that video game play has an impact on course grade.

There is much room to do additional research on this topic. As Brau et al. (2017) mentions in their conclusion, we believe that an experimental design as opposed to a survey method could help us understand causality among variables, and not just correlation. Additionally, some of the counterintuitive results or inconclusive results pose interesting questions of why and how. Generalizing this study to other disciplines of management is natural. This paper adds to the discussion of decades of research on how to help students learn better in our classes.

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Association Between Television, Movie, and Video Game Exposure and School Performance

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Table 1 – Majors

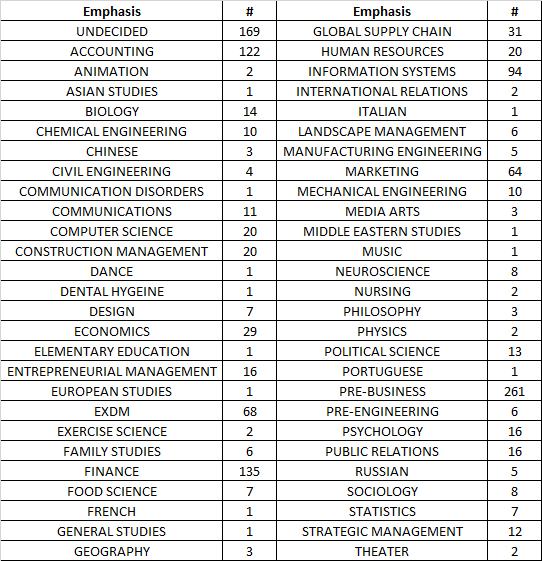


Table 2 – Summary Statistics and Factors (Cronbach’s Alphas)

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Spearman Correlations

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T-tests

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OLS Regression Combined



Logit Regression Combined

