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Research Article

Influence of Gadget Dependency on the Academic Procrastination Levels of Grade 12 STEM Students

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ABSTRACT

Excessive phone use has already impacted academic achievement and perceived sociability of students, but the intensity of screen time has worsened with the transition to online learning. Consequently, students tend to delay their tasks as they are easily distracted. This research examines the influence of gadget dependency on the academic procrastination levels of students. It employs a descriptive correlational research design and gathered data from Grade 12 STEM students. Overall, the degree of gadget dependency among students is high, whereas academic procrastination level is moderate, and these two measures have a significant relationship. Analysis shows that students from ROC are significantly higher in both areas. However, sex and screen time do not impact the extent of gadget dependency and academic procrastination. Saliently, learning modality induces gadget dependency and academic procrastination levels. In conclusion, gadget dependency directly affects academic procrastination levels. Findings also suggest further research on other related effects of online and distance learning.

Keywords: *academic procrastination, descriptive correlational research, gadget dependency, learning modality, screen time, STEM Students*

Introduction

The isolation brought by the proliferation of COVID-19 (Coronavirus Disease 2019) has posed severe crises, such as multiple adverse effects on physical and mental wellbeing (Cheval et al., 2020; Dhawan, 2020; Morens et al., 2020; Siste et al., 2020). During the lockdown period, one of the new addictive behaviors that stemmed from the limited outdoor movement, particularly for teenagers, is gadget

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dependency rise (Kar et al., 2020; Montag & Elhai, 2020; Nadeem & Ahmed, 2020; Sun et al., 2020).

As there is no well-established definition for gadget dependency, preceding research considered it as compulsive use of devices, even when individuals are aware that it affects them mentally, socially, emotionally, and physically (Ganganahalli et al., 2014; Gupta et al., 2013). A gadget refers to devices designed with advanced technology that offers more essential functions, such as laptops, smartphones, tablets, and many more technological gadgets used by the modern generation (Frahasini et al., 2018; Ganganahalli et al., 2014; Gupta et al., 2013; Muduli, 2014).

Prior studies have already presented the negative impacts of smartphone and mobile phone dependency on excessive phone use, academic achievement, and perceived sociability (Lin & Chiang, 2017; Rashid et al., 2020). The pattern and intensity of gadget use by teenagers, labeled hard-to-break escapism habits, shifted and worsened amid the pandemic, which induced changes in the limits considered standard (Beng et al., 2020; Király et al., 2020). Moreover, the lack of school structure and transition to online teaching can prompt students to focus on entertainment rather than taking lessons (Meng et al., 2020). As the school year for K-12 officially started on October 5, 2020, the Department of Education administered psychosocial support, and the Cordillera region advised parents to set time for using gadgets and accompany them as a distraction from devices (DepEd, 2020a, 2020b; DepEd CAR, 2020).

Investigations show that more than half of the students tend to procrastinate when it comes to online tests and assignments, which pose more risks of failing, but patterns of this habit in virtual learning are hardly shown in a study during COVID-19 (Agnihotri et al., 2020; Levy & Ramim, 2012; Memon et al., 2020). Procrastination is an irrational behavior of delaying intended action (Steel, 2010; Svartdal et al., 2018, 2020).

In educational settings, academic procrastination is a widespread propensity to defer academic activities, with detrimental effects such as academic disappointment, weaker psychological health, and even an impact on one's relationship with others (Balkis & Duru, 2017; McCloskey, 2011; McCloskey & Scielzo, 2015). It has the following aspects: psychological beliefs about abilities, distractions, social factors, poor time management skills, lack of personal initiative, laziness, and reduced self-confidence and learning achievement (McCloskey, 2011; McCloskey & Scielzo, 2015; Santyasa et al., 2020).

Studies before and during the pandemic indicated that students' internet dependency and usage are affected by academic procrastination in school work along with low self-efficacy (Gholamali et al., 2013; Tezer, 2020). Furthermore, there have been comprehensive research studies on the relationship between procrastination and gadget dependency in line with phone and internet addiction, such as Facebook use (Przepiórka et al., 2016; Uzun et al., 2014; Yang et al., 2020). However, data from previous studies were limited to the context in which they were collected, biased in sex ratio, and had poor sample representations (Uzun et al., 2014; Yang et al., 2020).

In this regard, the researchers want to examine the influence of gadget dependency on academic procrastination of Grade 12 STEM (Science, Technology, Engineering, and Mathematics) students of BCNHS (Bacolod City National High School). These students are from four sections under two different learning modalities: Remote Online Classes (ROC) and Remote Offline Digital Mode (RODM). The study may generate new knowledge that will contribute to the management of gadget use by learners under the guidance of both teachers and parents.

Methodology

Research Design and Respondents

As the study aims to determine the relationship between variables and describe each according to sex, learning modality, and screen time, the descriptive correlational research design is appropriate for collection, analysis, and interpretion of data. Descriptive correlational design assesses the naturally occurring relationship between variables and describes them simultaneously (Sousa et al., 2007).

Respondents were the sample of 96 students from Remote Online Classes (ROC) and Remote Offline Digital Modality (RODM) in Grade 12 level of School Year 2020-2021. A stratified random sampling technique was used wherein units from the population are randomly selected after dividing the population into subgroups or strata (Acharya et al., 2013; Taherdoost, 2016).

Profiling of Grade 12 STEM students in the academic year 2020-2021 was according to sex, learning modality, and screen time. Among the respondents, 52.08% (f=50) of the sample size are male students, while 47.92% (f=46) are female students. In terms of the learning modality of respondents, 34.37% (f=33) were from ROC, while 65.63 (f=63) belong to RODM.

When categorized based on their screen time, the survey data obtains the following: 4.17% (f=4) of student respondents answered less than 2 hours; 7.29% (f=7) respondents answered 2 to four hours; 26.04% (f=25) answered to have spent 4 to 6 hours; 62.5% (f=60) spent more than 6 hours on average.

Instruments

The study used two adopted standardized questionnaires. First, the data-gathering tool on the dependency on technological gadgets and services, a Likert scale questionnaire composed of 10 items adopted from the study of Subba Revathi, Sushil Nair, and Anitha Achuthan (2020). Second, is the Academic Procrastination Scale (APS) another likert scale questionnaire, comprising 25 items assessing the habits and routines of students developed by Justin McCloskey and Shannon Scielzo (2015).

Validity and Reliability

The two data-gathering research instruments have set valid and reliable constructs for eliciting relevant information concerning the degree of gadget dependency and academic procrastination levels, as previous studies have used them. Consent for using standardized survey tools was prepared and sent to the developers of gadget dependency and academic procrastination scale questionnaires. Furthermore, the researchers had measured reliability in a local setting using Cronbach's alpha. As the accepted score is 0.7 both instruments acquired acceptable and highly reliable scores with 0.909 for assessing gadget dependency and 0.891 for academic procrastination (Heale & Twycross, 2015; Shuttleworth, 2009).

Data Gathering Procedure

The researchers practiced adherence to authorities and research ethics. Permission to conduct the study was sent to the Senior High School Principal and Grade 12 STEM advisor. Inclusive of the letter is the request for the list of students which was used for sample size determination and random selection in each stratum. The researchers then invited randomly selected students in group chats through Messenger for orientation, clarifications, and access to survey links of the study.

Researchers administered the survey online using Google Forms. The survey is composed of three sections: the demographic profile, but names are optional; measurement for the degree of gadget dependency; and level of academic procrastination. With the help of Google Classroom and Google Sheets, the gathering of responses was automatic. Data collected were stored in the cloud and were deleted immediately after they were processed statistically. Tabulation of the mean and standard deviation was done. Independent Samples *t*-Test, Mann-Whitney U test, and ANOVA were employed to compare between and within groups, while Spearman-rho was used for the determination of a relationship between variables.

Ethical Standards

With human participants, the researchers employed the following core principles in the Belmont Report: respect for persons, beneficence, and justice (Brothers et al., 2019). Respect for the respondents was guaranteed through informed consent. On beneficence, this study ensures positive and identifiable benefits not only to the researchers but also to teachers and students. Lastly, the respondents were treated equally to ensure justice. Whatever benefits resulted from this study; the respondents received a fair share of these benefits.

Results and Discussion

Degree of gadget dependency of Grade 12 STEM students of BCNHS

Table 1 presents a high degree (M=3.51, SD=0.58) of gadget dependency amongst Grade 12 STEM students of BCNHS as a whole, with 96 respondents in total. Hence, despite the advantages of online learning, the high reliance on tools like the internet may lead to unusual levels of dependency on gadgets. Findings are similar in the study of Ellis et al. (2015) in the context of internet abuse and addiction before the pandemic.

According to sex, results show that gadget dependency of both groups is high among males (M=3.46, SD=0.57) and females (M=3.56, SD=0.60). It is to note that high degrees of gadget dependency are prevalent in both sexes. However, females are slightly higher, suggesting that they may spend more time on online tasks or any means of entertainment like social media. Also, results are supported by the findings of Ganganahalli et al. (2014) and Lin et al. (2017). The results also show that the data from males are slightly more consistent than females. In contrast, the results of Gupta et al. (2013) revealed that males have a higher degree of dependency than females.

Table 1. Degree of gadget dependency of Grade 12 STEM students

	n	Mean	SD	Interpretation
OVERALL	96	3.505	0.583	High Degree
Sex				
Male	50	3.456	0.566	High Degree
Female	46	3.559	0.603	High Degree
Learning Modality				
ROC	33	3.703	0.425	High Degree
RODM	63		0.629	Moderate Degree
Screen Time				
< 2 hours	4	3.700	0.726	High Degree
2 – 4 hours	7	3.229	0.499	Moderate Degree
4 – 6 hours	25	3.344	0.642	Moderate Degree
> 6 hours	60	3.592	0.545	High Degree

When grouped according to learning modality, gadget dependency is more evident among students under ROC with a high degree (M=3.70, SD=0.43) than those under RODM with a moderate degree (M=3.40, SD=0.63), entailing that frequent use of gadgets for online learning during the pandemic affects students' dependence on online platforms. Also, the data is more consistent for ROC than RODM. A study by Király et al. (2020) further supports the findings such that technology and gadgets are used for stress and anxiety during the pandemic, leading to an increase in dependency.

Also, for screen time, findings indicate that groups spending less than 2 hours (M=3.70, SD=0.73) and more than 6 hours (M=3.59, SD=0.55) on their gadgets have a high degree of dependency. Meanwhile, those groups spending 2-4 hours (M=3.23, SD=0.50) and 4-6 hours (M=3.34, SD=0.64) on gadgets are dependent to a moderate degree. The respondent group with less than 2 hours of gadget use were offline, and their high dependence suggests a high demand for gadgets despite the shortest screen time. Hence, more than half of students by any means use their devices for at least one-fourth of their day. Moreover, the levels of dependence are high whether they have the longest or the shortest amount of screen time.

Conclusively, more than 6 hours of using electronic devices were regarded as addictive and reportedly spent for studies and entertainment, with messaging as the most dominant availed service (Nakel & Naval, 2015; Revathi et al., 2019). Another recent study reveals that from an average of 4.75 hours of gadget use, college students report having daily usage of 11.36 hours during lockdowns due to classes online (Pachiyappan et al., 2021).

Academic procrastination level of Grade 12 STEM students

Table 2 presents a moderate level (M=3.01, SD=0.72) of academic procrastination among the 96 respondents taken as a whole. Although procrastination is typically present among learners, most students only indicate moderate levels. Meanwhile, those with less than 2 hours of gadget use have high degrees of gadget dependency and may indicate lack of resources such as electronic devices or internet connection to accomplish online schoolwork. Relevant to the results, a previous study also states that although procrastinating behavior is 91% present in respondents, 70% up to 95% of students do not do it often (Vargas, 2017). Also, Dontre (2020) and Lepp et al. (2019) show that multitasking is more prevalent in online courses than face-to-face, as smartphones and social media can cause academic distractions.

When grouped according to sex, results show that academic procrastination is evident in both males (M=3.13, SD=0.59) and females (M=2.89, SD=0.83), with a moderate level of interpretation and having a lesser deviation of data in males. The results show that male students are more likely to procrastinate academically than females. Moreover, the findings are similar to previous studies, which indicated that males are more likely to procrastinate than females due to their difficulty in doing tasks and often exhibit flouting (Abbasi & Alghamd, 2015; Mandap, 2016; Steel & Ferrari, 2013; Tamini et al., 2013).

Table 2. Academic procrastination level of Grade 12 STEM students

Variables	N	Mean	SD	Interpretation
OVERALL	96	3.013	0.722	Moderate Level
Sex				
Male	50	3.130	0.586	Moderate Level
Female	46	2.885	0.833	Moderate Level
Learning Modality				
ROC	35	3.247	0.716	Moderate Level
RODM	61	2.890	0.700	Moderate Level
Screen Time				
< 2 hours	4	3.420	0.662	High Level
2 – 4 hours	7	2.731	0.575	Moderate Level
4 – 6 hours	25	2.842	0.783	Moderate Level
> 6 hours	60	3.089	0.703	Moderate Level

In terms of learning modality, findings show that students under ROC and RODM have mean values (M=3.25, SD= 0.72) and (M=2.89, SD=0.70), respectively, both interpreted as moderate levels. Students under ROC based on results are more prone to academic procrastination than those under RODM, with both data almost similarly consistent. Students under ROC may presumably have devices and access to the internet and are more productive in learning online, but they may be susceptible to delays and distractions upon browsing online. Although no in-depth scientific articles compare the online and offline modalities, a previous study discusses that poorer learning outcomes and the tendency of procrastinating are observed in online students because they do not regularly attend classes (Dunn & Rakes, 2010).

Furthermore, regarding the time they spent on gadgets, students with less than 2 hours of gadget use were found to have a high level of academic procrastination overall (M=3.42, SD=0.70). While the other categories for screen time all have moderate levels of procrastination, 2-4 hours (M=2.73, SD=0.58), 4-6 hours (M=2.84, SD=0.78), and more than 6 hours (M=3.09, SD=0.70). Moreover, data of the student group with less than 2 hours of gadget use is the least deviant, whereas those with 5-6 hours spent on gadgets was the most inconsistent.

Thus, students who spent more time using gadgets and multitasking on the internet

searching for relevant information on browsers while working on an academic task were more likely to complete their work, which conforms to the findings of Reinecke et al. (2018). However, the results of several related studies indicate that students who spent more hours using gadgets had a high level of academic procrastination as online platforms entertain and do away people from their work (Susiwalati, 2019; Lepped et.al, 2014 as cited in Susiwalati, 2019).

Remarkably, students with the least screen time were rated to be highly dependent on gadgets, suggesting that they may face challenges that may compromise their academic tasks, such as a lack of resources. Bazimaziki (2020) also asserts the lack of ICT (Information and Communication Technology) skills.

Difference in the degree of gadget dependency of Grade 12 STEM

On table 3, obtained values (t = 1294.50, p = 0.29) indicate that the null hypothesis is accepted at 0.05 alpha. This means that there is no significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to sex.

Table 3. The significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to sex

Mann-Whitney U Test - Gadget Dependency

Sex	Mean	Test	*t*	*P*	Interpretation
Male	3.456	Mann-Whitney	1294.500	0.290	Not significant
Female	3.559				

Thus, sex is not an indicator and does not impact the degree of gadget dependency, as past studies on smartphone addiction also showed no gender differences though noting that females were commonly higher (Chen et al., 2017; Kwon et al., 2013).

Hence, both sexes are susceptible to being reliant or addicted to gadgets, although females have a higher degree. In line with this, a study on smartphone dependency by Lin and Chiang (2017) shows that females are more dependent, while an investigation by Rashid et al. (2020) dealing with mobile phone addiction data reveals that male students are more addicted. Still, based on Chen et al. (2017), gadget use for both sexes was different wherein males were fond of gaming and females were more for social media.

Table 4. The significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to learning modality

Mann-Whitney U Test - Gadget Dependency

Learning Modality	Mean	Test	*t*	*p*	Interpretation
ROC	3.703	Mann-Whitney	1348.500	0.017	Significant
RODM	3.402				

On table 4, obtained t and p values (t = 1348.50, p = 0.02) indicate that the null hypothesis is rejected at 0.05 alpha. Results entail that there is a **s**ignificant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to learning modality.

Remote learning has brought abrupt changes to the lives of students, and reliance on gadgets is evident with varied learning modalities. As the school system rapidly switched online in March, gadget use varies from 1 to 8 hours a day for learning, especially when face-to-face classes are not allowed due to health risks brought by COVID-19 (Shandler, 2020; Moaje, 2020; Rawal, 2020).

However, some students are under RODM, wherein they do not attend virtual classes but receive and submit outputs only online. Consequently, those under ROC have online meetings

from 2-4 hours a day, so they tend to be around gadgets for a longer time. Hence, a prior study states that internet addiction is significantly associated with screentime (Asut et al., 2019).

Table 5. The significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to screen time

ANOVA - GADGET DEPENDENCY

screen time	Mean	*F*	*p*	Interpretation
< 2 hours	3.700	1.795	0.154	Not Significant
2 – 4 hours	3.229			
4 – 6 hours	3.344			
> 6 hours	3.592			

Note. Type III Sum of Squares

On table 5, obtained F and p values (F = 1.80, p = 0.15) suggest that the null hypothesis is accepted at 0.05 alpha. This means that there is no significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to screen time.

In this regard, the current study supports the statement that gadget dependence is regardless of screen time. Moreover, the demand for gadgets is almost the same for students where online environments are necessary for learning and accessing schoolwork. Conversely, past studies review that screen addiction is influenced and differs in screen time (Asut et al., 2019; Khalili-Mahani, et al., 2019; Uzun et al., 2014). Due to the online setting during quarantine, students tend to use their gadgets for 4-8 hours, but past suggest a maximum of 3-4 hours, and using electronic devices for more than is again said to be addictive (Beng et al., 2020; Meng et al., 2020; Nakel & Naval, 2020).

Significant difference in the academic procrastination levels of Grade 12 STEM students

On table 6, obtained t and p values (t = 963.50, p = 0.17) indicate that the null hypothesis is accepted at 0.05 alpha. This entails that there is no significant difference in the academic procrastination levels of Garde 12 STEM students when grouped according to sex.

Table 6. The significant difference in the academic procrastination levels of Grade 12 STEM students of BCNHS when grouped according to sex

Mann-Whitney U Test - Academic Procrastination

Sex	Mean	Test	*t*	*p*	Interpretation
Male	3.130	Mann-Whitney	963.500	0.172	Not significant
Female	2.885				

The result in Table 6 implies that gender is not associated with academic delaying behavior, wherein both sexes show moderate and almost the same academic procrastination levels, similar to prior findings that gender is not an excuse for delay (Akinsola et al., 2007; Vij, 2016). Although male students may often delay finishing their school tasks, their habits are not necessarily more alarming than females. Other research reports mostly have higher procrastination levels in males than females, but different interpretations of sexes are assumed to make variations (Vij, 2016).

Table 7. The significant difference in the academic procrastination levels of Grade 12 STEM students when grouped according to learning modality

Independent Samples *t*-test - Academic Procrastination

Learning Modality	Mean	Test	*T*	*p*	Interpretation
ROC	3.130	Student	2.361	0.020	Significant
RODM	2.885				

On table 7, calculated t and p values (t = 2.36, p = 0.02) recommend that the null hypothesis is rejected at 0.05 alpha. Results reveal that there is a significant difference in the academic procrastination levels of Grade 12 STEM students when grouped according to learning modality.

Thus, gadgets, along with internet connection, not only help students cope with learning online, but they may also bring them distractions. According to Babadogan (2010), a positive correlation is significant between academic procrastination and learning modality. The latter suggests that if curriculum design follows the preferred learning modality, academic procrastination behavior may be reduced (Babadogan 2010).

Table 8. The significant difference in the academic procrastination levels of Grade 12 STEM students when grouped according to screen time

ANOVA - Academic Procrastination

Screen Time	Mean	*F*	*p*	Interpretation
< 2 hours	3.420	1.495	0.221	Not Significant
2 – 4 hours	2.731			
4 – 6 hours	2.842			
> 6 hours	3.089			

Note. Type III Sum of Squares

On table 8, acquired F and p values (F = 1.495, p = 0.22) show that the null hypothesis is accepted at 0.05 alpha. This argues that there is no significant difference in the degree of gadget dependency of Grade 12 STEM students when grouped according to screen time.

The amount of exposure to devices does not necessarily induce variations in procrastination behavior among learners. Thus, screen time does not mainly affect students' academic procrastination levels. However, Susiwalati (2019) states that those who spend much time on social media, correlating to gadgets, tend to have work delays, and the degree of procrastination depends on the time spent. Short breaks on the internet while studying may also gradually increase, leading to academic procrastination (Aslan Efe & Efe, 2018).

Significant relationship in the degree of gadgets dependency and academic procrastination levels of Grade 12 STEM students

Data in Table 9 shows the significant relationship between the degree of gadgets dependency and academic procrastination levels of Grade 12 STEM students of BCNHS.

Table 9. Significant relationship in the degree of gadgets dependency and academic procrastination levels of Grade 12 STEM students of BCNHS

	Spearman		Interpretation
	rho	p	
Gadget Dependency - Academic Procrastination	.340	<.001	Significant

Obtained rho and p values (rho = .34, p = <.001) show that in the null hypothesis, there is enough evidence to reject the null hypothesis, and a moderately significant relationship exists between the degree of gadget dependency and academic procrastination levels of Grade 12 STEM students. Consequently, under distance learning, gadget dependency and academic procrastination may not necessarily be the cause of another. However, if one variable rises, the other may also increase, and vice versa. Also, the findings are similar to other studies (Bühl, 2012 as cited in Schmidt & Osebold, 2017).

In Table 9, the rho value is near zero and is very low. Yet, a correlation coefficient of at least 0.3 has different interpretations from various sources, such as weak, fair, and moderate (Akoglu, 2018). Moreover, a statistically significant correlation does not mean that variables have a strong relationship (Akoglu, 2018).

A study by Uzun et al. (2014) also shows a significantly medium relationship between internet addiction and academic procrastination (r=0.34). Prior studies also reveal that the influence of gadget addiction on procrastination is estimated to be from 27% to 40% (Susilawati, 2010; Yang et al., 2020).

Conclusion

This study provides insight into the influence of gadget dependency on the academic procrastination levels of Grade 12 STEM students in Bacolod City National High School for the school year 2020-2021. Overall, under distance learning amid the pandemic, gadget dependency among students is high. Learners are reliant on utilizing gadgets for entertainment and educational purposes. Meanwhile, academic procrastination level is moderate, mainly due to distractions. Both sexes have high degrees of gadget dependency, so both have high demands or are susceptible to excessive gadget use. There is a high degree of gadget dependency for ROC and a moderate for RODM regarding learning modality. Those under ROC have virtual meetings, which contributes to their higher level of dependence. Concerning the screen time, less than 2 hours and more than 6 hours of screen time exhibit high degrees of gadget dependency while the rest have moderate levels. Moreover, the levels of dependence are high whether they have the longest or the shortest amount of screen time.

Most groups of students have moderate levels of academic procrastination, except for those with less than 2 hours as they have high levels. Hence, students with the shortest screen time may face challenges that may compromise their academic tasks, such as a lack of resources. Gadget dependency does not vary when grouped according to sex or any amount of screen time. Saliently, students from ROC are significantly higher than those from RODM in their degrees of gadget dependency. Gadgets not only help students cope with learning online, but they may also bring them distractions. Also, academic procrastination levels are equal regardless of sex and screen time. Like gadget dependency, the difference between ROC and RODM is also significant, implying that learning modalities may affect procrastination behavior. Hence, the new learning system needs to monitor students attending virtual classes to help them become more focused and productive in an online environment. Generally, the study reports a positive association between gadget dependency and academic procrastination in Grade 12 STEM students. Gadget dependency and academic procrastination under distance learning may not necessarily cause one another's occurrence. Hence, as the degrees of gadget dependency increase, the procrastination levels also rise and vice versa. Thus, we can evaluate these variables to help indicate or predict the extents of one another, especially amid remote learning.

References

Abbasi, I. S., & Alghamd, N. G. (2015, February 15). The prevalence, predictors, causes, treatment, and implications of procrastination behaviors in general, academic, and work settings. *International Journal of Psychological Studies*, *7*(1). CiteSeerX. http://dx.doi.org/10.5539/ijps.v7n1p59

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013, December). Sampling: Why and how of it. *Indian Journal of Medical Specialties*, *4*(2), 330-333. ResearchGate. http://dx.doi.org/10.7713/ijms.2013.0032

Agnihotri, L., Baker, R. S., & Stalzer, S. (2020, June). *A Pro-*

crastination Index for online learning based on assignment start time [Conference: The 13th International Conference on Educational Data Mining]. ResearchGate. https://www.researchgate.net/publication/342815309_A_Procrastination_Index_for_Online_Learning_Based_on_Assignment_Start_Time

Akinsola, M. K., Tella, A., & Tella, A. (2007, April 19). Correlates of academic procrastination and mathematics achievement of university undergraduate students. *Eurasia Journal of Mathematics, Science & Technology Education*, *3*(4), 363-370. Eurasia Journal of Mathematics, Science and Technology. https://www.ejmste.com/download/correlates-of-academic-procrastinationand-mathematics-achievement-ofuniversity-undergraduate-4083.pdf

Akoglu, H. (2018, September). User's guide to correlation coefficients. *Turkish Journal for Emergency Medicine*, *18*(3), 91–93. National Center for Biotechnology Information. https://doi.org/10.1016/j.tjem.2018.08.001

Aslan Efe, H., & Efe, R. (2018). The relationship between academic procrastination behaviors of preservice science teachers and their attitudes toward social media. *Journal of Education and e-Learning Research*, *5*(2), 102-109. ERIC. https://doi.org/10.20448/journal.509.2018.52.102.109

Babadogan, C. (2010, December). The impact of academic procrastination behaviors of the students in the certificate program in English language teaching on their learning modalities and academic achievements. *Procedia - Social and Behavioral Sciences*, *2*(2), 3263-3269. ResearchGate. https://doi.org/10.1016/j.sbspro.2010.03.499

Balkis, M. (2013, March). Academic procrastination, academic life satisfaction and academic achievement: The mediation role of rational beliefs about studying. *Journal of Cognitive and Behavioral Psychotherapies*, *13*(1), 57-74. ResearchGate. https://www.researchgate.net/profile/Murat-Balkis-2/publication/236173872_Academic_procrastination_academic_life_satisfaction_and_academic_achievement_The_mediation_role_of_rational_beliefs_about_studying/links/0c960533a98186b6b9000000/Academic-procrastina

Balkis, M., & Duru, E. (2017, April). Gender differences in the relationship between academic procrastination, satisfaction with academic life and academic performance. *Electronic Journal of Research in Educational Psychology*, *15*(1), 105-125. Redalyc. http://dx.doi.org/10.14204/ejrep.41.16042

Bazimaziki, G. (2020, August). Challenges in using ICT Gadgets to cope with effects of COVID-19 on Education: A short survey of online teaching Literature in English. *Journal of Humanities and Education Development*, *2*(4). ResearchGate. https://dx.doi.org/10.22161/jhed.2.4.8

Beng, J. T., Tiatri, S., Lusiana, F., & Wangi, V. H. (2020, December 12). Intensity of gadgets usage for achieving prime social and cognitive health of adolescents during the COVID-19 pandemic. *Advances in Social Science, Education and Humanities Research*, *478*, 735-741. Atlantis Press. https://doi.org/10.2991/assehr.k.201209.116

Brothers, K. B., Rivera, S. M., Cadigan, R. J., Sharp, R. R., & Goldenberg, A. J. (2019). A Belmont Reboot: Building a normative foundation for human research in the 21st century. *The Journal of Law, Medicine & Ethics*, *47*(1), 165-172. SAGE Journals. https://doi.org/10.1177/1073110519840497

Chen, B., Liu, F., Ding, S., Ying, X., Wang, L., & Wen, Y. (2017). Gender differences in factors associated with smartphone addiction: a cross-sectional study among medical college students. *BMC Psychiatry*, *17*. BMC Psychiatry. https://doi.org/10.1186/s12888-017-1503-z

Cheval, B., Sivaramakrishnan, H., Maltagliati, S., Fessler, L., Forestier, C., Sarrazin, P., Orsholits, D., Chalabaev, A., Sander, D., Ntoumanis, N., & Boisgontier, M. P. (2020, October 29). Relationships between changes in self-reported physical activity, sedentary behaviour and health during the coronavirus (COVID-19) pandemic in France and Switzerland. *Journal of Sports Sciences*, *39*(6), 1-6. SHAPE America. https://doi.org/10.1080/02640414.2020.1841396

DepEd. (2020a, July 24). *DepEd provides psychosocial support service for parents, teachers, and non-teaching personnel*. GOVPH. https://www.deped.gov.ph/2020/07/30/deped-provides-psycho-social-support-service-for-parents-teachers-and-non-teaching-personnel/

DepEd. (2020b, August 14). *Official statement on the opening of classes*. GOVPH. https://www.deped.gov.ph/2020/08/14/official-statement-on-the-opening-of-classes/

DepEd CAR. (2020). Enclosures. *Republic of the Philippines Department of Education-Cordillera Administrative*

Region. https://www.depedcar.ph/sites/default/files/regionalMemos/long-memo_1.pdf

Dhawan, S. (2020, June 20). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5-22. SAGE Journals. https://doi.org/10.1177/0047239520934018

Dontre, A. J. (2021, July). The influence of technology on academic distraction: A review. *Human Behavior and Emerging Technologies*, *3*(3), 379-390. Wiley Online Library. https://doi.org/10.1002/hbe2.229

Dunn, K., & Rakes, G. C. (2010). The impact of online graduate students' motivation and self-regulation on academic procrastination. *Journal of Interactive Online Learning*, *9*(1), 78-93. CiteSeerX. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1069.9851&rep=rep1&type=pdf

Ellis, W. F., McAleer, B., & Szakas, J. S. (2015, September). Internet addiction risk in the academic environment. *Information Systems Education Journal*, *13*(5), 100-105. ERIC. https://files.eric.ed.gov/fulltext/EJ1137201.pdf

Frahasini, Astuti, T. M. P., & Atmaja, H. T. (2018, December). The impact of the use of gadgets in the school of school-age towards children's social behavior in Semata village. *Journal of Educational Social Studies*, *7*(2), 161-168. UNNES JOURNAL. https://doi.org/10.15294 /jess.v7i2.26842

Ganganahalli, P., Tondare,, M. B., & Durgawale, P.M. (2014, October). Use of electronic gadgets among medical students in Western Maharashtra, India. *International Journal of Health Sciences and Research*, *4*(9), 27. ResearchGate. https://www.researchgate.net/profile/Praveen-Ganganahalli/publication/308169718_Use_of_Electronic_Gadgets_among_Medical_Students_in_Western_Maharashtra_India/links/57dbfa3e08ae72d72ea67ef3/Use-of-Electronic-Gadgets-among-Medical-Students-in-Western-Mahara

Gholamali, M. L., Azarniad, A., MehmanPazir, P., & Rezaian, H. (2013). The role of academic self-efficacy and some aspects of academic procrastination on prediction of the levels of dependency on internet. *Global Media Journal*, *8*(2). Global Media Journal. https://gmj.ut.ac.ir/article_66495.html?lang=en

Gupta, N., Krishnamurthy, V., Majhi, J., & Gupta, S. (2013, December). Gadget dependency among medical college students in Delhi. *Indian Journal of Community Health*, *25*(4), 362-366. CiteSeerX. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.682.6175&rep=rep1&type=pdf

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. Evidence-based nursing, 18(3), 66-67. ResearchGate. https://www.researchgate.net/publication/280840011_Validity_and_reliability_in_quantitative_research

Kar, S. K., Arafat, S.M. Y., Sharma, P., Dixit, A., Marthoenis, M., & Kabirf, R. (2020, April 10). COVID-19 pandemic and addiction: Current problems and future concerns. *Asian Journal of Psychiatry*, *51*. National Center for Biotechnology Information. https://doi.org/10.1016/j.ajp.2020.102064

Khalili-Mahani, N., Smyrnova, A., & Kakinami, L. (2019, April 2). To each stress its own screen: A cross-sectional survey of the patterns of stress and various screen uses in relation to self-admitted screen addiction. *Journal of Medical Internet Research*, *21*(4). JMIR Publications. https://doi.org/10.2196/11485

Király, O., Marc, P. N., Stein, D. J., King, D. L., Hodgins, D. C., Saunders, J. B., Griffiths, M. D., Gjoneska, B., Billieux, J., Brand, M., Abbott, M. W., Chamberlain, S. R., Corazza, O., Burkauskas, J., Sales, C. M.D., Montag, C., Lochner, C., Grünblatt, E., Wegmann, E., … Demetrovics, Z. (2020, July). Preventing problematic internet use during the COVID-19 pandemic: Consensus guidance. *Comprehensive Psychiatry*, *100*. ScienceDirect. https://doi.org/10.1016/j.comppsych.2020.152180

Kwon, M., Lee, J.-Y., Won, W.-Y., Park, J.-W., Min, J.-A., Hahn, C., Gu, X., Choi, J.-H., & Kim, D.-J. (2013, February 27). Development and validation of a Smartphone Addiction Scale (SAS). *PLoS One*, *8*(2). National Center for Biotechnology Information. https://doi.org/10.1371/journal.pone.0056936

Lepp, A., Barkley, J. E., Karpinski, A. C., & Singh, S. (2019, January 13). College students' multitasking behavior in online versus face-to-face courses. *Sage Open*, *9*(1). SAGE Journals. https://doi.org/10.1177/2158244018824505

Levy, Y., & Ramim, M. M. (2012). *A study of online exams procrastination using data analytics techniques* (Vol. 8, Issue 1). CORE. https://core.ac.uk/download/pdf/51072311.pdf

Lin, T. T. C., & Chiang, Y.-H. (2017, October 3). Investigating predictors of smartphone dependency symptoms and effects on academic performance, improper phone use and perceived sociability. *International Journal of Mobile Communications*, *15*(6), 655-676. ResearchGate. https://doi.org/10.1504/IJMC.2017.086881

Liu, P., & Feng, T. (2019, June 15). The effect of future time perspective on procrastination: the role of parahippocampal gyrus and ventromedial prefrontal cortex. *Brain Imaging and Behavior*, *13*, 615–622. Springer Link. https://doi.org/10.1007/s11682-018-9874-4

Mandap, C. M. (2016, April). Examining the differences in procrastination tendencies among university students. *International Journal of Education and Research*, *4*(4). International Journal of Education and Research. https://www.ijern.com/journal/2016/April-2016/35.pdf

McCloskey, J., & Scielzo, S. A. (2015, January). *Finally: The development and validation of the Academic Procrastination Scale* [Under Review]. ResearchGate. https://doi.org/10.13140/RG.2.2.23164.64640

McCloskey, J. D. (2011). *Finally, my thesis on academic procrastination*. UTA ResearchCommons. https://rc.library.uta.edu/uta-ir/bitstream/handle/10106/9538/McCloskey_uta_2502M_11260.pdf?sequence=1&isAllowed=y#:~:text=Academic%20procrastination%20occurs%20when%20students,%2Dbeing%2C%20and%20more%20stress.&text=However%2C%20the%20Tuckman%20(1991),sca

Memon, M. M., Hashmani, M. A., Jameel, S. M., Junejo, S., & Raza, K. (2020). Analysis of student procrastinatory behavior in virtual learning environments using machine learning. *Journal of Hunan University Natural Sciences*, *47*(10). Journal of Hunan University Natural Sciences. http://www.jonuns.com/index.php/journal/article/view/459

Meng, S., Dong, P., Sun, Y., Li, Y., Chang, i., Sun, G., Zheng, X., Sun, Y., Sun, Y., Yuan, K., Sun, H., Wang, Y., Zhao, M., Tao, R., Domingo, C., Bao, Y., Kosten, T. R., Lu, L., & Shi, J. (2020, November 20). Guidelines for prevention and treatment of internet addiction in adolescents during home quarantine for the COVID-19 pandemic. *Heart and Mind*, *4*(4). HM. https://www.heartmindjournal.org/article.asp?issn=2468-6476;year=2020;volume=4;issue=4;spage=95;epage=99;aulast=Meng#ref21

Moaje, M. (2020, August 19). Gadgets for distance learning are DepEd property: exec. *Philippine News Agency*. https://www.pna.gov.ph/articles/1112828

Montag, C., & Elhai, J. D. (2020, November 4). Discussing digital technology overuse in children and adolescents during the COVID-19 pandemic and beyond: On the importance of considering Affective Neuroscience Theory. *Addictive Behaviors Reports*, *12*. ScienceDirect. https://doi.org/10.1016/j.abrep.2020.100313

Morens, D. M., Daszak, P., Markel, H., & Taubenberger, J. K. (2020). Pandemic COVID-19 Joins History's Pandemic Legion. *mBio*. ASM Journals. https://doi.org/10.1128/mBio.00812-20

Muduli, J. R. (2014). *Addiction to technological gadgets and its impact on health and lifestyle: a study on college students (Doctoral dissertation)*. Department of Humanities and Social Sciences National Institute of Technology, Rourkela - 769008 India. http://ethesis.nitrkl.ac.in/5544/1/e-thesis_19.pdf

Nadeem, K., & Ahmed, N. (2020, July 23). Persistent use of gadgets and internet in lockdown endangers childhood. *Electronic Research Journal of Social Sciences and Humanities*, *2*(3). Social Science Research Network. https://doi.org/10.1111/ajad.13066

Nakel, M., & Naval, S. (2017, May). Study of impact and dependency of electronic gadgets on health & life style of students-A comparative study among youth population in MGM Campus, Aurangabad. *International Journal of Scientific Research*, *6*(5). Semantic Scholar. https://www.ijsr.net/archive/v6i5/ART20173757.pdf

Pachiyappan, T., Kumar, K. V., Mark, P., Venugopal, R., Jilumudi, D., & Palanisamy, B. (2021). Effects of excessive usage of electronic gadgets during COVID-19 lockdown on health of college students: An online cross-sectional study. *Asian Journal of Pharmaceutical Research and Health Care*, *13*(2). Informatics Journal. https://doi.org/10.18311/ajprhc/2021/26836

Rashid, J. A., Aziz, A. A., Rahman, A. A., Saaid, S. A., & Ahmad, Z. (2020). The influence of mobile phone addiction on academic performance among teenagers. *Malaysian Journal of Communication*, *36*(3), 420. UKM e-Journal System. https://doi.org/10.17576/JKMJC-2020-3603-25

Rawal, U. D. (2020, June 16). Gadget addiction among children during lockdown a cause of concern: Study. *Hindustan Times*. https://www.hindustantimes.com/india-news/gadget-addiction-among-children-during-lockdown-a-cause-of-concern-study/story-2Y2HmdPNnEVtZC6NBJWdzN.html

Reinecke, L., Meier, A., Beutel, M. E., Schemer, C., Stark, B., Wölfling, K., & Müller, K. W. (2018, June 11). The relationship between trait procrastination, internet use, and psychological functioning: Results from a community sample of German adolescents. *Frontiers in Psychology*. Frontiers in Psychology.

https://doi.org/10.3389/fpsyg.2018.00913

Revathi, S., Nair, S., & Achuthan, A. (2020, January 8). Influence of technological gadgets on health and lifestyle of medico. *National Journal of Physiology, Pharmacy and Pharmacology*, *10*(3), 201-205. National Journal of Physiology, Pharmacy and Pharmacology. http://dx.doi.org/10.5455/njppp.2020.10.12377201908012020

Santyasa, I. W., Rapi, N. K., & Sara, I. W. W. (2020). Project-based learning and academic procrastination of students in learning physics. *International Journal of Instruction*, 13(1), 489-508. https://doi.org/10.29333/iji.2020.13132a

Schmidt, J.-S., & Osebold, R. (2017). Environmental management systems as a driver for sustainability: state of implementation, benefits and barriers in German construction companies. *Journal of Civil Engineering and Management*, *23*(1), 150-162. ResearchGate. https://doi.org/10.3846/13923730.2014.946441

Shandler, R. (2020, July 13). The pandemic shows we depend on the Internet. So is Internet access a human right? *The Washinton Post*. https://www.washingtonpost.com/politics/2020/07/13/pandemic-shows-we-depend-internet-so-is-internet-access-human-right/

Siste, K., Hanafi, E., Sen, L. T., Christian, H., Adrian, Siswidiani, L. P., Limawan, A. P., Murtani, B. J., & Suwartono, C. (2020, September 3). The impact of physical distancing and associated factors towards internet addiction among adults in Indonesia during COVID-19 pandemic: A nationwide web-based study. *Frontiers in Psychiatry |*, *11*. ResearchGate. https://doi.org/10.3389/fpsyt.2020.580977

Shuttleworth, M. (2009, April 26). Internal consistency reliability. Explorable. https://explorable.com/internal-consistency-reliability

Sousa, V. D., Driessnack, M., & Mendes, I. A. C. (2007, June). An overview of research designs relevant to nursing: Part 1: quantitative research designs. *Rev Lat Am Enfermagem*, *15*(3), 502-507. National Center for Biotechnology Information. https://doi.org/10.1590/S0104-11692007000300022

Steel, P. (2010, June). Arousal, avoidant and decisional procrastinators: Do they exist? *Personality and Individual Differences*, *48*(8). CiteSeerX. https://doi.org/10.1016/j.paid.2010.02.025

Steel, P., & Ferrari, J. (2013). Sex, education and procrastination: An epidemiological study of procrastinators' characteristics from a global sample. *European Journal of Personality*, *27*(1). SAGE Journals. https://doi.org/10.1002/per.1851

Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y., Schumann, G., Kosten, T., Strang, J., Lu, L., & Shi, J. (2020, June 4). Brief report: Increased addictive internet and substance use behavior during the COVID-19 pandemic in China. *The American Journal on Addictions, 29*(4). Wiley Online Library. https://doi.org/10.1111/ajad.13066

Susilawati, E. (2019, November). The influence of gadget towards information technology addict and procrastination behaviour. *IOP Publishing*. ResearchGate. https://doi.org/10.1088/1757-899X/662/2/022054

Svartdal, F., Granmo, S., & Færevaag, F. S. (2018, May 16). On the behavioral side of procrastination: Exploring behavioral delay in real-life settings. *Frontiers in Psychology*. Frontiers. https://doi.org/10.3389/fpsyg.2018.00746

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. How to Choose a Sampling Technique for Research. *International Journal of Academic Research in Management (IJARM)*, *5*(2), 18-27. http://dx.doi.org/10.2139/ssrn.3205035

Tamini, B. K., Minakhany, G., & Zare, F. (2013, January). Academic procrastination and its relationship with self-esteem and life satisfaction. *International Journal of Psychology*, *7*(1), 87-104. Iranian Psychological Association. http://www.ijpb.ir/article_55555_2cdb07096f155736740c1d244081b33a.pdf

Tezer, M. (2020, November 30). Academic procrastination behaviours and problematic internet usage of high school students during the COVID-19 pandemic period. *International Journal of Special Education and Information Technology*, *6*(1), 1-17. UN-PUB.EU. https://doi.org/10.18844/jeset.v6i1.5490

Uzun, A. M., Unal, E., & Tokel, S. T. (2014, April). Exploring Internet addiction, academic procrastination and general procrastination among pre-service ICT teachers. *Mevlana International Journal of Education*, *4*(1), 189-201. ResearchGate. http://dx.doi.org/10.13054/mije.14.18.4.1.

Vargas, M. A. P. (2017, June). Academic procrastination: The case of Mexican researchers in Psychology. *American Journal of Education and Learning*, *2*(2), 103-120. ResearchGate. https://doi.org/10.20448/804.2.2.103.120

Vij, J. (2016, June). Gender does not influence delaying excuses: An exploratory study of the reasons of academic procrastination among college students. *The International Journal of Indian Psychology*, *3*(3). The International Journal of Indian Psychology. https://doi.org/18.01.016/20160303

Yang, X., Wang, P., & Hu, P. (2020, December 1). Trait procrastination and mobile phone addiction among Chinese college students: A Moderated Mediation Model of stress and gender. *Frontiers in Psychology*. Frontiers. https://doi.org/10.3389/fpsyg.2020.614660