The Impact of Technological Advancements on The Academic Performance of Senior High School Students

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ABSTRACT: Inclusion of technology in education was utilized even before pandemic. As the pandemic hit, technology usage for personal and academic purposes among senior high school students significantly increased. This study aimed to determine the impact of technological advancement to the academic performance of senior high school students from selected public and private school in the province of Zambales and City of Olongapo, Philippines. There were 187 senior high school students from the selected schools who were the respondents chosen through stratified random sampling. The study used the descriptive survey research design with survey questionnaires as the main instrument to describe the emerging impact of technological advancement to the academic performance of students. The results showed that students often experience the impact of technological advancements in their academic performance, and that it poses both positive and negative impact. Furthermore, it was found that there is a significant difference in the correlation between technological advancements and academic performance of students in terms of sex, school, and strand. The study suggests that the Department of Education (DepEd) may spearhead seminars and trainings to assist and help teachers in the successful inclusion of technology in the classroom; allocate enough fundings for the creation of programs that will help solve the digital divide that exist between students; allocate adequate funding for the provision of additional technological equipment in schools; teacher educators may practice using and including more technologies in the teaching-learning process and in their lesson plans; students may start utilizing technology to assist them in their academic performance; and parents may monitor their children's use of technology to avoid misuse and negative impacts on academic performance.

KEYWORDS: Academic performance, technology, academic performance

BACKGROUND OF THE STUDY

Higher education institutions view technology as the most important factor in raising students' achievement levels (Awang et. al, 2018). Because of this, there has been an increased interest in recent years in incorporating technology into every area of classroom instruction, and it has done so in most countries' schools (Chander & Arora, 2021). As the pandemic era came, it was difficult to picture the education sector without digital platforms because it has served as the means to conduct the teaching-learning process. However, Khamis et. al, (2022), point out how crucial internet technology is to education. Emphasizing that it is a tool that students utilize to exchange information, communicate, and produce new knowledge. Additionally, a rising body of research since the pandemic has focused on the issue of excessive student use of digital technology, particularly social media and online video games (Motag& Elhai, 2020). How such dependence is discovered to harm the educational process and, as a result, lower academic performance (Khamis et. al, 2022; Ramirez, 2021; Rodriguez et. al, 2022).

Back in 2005, it was noted that students in the United States spend more time using computers for educational reasons than for amusement or socializing with friends. A study's conclusion that technological advancement does, in fact, have a positive impact on students' academic performance in the areas of communication and collaboration with teachers and classmates, improving the presentation of schoolwork, comprehending concepts, and arousing interest in the subject matter of the class (Kvavik, 2005). However, as technology has advanced more in recent years, this study has appeared to be out of date. For example, in Germany, social media usage on weekdays has increased by 66 percent, from 116 to 193 minutes per day, and online video game use has increased by the same amount, from 79 to 139 minutes per day among 10 to 17-year-olds during the pandemic (Montag & Elhai, 2020). According to Al Menayes (2015), excessive use of technology and social networks both during the week and on the weekends affects performance negatively (Navaro & Pea, 2022). This is supported by the finding that social media use has a detrimental impact on academic performance in Kuwait.

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In the Philippines however, the number of internet users therein has also grown to approximately 79.7 million in number since the pandemic, where the digital population is mostly belonging to age group of 16 years old and above. But unlike the foreign countries, the country has been called the social media capital of the world, as most of the social media users have an extraordinarily high usage time of about four hours per day (Statista Research Department, 2022). This aspect of technological advancement exerting tremendous negative effects on school-aged children's health and learning habits, including longer screen exposure and irregular sleeping pattern as the temptations to use social media like facebook and tiktok, playing music, gaming, taking and returning calls/messages, become inevitable as well as just copying information from the internet for compliance become a norm (Guo et. al, 2021; Carbonilla& Bhati, 2016). However, in the context of providing resources in education such as televisions, printers, multimedia presentations, as well as various software applications that works as an advantage for the students performance, technological advancement in the Philippines, still foster positive impact on student outcome (Cruz et. al, 2019). The pros and cons that are both observed in the academic performance of BEED Graduating Students at Bestlink College of the Philippines, S.Y. 2019–2020 (Sechcico et. al, 2020).

Currently, most educational institutions around the world have switched back to normal on-campus classes. According to DepEd Order No. 034, series of 2022, the Philippine education system is likewise anticipated to resume the full-time implementation of face-to-face classes by November 22, 2022. Accordingly, there is continuing worry about how technology use by Senior High School (SHS) students may impair their academic performance, especially in light of the habits of addictive online gaming and social media use that have been formed during the lockdown.

METHODOLOGY

The study used a descriptive research-survey design in order to get a data collection tool by asking some descriptive questions that will target to systematically answer questions. A quantitative approach was used to conduct this study wherein the data gathered was measured and interpreted numerically.

The respondents of this study are the senior high school students in 10 public and private secondary education institution in Central Luzon, Philippines (table 1.). Stratified random sampling was employed to choose the participants to determine if there are differences within a larger population. A stratified sample was used by researchers to divide a population into groups and subpopulations based on specific traits (e.g., grade level, gender identity, location, etc.) ("Stratified Random Sampling," 2017).

Table 1. Distribution of Respondents

School	Classification	No. of Frequency	Percent
SEI 1	Public	29	15.51
SEI2	Private	28	14.97
SEI3	Public	22	11.76
SEI4	Public	12	6.42
SEI5	Private	11	5.88
SEI6	Private	8	4.28
SEI7	Public	11	5.88
SEI8	Public	18	9.63
SEI9	Private	4	2.14
SEI10	Public	44	23.53
Total		**187**	**100**

Where SEI: Secondary Education Institution. As shown, the study involved 10 institutions from private secondary educaton institution and four public secondary education institution.

Table 2 shows the profile of the Senior High School Students. The profile of the respondents are determined to provide a comprehensive background of their age, sex, grade level, strand, and school.

Table 2. Frequency and Percent Distribution of theRespondents' Profile

	Profile	Frequency	Percent
Age	15 and below	2	1.1
	16-17	145	78.1
	18 and above	39	20.9
	Total	**187**	**100.00**
Sex	Male	76	39.6
	Female	111	60.4
	Total	**187**	**100.00**
	11	91	48.7

Grade Level	12	96	51.3
	Total	**187**	**100.00**
Strand	GAS	21	11.2
	HUMSS	78	41.7
	ABM	22	11.8
	STEM	43	23.0
	TVL	23	12.3
	Total	**187**	**100.00**
School	Public	91	48.7
	Private	96	51.3
	Total	**187**	**100.00**

The impact of technology to the academic performance of senior high school students survey questionnaire developed by the researchers served as the main instrument in gathering the data. The survey questionnaire was subjected to construct and content validity checks. Experts were tapped to check the stability of the items in each variable. The responses were processed and subjected to a reliability test. The questionnaire's Cronbach alpha value ranged from 0.80 to 0.99, indicating a high level of reliability that allowed it to be used in the study.

The data processing was carried out using SPSS version 20 and MS Excel 2013. Frequency count, percent, weighted mean, and analysis of variance (ANOVA) were the statistical techniques that were employed in the study and interpretation of the data and hypotheses.

For the respondents to avoid the risk of being portrayed in 'bad light', answering questions that might be a sensitive matter for them to expose, their names were omitted from all aspects of this research. The students responded therefore is not harmed physically or emotionally, having considered their confidentiality, safety, security, and comfort as they participate. Any data gathered in this research was used for the sole purpose of this research and will remain confidential in accordance to the Data Privacy act of 2012. Coding scheme was used in identifying the respondents. Proper document sourcing and referencing of materials was performed in line with the copy right law. A request letter was presented to the principal of schools participated to gain permission to collect the necessary information as well as permission to float the questionnaires.

RESULTS AND DISCUSSION
Table 3. Impacts of technological advancements to the academic performance of students in terms of learning habits and attitudes

Indicators	Mean	SD	VD	Rank
I cram and procrastinate being tempted to use my phone	3.53	1.03	O	3
I use various search engines to complete my assignments without copying and pasting answers	3.62	1.03	O	1
I rushly do my school works so I can browse social media / play online games again	3.32	1.21	S	4
I get late in class because of late night online gaming/social media browsing	2.57	1.37	S	6
I copy paste answers from the internet to do my school homeworks	2.67	1.23	S	5
I use my phone during my vacant time in school	3.59	1.25	O	2
Overall	**3.22**	**1.19**	**S**	

Table 3 shows the impacts of technological advancements to the academic performance of senior high school students in terms of learning habits and attitudes.

As shown in the table, senior high school students sometimes experience the impacts of technological advancements to their academic performance in terms of learning habits and attitudes with the overall mean of 3.22 and standard deviation of 1.19.

The highest means were acquired in the following indicators: I use various search engines to complete my assignments without copying and pasting answers (M= 3.62; SD= 1.03), I use my phone during my vacant time in school (M= 3.59; SD= 1.25), I cram and procrastinate being tempted to use my phone (M= 3.53; SD= 1.028), and I rushly do my school works so I can browse social media / play online games again, as well as other higher order thinking skills. (M= 3.32; SD= 1.21). This suggests that it has often become a habit of the senior high school students to responsibly use technology as a resource for doing their school works. But it can be also noted that technology often serves as a distraction that leads them to cram and procrastinate.

The lowest means were obtained in the following indicators: I copy paste answers from the internet to do my school homeworks (M= 2.66, SD= 1.23) and I get late in class because of late night online gaming/social media browsing (M= 2.56, SD= 1.38). This

implies that the senior high school students sometimes abuse technology that it becomes an enabler tool rather than a helpful resource for them to do their school works. It can also be noted that sometimes, even the attendance of the senior high school students are affected in a negative way due to irresponsible use of technology.

The highest means acquired in the indicators is the use of various search engines to complete assignments without copying and pasting answers which correlates with Cohen et. al, (2022) where he emphasized that students used a variety of digital resources in their academic lives. However, it contradicts with Khamis et. al, (2022) emphasized that as vital internet technology is in education, it also is an enabler tool used by students for information exchange, communication, and creation of knowledge by using copyrighted material.

Table 4 shows the impacts of technological advancements to the academic performance of students in terms of sleeping pattern.

Table 4. Impacts of technological advancements to the academic performance of students in terms of sleeping pattern

Indicators	Mean	SD	VD	Rank
I stay up late at night to browse social media/ play online game	3.35	1.25	S	2
I stay up late watching movies on different websites and applications.	3.45	1.21	S	1
Overall	3.40	1.19	S	

As shown in the table, senior high school students sometimes experience the impacts of technological advancements to their academic performance in terms of sleeping pattern with the overall mean of 3.40 and standard deviation of 1.19.

The highest mean was acquired in the indicator: I stay up late watching movies on different websites and applications with a mean of 3.45 and a standard deviation of 1.11. This suggests that senior high school students sometimes end up being sleep deprived because of late night watching, made possible by the advancement in technology.

Furthermore, the lowest mean was obtained in the indicator: I stay up late at night to browse social media/ play online game (M= 3.35, SD= 1.25). This implies that senior high school students sometimes stay up late at night just to play online games or use social media.

The result shows that the senior high school students sometimes get sleep deprived due to social media and online video games use and which correlates with Mundy (2020) which emphasized that sleep deprivation mediates the effect of technology on students academic performance.

Table 5. Impacts of technological advancements to the academic performance of students in terms of time management

Indicators	Mean	SD	VD	Rank
Technical problems when technology is included in class waste time	3.26	1.00	S	3
It took me lesser time to do various written school works because I can type it and print it out afterward	3.56	1.06	O	2
Classes that use information technology allow me to take greater control of my class activities	3.69	0.97	O	1
Overall	3.50	1.01	S	

Table 5 shows the impacts of technological advancements to the academic performance of students in terms of time management. As shown in the table, senior high school students sometimes experience the impacts of technological advancements to their academic performance in terms of time management with the overall means of 3.50 and standard deviation of 1.01.

The highest means were acquired in the following indicators: Classes that use information technology allow me to take greater control of my class activities (M= 3.69, SD= 0.97) and it took me lesser time to do various written school works because I can type it and print it out afterward (M=3.56, SD= 1.058). This suggests that senior high school students can often manage their time as they can do their school works in lesser time with the help of technology.

The lowest mean was obtained in the following indicator: Technical problems when technology is included in class waste time (M= 3.26, SD= 1.00). This suggests that one of the negative implications of using technology in class is sometimes poor time management due to technical problems that arise.

The highest means acquired in the indicators is classes that use information technology allow me to take greater control of my class activities which is similar to the findings of Ababa (2021) where he found that educational applications is proven to effectively support students in doing their school works and activities.

Table 6 shows the impacts of technological advancements to the academic performance of students in terms of presentation of school works.

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Table 6. Impacts of technological advancements to the academic performance of students in terms of presentation of school works

Indicators	Mean	SD	VD	Rank
With the availability of various editing apps, as well as printers, I can neatly and creatively do my school works and projects	3.99	0.98	O	2
I use information technology to improve the presentation of my work	4.12	0.93	O	1
Overall	**4.06**	**0.96**	**O**	

As shown in the table, senior high school students often experience the impacts of technological advancements to their academic performance in terms of presentation of school works with the overall means of 4.06 and standard deviation of 0.96.

The highest mean was acquired in the following indicator: I use information technology to improve the presentation of my work (M= 4.12, SD= 0.93). This proves that the senior high school students often benefit from the use of technology as they can improve their works through it.

The lowest mean was obtained in the following indicator: With the availability of various editing apps, as well as printers, I can neatly and creatively do my school works and projects (M= 3.99; SD= 0.98). This implies that the senior high school students oftenuse various technologies like printers and editing applications to creatively present their schoolworks.

The highest mean acquired in the indicators is I use information technology to improve the presentation of my work that according to Churiyah (2022), is a necessary skill considering that we have entered the era of digitalization of education and industry. Furthermore, this is also supported by Ogunbodede (2022) and Tisoglu (2022) which emphasized that usage of digital resources does reveal some components of creative thinking skills of students that eventually also increase academic performance. Table 7 shows the impacts of technological advancements to the academic performance of students in terms of communication and collaboration.

Table 7. Impacts of technological advancements to the academic performance of students in terms of communication and collaboration

Indicators	Mean	SD	VD	Rank
The use of information technology in classes has helped me to better communicate my teachers	4.06	0.86	O	3
The use of information technology has resulted in prompt feedback from my teachers regarding clarifications and questions outside school	3.93	0.93	O	4
Social Media platforms like messenger helps me collaborate well with my classmates when there is an event in school or classroom, announcement	4.21	0.98	O	1
Different applications like meet or messenger enable me to meet online or chat with my groupmates regarding the distribution of works to be done	4.15	0.98	O	2
Overall	**4.09**	**0.94**	**O**	

As shown in the table, senior high school students often experience the impacts of technological advancements to their academic performance in terms of communication and collaboration with the overall means of 4.09 and standard deviation of 0.94.

The highest means were acquired in the following indicators: Social Media platforms like messenger helps me collaborate well with my classmates when there is an event in school or classroom, announcement, (M= 4.21, SD= 0.98) and Different applications like meet or messenger enable me to meet online or chat with my groupmates regarding the distribution of works to be done (M= 4.15, SD= 0.98). This suggests that senior high school students often continue to communicate and collaborate with each other regarding schoolworks and agenda even after school using various information communication technologies like messenger.

The lowest means were obtained in the following indicators: The use of information technology in classes has helped me to better communicate my teachers (M= 4.06, SD= 0.86) and the use of information technology has resulted in prompt feedback from my teachers regarding clarifications and questions outside school (M= 3.93, SD= 0.93). This supports that senior high school students often use information and communication technologies to clarify instruction with teachers.

The result shows that senior high school students often use information and communication technologies for academic purposes which is supported by Bhati (2016) and Kvavik (2015) where they found that the second ranked activity by which students use technology is for lesson inquiry.

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Table 8. Impacts of technological advancements to the academic performance of students in terms of class preparation

Indicators	Mean	SD	VD	Rank
Instead of browsing my notes after school and before going to school, I browse the internet/play online games rather	3.11	1.26	S	2
I can come to class with enhanced knowledge and pre existing conceptual frameworks, as the world wide web makes information readily available to me	3.55	1.04	O	1
Overall	**3.33**	**1.15**	**S**	

Table 8 shows the impacts of technological advancements to the academic performance of students in terms of class preparation. As shown in the table, senior high school students sometimes experience the impacts of technological advancements to their academic performance in terms of class preparation with the overall means of 3.33 and standard deviation of 1.15.

The highest mean was acquired in the indicator: I can come to class with enhanced knowledge and pre-existing conceptual frameworks, as the world wide web makes information readily available to me (M= 3.55, SD= 1.038). This suggests that senior high school students often make use of educational resources available on the internet to advance study and come to class prepared.

The lowest mean was obtained in the indicator: Instead of browsing my notes after school and before going to school, I browse the internet/play online games rather (M= 3.11, SD= 1.26). This supports that senior high school students sometimes prioritize online gaming and social media browsing instead of studying, to come to class prepared.

The highest means acquired in the indicators is I can come to class with enhanced knowledge and pre-existing conceptual frameworks, as the world wide web makes information readily available to me.

Table 9. Impacts of technological advancements to the academic performance of students in terms of finishing of school works

Indicators	Mean	SD	VD	Rank
I can effectively do my schoolworks because clarifying instructions with my teachers even afterschool is possible online	3.84	0.97	O	2
I can easily think of answers to various school works because I can easily search for related information that can help me widen my understanding.	3.86	1.06	O	1
I don't finish my schoolworks as quickly as I should since I'm more interested in playing online games and chatting with my online friends.	2.78	1.27	S	3
Overall	**3.49**	**1.1**	**S**	

Table 9 shows the impacts of technological advancements to the academic performance of students in terms of finishing of school works.

As shown in the table, senior high school students sometimes experience the impacts of technological advancements to their academic performance in terms of finishing of school works with the overall means of 3.49 and standard deviation of 1.1.

The highest means were acquired in the following indicators: I can easily think of answers to various school works because I can easily search for related information that can help me widen my understanding (M= 3.86, SD= 1.060) and I can effectively do my school works because clarifying instructions with my teachers even afterschool is possible online (M=3.84, SD=0.97) This suggests that the senior high school students can often effectively and efficiently do their school works with technology allowing them have an easy access to helpful information and to chat and clarify instruction with their teachers even outside school.

The lowest mean was obtained in the indicator: I don't finish my school works as quickly as I should since I'm more interested in playing online games and chatting with my online friends. (M= 2.78, SD= 1.27). This supports that the senior high school students sometimes neglect school works to play online games and chat with online friends.

According to Neiterman and Zaza (2019), off-task usage of technology can be really distracting. Leading the negative relationship between technology use and academic performance that is primarily mediated by high levels of procrastination behavior (Turel, 2022).

Table 10 shows the impacts of technological advancements to the academic performance of students in terms of concentration and focus.

Table 10. Impacts of technological advancements to the academic performance of students in terms of concentration and focus

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Indicators	Mean	SD	VD	Rank
1. My mind lingers away to my social media accounts, gaming performance, movie and content watched and seen during class	3.07	1.16	S	3
2. I get sleepy/sleeps during class	3.26	1.12	S	2
3. The instructors' use of technology in my classes has increased my interest in the subject matter.	3.51	1.07	O	1
Overall	**3.28**	**1.12**	**S**	

As shown in the table, senior high school students often experience the impacts of technological advancements to their academic performance in terms of concentration and focus with the overall means of 3.28 and standard deviation of 1.12.

The highest mean was acquired in the indicator: The instructors' use of technology in my classes has increased my interest in the subject matter (M= 3.51, SD= 1.07). This suggests that technology does help catch the attention of students during the teaching-learning process.

The lowest mean was obtained in the following indicator: I get sleepy/sleeps during class (M= 3.26, SD= 1.12) and My mind lingers away to my social media accounts, gaming performance, movie and content watched and seen during class (M= 3.07, SD= 1.16). This suggests that, senior high school students sometimes get out of focus during class while thinking on about their social media accounts, gaming performance, or movie and content watched, and because of being sleepy.

The highest mean was acquired in the indicator, The instructors' use of technology in my classes has increased my interest in the subject matter which Organization for Economic Cooperation and Development (OECD) (2021) suggests to be the core of effective teaching-learning process. This is because a student engaged is primed to learn while one who is not or bored, is likely to suffer negative academic outcomes.

Table 11. Summary of the eight (8) impacts of technological advancements to the academic performance of senior high school students

Variables	Mean	SD	VD	Rank
1. Learning Habits and Attitude	3.22	1.19	S	8
2. Sleeping Pattern	3.40	1.19	S	5
3. Time Management	3.50	1.01	S	3
4. Presentation of schoolworks	4.06	0.96	O	2
5. Communication and Collaboration	4.09	0.94	O	1
6. Class Preparation	3.33	1.15	S	6
7. Finishing of School Works	3.49	1.1	S	4
8. Concentration and focus	3.28	1.12	S	7
Average Weighted mean	**3.55**	**1.08**	**O**	

Table 11 shows the summary of the eight (8) impacts of Technological advancements to the academic performance of senior high school students.

As shown in the table, senior high school students often experience the impacts of technological advancements to their academic performance with the overall means of 3.55 and standard deviation of 1.08.

The highest means were acquired in the following indicators: Communication and Collaboration (M= 4.09, SD= 0.79) and Presentation of school works (M=4.06, SD= 0.87). This imply that the senior high school students often experience the impact of technological advancement to their academic performance in the aspect of communication and collaboration and in presentation of school works.

The lowest means were obtained in the following indicators: Time Management (M= 3.50, SD= 0.82), Finishing of School Works (M=3.49; SD= 0.83) Sleeping Pattern (M= 3.40; SD= 1.11), Class Preparation (M=3.33; SD= 0.93), Concentration and focus (M=3.28; SD= 0.87), and Learning Habits and Attitude (M=3.22; SD= 0.81) This implies that senior high school students sometimes experience the impact of technological in all dimensions cited.

Overall, this suggests that the senior high school students are impacted the greatest by technology in terms of communication and collaboration, while technology impacts them the least in terms of health habits and attitudes.

Table 12. Independent Sample t-test on the impacts of technological advancements to the academic performance of the senior high school students by sex

Variables	Sex	Mean	SD	t-value	Df	p-value	Decision/ Interpretation
Learning Habits and Attitude	Male	3.31	0.90	1.319	187	0.065	Accept Ho/ Not significant
	Female	3.15	0.74				
Sleeping Pattern	Male	3.49	1.05	0.908	187	0.273	Accept Ho/ Not

Variables	Sex	Mean	SD	t-value	Df	p-value	Decision/ Interpretation	
	Female	3.35	1.15				significant	
Time Management	Male	3.61	0.82	1.471	187	0.756	Accept Ho/	Not
	Female	3.43	0.81				significant	
Presentation of schoolworks	Male	4.09	0.80	0.402	187	0.016	Reject Ho/	
	Female	4.04	0.92				Significant	
Communication and Collaboration	Male	4.08	0.80	-0.034	187	0.653	Accept Ho/	Not
	Female	4.09	0.80				significant	
Class Preparation	Male	3.56	0.90	2.836	187	0.904	Accept Ho/	Not
	Female	3.18	0.93				significant	
Finishing of School Works	Male	3.58	0.77	1.220	187	0.243	Accept Ho/	Not
	Female	3.43	0.86				significant	
Concentration and focus	Male	3.46	0.80	2.419	187	0.311	Accept Ho/	Not
	Female	3.16	0.90				significant	

*Significant at p <0.050   *equal variances assumed

Table 12 shows the sample t-test for the impacts of technological advancements to the academic performance of the senior high school students by sex.

As seen on the table above, there exist no significant differences in the correlation between technological advancements and academic performance by sex in the most given variables but there is a significant difference in terms of presentation of school works.

However, it can be noted that male senior high school students (M=3.31) experience greater impacts of technology than females (M=3.15) in terms of Learning Habits and Attitude. In terms of Sleeping Pattern, male senior high school students (M=3.49) experience greater impacts of technology than female (M=3.35) who experience lesser impacts. In terms of Time Management male respondents (M=3.61) experience greater impacts of technology than female (M=3.43) who experience lesser impacts. In terms of Presentation of schoolworks male respondents (M=4.09) experience greater impacts of technology than female (M=4.04) who experience lesser impacts. In terms of Communication and Collaboration female senior high school students (M= 4.09) experience greater impacts of technology than male respondents (M=4.08) who experience lesser impacts. In terms of Class Preparation, male senior high school students (M=3.56) experience greater impacts of technology than female (M=3.18) who experience lesser impacts. In terms of Finishing of School Works male senior high school students (M=3.58) experience greater impacts of technology than female (M=3.43) who experience lesser impacts. In terms of Concentration and focus male senior high school students (M=3.46) experience greater impacts of technology than female (M=3.16) who experience lesser impacts.

Results showed that male experience greater impacts of technology to their academic performance in terms of presentation of school works which may be for the reason of having greater competence in digital cartography and online presentations than females as emphasized by Vasquez-Cano et al, (2017). Furthermore, it contradicts with Trecene and Abides (2020) which found that female students benefit more from technology as they use the internet more for academic research than male students who make use of technology more for online games.

Table 13. Independent Sample t-test for the impacts of technological advancements to the academic performance of the senior high school students by grade level

Variables	Grade Level	Mean	SD	t-value	Df	p-value	Decision/ Interpretation	
Learning Habits and Attitude	11	3.16	0.87	-0.846	187	0.150	Accept Ho/	Not
	12	3.27	0.76				significant	
Sleeping Pattern	11	3.34	1.23	-0.816	187	0.012	Reject Ho/	
	12	3.47	0.99				Significant	
Time Management	11	3.47	0.85	-0.519	187	0.855	Accept Ho/	Not
	12	3.53	0.79				significant	
Presentation of schoolworks	11	3.92	0.92	-2.048	187	0.295	Accept Ho/	Not
	12	4.18	0.81				significant	
Communication and Collaboration	11	3.98	0.78	-1.886	187	0.336	Accept Ho/	Not
	12	4.19	0.80				significant	
Class Preparation	11	3.21	1.00		187	0.133	Accept Ho/	Not
	12	3.44	0.85	-1.723			significant	
Finishing of School Works	11	3.43	0.82	-1.022	187	0.691	Accept Ho/	Not
	12	3.55	0.83				significant	
Concentration and focus	11	3.25	0.89	-0.468	187	0.816	Accept Ho/	Not
	12	3.31	0.86				significant	

*Significant at p <0.050   *equal variances assumed

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Table 13 shows the sample t-test for the impacts of technological advancements to the academic performance of the senior high school students by grade level.

As seen on the table below, there exist no significant differences in the correlation between technological advancements and academic performance by grade level in the most given variables but there is a significant difference in terms of sleeping pattern.

Furthermore, it can be noted that Grade 12 students (M=3.27) experience greater impacts of technology than Grade 11 students (M=3.16) who experience lesser impacts in terms of Learning Habits and Attitude. In terms of Sleeping Pattern, Grade 12 students (M=3.47) experience significantly greater impacts of technology than Grade 11 students (M=3.34) who experience lesser impacts. In terms of Time Management Grade 12 students (M=3.53) experience greater impacts of technology than Grade 11 students (M=3.47) who experience lesser impacts. In terms of Presentation of school works Grade 12 students (M=4.18) experience greater impacts of technology than Grade 11 students (M=3.92) who experience lesser impacts. In terms of Communication and Collaboration Grade 12 students (M=4.19) experience greater impacts of technology than Grade 11 students (M=3.98) who experience lesser impacts. In terms of Class Preparation Grade 12 students (M=3.44) experience greater impacts of technology than Grade 11 students (M=3.21) faced least challenge. In terms of Finishing of School Works, Grade 12 students (M=3.55) experience greater impacts of technology than Grade 11 students (M=3.43)) who experience lesser impacts. In terms of Concentration and focus, Grade 12 students (M=3.31) experience greater impacts of technology than Grade 11 students (M=3.25) faced lesser impacts.

The results simply suggests that grade 12 students experience sleep deprivation more because of technology use compared to grade 11 students.

Table 14. Independent Sample t-test on the perceived impacts of technological advancements to the academic performance for the respondents by school

Variables	School	Mean	SD	t-value	Df	p-value	Decision/ Interpretation
Learning Habits and Attitude	Public	3.09	0.91	-2.056	187	0.007	Reject Ho/
	Private	3.34	0.69				Significant
Sleeping Pattern	Public	3.09	1.23	-3.894	187	0.000	Reject Ho/
	Private	3.70	0.89				Significant
Time Management	Public	3.31	0.93	-3.198	187	0.001	Reject Ho/
	Private	3.69	0.64				Significant
Presentation of schoolworks	Public	3.81	0.95	-3.922	187	0.000	Reject Ho/
	Private	4.29	0.72				Significant
Communication and Collaboration	Public	3.91	0.86	-3.028	187	0.050	Reject Ho/
	Private	4.26	0.69				Significant
Class Preparation	Public	3.21	1.01	-1.721	187	0.065	Accept Ho/ Not
	Private	3.44	0.83				significant
Finishing of School Works	Public	3.28	0.93	-3.515	187	0.002	Reject Ho/
	Private	3.69	0.65				Significant
Concentration and focus	Public	3.15	0.92	-2.044	187	0.254	Accept Ho/ Not
	Private	3.41	0.81				significant

*Significant at p <0.050   *equal variances assumed

Table 14 shows the Independent Sample t-test on the perceived impacts of technological advancements to the academic performance for the respondents by school.

As seen on the table, there is a statistically significant difference in the correlation between technological advancements and academic performance of senior high school students by school.

In terms of learning habits and attitude, the academic performance of Senior High School Students from private school (M=3.34) is significantly impacted greater by technological advancement than of those students from public schools (M=3.09) whom is weakly impacted. In terms of sleeping pattern, the academic performance of Senior High School Students from private school (M=3.70) is significantly impacted greater by technological advancement than of those students from public schools (M=3.09) whom is weakly impacted. In terms of time management, the academic performance of Senior High School Students from private school (M=3.69) is significantly impacted greater by technological advancement than of those students from public schools (M=3.31) whom is weakly impacted. In terms of presentation of school works, the academic performance of Senior High School Students from private school (M=4.29) is significantly impacted greater by technological advancement than of those students from public schools (M=3.81) whom is weakly impacted. In terms of communication and collaboration, the academic performance of Senior High School Students from private school (M=4.26) is significantly impacted greater by technological advancement than of those students from public (M=3.91) whom is weakly impacted. In terms of class preparation, the academic performance of Senior High School Students from private school (M=3.44) is impacted greater by technological advancement

than of those students from public (M=3.21) whom is impacted weaker. In terms of finishing of school works, the academic performance of Senior High School Students from private school (M=3.69) is significantly impacted greater by technological advancement than of those students from public (M=3.28) whom is weakly impacted. In terms of concentration and focus, the academic performance of Senior High School Students from private school (M=3.41) is impacted greater by technological advancement than of those students from public school (M=3.15) who is impacted weaker.

The results show that there is a significant difference towards the impact of technological advancements between private and public-school students which may be due to private school students' higher levels of access and exposure to technology. Furthermore, according to Ibanez et. al, (2022), private school students have a higher level of motivation when using the augmented reality learning than of public-school students which may be due to private school initiatives to expose their students with technology more than public schools, as emphasized way back before by Rodrigo (2001).

Table 15. One-Way analysis of Variance on the perceived impacts of technological advancements to the academic performance of the respondents by age

	Source	SS	df	MS	F	Sig.	Decision/ interpretation
Learning Habits and Attitude	Between Groups	0.924	2	0.462	0.701	0.498	Accept Ho/ Not significant
	Within Groups	121.388	184	0.660			
	Total	122.312	186				
Sleeping Pattern	Between Groups	3.347	2	1.674	1.360	0.259	Accept Ho/ Not significant
	Within Groups	226.420	184	1.231			
	Total	229.767	186				
Time Management	Between Groups	2.507	2	1.253	1.900	0.152	Accept Ho/ Not significant
	Within Groups	121.351	184	0.660			
	Total	123.857	186				
Presentation of schoolworks	Between Groups	2.054	2	1.027	1.363	0.258	Accept Ho/ Not significant
	Within Groups	138.606	184	0.753			
	Total	140.660	186				
Communication and Collaboration	Between Groups	0.856	2	0.428	0.678	0.509	Accept Ho/ Not significant
	Within Groups	116.170	184	0.631			
	Total	117.025	186				
Class Preparation	Between Groups	2.817	2	1.409	1.643	0.196	Accept Ho/ Not significant
	Within Groups	157.707	184	0.857			
	Total	160.524	186				
Finishing of School Works	Between Groups	2.003	2	1.002	1.475	0.231	Accept Ho/ Not significant
	Within Groups	124.957	184	0.679			
	Total	126.960	186				
Concentration and focus	Between Groups	0.711	2	0.356	0.464	0.629	Accept Ho/ Not significant
	Within Groups	140.976	184	0.766			
	Total	141.687	186				

*Significant at p <0.050   *equal variances assumed

Table 15 shows the One-Way analysis of Variance on the perceived impacts of technological advancements to the academic performance of the respondents by age.
A one-way analysis of variance between groups was conducted to explore the impact of the profile variables on the rating mean scores.

The computed p-value for Learning Habits and Attitude (0.498), Sleeping Pattern (0.259), Time Management (0.152), Presentation of schoolworks (0.258), Communication and Collaboration (0.509), Class Preparation (0.196), Finishing of School Works (0.231) and Concentration and focus (0.629) are higher than (>) 0.05 level of significance, thus the null hypothesis is accepted. Hence, there were no statistically significant differences at the 0.05 level of significance in the rating mean scores of the respondents. There is no sufficient evidence to show statistically significant differences in the senior high school students rating in

the impacts of technological advancements by age which is probably due to the small sample size taken or might be due to the large error of measurement.

Table 16 shows the One-Way analysis of Variance on the perceived impacts of technological advancements to the academic performance of the respondents by strand.

Table 16. One-Way analysis of Variance on the perceived impacts of technological advancements to the academic performance of the respondents by strand

Source		Sum of Squares	df	Mean Square	F	Sig.	Decision/ interpretation
Learning Habits and Attitude	Between Groups	4.428	7	0.633	0.961	0.462	Accept Ho/ Not significant
	Within Groups	117.884	179	0.659			
	Total	122.312	186				
Sleeping Pattern	Between Groups	14.799	7	2.114	1.760	0.098	Accept Ho/ Not significant
	Within Groups	214.968	179	1.201			
	Total	229.767	186				
Time Management	Between Groups	10.574	7	1.511	2.387	0.023	Reject Ho/ Significant
	Within Groups	113.283	179	0.633			
	Total	123.857	186				
Presentation of schoolworks	Between Groups	14.868	7	2.124	3.022	0.005	Reject Ho/ Significant
	Within Groups	125.792	179	0.703			
	Total	140.660	186				
Communication and Collaboration	Between Groups	10.858	7	1.551	2.615	0.014	Reject Ho/ Significant
	Within Groups	106.168	179	0.593			
	Total	117.025	186				
Class Preparation	Between Groups	6.401	7	0.914	1.062	0.390	Accept Ho/ Not significant
	Within Groups	154.123	179	0.861			
	Total	160.524	186				
Finishing of School Works	Between Groups	5.881	7	0.840	1.242	0.282	Accept Ho/ Not significant
	Within Groups	121.079	179	0.676			
	Total	126.960	186				
Concentration and focus	Between Groups	7.234	7	1.033	1.376	0.218	Accept Ho/ Not significant
	Within Groups	134.454	179	0.751			
	Total	141.687	186				

*Significant at $p < 0.050$ *equal variances assumed

A one-way analysis of variance between groups was conducted to explore the impact of the profile variables on the rating mean scores.

The computed p-value for Learning Habits and Attitude (0.462), Sleeping Pattern (0.098), Time Management (0.023), Presentation of schoolworks (0.005), Communication and Collaboration (0.014), Class Preparation (0.390), Finishing of School Works (0.282) and Concentration and focus (0.218) are higher than (>) 0.05 level of significance, thus the null hypothesis is accepted. Hence, there were a statistically significant differences at the 0.05 level of significance in the rating mean scores of the

respondents. There is no sufficient evidence to show statistically significant differences in the respondents' rating in the program relevance by age which is probably due to the small sample size taken or might be due to the large error of measurement.

On the other hand, the computed p-value for Time Management (0.023), Presentation of schoolworks (0.005) and Communication and Collaboration (0.014) are less than (<) 0.05 level of significance, thus the null hypothesis is rejected. Hence, there were a statistically significant differences at the 0.05 level of significance in the rating mean scores of the respondents. Hence, there is a sufficient evidence that show statistically significant differences in the respondents' rating in the impact of technological advancements to academic performance by strand which is probably due to the differences in the level of each academic track's complexity that determines the demand and the requirement for technology utilization as supported by Yang & Baldwin (2020) which found that the infusion of technology in education benefit STEM students more as it promotes exposure to authentic context, bridging the gap of mathematics and science subjects complexity, as well as promoting the development of technical skills that is a necessary STEM discipline.

CONCLUSIONS

A typical senior high school student is enrolled in a private education institution, under the Humanities and Social Sciences academic track, Grade 12, aged 16 to 17, and female. The senior high school students often make use of technology for activities that is for personal purposes and often exposed to various technologies during the teaching-learning process. The students are impacted the greatest by technology in terms of communication and collaboration, while technology impacts them the least in terms of health habits and attitudes. There is a significant difference in the technological advancements and academic performance of senior high school students when grouped according to profile variables, specifically by sex, strand, and school while the students described the impact of technological advancement to their academic performance to be both positive and negative.

RECOMMENDATIONS

The study suggests that the Department of Education may spearhead seminars and trainings to assist and help teachers in the successful inclusion of technology in the classroom. They may also allocate enough fundings for the creation of programs that will help solve the digital divide that exist between students. The school administrations may allocate adequate funding for the provision of additional technological equipment to further assist the students in their academic performance and teachers in their teaching strategies. The teacher educators may practice using and including more technologies in the teaching-learning process and in their lesson plans to further benefit the students. Students may start utilizing technology to assist them in their academic performance. Parents may monitor their children's use of technology to avoid misuse and negative impacts on academic performance. Future researchers may use the paper as a baseline for further development of the study.

REFERENCES

1) Ababa, E. A., Joven, S. M., Santiago, J. B., Mostajo, Y. J. O., Pasqual, S. T., Bucascas, J. C., & Francisco, C. D. (2021). The Use of Educational Applications on the Student's Academic Performance. International Journal of Multidisciplinary Studies, 5(1), 92-99. https://www.researchgate.net/publication/348930098_The_Use_of_Educational_Applications_on_the_Student's_Academic_Performance

2) Ai-Menayes, (Jamal)., J. Social Media Use, Engagement and Addiction as Predictors of Academic Performance. International Journal of Psychological Studies, 7(4):86, 7(4), 86-94. DOI:10.5539/ijps.v7n4p86

3) Awang, H., Yaakob, M., F., Osman, W., R., Aji, Z., M., (2018). Teachers' intention to continue using Virtual Learning Environment (VLE): Malaysian context. Journal of Technology and Science Education 8(4):439, 8(4), 439-452, 8(4), 439-452. https://doi.org/10.3926/jotse.463

4) Carbonilla Gorra, V., & Bhati, S. S. (2016). Students' perception on use of technology in the classroom at higher education institutions in Philippines. https://ro.uow.edu.au/cgi/viewcontent.cgi?article=1878&context=buspapers

5) Chander, S., Arora, C. (2021). Integrating Technology into Classroom Learning.Project: NCERT/CIET publication, 2(1), 1132.https://www.researchgate.net/publication/355425017_Integrating_Technology_into_Classroom_Learning?fbclid=IwAR0ZiSLFAwrOjKuvoPNvoPeC_9hmJ2n_A1lgClFqkg0smvaCaLNt775SDU

6) Churiyah, M., Basuki, A., Filianti, F., Sholikhan, S., & Akbar, M. F. (2022). Canva for Education as a Learning Tool for Center of Excellence Vocational School (SMK Pusat Keunggulan) Program to Prepare Competitive Graduates in the Field of Creativity Skills in the Digital Age. International Journal of Social Science Research and Review, 5(3), 226-234. DOI: https://doi.org/10.47814/ijssrr.v5i3.228

7) Cohen, A., Henderson, M., Soffer T. (2022). Students' use of technology and their perceptions of its usefulness in higher education: International comparison. Journal of Computer Assisted Learning, 38(5), 1321-1331. https://doi.org/10.1111/jcal.12678

8) Guo, Y., F., Cai, W., L., Liao, M., Yu, X., (Xuan). (2021). Physical activity, screen exposure and sleep among students during the pandemic of COVID-19. Scientific Reports, 11(1), 1-12. DOI: 10.1038/s41598-021-88071-4

9) IBANEZ, M., B., POTILLO, A., U., CABADA, R., Z., BARRON, M., L. (2020). Impact of augmented reality technology on academic achievement and motivation of students from public and private Mexican schools. A case study in a middle-school geometry course. 145. https://doi.org/10.1016/j.compedu.2019.103734

10) Khamis, S., B., Ahmad, A., Ahmad, M., Ahmad, M., N. (2022). Internet use behavior model for predicting students' performance. Expert Systems, 39(8), 1-21. https://doi.org/10.1111/exsy.12999

11) Kvavik, R., B. (2005). Convenience, Communications, and Control: How Students Use Technology. EDUCAUSE Center for Analysis and Research and University of Minnesota, Twin Cities. https://www.educause.edu/

12) Montag, C., Elhai, J., D. (2020). 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. https://doi.org/10.1016/j.abrep.2020.100313

13) Navarro-Martinez, O., Peña-Acuña, B. (2022). Technology Usage and Academic Performance in the PISA 2018 Report. *Journal of New Approaches in Educational Research,* 11(1), 130-145.
DOI https://doi.org/10.7821/naer.2022.1.735

14) Neiterman, E., & Zaza, C. (2019). A Mixed Blessing? Students' and Instructors' Perspectives about Off-Task Technology Use in the Academic Classroom. Canadian Journal for the Scholarship of Teaching and Learning, 10(1), n1. https://doi.org/10.5206/cjsotl-rcacea.2019.1.8002

15) Ogunbodede, K., Smart, A., E. (2021). Undergraduate Students Use of Electronic Resources amid the COVD-19 Pandemic Lockdown. 1-14. https://digitalcommons.unl.edu/libphilprac/6434

16) Ramirez, S., Garces, S., Gana, S., Zuniga, T. (2021). Use of Technology and Its Association With Academic Performance and Life Satisfaction Among Children and Adolescents. Frontiers in Psychiatry, 12, 1-12. https://doi.org/10.3389/fpsyt.2021.764054

17) Rodrigo, M., T. (2001). INFORMATION AND COMMUNICATION TECHNOLOGY USE IN PHILIPPINE PUBLIC AND PRIVATE SCHOOLS. 2. https://www.academia.edu/download/51367101/2001ICTUse.pdf

18) Sechcico, C., Amado C., Mariano, K., M., Moraleda, J., Pamintuan, S., A., Salvador, S., J., Ablen, Amelia. (2020). Technology: Its Effects on Academic Performance of Selected Beed Graduating Students at Bestlink College of the Philippines, S.Y. 2019–2020. Ascendens Asia Singapore – Bestlink College of the Philippines Journal of Multidisciplinary Research Abstracts, 2(1), 5-7.
https://ojs.aaresearchindex.com/index.php/aasgbcpjmra/issue/view/54

19) Tisoglu, S., Piri, Z., Mericelli, M., & Inan, F. C. Targeting Creativity Through a Learner-Generated Digital Storytelling Project. Teaching and Learning, 18(1), 1-23. DOI:10.37120/ijttl.2022.18.1.01

20) Tresene, J., K., Abides, R., J. (2020). A Study on the Variations of Internet Usage among Male and Female BS Information Technology Students. 5(1), 12-17. https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=3672324

21) Turel, Y., K., Dokumaci, O. (2022). Use of Media and Technology, Academic Procrastination, and Academic Achievement in Adolescence. 9(2), 481-497. http://dx.doi.org/10.17275/per.22.50.9.2

22) Vasquez-Cano, E., Meneses, E., L., Garcia-Garzon, E. (2017). Differences in basic digital competences between male and female university students of Social Sciences in Spain. 14(27). https://link.springer.com/article/10.1186/s41239-017-0065-y