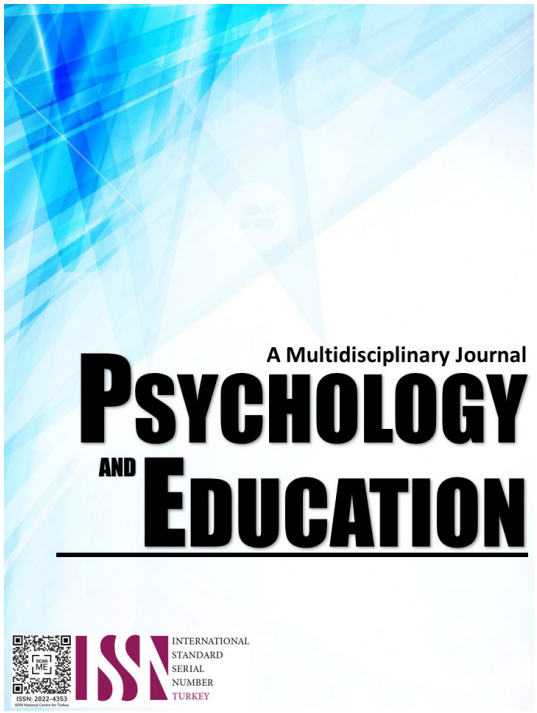
INFORMATION AND COMMUNICATIONS TECHNOLOGY SKILLS AND DIGITAL LITERACY OF SENIOR HIGH SCHOOL STUDENTS



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Research Article

Information and Communications Technology Skills and Digital Literacy of Senior High School Students

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Abstract

This study aims to investigate the information and communications technology skills and digital literacy of senior high school students in the Municipality of Pigcawayan, Cotabato. This study used a survey method and quantitative descriptive-correlational design to collect information. Stratified random probability sampling was used to get the stratum (sub-group) of the respondents. A total of 246 respondents, wherein the majority are females; the highest population was on the Academic track, and the HUMSS strand dominates, followed by SMAW, ABM, and COOKERY, respectively. Based on the results, the researcher concluded that the students got a high rating regarding their ICT skills and digital literacy. Notably, they are lowest in data processing and content creation. The tracks and strands display a significant difference. On the other hand, it disclosed that sex had no significant difference in students' ICT skills and digital literacy. Remarkably, ICT skills and digital literacy have a positive and significant relationship with an r-value of .599 which means that as the students acquire more and more ICT skills, their digital literacy is also improving

Keywords: Information, Philippines, Digital Literacy, Data Processing, Communications Technology Skills

Introduction

Digital literacy is a vital tool in the digital age. Streamlining digital literacy is now one of the main agendas of the United Nation's sustainable development goals (Bandura & Mendez Leal, 2022). With this agendum, international organizations, the private sector, and national governments have established strategic plans to combat digital literacy issues. In the past decades, digital literacy has not been rigorously discussed, for it was just merely defined as basic skills in using technologies (Brown, 2022). When digital technology advances and progresses, it paves the way for information search, communication, collaboration, and digital creation. However, the untoward behavior of digital natives in using these technologies has never been predicted. Thus, this leads to the redefinition of digital literacy to make it more relevant and responsive in the digital age.

The definition of digital literacy has evolved throughout time. Currently, it already comprises more expansive areas. It does not only include reading, synthesizing, and evaluating digital resources but also appropriately, responsibly, and critically using digital tools to communicate and collaborate efficiently, ensure online safety, and create digital expressions to enable productive social actions (UNICEF, 2019). Unfortunately, digital illiteracy is rampant among students, and they readily believe what they read or see on social media or other online platforms. They are easily deceived by false information, leading to wrong beliefs and views. They are vulnerable and easily influenced by what they read without further validating the sources. This digital illiteracy can be proven by the result of PISA 2018, where Filipino students need help in evaluating the information on digitals (Baron, 2021).

Issues such as these can be observed too in most senior high school students. Students cannot scrutinize information from various digital sources. Difficulty synthesizing ideas leads to plagiarism, sharing unvalidated information, and unethical behavior in a digital environment, especially in social media. Even though teachers integrate lessons about being mindful of sharing and consuming online resources and distinguishing fact and opinion, more than these teaching strategies are needed to guarantee that students will become highly digitally literate individuals.

In addition, despite the advancement of technology, some still need to catch up. These students could not use computers and gadgets due to insufficient financial resources and exposure. These situations limit them from attaining the needed skills in ICT (Oguguo et al., 2020). Remarkably, these skills are now essential for higher learning and participation in online communities (Chen et al., 2015). Most students are directly engaging in online learning tasks and other activities due to the sudden change to distance learning brought about by the pandemic. Sad to say, some cannot cope with this change. Digital skills and

literacy are both necessary tools for achieving maximum learning and adapting to the trends of the digital age.

Thus, these scenarios have prompted the researcher to conduct a study to determine the student's ICT skills and digital literacy level. Moreover, the researcher wanted to investigate the association between ICT skills and digital literacy among senior high school students.

Research Questions

This study sought to determine the level of ICT skills and digital literacy of senior high school students. Specifically, it sought to answer the following questions:

1.What is the demographic profile of the students regarding sex, track, and strand?
2.What is the level of ICT skills of students in terms of computer appreciation, word processing, data processing, and internet use?
3.What is the level of digital literacy of students in the areas of information search and evaluation, communication and collaboration, online safety, and content creation?
4.Is there a significant difference in the level of ICT skills of students when grouped according to their demographic profile?
5.Is there a significant difference in the level of digital literacy of students when grouped according to their demographic profile?
6.Is there a significant relationship between ICT skills and digital literacy of students?

Literature Review

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Methodology

This study is a quantitative research design that utilized the descriptive-correlational study. Descriptive research design is the term given to the analysis of data that helps describe, present, or summarize data meaningfully (Sharma, 2019). It described the respondents' profile, their level of ICT skills, and their level of digital literacy. Correlational research, on the other hand, refers to the statistical study of the relationship between two or more variables. This study is also correlational because it established a relationship between the students' ICT skills and digital literacy.

Participants

The Municipality of Pigcawayan is the area where this study was conducted. It is one of the towns in Cotabato Province and is situated between BARMM municipalities. Thus, the respondents came from diverse places with different cultural, social, and academic backgrounds. Only two schools in Pigcawayan that implemented face-to-face classes were selected to participate. The study's respondents were the Grade 12 students enrolled for the S.Y. 2021-2022. A total of 246 students from the Academic and Technical Vocational Livelihood tracks from the two identified senior high schools participated in this study.

Instruments of the Study

A validated questionnaire assessed the ICT skills and digital literacy of the students. The ICT skills questionnaire skills from Igbongidi (2018) was adopted and modified. The questionnaire used to determine the digital literacy of senior high school students was also adopted and modified from the study of Al-Khateeb (2017). However, the digital literacy areas from a model by Son (2015), which contains information search and evaluation, communication and collaboration, online safety, and content creation, were used. Authors of the adapted questionnaires were asked permission to use questionnaires through email and were cited properly in the research paper.

The survey questionnaire is composed of three parts. Part 1 is the demographic profile of the respondents. Part 2 contains the indicators for the level of ICT skills in four areas: computer appreciation skills, word processing skills, data processing skills, and internet skills. Part 3 contains the indicators for the respondents' digital literacy level with four competency areas: information search and evaluation, communication and collaboration, online safety, and content creation.

In Part 2, the students described their ICT skills using a 5-point Likert scale with the following scale and description; 5- strongly agree, 4-agree, 3-moderately agree, 2-disagree, 1-strongly disagree. The result for ICT skills used the following description: a mean of 4.5-5.0 indicates a very high level of ICT skill, 3.5-4.4 indicates a high-level skill, 2.5-3.4 indicates a moderate-level skill, 1.5-2.4 indicates a low-level skill and a score of less than 1.4 indicates almost no ICT

skill at all.

Meanwhile, Part 3 also assessed respondents' digital literacy using a 5-point Likert scale with the following scale and descriptions: 5- strongly agree, 4-agree, 3-moderately agree, 2-disagree, 1-strongly disagree. The result for digital literacy used the following description: a mean of 4.5-5.0 indicates a very high literacy, 3.5-4.4 indicates a high literacy, 2.5-3.4 indicate a moderate literacy, 1.5-2.4 indicates low literacy, and 0.0-1.4 indicates a very low literacy level.

Procedure

To officially conduct the data gathering, the researcher sent letters to the proper authorities and offices. A letter to conduct a study was noted by the Dean of the Graduate School of NDMC and sent to the superintendent of the Cotabato Division. With his approval, another letter was sent to the Principals of the two public senior high schools. After the principals' approval, the researcher asked for the assistance of the adviser and testing coordinator to efficiently gather data.

Before the test administration, the researcher assured that the respondent's information and responses be treated with the utmost confidentiality. The survey was administered among strands (ABM, HUMSS, Cookery, and SMAW). It was conducted for two weeks, scheduled alternately. Minimum health protocols were observed during the distribution of survey questionnaires, such as wearing face masks and social distancing. Questionnaires were retrieved after all the respondents had answered the survey. After which, data were forwarded to the statistician for further data treatment.

Result

This section includes the study's results on the demographic profile and level of ICT skills in terms of computer appreciation, word processing, data processing, and internet use. On the other hand, senior high school's digital literacy level was measured through information search and evaluation, communication and collaboration, online safety, and content creation. This study also presented the relationship between ICT skills and students' digital literacy.

Demographic Profile of the Respondents

The demographic profile of the respondents includes sex, senior high school tracks, and strand presented in Table 1.

Table 1. *Frequency and Percentage Distribution of the Demographic Profile of the Respondents*

Demographic Profile	*Frequency*	*Percent*
Sex		
Male	101	41.10
Female	145	58.90
Total	246	100.00
Track		
Academic	161	65.40
TVL	85	34.60
Total	246	100.00
Strand		
Academic		
ABM	40	16.30
HUMMS	121	49.20
TVL SMAW	53	21.5
Cookery	32	13.00
Total	246	100.00

Figure 1. .

Table 1 shows demographic profile of the respondents used in this study includes sex, tracks, and strands. Based on the data presented in the frequency distribution for sex, most respondents were female, with a frequency of 145, indicating that they dominate

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the population. Furthermore, as to the tracks, it was shown that Academic has a higher population, with 161, than TVL, with only 85 respondents. The academic track was twice higher as TVL. The strand showed that HUMSS has the highest frequency of 121, followed by SMAW with 53 and ABM with 40, and last with the least population is Cookery with only 32 respondents. Most of the respondents enrolled in Academic Track, specifically in HUMSS strands because they mostly wanted to proceed to higher education, and they believe that Academic Strands will help them achieve their dreams.

Table 2. *Level of ICT Skills of Students in Terms of Computer Appreciation, Word Processing, Data Processing, and Internet Use*

Variable	*Mean*	*SD*	*Interpretation*
Computer Appreciation	3.58	1.23	High-level skill
Word Processing	3.66	1.12	High-level skill
Data Processing	3.39	1.12	Moderate-level skill
Internet Use	3.93	1.48	High-level skill
Grand Mean		3.64	High-level skill
Average Standard Deviation		1.24	

Figure 2. .

As shown in Table 2, the students' ICT skills level is high, with a grand mean of 3.64. Among the areas of ICT, Internet use has the highest rating with a mean of 3.93, followed by word processing with a mean of 3.66, and then computer appreciation with a mean of 3.58, which are all interpreted as high-level skills. This means that students still attained the necessary ICT skills to cope in the digital society. This implies that students have the necessary ICT skills and competency to become globally competitive individuals. This is congruent with the findings of Oguguo et al. (2020), who stated that as students proceed to higher education, their skills are also increasing and improving. Thus, he encourages students to continue harnessing their skills in using ICT, as this will help them strive in their academics and become competent learners.

Meanwhile, the lowest rating is *data processing* with a moderate skill level. This result means that this is the least learned competency among the areas. This implies that students are less exposed to using Excel and that more activities, such as computer laboratory activities and drills, should be done to increase learners' skills. Students should also strive to become more adept in using Excel tools to help them study. This corroborates the findings of Siddiquah and Salim (2017) that students could only partially achieve standard competency in the field of ICT, especially in data processing through Excel tools, because they concentrate more on recreational activities rather than using it for academic purposes.

Table 3. *Level of Digital Literacy of Students in the Area of Information Search and Evaluation, Communication and Collaboration, Online Safety, and Content Creation*

Variables	*Mean*	*SD*	*Interpretation*
Information Search and Evaluation	3.58	1.26	High Literacy
Communication and Collaboration	3.60	1.10	High Literacy
Online Safety	3.81	1.11	High Literacy
Content Creation	3.44	1.12	Moderate Literacy
Grand Mean		3.61	High Literacy
Average Standard Deviation		1.14	

Figure 3. .

Table 3 shows that students' digital literacy is high, with a mean of 3.61. Specifically, the highest rating is an online safety, with a mean of 3.81, followed by communication and collaboration and information search and evaluation, with a mean of 3.60 and 3.58, respectively. These are all interpreted as high literacy skills. Students are responsible, critically minded digital natives and highly literate in searching and evaluating information, communication and collaboration, and online safety.

This implies that students are now transforming into 21st-century learners who think critically and creatively and communicate and collaborate effectively through the help of digital technologies. Society is constantly changing. As a result, students need to have the ability to become adaptive learners in order to cope with changes and succeed in this complex world. Technological advancement promotes lifelong learning skills, and students must adapt to these skill sets, or they will fail in their endeavors (Llego, 2022).

They are now digitally literate in searching and evaluating the information they read digitally. Hsu (2022) said they are becoming an independent learner who can identify reliable sources of information. He added that students' way of learning is evolving due to technology. Students can now access information and resources that were previously inaccessible, thanks to the Internet and mobile technology. This has altered

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how students learn, and it becomes possible for them to study whenever they want, anywhere.

They also communicate and collaborate effectively with others. The impact of digital technologies on communication and collaboration was generally viewed positively by teachers. They discovered that using digital technologies had improved student collaboration and teacher-pupil communication (Johler, 2022). Lastly, students are already literate in terms of online safety. Tomczyk and Eger (2020) concluded that students got good scores on the competence test regarding online safety as one of the components of digital literacy. With this, students can already counteract technology threats and become solution-oriented individuals.

Nevertheless, the area with the lowest rating is content creation. This means that, as of the moment, this area of literacy needs to be prioritized in school. This implies that content creation can be seen as not beneficial and that students create content through their initiatives without proper guidance. It supports Delita et al. (2022), who said that creating digital content was the lowest compared to other areas. This affirms the study of Perdana et al. (2022) that there needs to be more training related to content creation. Moreover, Lucas et al. (2022) also confirm that even in higher education, there is also a problem with digital content creation. This problem primarily exists in schools which could be a result from the poor implementations of digitization in schools that reflect the poor digital literacy of the students.

Significant Difference in the Level ICT Skills of Students When Grouped According to their Demographic Profile

Table 4. *Difference in the Level of ICT Skills of Students in Terms of their Sex Using Independent-sample's T-test*

Variables	*Sex*	*N*	*Mean*	*SD*	*t-value*	*DF*	*p-value*	*Interpretation*	*Decision*
ICT Skills	Male	101	3.62	0.61	0.491	244	0.624	Not significant	Not to reject the null hypothesis
	Female	145	3.66	0.74					

Figure 4. .

The T-test result in Table 4 indicates that male (M=3.62, sd=.61) was not significantly different from the female (M=3.66, sd=.74); t(244)=.491, p=.624. Thus, null hypothesis is not rejected. This means that sex does not influence the students' acquired skills, as both have equal skills and access to digital resources. This implies that they can both excel in the field of ICT. This is congruent with the study of Obichukwu et al. (2021), where they also found no significant difference among gender in ICT skills. This is also consistent with the study of Oguguo et al. (2020), where they found that male students were similar to males in terms of their ICT skills.

Table 5. *Difference in the Level of ICT Skills of Students in Terms of their Tracks using Independent-sample's t-test*

Variables	*Track*	*N*	*Mean*	*SD*	*t-value*	*DF*	*p-value*	*Interpretation*	*Decision*
ICT SKILLS	Academic	161	3.76	0.66	3.982	244	0.000	Significant	Reject the null hypothesis
	TVL	85	3.41	0.69					

Figure 5. .

For the track, Academic and TVL significantly differ from each other. T-test result indicates that Academic (M=3.76, sd=.65982) was significantly different from the TVL (M=3.41, sd=.69); t (244)=.3.98, p=.000. Thus, null hypothesis is rejected. This means that Academic Track students are more skillful in ICT than those from the TVL Track. This further implies that Academic Tracks have a more significant advantage over TVL regarding the use and availability of digital resources. This reinforces the study of Delizo (2019), where most TVL students needed more ICT skills, especially in word processing and spreadsheets application. Meanwhile, academic track students perform excellently in ICT (Dagohoy, 2021). Sadly, the findings shows that there is a significant digital divide exist within tracks regarding technological skills of the students and this aligns to the conclusion of Cuevas (2019).

Table 6. *Difference in the Level of ICT Skills of Students in Terms of their Strands Using ANOVA*

Variable	*Groups*	*Sum of Squares*	*DF*	*Mean Square*	*F*	*p-value*	*Interpretation*	*Decision*
ICT Skills	Between Groups	10.443	3	3.481	7.986	0.000	Significant	Reject the null hypothesis
	Within Groups	105.486	242	.436				
	Total	115.929	245					

Figure 6. .

It can be seen in Table 6 that ANOVA was run with the strand as the independent variable and the respondents' ICT skills as the dependent variable. Results of the ANOVA show a significant difference between strands (ABM, HUMSS, SMAW, and Cookery); F(3,242)= 7.986, P(.05)=.000. Therefore, the null hypothesis that there is no significant

difference in the level of ICT skills when grouped according to the strands of the respondents is rejected. The result means that strand is also one of the factors that affect the acquired ICT skills of the students. Moreover, this implies that each strand varies in terms of their proficiency in using ICT due to different opportunities for access to technology or digital resources, integration of ICT in teaching and learning, and experiences using digital technology. This aligns to the findings of Guino et al., (2019) where he found that most of the senior high students are beginners and only few are on the advanced level in terms of using ICT tools.

Significant Difference in the Level of Digital Literacy of Students When Grouped According to their Demographic Profile

Table 7**.** *Difference in the Level of Digital Literacy of Students in Terms of their Sex Using the Independent - sample's T-test*

Variable	*Sex*	*Mean*	*SD*	*t-value*	*DF*	*p-value*	*Interpretation*	*Decision*
Digital Literacy	Male Female	3.52 3.66	0.70 0.73	1.539	244	0.125	Not significant	Not to reject the null hypothesis

Figure 7. .

T-test results in Table 7 indicate that the male (M=3.52, sd=.68) was not significantly different to female (M=3.66, sd=.73); t (244)=.1.539, p=.125. Thus, the null hypothesis that there is no significant difference in the level of digital literacy when grouped according to the sex of the respondents is not rejected. This means that sex does not influence the students' digital literacy and that both sexes share equal opportunities in ICT and its resources. This implies that male and female respondents have acquired critical digital literacy in information search and evaluation, communication and collaboration, online safety, and content creation. Both have utilized digital technologies in purposeful ways. The result also agrees with the findings of Siddiq et al. (2017), which state that there is no significant difference among groups of gender in terms of their digital literacy.

Table 8. *Difference in the Level of Digital Literacy of Students in Terms of their Tracks using Independent-sample's T-test*

Variable	*Tracks*	*N*	*Mean*	*SD*	*t-value*	*DF*	*p-value*	*Interpretation*	*Decision*
Digital Literacy	Academic TVL	161 85	3.77 3.30	0.64 0.76	5.045	244	.000	Significant	Reject the null hypothesis

Figure 8. .

Table 8 shows the T-test results which indicate that Academic (M=3.77, sd=.64) was significantly different from the TVL (M=3.30, sd=.76); t (244)= 5.045, p=.000. Thus, the null hypothesis which states that there is no significant difference in the level of ICT skills of the students when grouped according to the track of the respondents is rejected. As shown in the result on the digital literacy in terms of track of the students, it confirms that the Academic track performed better than the TVL track as it showed a significant difference. Academic Track students are more likely to be critical thinkers than TVL Track. This implies that Academic Track students are more intelligent and exercise metacognition and higher-order thinking skills when making decisions. Based on the evaluation of the Academic Performance K to 12 in the Philippines, Academic Track attains average and above average scores, while TVL only gets below average (Almerino et al., 2020). Moreover, most Academic Track students are prepared for higher education, while TVL is equipped with skills for employment after graduation. With this result, students in the Academic Track are advanced because they must acquire critical thinking skills to prepare for college (Orbeta et al.)

Table 9. *Difference in the Digital Literacy of Students in Terms of their Strand Using ANOVA*

Variables *Groups*		*Sum of Squares*	*DF*	*Mean Square*	*F*	*Sig.*	*Interpretation*	*Decision*
Digital Literacy	Between Groups	14.4	3	4.784	10.313	0.000	Significant	Reject the null hypothesis.
	Within Groups	112.3	242	0.464				
	Total	126.6	245					

Figure 9. .

Results of the ANOVA in Table 9 show a significant

difference between strands (ABM, HUMSS, SMAW, and Cookery); *F= 10.313, p-value (.05)=.000.* The null hypothesis that there is no significant difference in the level of digital literacy when grouped according to the strands of the respondents is rejected. This result indicates that there is a significant divide in the digital literacy of students in terms of their strands. This implies that Academic Track students used digital technologies appropriately, responsibly and critically than TVL. This only proves that Academic Track is digitally literate because intelligence is highly associated with digital literacy according to Orbeta et al. (2019). This also aligns to the findings of Rusiana (2021) that Academic strands (STEM, ABM, HUMSS, and GAS) got a good level rating while TVL strands got a fair level regarding their media and information literacy.

Relationship Between ICT Skills and Digital Literacy

Table 10. *Correlation Between the Level of ICT Skills and Digital Literacy of Students*

Independent Variables	*ICT Skills*			
	r-value	*p-value*	*Interpretation*	*Decision*
Digital Literacy	.599**	.000	Significant	Reject the null hypothesis

Figure 10. .

Table 10 shows the significant relationship between ICT skills and the students' digital literacy, as shown in the p-value of less than .05 and a strong positive correlation coefficient of .599**. Thus, a null hypothesis, which states no significant relationship between ICT skills and students' digital literacy, is rejected.

A positive association between the two variables was found regarding the relationship between the ICT skills and digital of the students. This means that the student's digital literacy increases as the ICT skills increase. This implies that as students constantly practice their skills in using digital technologies, they become proficient in using them. When they become proficient in using them, they discover and explore more of the benefits of using ICT. It provides them with everything they need, from information, communications, security, and even creating their digital creations. Learners become critical thinkers, adapting to more information-related tasks (Bundsgaard & Gerick, 2017).

This shows that being skilled in ICT is the first step to becoming digitally literate (Cote & Milliner, 2016). Livingstone et al. (2021) also disclosed that digital skills are positively associated with online opportunities and information benefits as one of the various areas of digital literacy. Thus, this gives them the advantage of acquiring more and more information and evaluating which information is reliable. ICT skills and digital literacy will enable students to contribute productively to the digital economy. More than being skillful is required. Skills and literacy must go together to produce 21st-century learners who are critical thinkers, responsible digital information users, and productive digital natives (Bejakovic & Mrnjavac, 2020).

Discussion

Based on the results drawn from the data collected, it can be concluded that students in Pigcawayan have high-level skills in ICT and are also high in digital literacy. This means that students are proficient in using technologies and they use it in a more purposeful ways. However, they are lowest in data processing which implies that this is one of the ICT Skills that is least attained in schools. There is a lack of hands on activities for using Excel tool and there is less exposure for the students in using ICT for computational learning activities.

On top of that, they still responsibly use technologies for information search and evaluation, communication and collaboration, and online safety. Unfortunately, the findings shows that they are lowest in content creation which implies that although students frequently posting and publishing their digital contents, there are competencies that have been neglected such as applying for copyrights, licenses and creating content without committing legal consequences.

Moreover, the level of ICT skills and digital literacy of students, when grouped according to sex, shows no significant difference. This affirm that both male and female students are technology-oriented and both use these technologies responsibly. Meanwhile, the level of ICT skills and digital literacy of the students when grouped according to tracks and strands reveal a significant difference. These findings validates that

digital divide in terms of skills and literacy exist among senior high school tracks and strands. Academic Track performed better than TVL Track students. This is because Academic Track frequently use technologies for learning such as researching and academic writing in preparation for higher education while TVL Track focused on improving the vocational skills they have chosen.

Also, the study proves a positive and significant relationship between ICT skills and students' digital literacy. As students acquire more and more ICT skills, their digital literacy is also increasing and improving. They become critical thinkers and solution oriented individual to be able to adapt in the fast changing techno-society.

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