The Role of Technology in the 21st Century Education of Learners

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ABSTRACT

Technology is one of the most powerful influences in today's educational scene. This mixed methods study aimed to determine and describe the lived experiences of senior high school learners in terms of the role of technology in 21st century education. The researcher collected data from 100 senior high school (SHS) learners using simple random sampling for the quantitative phase (QTP) and five from SHS students using purposive sampling for the qualitative phase (QLP) for SY 2021-2022. Survey questionnaires and an in-depth interview guide were utilized to gather data and were analyzed using frequency, percentage, mean, and thematic analysis. Results revealed that because of the widespread availability of internet mobile connections, there has been a significant number of students that use technology. As a result, students have a high level of computer skills and use of technology because it is useful and relevant in the educational process. Similarly, students see the value of incorporating technology into classroom discussions since it increases their interest in the subject. Furthermore, technology is viewed as an important tool for learning, and the importance of using social media is proved by learners' average daily usage. The introduction of popular media into the lives of students has had a significant impact on this. Despite the negative effects of social media, students still find it useful in the classroom since it can spark other people's interests and inspire them to learn. It implies that instructional delivery and assessment need to be addressed with respect to the needs of the 21st century learners.

Keywords: role of technology, 21st century education, convergent parallel approach, Tagum City

INTRODUCTION

Technology is one of the most powerful influences in today's educational scene. With that, many school districts are supporting greater levels of technology in the classroom by providing gadgets like tablets and laptops, improving internet access, and developing computer literacy programs for both instructors and students (Johnson et al., 2016). As innovations rise, it is claimed that technology-enhanced embodied learning has the potential to change K-12 education. While Information and Communications Technology (ICT) offers a lot of potential for promoting new pedagogies, it is not a silver bullet (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2013 as cited in Serdyukov, 2017). And, despite its benefits, its adoption in mainstream education has been slow which is not a new problem (Georgiou & Ioannou, 2019).

In addition, the major technological difficulties in education may be divided into the integration of contemporary technology into existing learning theory, the evaluation of the usefulness of technology within instructional contexts, and the trials of successful technology integration (Courville, 2011). Several variables also contribute to teachers' apprehension about implementing educational innovations (Courville, 2011; Georgiou & Ioannou, 2019) in the classroom. Sometimes, teachers find it difficult to integrate new instructional technology smoothly and effectively. In fact, technological integration offers substantial obstacles to educators at all levels of school systems, from the procurement of new technology equipment to the adaption of curricula and teaching styles to include new educational resources (Irgashevich, 2020; Johnson et al., 2016). Teachers were also concerned about their own abilities to adapt to smartphones as well as their pupils' reactions to the technology. As teachers

become more involved with specific smartphone initiatives, they are likely to acquire greater management issues (Al-Furaih & Al-Awidi, 2020).

In the United States, Johnson et al. (2016) emphasized that most of the hurdles to successful technology integration in the classroom are external to the teachers who are utilizing technology. In Spanish Autonomous Communities, it was found that that the increased usage of ICT at school had no significant influence on students' arithmetic and reading achievements but has a favorable effect on science outcomes. Using data from national and international surveys such as Programme for International Student Assessment [PISA], Progress in International Reading Literacy Study [PIRLS], and Trends in International Mathematics and Science Study [TIMSS], some research has looked at the link between ICT and educational results. In general, their data suggest that having access to ICT is positively linked with educational outcomes but having a greater level of usage of these technologies is negatively connected with these outcomes (Fernández-Gutiérrez, Gimenez, & Calero, 2020).

Likewise, Das (2020) concluded that adopting ICT for inclusive education in North-East India is faced with difficulties. The issue has arisen owing to a variety of factors, including a lack of technology, internet access, and trained teachers, a multilingual and multicultural classroom, and a gap between policy and execution, among others (So, Jong, & Liu, 2020). In the Philippines, a 3G mobile internet signal is not available to more than seven million Filipinos (Global System for Mobile Communications [GSMA], 2016). For this reason alone, millions of Filipinos do not have access to the internet. Hundreds of isolated islands are without electricity, cellular coverage, or internet access (Roberts & Hernandez, 2019). In fact, mobile data is five times more expensive for the poorest or 40 percent (40%) of the Filipinos than it is for the richest which is five percent (5%). According to World Economic Forum data, Philippines ranks 107th out of 139 nations in terms of affordability (GSMA, 2016).

Additionally, the learner-to-computer ratio at the elementary and secondary levels of education in the Philippines is 412:1 and 49:1, respectively, according to the UNESCO 2014 report, and the shortage of computer equipment in schools has been a major problem. Internet access is similarly limited, with just seven percent (7%) of primary schools having access to the internet and only 40 percent (40%) of senior high schools having access to it ("Corporate Partnerships…", 2018). Furthermore, it was reported that during Coronavirus Disease- 2019 (COVID-19) classes, internet access was a problem for teachers and students in many schools (Barrot, Llenares, & Del Rosario, 2021).

Moreover, many Filipinos lack the necessary digital literacy or technical skills to participate actively in digital governance efforts (Roberts & Hernandez, 2019). In a study conducted to the students in Makati City and Cabuyao, Laguna, Nuncio et al. (2020) found that students will succeed and be well-versed in the use of technology if provided with chances such as access to online educational resources and exposure to a safe and child-friendly online environment.

With the emergence of COVID-19 in the country, students' fear in online learning experience stems not just from COVID-19's threats, but also from social and physical constraints, unfamiliarity with new learning platforms, technological problems, and concerns about financial resources (Barrot, Llenares, & Del Rosario, 2021). Exploring into the investigation in a school in Davao del Norte on the educational orientation of generation Y students, Gopo (2018) cited that learner were using technology in their classes and as a tool for research. However, students emphasized that they have insufficient technological resources and that, they call for innovative teaching strategies to supplement the gaps they encountered. Further, Cutillon (2019) agreed that during the implementation of Massive Open Online Course in a school in Sto. Tomas, Davao del Norte it was found that students must deal with poor internet connectivity during classes. In terms of adopting the Information and Communications Technology for Education (ICT4E) of

Japan, Philippines is still catching up. This implies that the Philippine government must set aside a significant amount of money to invest in ICT infrastructure (Nuncio, 2020).

As a senior high school teacher, the researcher aims to fill the gap between the role of technology in the 21st century education of the learners and its impact on the quality of education. Also, the researcher has not come across any studies relating to the role of technology in education in the new normal in Tagum City. With that, this mixed methods study aimed to determine and describe the lived experiences of senior high school learners in terms of the role of technology in the 21st century education. A convergent mixed methods design was used in which quantitative and qualitative data were collected in parallel, analyzed separately, and then merged. In this study, an adapted survey questionnaire was used to test the Constructivism Theory. Concurrent with this data collection, the qualitative part which involved in-depth interviews explored on the experiences of the learners in Tagum City Division in terms of the role of technology in their education. The perspectives and perceptions of learners were explored through a collection of both quantitative and qualitative data to compare the results on the role of technology in 21st century education of senior high school learners.

METHODS

Research Design

This study used a convergent mixed methods design, which entails conducting both quantitative and qualitative data collection in the same stage of the research process, weighing both techniques equally, and interpreting the results individually and jointly (Creswell & Plano-Clark, 2011). The researcher did not only collect and assess all types of data, but also used both quantitative and qualitative approaches combined.

Research Participants

Quantitative Strand. The participants of this study were the 100 purposely selected senior high school learners in a school in Tagum City Division, Tagum City, Davao del Norte, Region XI for SY 2021-2022. The names of the participants as well as the school where they are connected were purposely concealed.

Qualitative Strand. The participants for the qualitative part were the purposely selected five senior high school learners who were subjected for in depth-interviews. These five SHS learners were separate from the respondents surveyed in the quantitative phase. These learners were from a school in Tagum City Division, Tagum City, Davao del Norte, Region XI for SY 2021-2022 who qualified for the pre-inclusion criteria.

Research Instruments

*Quantitative Strand***.** The researcher adapted survey questionnaires to find out the role of technology in the 21st century education of senior high school learners. First, the researcher adapted the research questionnaire of Das and Mishra (2016) from the Technology-Enabled Learning Implementation Handbook. Further, the researcher also adapted the research questionnaire of Ardies, De Maeyer and Gijbels (2013) from the survey Reconstructing the Pupils Attitude Towards Technology.

*Qualitative Strand***.** The researcher used an interview guide and recorded all the original statements. After it was validated by experts, the interview guide was used to answer the question on the role of technology in the 21st century education of learners.

Data Collection

*Quantitative Strand***.** Data was gathered via a survey questionnaire administered online using *Google Form*. The survey questionnaire was revised to suit the context. The items include the learner use of technology and student attitude towards technology.

Qualitative Strand. The researcher made use of virtual in-depth interviews with the five identified participants. The data collection observed proper protocols of conducting interviews which was guided by the interview guide. Interviews were recorded with permission from the

participants which lasted for not more than an hour per participant.

Data Analysis

Quantitative Strand. Frequency, percentage, and mean were utilized to determine the extent of learner use of technology and student attitude toward technology.

Qualitative Strand. The researcher utilized thematic analysis to have a better grasp and appreciation of the examined data. Transcription was an essential approach in qualitative study outcomes. The translated data were encoded and analyzed for proper coding of the relevant subjects and theme statements.

Ethical Considerations

This research study involved sensitive issue, the student participants were hesitant at first to disclose information out of fear and withheld some data. Thus, the researcher ensured that the study was guided by ethical principles namely: respect for persons, beneficence, justice, consent, and confidentiality.

Prior to conducting a study, it is necessary to secure permission from them through understanding and signing of the informed consent. Before I conducted the in-depth interviews and survey, I explained verbally and in writing about the objectives and purpose of this research study. After getting the approval, I asked them to sign the informed consent/ assent form.

To minimize the risks or harm, anonymity of the interviewee in relation to the information shared was maintained. Confidentiality of the findings and protection of the identities of the informants was done by using a coding system to hide their true identities. Respect to right of privacy was given due importance in this study. Participants was informed that they have the right to refuse to answer any of the interview questions if they do not feel comfortable.

In conducting the study, I ensured that the participants do not spend any amount for the survey and interview, and their comfortability is my priority. To establish confidentiality, I made sure the students' true identities were safeguarded. After analyzing the data, audio recordings, encoded documents, notes, and other materials were deleted/shredded.

RESULTS

Quantitative Results

This section deals with the results of the quantitative data gathered through the survey questionnaires.

Nature of the Role of Technology in the 21st Century Education of Senior High School Learners

The nature of the role of technology in the 21st century education of senior high school learners is measured using the two variables which are *Learner Use of Technology* and *Student Attitude Toward Technology*.

A. Learner Use of Technology

This section presents the role of technology in the 21st century education of senior high school learners in terms of *Access to And Use of ICT* and *Perceptions of Use of Technology-Enabled Learning.*

1. Access to and Use of ICT

Access to and use of ICT is measured using the constructs*: Ownership of ICT, Internet Access, Use of ICT and Internet Skills, social media,* and *Resources/ Services/ Spaces.* The following discussions present the findings and supporting literature.

Ownership of ICT

Table 1 shows the ownership of ICT of the senior high school learners. It reveals that 49 percent (49%) of the learners have smartphones while a portion of them accounting to three percent (3%) only owns desktop computer, laptop/ netbook, smartphone, & tablet device (e.g. ipad).

Table 1
Access to and Use of ICT in Terms of Ownership of ICT

Ownership of and Access to ICT	Number	Percentage
Desktop Computer	6	6%
Laptop/ Netbook	5	5%
Smartphone	49	49%
Desktop Computer & Smartphone	10	10%
Laptop/ Netbook & Smartphone	19	19%

Desktop computer, Laptop/ Netbook, & Smartphone	8	8%
Desktop computer, Laptop/ Netbook, Smartphone, & Tablet device (e.g. iPad)	3	3%
Total	**100**	**100%**

Internet Access

Table 2 shows the access and use of ICT in terms of the area in accessing the internet. Among the given indicators, learners access the internet most of the time when they are at home accounting to 82 percent (82%) while a variable access is observed in the student who uses it at home and in the office with one percent (1%) only.

Table 2
Access to and Use of ICT in Terms of the Area in Accessing Internet

Area in Accessing Internet	Number	Percentage
Cybercafe/ Internet Shop	5	5%
Home	82	82%
Home & Office	1	1%
Home & Cybercafe/ Internet Shop	5	5%
Do not access	7	7%
Total	**100**	**100%**

Table 3 shows the access and use of ICT in terms of sources of internet. Among the sources of internet, two percent (2%) of the learners have variable access to different sources such as dial-up connection (use of telephone lines), wireless, & mobile devices. On the other hand, users of ADSL connection (broadband internet connection) account to about 30 percent (30%) which is followed by users of mobile devices at 28 percent (28%).

Table 3
Access to and Use of ICT in Terms of Sources of Internet

Sources of Internet	Number	Percentage
Dial-up connection (Use of telephone lines)	8	8%
Wireless	17	17%
Mobile Devices	28	28%
ADSL connection (Broadband Internet Connection)	30	30%
Wireless & Mobile devices	7	7%
ADSL connection (Broadband Internet Connection) & Mobile devices	8	8%
Dial-up connection (Use of telephone lines), Wireless, & Mobile devices	2	2%
Total	**100**	**100%**

Table 4 shows the access and use of ICT in terms of frequently used devices in accessing the internet. Most of the learners frequently use the smartphone or mobile phone with 75 percent (75%). However, none of the respondents use the tablet or iPad in accessing the internet.

Table 4
Access to and Use of ICT in Terms of Frequently Used Devices in Accessing the Internet

Frequently Used Devices in Accessing the Internet	Number	Percentage
Desktop Computer	8	8%
Laptop	17	17%
Smartphone/ Mobile Phone	75	75%
Tablet or iPad	0	
Total	**100**	**100%**

Table 5 shows the access and use of ICT in terms of average internet usage. It can be observed that more than half of the learners use internet daily accounting to 68 percent (68%).

Table 5
Access to and Use of ICT in Terms of Average Internet Usage

Average Internet Usage	Number	Percentage
Daily	68	68%
Alternate Days	20	20%
Once a Week	7	7%
Irregularly	3	3%
Rarely	2	2%
Never	0	
Total	**100**	**100%**

Table 6 shows the access and use of ICT in terms of average daily internet usage. The findings reveal that 38 percent (38%) of the students use internet more than five hours while 26 percent (26%) use internet for three to five (3-5) hours. Only around two percent (25) do not use the internet daily.

Table 6
Access to and Use of ICT in Terms of Average Daily Internet Usage

Average Daily Internet Usage	Number	Percentage
Less than 1 hour	7	7%
1-2 hours	26	26%
3-5 hours	27	27%
More than 5 hours	38	38%
Do not use daily	2	2%
Total	**100**	**100%**

Use of ICT and Internet Skills

Table 7 shows the access and use of ICT in terms of computer skills. It can be observed that the average computer skills of the students are 3.30 with a descriptive equivalent of moderate. From the data, the skill on using email has the highest mean

of 4.10 or high. Similarly, student's computer skills are often manifested in using word processor, PowerPoint presentation, search engines, video editing, and web 2.0 tools.

Table 7
Access to and Use of ICT in Terms of Computer Skills

Item	Mean	Descriptive Level
Word processor (e.g. Word)	3.58	High
Spreadsheets (e.g. Excel)	2.83	Moderate
Presentation (e.g. PowerPoint)	3.57	High
Email	4.10	High
Search engines	3.85	High
Databases	3.12	Moderate
Multimedia authoring	2.87	Moderate
Graphic editing	3.02	Moderate
Digital audio	3.03	Moderate
Video editing	3.52	High
Web page design	2.80	Moderate
Learning Management System	3.15	Moderate
Web 2.0 tools (wikis, blogs, social networking, and sharing tools)	3.43	High
Overall Mean	**3.30**	**Moderate**

Social Media

Table 8 shows the access and use of ICT in terms of having social media account. A vast majority of the senior high school learners have social media accounts which comprises the 97 percent (97%).

Table 8
Access to and Use of ICT in Terms of Having Social Media Account

Having Social Media Account	Number	Percentage
Yes	97	97%
No	3	3%
Total	**100**	**100%**

Also, it shows that the access and use of ICT in terms of utilization social media platforms. Among the respondents, *Facebook* has been utilized by the majority among the different platforms. On *Facebook* alone, it accounts to 29 percent (29%) of the respondents. Further, learners who casually use *Facebook* and *Google +* is at 19 percent (19%).

Table 9 shows the access and use of ICT in terms of updating social media status. It can be observed that 37 percent (37%) of the senior high school learners are not very frequently updating their social media status while 27 percent (27%) learners do it several times a day.

Table 9
Access to and Use of ICT in Terms of Updating Social Media Status

Having Social Media Account	Number	Percentage
Several times a day	27	27%
Once a day	17	17%
Once a week	10	10%
Once a fortnight	2	2%
Not very frequently	37	37%
Not at all	7	7%
Total	**100**	**100%**

Table 10 shows the access and use of ICT in terms of average daily usage of social media. Data reveals that learners who use the social media daily for one to two (1-2) hours tied with three to five (3-5) hours. Interestingly, none of the learners miss to use social media daily.

Table 10
Access to and Use of ICT in Terms of Average Daily Social Media Usage

Average Daily Social Media Usage	Number	Percentage
Less than an hour	20	20%
1-2 hours	40	40%
3-5 hours	40	40%
Do not use daily	0	
Total	**100**	**100%**

Resources/ Services/ Spaces

Table 11 shows the access and use of ICT in terms of resources/ services/ spaces provided by the school. It can be noted that the resources/ services/ spaces provided by the school has an average of 3.25 or moderate level. The highest mean is observed in the use of email with 4.03 having a high descriptive level.

Table 11
Access to and Use of ICT in Terms of Resources/ Services/ Spaces Provided by the School

Resources/ Services/ Spaces Provided by the School	Mean	Descriptive Level
Email services	4.03	High
Learning Management System (e.g. Moodle, etc.)	3.64	High
ePortfolio	2.98	
Online or virtual technologies (e.g. network or cloud-based file storage system, Web portals, etc.)	3.59	High
Access to software (e.g. MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis program, etc.)	3.22	Moderate

Download and use of free and open-source software for teaching and learning	3.60	High
Access to data storage	3.68	High
Data visualization software	3.35	Moderate
Citation/reference management software	3.43	High
Plagiarism detection software	3.23	Moderate
Institutional repository for sharing of research	3.26	Moderate
e-Journals	2.98	Moderate
e-Books	3.20	Moderate
Citation databases	2.91	Moderate
Bibliographic databases	3.14	Moderate
e-Newspapers	3.12	Moderate
e-Theses and dissertations	2.84	Moderate
Patent database	2.93	Moderate
e-Proceedings of conferences	2.95	Moderate
Statistical databases	2.98	Moderate
Overall Mean	**3.25**	**Moderate**

2. Perceptions on the Use of Technology-Enabled Learning

Perceptions on the use of technology-enabled learning is measured using the two constructs: *Reasons for Using Technology* and *Usefulness of the Technology.*

Reasons for Using Technology

Table 12 shows the perceptions of the learners on the use of technology-enabled learning in terms of the reasons for using it. It can be observed that the overall mean is 4.25 having a descriptive level of very high; this means that the items are always manifested.

Table 12
Perceptions of Use of Technology-Enabled Learning in Terms of the Reasons for Using It

Reasons for Using Technology	Mean	Descriptive Level
I want to use technology in my studies because:		
It will help me get better results in my subjects.	4.30	Very High
It will help me understand the subject material more deeply.	4.33	Very High
It makes completing work in my subjects more convenient.	4.32	Very High
It motivates me to explore many topics I may not have seen before.	4.25	Very High
It allows me to collaborate with others easily, both on and outside of the campus.	4.13	High
It will improve my IT/information management skills in general.	4.32	Very High
It will improve my career or employment prospects in the long term.	4.12	High
Overall Mean	**4.25**	**Very High**

Usefulness of the Technology

On the perceptions of the learners on the use of technology-enabled learning in terms of usefulness, the average mean of usefulness according to the learners is 3.97 or high level, which means that the indicator is oftentimes manifested. Among the items, “Use instant messaging/chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course”, has been the highest with a mean of 4.37 or very high level, followed by the item, “Use instant messaging/chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff from the course”, with a mean of 4.35 or very high level. Among the items, “contribute to another blog as part of your course requirements”, has got the lowest mean of 3.40 or high level.

B. Student Attitude Toward Technology

This section presents the role of technology in the 21st century education of senior high school learners in terms of *Student Attitude Toward Technology.* It has the following indicators: *Technological career aspirations, Interest in technology, Tediousness towards technology, Technology is for both, Boys and Girls, Consequences of technology,* and *Technology is Difficult.*

1. Technological Career Aspirations

Table 13 shows the student attitude toward technology in terms of technological career aspirations. It reveals that their overall mean is 3.85 having a descriptive level of high. This means further that the indicator is oftentimes manifested. However, among the items, “I would probably choose a job in technology”, has the lowest mean of 3.68 with a high-level description.

Table 13
Student Attitude Toward Technology in Terms of Technological Career Aspirations

Technological Career Aspirations	Mean	Descriptive Level
I will probably choose a job in technology.	3.68	High
I would enjoy a job in technology.	3.77	High
I would like a career in technology later on.	3.88	High
Working in technology would be interesting.	4.05	High

Overall Mean	**3.85**	**High**

2. Interest in Technology

Table 14 shows the student attitude toward technology in terms of interest in technology. The interest in technology of the senior high school learners has an overall mean of 3.94 having a descriptive high level. Among the items, "I would rather have technology lessons at school", has the lowest mean of 3.75 or high level. On the other hand, the item, "Technology lessons are important", have the highest mean of 4.15 with a high level.

Table 14
Student Attitude Toward Technology in Terms of Interest in Technology

Interest in Technology	Mean	Descriptive Level
Technology lessons are important.	4.15	High
I would rather have technology lessons at school.	3.75	High
If there was a school club about technology, I would certainly join it.	3.78	High
I am interested in technology.	4.00	High
There should be more education about technology.	4.13	High
I enjoy repairing things at home.	3.85	High
Overall Mean	**3.94**	**High**

3. Tediousness Towards Technology

Table 15 shows the student attitude toward technology in terms of tediousness towards technology. The tediousness towards technology of the senior high school learners has an overall mean of 2.54 with a descriptive equivalent of low level. This means that the items are seldom manifested.

Table 15
Student Attitude Toward Technology in Terms of Tediousness Towards Technology

Tediousness Towards Technology	Mean	Descriptive Level
I do not understand why anyone would want a job in technology.	3.02	Moderate
Most jobs in technology are boring.	2.58	Low
I think machines are boring.	2.32	Low
A technological hobby is boring.	2.25	Low
Overall Mean	**2.54**	**Low**

4. Technology is for Both, Boys and Girls

Table 16 shows the student attitude toward technology in terms of technology is for both (boys and girls). It can be noticed that the overall mean is 2.80 with a descriptive equivalent of moderate. This means that the items are sometimes manifested.

Table 16
Student Attitude Toward Technology in Terms of Technology is for Both (Boys and Girls)

Technology is for Both (Boys and Girls)	Mean	Descriptive Level
Boys are able to do practical things better than girls.	2.98	Moderate
Boys know more about technology than girls do this.	2.77	Moderate
Boys are more capable of doing technological jobs than girls.	2.65	Moderate
Overall Mean	**2.80**	**Moderate**

5. Consequences of Technology

Table 17 shows the student attitude toward technology in terms of consequences of technology. When it comes to the perceptions of the students on the consequences of technology, it has recorded an overall average of 4.02 having a descriptive level of high, which means that the items are oftentimes manifested. Among the items, senior high school learners believe that technology makes everything work better with a mean of 4.08 or high level.

Table 17
Student Attitude Toward Technology in Terms of Consequences of Technology

Consequences of Technology	Mean	Descriptive Level
Technology makes everything work better.	4.08	High
Technology is very important in life.	4.03	High
Technology lessons are important.	4.07	High
Everyone needs technology.	3.90	High
Overall Mean	**4.02**	**High**

6. Technology is Difficult

Table 18 shows the student attitude toward technology in terms of technology is difficult. In terms of the difficulty of technology, senior high school learners' perception presented that it is sometimes manifested having an overall mean of 2.81.

Table 18

Student Attitude Toward Technology in Terms of Technology is Difficulty

Technology is Difficult	Mean	Descriptive Level
You have to be smart to study technology.	3.33	Moderate
Technology is only for smart people.	2.40	Low
To study technology, you have to be talented.	2.77	Moderate
You can study technology only when you are good at both mathematics and science	2.73	Moderate
Overall Mean	**2.81**	**Moderate**

Qualitative Result

This section tackles the results of the data gathered from the in-depth interviews. The themes that emerged from the results were thoroughly discussed.

Experiences of Senior High School Learners in Carrying Out their Role with respect to Technology in the 21st Century Education

From the data collected on the experiences of senior high school learners in carrying out their role with respect to technology in the 21st century education, six essential themes emerged. The emergent themes are *utilizing smartphone during classes, using internet daily, enjoying social media usage while learning, using applications relevant to learning, valuing technology as a learning tool,* and *recognizing teachers using technology in instruction.*

Utilizing Smartphone during Classes. The informants of the study indicated that they made use of smartphones or mobile phones during their classes. With the New Normal, it has become a big part of the learner's education to use the technology.

In fact, IDI 04 said that the use of cellphone is very vital right now.

> *"Cellphone is a big help in my studies right now. It has been very important to me. In fact, I use it always during classes." -IDI 04*

IDI 01 agreed that cellphone is a tool for learning. As teachers communicate through Facebook Messenger, learners find it advantageous.

> *"Right now, the use of mobile phone is important to me. My teachers communicate online. It would be difficult if I can't communicate with them through it." -IDI 01*

IDI 03 explained the importance of cellphones or smartphones in the New Normal.

> *"Because of the pandemic, some teachers give activities that need to be accessed online. It gives us the chance to explore some of the things that we have not done before." -IDI 03*

Using Internet Daily. Learners revealed that they access the internet daily. They find it necessary to access the internet as they explore social media, search relevant information related to the subject and use editing applications that need internet.

IDI 01 shared that using internet has become a necessary part of his daily life. It seems impossible for him to go on a day without an internet. Also, in class, they use internet to search for information.

> *"I find the internet very vital right now. It is everything. I find it so important. I even use it daily because I update social media. I use it for my lessons also." -IDI 01*

IDI 02 explained his side why he is using internet daily. Although it is quite difficult especially that sometimes the internet is intermittent. Nevertheless, internet becomes a tool for learning.

> *"It is very important to me. Internet is life for me. This is the reason why I am so into using the internet. I find it important in my class. I really have to use it." -IDI 02*

IDI 03 said the internet has been a source of happiness while watching different videos. Also, *Tiktok* has been so addictive to him.

> *"I enjoy the videos online. I use the internet watching videos in YouTube and TikTok. I have been using it daily." -IDI 03*

Enjoying Social Media Usage while Learning. Students appreciate the value of using social media while learning. It was underscored by the learners that they sometimes use social media for learning like in *Facebook, YouTube,* and other popular sites. Some teachers require them to present their outputs online also.

IDI 05 explained the value of social media while learning. They reasoned out that it had been exciting to use it for learning purposes.

> *"My teachers before use social media. They ask us to post our outputs in Facebook. We were able to present our videos online. I find it exciting. It is cool." -IDI 05*

Further, IDI 04 shared her sentiment that social media can also become relevant when it comes to doing different tasks in school. Indeed, it has been the avenue to showcase their victories in their subjects.

> *"I also see social media as a positive tool for learning. Imagine that there are things that we can store there. We can enjoy our activities also. We can do other tasks related to it. Yeah. I am happy to use social media in class." -IDI 04*

IDI 02 narrated that social media has been a tool for learning. There are many news and information that are posted by many pages.

> *"If you watch videos in social media, you will learn many things also. There are people who posts things like videos of history, science, and others. I think, that is very important to me." -IDI 02*

Using Applications Relevant to Learning. Nowadays, there are many applications online and even offline that provide easy access to the things that learners could use for their classes. They could even do things easily than other students before as what is needed is their skills to navigate the platforms.

IDI 02 stressed that using applications like editing apps have become very necessary especially that most of the activities/ tasks are done using technology.

> *"I use different apps. When we edit videos. We also edit pictures. I use PicsArt and CapCut. Things like these are important to me when I'm learning. It makes life easy." -IDI 02*

In addition, on using different apps for learning, teachers introduce to students the apps before they asked them to use it for their activities.

> *"When we had an activity in Math and English, teachers introduce to us some apps that we haven't use. We appreciate it so much. There are applications that can make your learning more fun. I think other teachers have to use it too." -IDI 03*

IDI 05 highlighted that there are activities in school today that are better be done with the use of plentiful applications online.

> *"When I do the tasks given to us by our teachers, I always make use of the applications that are available at hand. Sometimes, I find it hard to accomplish tasks that don't use easy-available apps." -IDI 05*

Valuing Technology as a Learning Tool. Students identify the importance of technology as indispensable in today's classroom settings. Learning skills are also changing because of the technology. With this, learners find it enjoying and at the same time valuable to use technology as a learning tool.

IDI 04 said that technology is a useful learning tool. For teachers to make use of this, learners must be navigated in the use of technology.

> *"I find the use of technology valuable in real-life. It is quite exciting to use technology. And others would agree that technology is very valuable in many tasks." -IDI 04*

Furthermore, IDI 02 supported the idea of the value of technology in learning. It has become a valuable tool for doing tasks in the different subjects.

> *"I find it technology valuable in my assignments in school. Right now, technology is just handy. You can use it anywhere. I can't imagine life without technology." -IDI 02*

IDI 01 said that technology is valuable for doing many things in life and most especially in school. In his class, he made use of the technology to accomplish activities easily unlike without using it.

> *"I realize that technology is valuable for many tasks. It is valuable doing presentations and writing essays. Before, technology is intended for some professionals, but right now, almost everyone uses it." -IDI 01*

Recognizing Teachers Using Technology in Instruction. Technology is a transformative tool in learning. With the teacher's pedagogical practices, it becomes an important tool to ignite interests and enhance the motivational aspects on the learners. In fact, many technological applications are designed to make changes in the delivery of instruction especially in the new normal.

IDI 05 explained why technology is valuable in class. She added that teachers using technology are doing a good job.

> *"When our teachers use technology, it becomes so enjoyable. I really appreciate them for using it." -IDI 05*

Furthermore, IDI 01 said that classes become exciting when technology is introduced in the lessons.

> *"We had activities before using technology. It was exciting. I had fun. We navigate through it. We use it. We are really found it so exciting. I wish all teachers would use it in classes especially now." -IDI 01*

IDI 02 emphasized the need to use technology in class.

> *"As learning is changing, teachers also need to change their strategies. Some*

teachers are quite boring because they ask us to always write and all sorts. We find it valuable to answer using technology or perform activities with the technology." -IDI 02

Mixed Methods Result

Data Integration

Table 22 presents the integration of salient findings from quantitative data gathered from 100 respondents and qualitative data transcribed from five participants in in-depth interviews. In this paper, there are only two nature of integration present, first, merging-confirmation in which quantitative data agreed with the qualitative data and second, merging-expansion, in which there is an emerging theme (critical feedback) that has no equivalent indicator in the quantitative survey.

Role of Technology in the 21st Century Education of Senior High School Learners. In the area Nature of the Role of Technology in the 21st century education of senior high school learners, it was found out that the quantitative data bearing the items *Access to and Use of Technology in Terms of Internet Usage, Use of ICT and Internet Skills in Terms Average Social Media Daily Usage, Perceptions of Use of Technology-Enabled Learning in Terms of the Reasons for Using It, Usefulness of Technology,* and *Student Attitude Toward Technology in Terms of Interest in Technology* are parallel to the qualitative data observed from the informants/participants on the experiences of senior high school learners on the role of technology in their 21st century education. In other words, the a priori themes confirm the high percentage and high ratings of the indicators of the quantitative data.

Table 22
Joint Display of Qualitative and Quantitative Results

Research Area	Quantitative Phase	Qualitative Phase	Nature of Integration
Role of Technology in the 21st Century Education of Senior High School Learners	The role of technology of in the 21st century education of senior high school learners shows that about 68% is recorded in the item, *Access to and Use of Technology in Terms of Internet Usage,* while 80% of the learners indicated the *Use of ICT and Internet Skills in Terms Average Social Media Daily Usage.* In terms of the *Perceptions of Use of Technology-Enabled Learning in Terms of the Reasons for Using It* of the learners, it was revealed that the mean has been 4.25 or very high. In the item, *Usefulness of Technology,* it shows a mean of 3.97 or high while the item, *Student Attitude Toward Technology in Terms of Interest in Technology* also shows a high mean of 3.94.	The five themes based on the indicators of the quantitative survey generally showed positive observations from the informants/ participants with regards to the role of technology in the 21st century education. This is parallel to the result in the quantitative phase wherein the five indicators indicated overall high rating.	Merging (Confirmation)

Conclusion

Because of the widespread availability of internet mobile connections, there has been a significant number of students that use technology. As a result, schools have a high level of computer skills and use of technology because it is useful and relevant in the educational process. Similarly, students see the value of incorporating technology into classroom discussions since it increases their interest in the subject.

Furthermore, technology is viewed as an important tool for learning, and the importance of using social media is proved by learners' average daily usage. The introduction of popular media into the lives of students has had a significant impact on this. Despite some concerns on social media, students still find it useful in the classroom.

Recommendations

With respect to the popularity of social media and internet use, teachers may anchor the curriculum implementation

on the aspects of creating a room of technological excitement. With the variability of internet access and the non-affordance of learners to the technology, it is encouraged that teachers be creative and innovative in designing and implementing lessons.

Moreover, a specialized training is recommended to be employed to address the growing concern of providing qualified teachers who could provide the best possible education to the 21st century learners. Lastly, it is recommended that future researchers explore the impact of technology especially for the underprivileged learners and document their experiences during the New Normal. Despite its limitations especially on the inclusion of other schools, these findings will be relevant in underscoring how the government could aid these learners and how policies could address their concerns.

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