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Technology adaptation of teachers and students under the learning continuity plan: A case of one school in the Philippines

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Abstract
The COVID-19 pandemic has prompted educational leaders to restructure the curriculum and modify the instructional set-up to accommodate remote learning of which using technology is the most viable solution to the existing problem. This study explores how teachers adapt and utilise technology-based teaching, and what makes students learn under blended learning modalities in Taytay Senior High School. Quantitatively, using the validated survey questionnaire anchored on the technology adaptation model and the adaptive learning environment model, this study revealed that teachers' age is the factor in all aspects of the model (performance and effort expectancy, social influence and facilitating conditions). When comparing the adaptation levels of students and teachers, it showed that teachers were slightly higher than the students, and that there is a negligible correlation. The findings of this study will serve as baseline data for immediate actions for items that surfaced concerns as hindrance or factors that can hamper students' academic performance.

Keywords: Technology adaptation, online classes, remote learning, Senior High School, Philippines.

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Introduction

Distance learning is going to be part of the new normal in education as claimed by education experts (Arrieta, 2020). It is the current hot topic for educators in all fields. Distance learning has become an extensive and growing phenomenon, giving a huge improvement to the use of information and communication technologies (ICT) in tertiary institutions. The positive attitude of teachers to ICT also does affect students' perceptions of their distance learning experiences (Valentine, 2002, as cited by Markova, Glazkova, & Zaborova, 2017). A study by Bowa (as cited in Van Zyl & Spamer, 2013; Olivier, 2016) investigated the effect of contact classes on the academic performance of distance education students, and they found out that on the one hand it contributed to cognitive, affective and systemic learner support services, including contact classes; on the other hand, it did not contribute significantly to academic performance. Notable in this study is the involvement of teachers in curriculum design in sustaining the connection of technology-enhanced learning materials. Teachers are engaged in customising learning activities to suit situations and settings. Their research indicates that customisations supported evidence from student work to improve learning outcomes (Matuk, Linn & Eylon, 2015).

Some educators find distance learning as the best way to demonstrate the utilisation of technology for learning. Technology has become an integral alternative to pursue schooling and may open new learning and teaching strategies. Moreover, the Department of Education rethought and focused more on the most essential learning competencies due to the limitations of online learning made. Despite the effects and limitations brought about by the COVID-19 pandemic, classes must continue because it is an essential need of everyone. The data became one of the foremost important bases in arising with a learning continuity plan for the new normal in education (Arrieta, 2020).

In preparation for the school year 2020–2021, the DepEd launched the basic education-learning continuity plan (BE-LCP). Taytay Senior High School, as a strong arm of the Department of Education in pursuing its vision and mission, accepts the challenges of the new normal. The school LCP was designed to set its direction for the coming school year under the new normal. The LCP was anchored in the context of the school and community. The preferred learning modalities of parents and students are considered, and stakeholders support is likewise sought to respond to the needs and requirements identified in the implementation. A series of capacity development seminar–trainings are being conducted to equip teachers for online distance learning and augment existing skills in the preparation for modular distance learning. Based on the Learners' Enrolment and Survey Form being culled and evaluated for school year 2020–2021, parents preferred online distance learning, such as synchronous and asynchronous distance learning, for their children and the combination of face-to-face and other modalities. Taytay Senior High School employed the combination of modular distance learning and online distance learning in recognition of the prevailing conditions of our learners under the general community quarantine status of Taytay, Rizal. The school was one with the DepEd Rizal's campaign for a strong school–family–community partnership to ensure effective and efficient implementation of the BE-LCP of the school. Hence, this study aimed to assess the implementation of the school learning continuity plan and determine its effects and efficiency to the academic performance of the students.

The purpose of this research project was to help the department to gather data on the effectiveness of SLCP. The data gathered will serve as a baseline data for further programme adjustments or improvement or for other future school plans such as training programmes and procurement of school equipment and improvement of school facilities.

1.1. Literature review

The sudden outbreak of COVID-19 challenged the education system across the world and forced educators to shift to an online mode of teaching overnight (Dhawan, 2020). According to Almarzooq, Lopes and Kochar (2020), the primary challenge of this novel platform lies in the faculty's willingness to embrace this virtual learning platform. In other studies, teachers' commitment to learning materials design and delivery was very essential for creating effective virtual classrooms. The literature indicates that teachers need to recognise that the virtual learning environment requires design expertise and delivery skills (Salyers et al., 2014, as cited by Markova et al., 2017). Some studies have suggested that courses must be designed so that students could benefit from the interactive potential of online learning (Thorpe, 2002, as cited by Markova et al., 2017). For this reason, teachers require extensive training on how to utilise new technologies and adapt teaching methods to a distance learning environment (Valentine, 2002, as cited by Markova et al., 2017). Generally, teachers should perceive that online distance learning develops new forms of interaction, learner engagement and assessment.

It is said that students in online environments tend to feel more confused, isolated and frustrated, and as a result, their learning effectiveness and satisfaction can be reduced (Zaborova & Markova, 2016). However, there is evidence that technologies utilised in distance learning have vital effects on the learning process. Hackman and Walker (1990), as cited by Allen, et al. (2004), noted that communication technology affects learning outcomes. Students participating in interactive television classes believed that technology had been effective when it worked well.

Online learning has been used even before the COVID-19 pandemic, and there are different findings about the effect of this platform, where some studies related that most of the activities in distance learning try to recreate online learning in the traditional classroom (Beck 2002, as cited by LaBay & Comm, 2004). That is because many people believe that high-quality learning cannot occur outside of a traditional classroom environment (Uhlig, 2002, as cited by LaBay et al., 2004). Compared to chat rooms in the virtual classroom, the learning interaction among students in the classroom is not the same.

The reviewed studies were partially related to the present study, specifically with the use of distance learning as a learning modality or platform. Online distance learning is basically regarded as a primary factor affecting the academic performance of the students.

1.2. Conceptual/theoretical framework

1.2.1. Technology readiness/ technology acceptance model (TAM)

The TAM, first proposed by Davis (1985), comprises core variables of user motivation [i.e., perceived simple use (PEU), perceived usefulness (PU) and attitudes towards technology] and of those

variables (i.e., behavioural intentions and technology use). Of these variables, PU and PEU were considered key variables that directly or indirectly explained the outcomes (Marangunić & Granić, 2015). These variables were often amid external variables explaining variations in PU and direct use. Among the others, subjective norms, self-efficacy (CSE) and facilitating conditions (FC) were remarkably related to the TAM core variables, but to different degrees (Abdullah & Ward, 2016; Schepers & Wetzels, 2007). These external variables represent personal capabilities following contextual factors. Their conceptualisations, however, vary across studies and thus necessitate clear definitions within this meta-analysis (Wu & Chen, 2017).

1.2.2. Social cognitive theory and self-efficacy

The social cognitive theory describes human functioning in terms of a model of triadic reciprocity. During this triadic reciprocal causation model, three factors (i.e., cognitive and other personal factors like affective states and physical attributes, external environmental influences and overt behaviour) bi-directionally affect each other. The reciprocal interactions among personal variables, the environment and behaviours do not work simultaneously. As causal factors, they have a delay to exert their influences (Sawitri, Hadiyanto & Hadi, 2015).

According to Bandura (1994, cited by Marsh et al., 2019), 'perceived self-efficacy is described as people's beliefs about their potentials to form designated levels of performance that practice influence over events that affect their lives. Self-efficacy beliefs control how people feel, think, motivate themselves and behave'. A critical feature of the self-efficacy theory is that it distinguishes between motivation to demonstrate target behaviour and self-perceptions of the potential to perform the behaviour.

Learning was not restricted only to formal educational activities where learners acquire knowledge and skills inside the classroom, but also encompasses informal learning opportunities that lead to improvement of the learners' overall knowledge and skill levels. In other words, smart learning environments engage and integrate formal and informal learning in order to create autonomous adaptive learning environments for supporting individual learners with real-time and seamless learning experiences in ubiquitous settings (Chen, Cheng & Chew, 2016).

The related literature and theoretical/conceptual framework implies that there was a working relationship between variables, only to be discovered in specific situations, such as in Filipino public senior high schools, teachers and students are not prepared and able to handle online classes because they are used to the traditional face-to-face set-up. Hence, this study intends to explore the effectiveness of the SLCP focusing on the implementation level, teachers and students' learning environment (online classes) adaptation level and academic performance of students. Specifically, the following research questions and hypothesis are posited.

1.3. Research questions

1. What is the profile of the students?
2. What is the profile of the teachers?
3. What is the technology adaptation level of teachers?
4. What is the technology adaptation of students?
5. Is there a significant relationship between the profile of the teacher and their technology adaptation level?
6. Is there a significant relationship between the profile of the students and their technology adaptation level?

1.3.1. Hypothesis

1. There is no significant relationship between the profile of the teacher and their technology adaptation level.
2. There is no significant relationship between the profile of the students and their technology adaptation level.

1.4. Significance of the study

The COVID-19 pandemic brought us to a situation where we need to do things even though we are not prepared or familiar with them. The 'mantra' nowadays is that we need to adapt to the 'new normal' and that we need to make the 'new normal' a 'better normal'. In the educational situation, one of the most significant platforms used in the delivery of instruction during the new normal is technology-based instruction of which there are factors that are related to yield positive effects on students. Technology-based instruction has been practiced among private and elite schools in basic education but not in public schools wherein we are limited to this aspect. For this reason, as Taytay Senior High School belongs to the public-school category and where technology-based instruction is new to teachers and students, this research intended to explore factors that affect the adaptation of teachers and students in using gadgets and applications used in teaching and learning. The exploration aimed to have a baseline data for school planning, presentation of instructional design and practices, and modifications to accommodate the Taytay Senior High School students' diverse needs and situations while in learning during the pandemic, not just in terms of teaching–learning *per se*, but also factors that are related to the acquisition of learning of the students such as lack of Internet data allowance and gadgets. Hence, the findings of this study can be a baseline data for guidance programmes especially in students at risk in dropping school.

The findings will also serve as a feedback to the learning continuity programme of the department of education for planning and policy and decision-making. Lastly, the findings reflected and echoed real-life situations that can be used as baseline data for those who are in the same situation around the world.

1.5. Scope and limitation

This study was conducted in Taytay Senior High School, the only standalone senior high in Taytay with 1,300 enrollees. The research project run within one semester evaluated the effectiveness of the implementation of the SLCP both quantitatively and qualitatively.

This delimits in the following variables such as teachers and students' technology adaptation and exploration of factors affecting it.

2. Research methods

The study applied the quantitative descriptive analysis that characterises the phenomenon by identifying patterns in the data to answer questions such as who, what, where, when and to what extent (Loeb et al., 2017). Data were gathered utilising the researcher-made survey questionnaire checklist. The constructs of the researcher-made survey questionnaire checklist and the interview guide were anchored on the theoretical framework that served as *a priori.* All instruments underwent validation and reliability tests using SMARTPLS for item loading.

2.1. Sampling

This research was conducted in Taytay Senior High School, Division of Rizal. The school offers various tracks and strands such as STEM, HUMSS, ABM, TVL and SPORTS. In addition, the school has an average enrolment of 1,300. In this study, only students who were in the online classes were selected as respondents and participants.

The study was a purposive sampling procedure, of which the number of respondents was based on the actual number of students who underwent the online modality, of which during the initial survey 40% chose to undergo the online class.

A total of 31 teachers and 571 students of Taytay Senior High School participated in this study.

2.2. Data collection

The developed and validated survey questionnaire for teacher and students anchored on the TAM and adaptive learning environment model were used in this study. The instrument has three parts: part one is the profile of the teachers; part two is for the level of the adaptation of teachers in handling online classes (synchronous and asynchronous); and part three is the open-ended question.

The interview guide questions were based on the theoretical framework for it to serve as *a priori* of the study.

2.3. Data gathering

Due to the pandemic, the survey questionnaires and interviews were conducted online through Google Forms.

2.4. Data analysis

XLstat is utilised in analysing quantitative data.

2.5. Ethical issues

- Identification of ethical concerns that could possibly emanate from the conduct of research and discussion on how to prevent these from taking place.
- It can include, but is not limited to, the ff: right to conduct a study or investigation to answer questions.
- Securing free prior and informed consent from respondents and/or parents and guardians of learners.
- Issues of confidentiality and anonymity.

3. Results

Using the online platform through Google Forms in gathering data during the pandemic, the data gathered were analysed both manually and statistically through XLstat, hence the following findings were generated and presented according to research question:

1. What are the demographic characteristics of teachers and students?

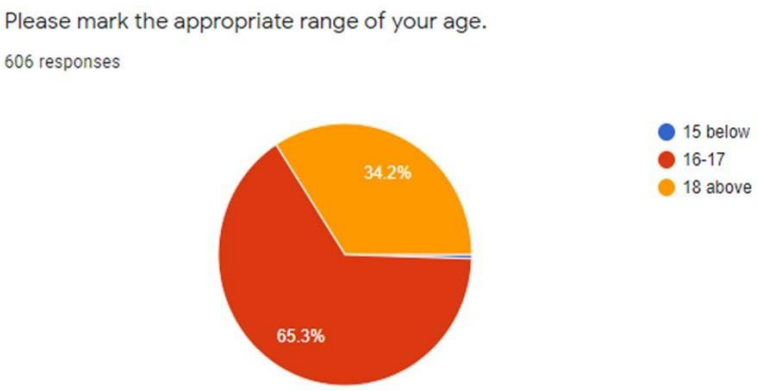

Figure 1. Age distribution of the students

Out of 606 responses of students, only 571 were considered valid respondents. It is shown in Figure 1 that the age distribution of students is 65.3% for those aged 16–17 years, 34.2% for those aged 18 years and above and a minimum percentage belonged to 15 years and below.

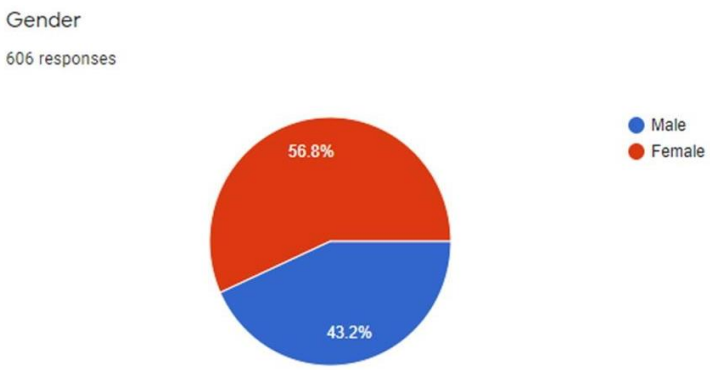

Figure 2. Gender distribution of the students

The distribution of gender among respondents comprises 56.8% male and 43.2% female (Figure 2).

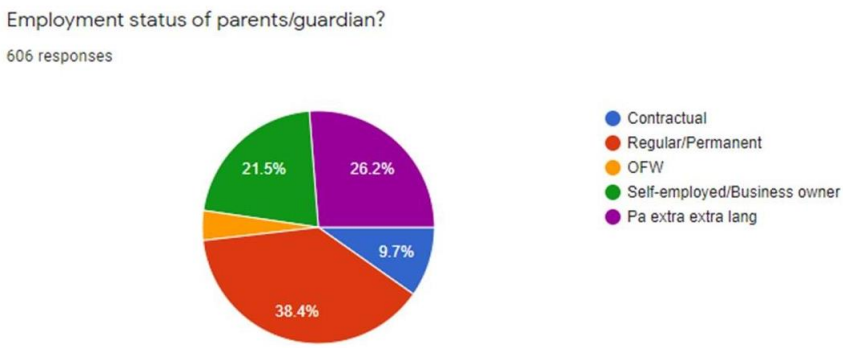

Figure 3. Distribution of employment status of parents/guardians of the students

Figure 3 shows that 38.4% had a regular or permanent status, 26.2%had a '*pa extra lang'* with no permanent job status, 21.5% were self-employed and/or had their own business, 9% had a contractual status and a minimal number of students had OFW parents.

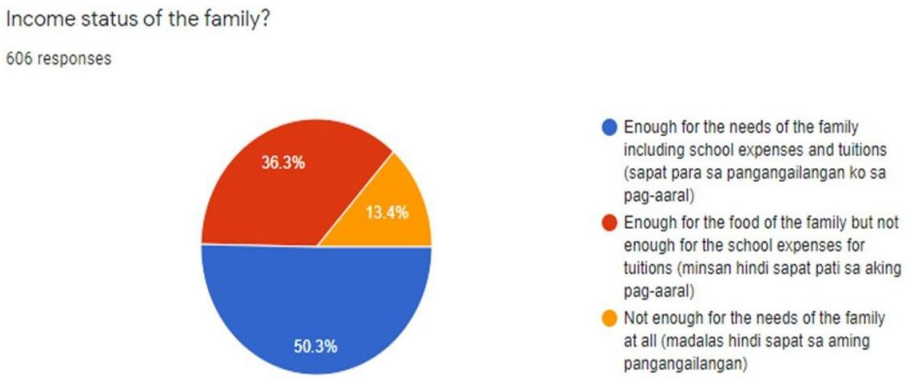

Figure 4. Distribution of income status of the family of the students

Figure 4 shows the responses of students when they were ask about the income status of their parents or guardians; 50.3% said that the income of their family was enough for the needs of their family, including school expenses and tuitions; 36.3% said that the income of their family was enough for the food but not enough for the school expenses or for tuitions; and 13.4% said that the income of their family was not enough for the needs of the family at all.

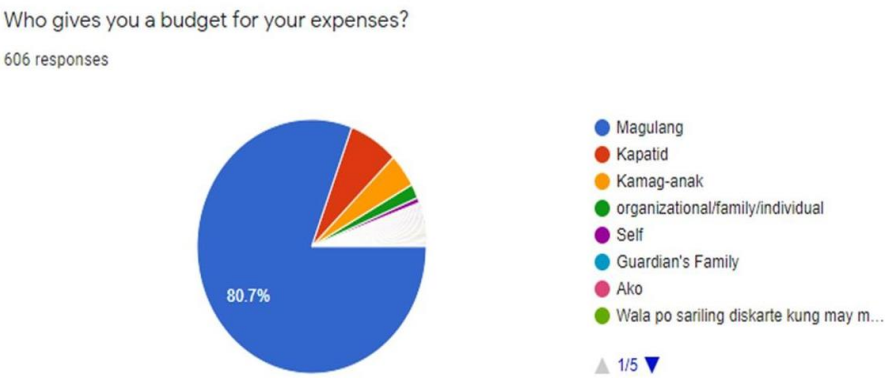

Figure 5. Distribution of who gives the budget for the expenses of the students

Figure 5 shows that majority (80.7%) of the students received allowance for their school needs from their parents; a minimal number said other factors, such as *kapatid* (sibling) and *kamag-anak* (relative, organisation/institution) and a limited number said 'self'.

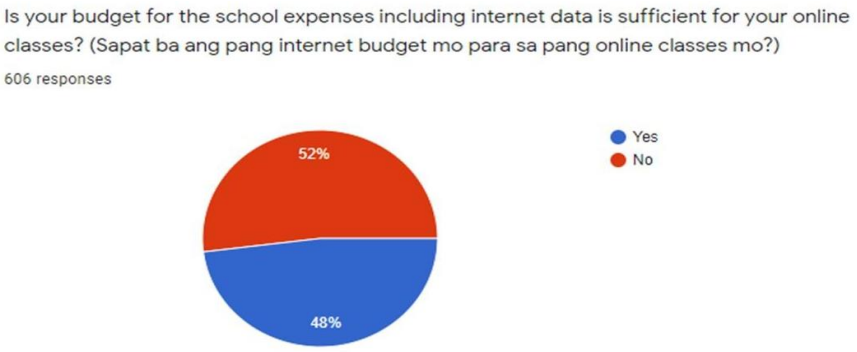

Figure 6. Distribution on the answer of students if they have enough allowance for their Internet data

Figure 6 shows that 52% answered that they have enough budget and 48% answered 'no, it is not enough'.

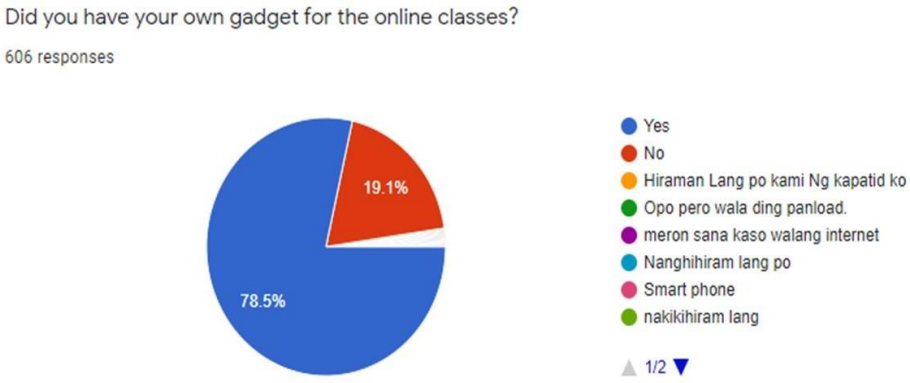

Figure 7. Distribution of students' ownership of gadget

It is shown in Figure 7 that 78.5% of the students use their own gadgets for school; 19.1% have no gadgets at all, of which it is revealed that students with no gadgets resulted in borrowing gadgets from their siblings and relatives. Other concerns reflected were that they have gadgets, but they have no budget for Internet data.

Figure 8. Distribution on the type of gadget used during remote learning

It is shown that majority (88.8%) of them use cell phones for their online learning, with only minimal responses to laptop, tablets and others (Figure 8).

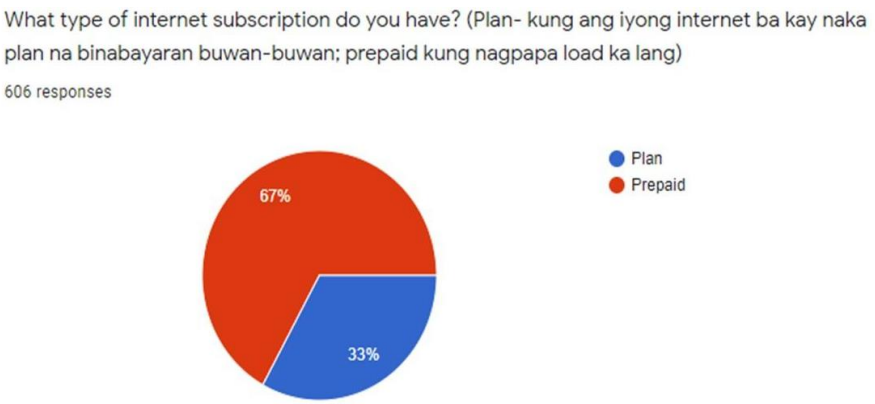

Figure 9. Distribution on the subscription of Internet data used by students in their online learning

Figure 9 shows that most (67%) of the students responded prepaid and 33% are on a plan subscription.

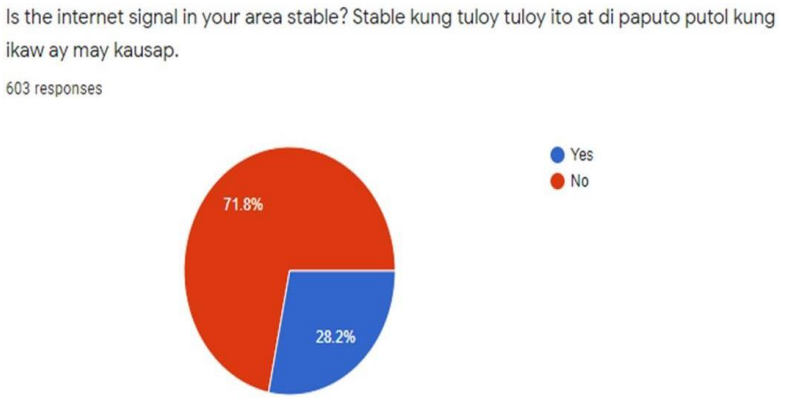

Figure 10. Distribution of Internet signal in the learning area of the students

Figure 10 shows the responses of students relating that 71.8% said they had no stable Internet signal in their area, while only 28.2% had a stable Internet connection.

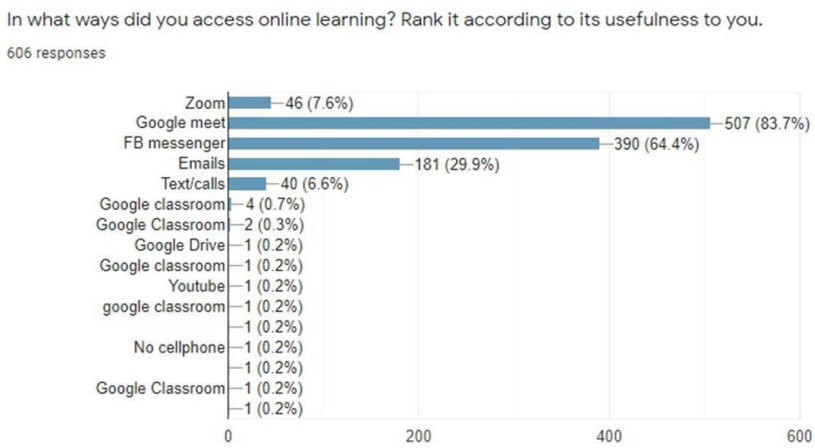

Figure 11. Distribution of useful applications to students in acquiring learning

Remarkably, Figure 11 shows that the most useful applications to the students' learning were Google Meet (83.7%), followed by FB Messenger with 64.4% and emails with 29.9%. Others, such as text/calls, Google Classroom and YouTube, received minimal responses.

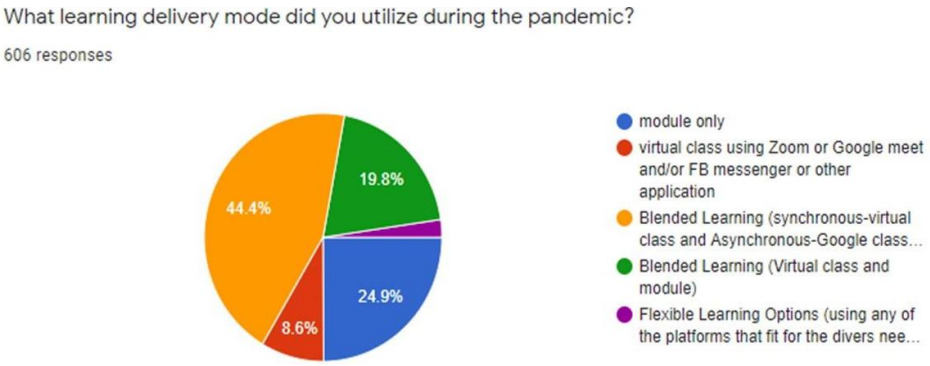

Figure 12. Distribution of modalities used by students

It is shown in Figure 12 that 44.4% of students used the blended platform, 24.9% used modular only, 19.8% used blended learning, 44.7% used blended learning, 8.6% used virtual class and a minimal number used the flexible learning option.

2. What is the profile of the teachers?

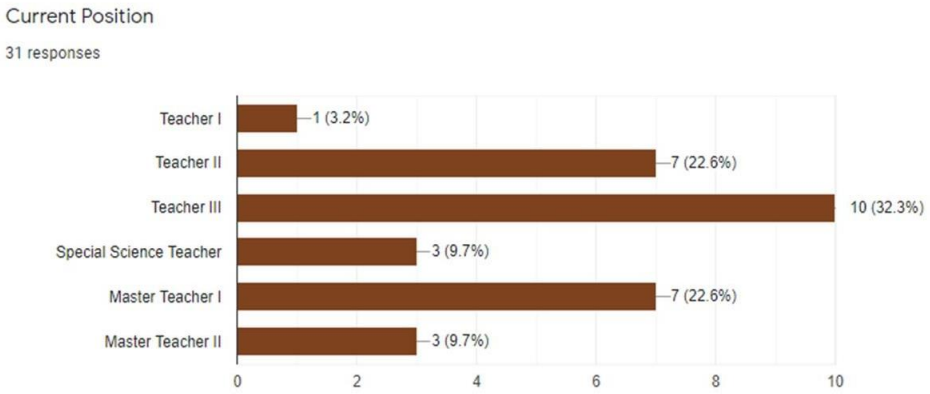

Figure 13. Distribution of the age of the teacher-respondent

Figure 13 shows the age distribution of the teacher-respondents, of which 38.7% were aged between 31 and 40 years, 19.4% were aged 50 and above and 16% belonged to the young generation, ageing between 20 and 30 years.

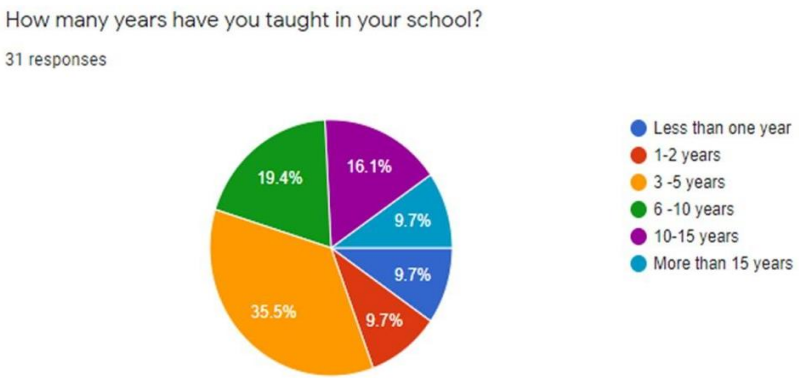

Figure 14. Distribution of years in service of the teacher-respondents

It shown in Figure 14 that 35.5% of the teacher-respondents taught for 3–5 years; 19.4% taught for 6–10 years; 16.1% taught for 10–15 years; and 9.7% had more than 15 years, less than 1 year and 1–2 years in service each.

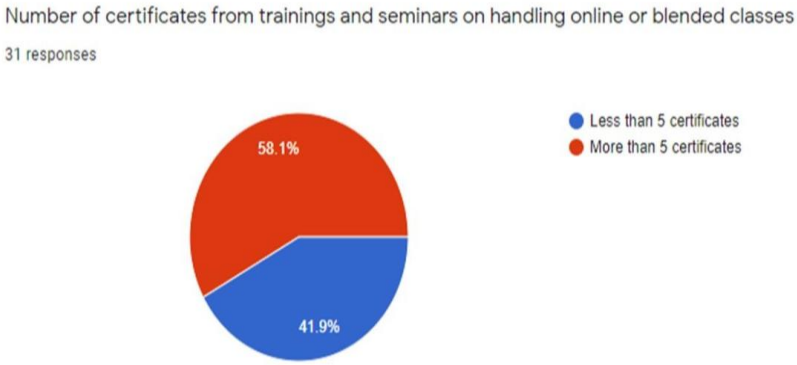

Figure 15. Distribution of trainings attended by the teacher-respondents

Figure 15 shows that 58.1% of the teacher-respondents had gained more than five certificates and 41.9% had less than five certificates.

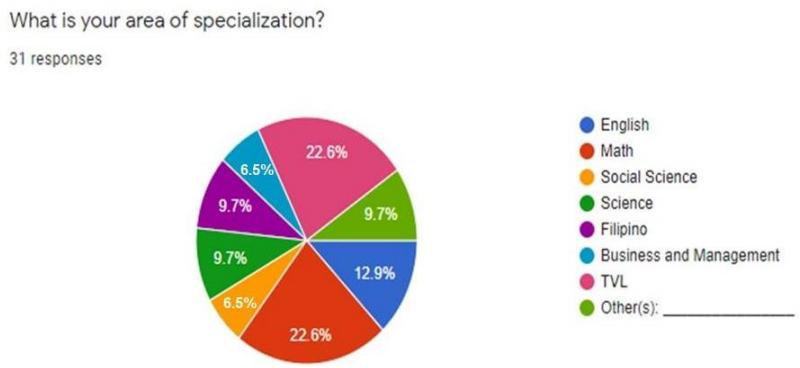

Figure 16. Distribution of subject specialisation of the teacher-respondents

It is shown in Figure 16 that 22.6% of the teacher-respondents had an area of specialisation in Mathematics and TVL; 12.9% specialised in English; 9.7% specialised in Science, Filipino and others; and 6.5% specialised in Business Management and Social Science.

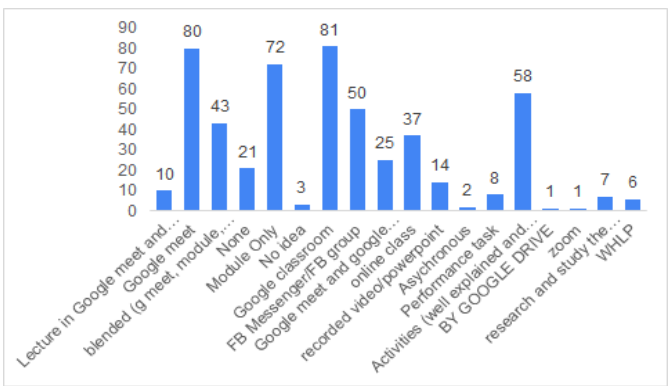

Figure 17. Distribution of the modality used by teachers

3. What is the technology adaptation level of teachers?

Table 1. Technology adaptability level of teachers

Variable	Mean	Standard deviation
I deliver my lessons using various online platforms with confidence	4.032	0.657
My students understand better when I use various online platforms in delivering my lessons.	4.065	0.727
I fully understand and accept in my heart that as a teacher in the new normal I	4.387	0.615

need to utilise various online platforms to deliver my lessons.		
I give feedback to my students' performance with ease using various online platforms, such as FB group/messenger, emails and another asynchronous platform such Google Classroom.	4.323	0.653
I can assist and help my colleague to make teaching and learning resources fit for online classes.	4.170	0.687
I have my own YouTube channel for my video tutorials.	4.161	0.688
My students used my video tutorials on YouTube to further understand their lessons.	3.806	0.833
I equip myself to be fit for the online classes to be part of the '*Sulong Edukalidad*' programme of our department.	4.097	0.700
I use the online platforms in order to provide learning in spite of the pandemic.	4.323	0.653
I use online platforms so that my students can continuously learn despite the pandemic.	4.355	0.661
I use online platforms to make learning accessible to my students anytime and anywhere.	4.387	0.667
I design my teaching and learning materials based on the diverse situation of my students.	4.097	0.746

Interpretation: 1–2 = low acceptability level; 2.1–3 = moderate adaptability; 3.1–4 = moderately high adaptability level.

3.1. High adaptability level

Anchored on the theoretical framework, the variables in the survey questionnaire were based on the PU and perceived ease of use, self-efficacy and FC (Abdullah & Ward, 2016; Schepers & Wetzels, 2007) that surfaced, which shows that the mean of the constructs where high based on the 5-point rating scale; only item 'My students used my video tutorials on YouTube to further understand their lessons' got a moderately high level (Table 1).

4. What is the technology adaptation of students?

Table 2. Technology adaptability level of students

Variable	Mean	Standard deviation
Performance expectancy (I finish my performance task and learning activities using various online platforms with confidence.)	3.588	0.994
Performance expectancy (I understand better when I use various online platform in delivering my lessons.)	3.532	0.978
Performance expectancy (I received feedback from my teachers with the use of various online platforms, such as FB messenger, email and another asynchronous platform such as Google Classroom.)	3.974	0.977
Effort expectancy (I use various online platforms in learning my lessons with ease.)	3.574	0.963
Effort expectancy (I can understand my lessons in online class using my own video tutorial and digital learning materials.)	3.128	1.101
Effort expectancy (I received real-time feedback through various online platforms.)	3.386	1.004
Effort expectancy (I can easily present my ideas and queries through various online platforms.)	3.212	1.053

Social influence (I can assist and help my classmates on how the online learning will best be utilised during this pandemic.)	3.456	1.096
Social influence (I can recommend the tutorial videos and other reading materials available online related to our lessons.)	3.332	1.130
Social influence (I share video tutorials on YouTube to my classmates.)	2.809	1.265
Social influence (I can freely share that online classes are effective during the pandemic.)	3.014	1.195
FC (I use the online platforms in order to learn despite the pandemic.)	3.568	1.025
FC (I use the online platforms so that I can continuously learn despite the pandemic.)	3.647	1.020
FC (I use online platforms to make my learning accessible anytime and anywhere.)	3.544	1.048
FC (I was able to learn despite the pandemic because of the online application and platforms.)	3.482	1.054

Interpretation: 1–2 = low acceptability level; 2.1–3 = moderate adaptability; 3.1–4 = moderately high adaptability level.

3.2. High adaptability level

5. Is there a significant relationship between the demographic profile of the teacher and their technology adaptation level?

Table 3. Correlation of the demographic profile of teachers and their adaptability level

Demographic profile	Adaptability level
Age	−0.285650585
Gender	−0.085003144
Position	−0.098358874
Years in service	−0.13386834
Degree	−0.332695474
Training	0.214926001
Specialization	−0.093218434

Table 3 shows that among the demographic profile of the respondents, only training of teachers (0.215) has a correlation, but the value is not enough to have a positive correlation as it is below the 0.60–0.799 coefficient interval.

6. Is there a significant relationship between the profile of the students and their technology adaptation level?

Statistically, based on the results generated by the XLstat summary table, the following had significant results: (1) age and social influence; (2) gender and performance/facilitating; (3) employment and performance; (4) income and facilitating; (5) source of budget and facilitating; (6) type of gadget and social; and (7) Internet subscription and performance, effort, social influence and facilitation.

3.3. Hypothesis

1. There is no significant relationship between the profile of the teacher and their technology adaptation level.

Statistically, there is no significant relationship between the profile of the teachers and their technology adaptability level, but there were constructs that posited positive note, which are as follows:

(I deliver m y lessons using various online platforms with confidence.) = 0.048.

(My students understand better when I use various online platforms in delivering my lessons.) = 0.017.

Table 4. Analysis of variance for teachers

Source	DF	Sum of squares	Mean squares	*F*	Pr > *F*
Model	8	4.042	0.505	1.245	0.320

2. There is no significant relationship between the profile of the students and their technology adaptation level.

Table 5. Analysis of variance for students

Source	DF	Sum of squares	Mean squares	*F*	Pr > *F*
Model	15	32.741	2.183	2.284	0.004

Statistically, based on the result of the *p*-value of 0.004 at 0.05 alpha, we can reject the null hypothesis; hence, the alternative hypothesis, there is a significant relationship between students' profile and adaptability level, is accepted.

4. Discussion

Amongst the modality amidst the pandemic, online education was believed to be the education's best weapon (Gonzales, 2020), but despite the good intention of this platform, teachers were hesitant whether they were in favour of online education and it was found that their profile age, sex, college, educational attainment, years in teaching, academic rank, level taught and employment status were factors in attaining a positive note on having online classes (Alea et al., 2020; Moralista & Oducado, 2020). This finding corroborated with our findings that age, position, years in service and degree were true significant factors in considering online education as the delivery mode. With this modality, it suggested that the users need to familiarise themselves with the interface and other related aspects of online education (Almarzooq et al., 2020).

With regard to students, gender was a factor in this study, just like with the findings in the study of Neupane, Sharma and Joshi (2020). Meanwhile, poor Internet connection became a challenge for the students to perform during online classes. This was supported in the study of Rinekso and Muslim (2020). In Bangladesh, the study of Ramij and Sultana (2020) showed that high cost of Internet, low speed of Internet and the financial crisis of the family were the prime hindrances for online education.

With the shared research findings of this study and with the findings across the world, the call to strengthen online learning platforms was needed to raise awareness to all stakeholders. As has been proven by the UNESCO (2020), online learning platforms such as Google, TV broadcasts, guidelines,

resources, video lectures and online channels are vital to pursue their mission of implementing quality education to every student. In addition, UNESCO (2020) mentioned as a public place where crowds were unavoidable and children were vulnerable, there was a need to strengthen this policy in terms of the delivery of instruction and to provide opportunities for online learning platforms (Tria, 2020).

5. Recommendation and advocacy

This study echoed the voice of education for all and no child left behind the policy and the principle of differentiated instruction to modify instruction and modality to accommodate the diverse needs and situation of the student. Since this study is school-based research, the findings of this study will serve as baseline data for immediate actions for items that surfaced concerns as a hindrance or factors that can hamper the students' academic performance; for feedback, the planning of programmes and activities can provide efficiency in delivering online education. Also, immediate dissemination of these findings is recommended through presentations and publications so that others can use this baseline data.

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