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RESEARCH ARTICLE

Filipino Teachers' Attitude Towards Technology — Its Determinants and Association With Technology Integration Practice

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Abstract: Technology in education has various challenges. However, limited empirical attention has been bestowed to determining whether teachers, who are at the heart of innovation in classroom instruction, have a favorable attitude towards technology. This study describes the attitude of Filipino teachers towards technology, including their determinants and association with technology integration practice. Data were collected from a randomly-selected sample of 150 teachers who responded to a survey instrument adapted from the tools of Ventakesh and Davis (2000) and of Florida's Center for Instructional Technology (2005). Data were analyzed using the Statistical Package for Social Sciences version 21 and AMOS version 20. Results suggest that the teachers surveyed have a favorable attitude towards technology. Moreover, the confirmatory factor analysis reveals that the grade level assignment of the teachers is significantly associated with their attitude towards technology (β=-.12, p=.05). In addition, results of the structural equation model revealed that only the perceived ease of use of technology significantly associates with technology integration practice of the teachers (β=0.75, p<.001 and β=0.59, p<.001). There is a need for large-scale surveys to obtain definitive findings on the topic. However, if the present evidence is an indication, the positive attitude among Filipino teachers will bode well for their application and integration of technology into their teaching activities.

Keywords: attitude towards technology, educational technology, technology-integration skills, technological literacy, technology uses in education

Countries around the world had expressed their desire to improve the accessibility of quality education for all people. With the aid of United Nations (UN), this desire was addressed and clearly stipulated in its Sustainable Development Goal number 4—"ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all" (Sustainabledevelopment.un.org, 2019). Free primary and secondary education were then provided. However, this move of the UN has not been enough to augment the current number of children attending school. Despite having free basic education, attendance of children is still a major concern, suggesting it should not be the sole indicator for granting accessibility to quality education. The Theirworld organization (2019) have identified gender inequality, security, natural

disaster, economic status of the country, poverty, and proximity of the school as among the reasons for children's inability to attend school. The advent of technology has been regarded as a tool to minimize the existence of these perennial problems in accessing quality education. It is now being used to provide education to those children who are geographically challenged, such form of education is known as "online distance learning."

However, since education is dynamic, it is subject to changes inflicted by external forces such as globalization. Global trends in using technology in education indicate that it is not merely used to help children learn outside the four corners of the room, but widely used as part of the instructional program. Though it has been integrated finally in the field of education, its use for teaching and learning remains a challenge (Wadell, 2015).

There were several studies conducted to examine the integration of technology in education extensively. In the Philippines for instance, being a developing country, infrastructures or the availability and accessibility to technological resources have been the major barriers for schools to fully benefit from this major innovation in education (Bana, Romasame, & Cristobal, 2016). In addition, the low level of computer literacy of teachers and the absence of technology integration in the curriculum have been identified as a significant hindrance on the effective utilization of technology in education (Morales, 2015). These are attributed to the fact that there were no clear national vision or direction and no related national standards to meet in terms of integrating technology in the Philippine education system (Vergel de Dios, 2016). The identified existing gaps from available literatures suggest that there is a need to re-examine how technology is being utilized in education.

This study examined the acceptance level of selected Filipino teachers on innovations by determining their attitude towards technology and its association with their technology integration practice. In addition, specific personal and academic characteristics of teachers were examined as to how they affect their use of technology. This study thus describes the technological and pedagogical readiness of Filipino teachers in technology-enhanced education. Results could serve as a foundation in introducing, enhancing, and evaluating school policies on innovations.

Review of Related Literature

This part of the study presents the results of the review of the literature conducted. It is divided into two themes, namely, attitude of teachers on technology-based education and technology integration skills of teachers

Attitude of Teachers on Technology-Based Education

Theory of planned behavior. Majority of the studies conducted in line with the attitude of individuals on using technology is grounded on the theory of planned behavior (TBD) of Icek Ajzen. It is designed to predict and explain human behavior in a specific context with attitude towards behavior, subjective norm, and perceived behavioral control as the primary predictors (Ajzen, 1991). Ajzen (1991) stated that the attitude of individuals towards a behavior is influenced by their intention to perform the behavior. He added that intentions capture the motivational factors that affect a person's behavior. These factors include how hard and how much effort an individual must exert to perform the behavior. Other factors classified as collective factors include the availability of requisite opportunities and resources. Subjective norm as the second predictor of attitude towards technology is a social factor, which refers to the perceived social pressure to perform or not to perform the behavior (Ajzen, 1991). Perceived behavioral control is defined by Azjen (1991) as the availability of resources and opportunities and self-efficacy or the individual's judgment on how well he or she can execute courses of action required to deal with the prospective situation.

The two predictors on attitude of individuals towards technology—attitude towards behavior and perceived behavioral control, given by Ajzen (1991) on his theory of planned behavior—were further examined in this study using the findings from related researches.

Defining attitude. Pickens (2005) defined attitude as a mindset or a tendency to act in a particular way due to both an individual's experience and temperament. He added that it is a complex combination of things that people tend to call personality, beliefs, values, behaviors, and motivations, which would affect the individuals' reactions to situations they encounter. In this study, attitude refers to the teachers' acceptance

of technology as part of their teaching and learning activities.

Domains of teachers' attitude towards technology. Ajzen (1991) and Pickens (2005) both stressed the contribution of motivation on the attitude of individuals. The individuals' motivation to perform a behavior depends on its complexity and their self-efficacy. Existing studies about the attitude of teachers towards technology refer to this as their perceived ease of use of technology and perceived usefulness of the technology.

Perceived ease of use of technology. Technology, if found to be easy to use, will receive greater appreciation from its users. Alharbi and Drew (2014) made a study about using the technology acceptance model in understanding academics' behavioral intention to use learning management systems. They found out that there is a significant positive-moderate correlation between perceived ease of use of technology and attitude towards using learning management systems among teachers. The same observation was revealed by Fathema, Shannon, and Ross (2015) in the quantitative study they conducted on expanding the technology acceptance model to examine the faculty use of learning management systems in higher education institutions in the United States of America. Using structural equation modeling, their study proves that there is a strong positive correlation between the faculty's perceived ease of use of technology and their attitude towards technology. Similarly, Elkaseh, Wong, and Fung (2016), in the quantitative study on the perceived ease of use and perceived usefulness of social media for e-learning in Libyan Higher Education, found out that the use of social media networking plays an important role in the adoption of e-learning. Their findings reveal that the attitude towards behavior or use of technology was predicted by perceived ease of use.

Perceived usefulness of technology. Existing studies reveal that users of technology have a better appreciation if they are able to maximize technology's full capacity as a tool. For instance, Alharbi and Drew (2014) found out in their study that the perceived usefulness of technology has a significant positive-moderate correlation with the attitude of teachers towards using the learning management systems. Fathema et al. (2015) have a similar finding in their study, revealing the existence of a very strong positive correlation between the faculty's perceived usefulness of technology and their attitude towards technology. Elkaseh et al. (2016) also found out in their study that perceived usefulness to e-learning was predicted by social media.

Measuring teachers' attitude towards technology. The instrument generated by Ventakesh and Davis (2000) from the technology acceptance model (TAM) is widely utilized by existing studies in determining the attitude of individuals towards technology. It has two main constructs, namely perceived ease of use of technology and perceived usefulness of technology, and each construct has five items. Alharbi and Drew (2014) used the TAM instrument in their study and revealed a .90 internal reliability coefficient for perceived ease of use and .92 for perceived usefulness. In the study of Fathema et al. (2015), its internal reliability coefficient is .93 for the perceived ease of use and .96 for perceived usefulness. For Elkaseh et al.'s (2016) study, perceived ease of use has an internal reliability coefficient of .83 and perceived usefulness of .77.The tool uses a five-point Likert Scale was used in gathering responses with 1 as Strongly Disagree, 2 as Disagree, 3 as Uncertain, 4 as Agree, and 5 as Strongly Agree.

Determinants of teachers' attitude towards technology. The theory of planned behavior of Ajzen (1991) suggests a number of predictors of an individual's attitude towards technology. Existing related studies reveal that age, years of stay in school, and grade level assignment found to have a significant association with these predictors.

Age. Cavas, Cavas, Karaoglan, and Kisla (2009) conducted a study about the attitude of science teachers towards information and communication technologies (ICT) in education. They found a significant difference in the overall attitude of Turkish teachers towards ICT. Results of their study suggested that younger teachers who have considerable experiences in using technology have a better appreciation of its integration to education than their counterpart. However, this was contrasted by Mustafina (2016) in the study she conducted about teachers' attitudes toward technology integration in a Kazakhstani secondary school. Using the one-way analysis of variance (ANOVA) to compare the effect of age on teachers' attitudes toward technology integration for the age groups 22–30, 31–40, 41–50 and 51 and above, findings revealed that there was no significant difference between the groups.

Years of stay in school. The years of stay in school as a determinant of attitude towards technology has not received much attention in the field of research.

The closest association is the number of teaching experience. In the study conducted by Tezci (2010) about the attitude and knowledge of Turkish teachers' ICT use, they found out that the respondents' attitude towards the use of ICT significantly differs depending on their years of teaching experience. Results of their survey revealed that the greater the number of teaching experience, the lesser the teachers' use of ICT. Result of Tezci's (2010) study was contrasted by Semerci and Aydin (2018) in the study they conducted about the Turkish high school teachers' attitudes toward ICT use in education. Result of the one way ANOVA they performed revealed that there is no significant difference between teachers' ICT use in terms of their teaching experience.

Grade level assignment. Similar to the years of stay in school, the grade level assignment as a determinant to teachers' attitude towards technology was not extensively examined in the research. Williams (2015), in the study he conducted about the K+12 teachers' attitude towards computer technology use in schools, found out that teachers' attitude towards computer technology differs in terms of their assigned teaching level. His findings revealed that elementary school teachers were found to have a more favorable attitude towards computer than high school and middle school teachers.

Technology Integration Practice of Teachers

The theory of engagement. Kearsley and Shneiderman (1998) developed the theory of engagement to provide a framework on how technology could be best applied in education. They used their experiences as teachers in electronic and distance education environments as the basis of the said theory. Kearsley and Shneiderman (1998) stated that the fundamental principle of engagement theory is for students to have meaningful engagement in learning activities through interaction with others and worthwhile tasks with the use of technology. Kearsley and Shneiderman (1998) further stated that relate, create, and donate, as the three components of the theory, should be experienced by students as they engaged in various learning tasks. They stated that the relate component emphasizes team efforts and should involve students in communication, planning, management, and social skills. The create component should challenge students to be involved in problem-solving, focusing their efforts on the application of ideas on a specific context. Lastly, Kearsley and Shneiderman (1998) described the donate component as a value of making useful contributions while learning, that is, projects developed by students should have a specific customer.

The engagement theory of Kearsley and Shneiderman (1998) provided a concrete foundation on how technology should be integrated into education to make learning more meaningful for the students. However, existing studies reveal that the application of the said theory has not been fully materialized, leading to various concerns on how teachers utilize technology in their respective classes and its impact to the performance of their students.

Defining technology integration. Dockstader (1999) defined technology integration as using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways. She added that it uses software supported by the business world for real-world applications, so the students learn to use computers flexibly, purposely, and creatively. Saettler (2004) believed that technology integration is any systematized practical knowledge, based on experimentation or scientific theory, which enhances the capacity of society to produce goods and services, and which is embodied in productive skills, organization, or machinery. Thus, the integration of technology for Saettler is more of a process than an outcome. The use of pictures and written language to convey information is already regarded as technology. The more complex the culture is, the more advanced the technology is. Panda (2017) defined the use of technology in education as encompassing design-development-application-evaluation of education and training systems and processes at all levels of education and training either formal, non-formal, adult, continuing, and lifelong education. She added that it also includes the use of a wide variety of media ranging from the audio-visual aids to the current open-source software and social networking tools. The understanding of Saettler (2014) and Panda (2017) on the use of technology in education pertains to a more appropriate concept associating technology to education, which is instructional technology. In here, teachers play a crucial role as instructional designers.

Bates (2014) emphasized the rise of computer-based learning in this computerized teaching.

A typology of teaching, where Bates said that information and assessment are structured, provides immediate feedback to learners without human intervention other than the design of the hardware and software being used.

Januszewski and Molenda (2008, as cited by Mikropolous, Sampson, Nikopolous, & Pintelas, 2014) defined educational technology as the study and ethical practice of facilitating learning and improving performance by creating and managing appropriate technological processes and resources. Indicating that beyond maximizing the use of technology to improve the process of learning, technology integration in education entails the managing of its processes and resources for appropriate use.

The varied definitions of technology integration in education indicate that it is more than the use of technological gadgets per se. The instructional design is an antecedent to make the utilization of technology in the learning process more effective. Teachers as instructional designers act as moderators between technology and learners for the latter's appropriate use.

In this study, technology integration refers to how teachers incorporate the use of technology in teaching their respective subjects to make learning more meaningful for the students. As such, it both concerns the use of technology as a teaching tool and as a learning tool.

Domains of technology integration. Results of the review of literature conducted in this study reveal that teachers have various ways and varying degree of integrating technology in education as a teaching tool and as a learning tool.

Technology as a teaching tool. Technology is used by teachers as an extension of traditional strategies to teach their respective subjects. In the study conducted by Bang and Luft (2014) on secondary science teachers' use of technology in the classroom, they found that PowerPoint, a software that aids the presentation of data, is mostly used by teachers whereas other software for procedural laboratories is less utilized. They recommended the redefinition of how technology should be utilized in science classrooms to enhance inquiry-based science teaching and learning. Findings of the study conducted by DeCoito and Richardson (2018) about the present practice and future direction of teachers' use of technology are in consonant with Bang and Luft's (2014) findings. The qualitative data they gathered revealed that 35% of the teachers use technology for research, 29% for visual and presentation of lessons, and only 17% for classroom interaction. In addition, they found that teachers are confident in terms of content, pedagogy, and technology but viewed technology as a tool rather than an embedded part of the learning process. DeCoito and Richardson (2018) recommended the provision of professional development that will serve as pathways for educators to learn the interdependence of technology, pedagogy, and subject matter content.

Technology as a learning tool. Teachers' use of technology as a learning tool for their students appears to be a prevailing concern even in the contemporary period. Ruggiero and Mong (2015), in the qualitative study they did to determine the experience of teachers as they integrate technology in the classroom, found that various technologies are utilized by teachers to facilitate their lessons, and utilization varies from one teacher to another. They added that there were teachers who establish routine tasks to their students using technology, such as Smartboard, and there were also those who maintained communication with parents and staff members using Internet resources. Furthermore, the results of the interview Ruggiero and Mong (2015) conducted revealed that teachers consider the lack of in-service training, lack of available technology, and restricted curriculum as external barriers for the effective integration of technology in the classroom.

Measuring technology integration. The technology integration matrix (TIM) developed by Florida's Center for Instructional Technology has been receiving fair attention in research as a tool to measure the extent of technology integration in schools. TIM has five interdependent characteristics of meaningful learning environment with technology: active, collaborative, constructive, authentic, and goal-directed. These characteristics are associated with five levels of technology integration: entry, adoption, adaptation, infusion, and transformation.

Meigs (2010), in his study about the development and validation of TIM questionnaire, revealed the internal reliability coefficient for each characteristic of the tool namely active=0.88, collaborative=0.91, constructive=0.86, authentic=0.93, and goal directed=0.89. Similarly, he also revealed the internal reliability coefficient of each level of technology

integration: entry=0.83, adoption=0.90, adaption=0.93, infusion=0.93, and transformation=0.91. Ruman and Prakasha (2017) examined the use of TIM in measuring the extent of technology integration among secondary science teachers to facilitate their lessons. In most of the studies they reviewed, they found that the use of TIM had been beneficial in helping teachers, administrators, and other stakeholders to effectively integrate technology, challenging these people to use a variety of technology in dynamic ways.

Association of Teachers' Attitude Towards Technology with Their Technology Integration Practice

Limited studies had been conducted to find the association between teachers' attitude towards technology and technology integration practice in the classroom. Howley, Wood, and Hough (2011) in the study they conducted about the rural elementary school teachers' technology integration practice found that attitudes, teachers' preparation for using technology, and the availability of technology had a significant positive association with technology integration. Similarly, Thang, Lin, Mahmud, Ismail, and Zabidi (2014), in the qualitative study they conducted to map out the concerns of Malaysian ESL instructors in using digital storytelling as a form of technology integration, found that teachers perceived technology to be beneficial for their students. However, concerns such as hardware and software troubleshooting, sharing expertise among themselves, and ease of use lead them to resist using technology. This, in a way, affects their technology integration practice.

Pittman and Gaines (2015) had a similar observation on the study they conducted about the technology integration practice in third, fourth, and fifth-grade classrooms in Florida, U.S.A. Findings of their study suggest that teachers' attitude and beliefs on the importance of technology integration had a significant positive correlation with the high level of technology usage. Pittman and Gaines (2015) recommended the creation of more appropriate professional development opportunities that target the three main goals—lessening the time required for teachers to learn and use technologies and implement them, providing specific strategies for instructing students in the use of technology and focusing on the importance of technology to students' future success.

Zyad (2016) investigated the attitude of secondary school teachers towards ICT in El-Jadida, Morocco, as well as the barriers that hinder them from spreading ICT use for teaching purposes. Zyad (2016) found that despite teachers' positive attitude towards ICT, infrastructural (poor quality of school equipment) and logistical (lack of communities practice and lack of collaboration among teachers) barriers need to be removed to improve its underused status. Results of Zyad's (2016) study indicates that a favorable attitude of teachers on technology use does not fully guarantee its full utilization.

The attitude of teachers towards technology was found to have a significant association with their technology integration practice. However, it does not fully define the teachers' extent of technology utilization in the classroom. The underutilization of technology remains to be a concern despite teachers having a favorable attitude towards its use in the classroom.

Conceptual Framework

This study aims to examine the attitude of Filipino teachers towards technology and its determinants. In addition, it intends to find an association between teachers' attitude towards technology and their technology integration practice in the classroom.

Figure 1 shows the conceptual framework of this study. It specifically displays the variable being examined in this research, which includes the profile of the teachers, attitude of teachers toward technology, and technological-integration practice of teachers. The framework illustrates (1) age (Cavas et al., 2009; Mustafina, 2016), years of stay in school (Tezci, 2010; Semerci & Aydin, 2018), and grade level assignment (Williams, 2015) as determinants of teachers' attitude towards technology; (2) perceived ease of use and perceived usefulness (Alharbi & Richardson, 2014; Fathema et al., 2015; Elkaseh et al., 2016) as measures of attitude towards technology; and (3) teaching tool (Bang & Luft, 2014; DeCoito & Richardson, 2018) and learning tool (Ruggiero & Mong, 2015) as measures of technology integration practice. Furthermore, it shows the association of teachers' attitude towards technology with their technology integration practice (Howley et al., 2011; Thang et al., 2014; Pittman & Gaines, 2015; Zyad, 2016).

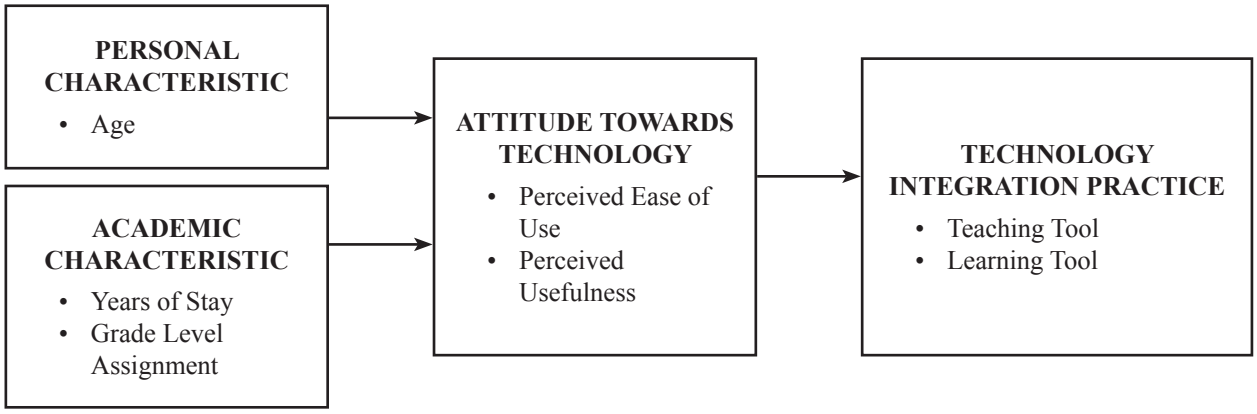

Figure 1. Conceptual framework.

Statement of the Problem

The following research questions are sought to be answered in this study:

1. What is the demographic profile of the teachers in terms of the following?
   a. personal characteristic
   b. academic characteristics
2. How do the personal and academic characteristics of teachers associate with their attitude towards technology?
3. What is the level of teachers' attitude towards technology?
4. What is the level of teachers' technology integration practice?
5. How does the attitude of teachers towards technology associate with their technology integration practice?

Hypotheses

The following hypotheses are to be tested in this study:

$H1_0$: The personal characteristic of the teachers is not a significant determinant of their attitude towards technology.

$H2_0$: The academic characteristic of the teachers is not a significant determinant of their attitude towards technology.

$H3_0$: The teachers' attitude towards technology is not significantly associated with their technology integration practice.

Significance of the Study

The significance of the study goes to the fact that there were limited studies conducted that examined the relationship of the personal and academic profiles, attitude towards technology, and technology-integration skills of teachers in Philippine settings. In addition, the findings of this study could serve as a foundation for the implementation of technology-enhanced education.

Scope and Limitations

This study examined the profile of teachers and determined its association with their attitude towards technology. In addition, the association of attitude to technology-integration skills of teachers was examined. Majority of the respondents of this study are teachers from the high school department of selected private and public schools in Metro Manila.

Methods

Research Design

This quantitative study used explanatory design to examine the attitude of teachers towards technology, its determinants, and association with their technology integration practice.

Population Sampling Technique

This study used the random sampling technique in the selection of respondents. It is a random selection of sampling units within the segments of the population

with the most information on the characteristics of interest (Guarte & Barrios, 2004). The target population size for this study is 150. The computed sample size, based on Raosoft, Inc. online sample calculator, is 109 with 95% confidence level, 5% margin of error, and 50% response distribution. The actual number of respondents is 125.

Instrumentation

I generated a survey tool with three parts. The first part was used to gather the personal and academic profile of the respondents. The second part was used to determine the respondents' attitude towards technology of which the items were adopted from the technology acceptance model of Ventakesh & Davis (2000). Item numbers 1–5 intend to measure the respondents' perceived usefulness of technology, whereas item numbers 6–10 intend to measure their perceived ease of use of technology. A five-point Likert scale was used to gather responses with 1 as strongly disagree, 2 as disagree, 3 as uncertain, 4 as agree, and 5 as strongly agree. The average of responses from items 1–5 and 6 –10 were computed to determine the level of respondents' attitude towards technology and interpreted based on the following: 0.00–1.00 as very unfavorable, 1.01–2.00 as unfavorable, 2.01–3.00 as moderately favorable, 3.01–4.00 as highly favorable, and 4.01–5.00 as very highly favorable.

The third part was used to determine the technology-integration practice of the respondents, and the items were derived from the technology integration matrix of Florida's Center for Instructional Technology . Item numbers 1–5 were adopted from the said tool and aimed to determine the teachers' use of technology as a teaching tool. I generated item numbers 6–9 to determine how teachers used technology as a learning tool. Item number 6 states, "My students are actively engaged in educational activities where technology is a transparent tool used to generate and accomplish objectives and learning." Item number 7 states, "My students use technology tools to collaborate with others." Item number 8 states, "My students use technology to understand the content and add meaning to the learning," and item number 9 states, "My students use technology tools to solve real-world problems meaningful to them such s digital citizenship." A five-point Likert Scale was used to gather responses with 1 as strongly disagree, 2 as disagree, 3 as uncertain, 4 as agree, and 5 as strongly agree. The average of responses from item numbers 1–5 and 6–9 were computed to determine the level of respondents' technology integration practice and interpreted based on the following: 0.00–1.00 as very low integration practice, 1.01–2.00 as low integration practice, 2.01–3.00 as moderate integration practice, 3.01–4.00 as high integration practice, and 4.01–5.00 as very high integration practice.

The instrument was pilot tested to 20% (30) of the total target respondents to determine its reliability. The computed internal reliability coefficient for perceived use of technology is .71, for perceived ease of use of technology is .82, for teaching tool is .71, and for learning tool is .80. Results suggest that the instrument is suited for the type of respondents it is intended to be used.

Data Collection Methods

Data were collected from the respondents through a paper and pen survey and online survey using Google Form. Research that gathered data through a survey refers to a collection of information from a sample of individuals through their responses to questions (Check & Schutt, 2012, as cited by Ponto, 2015). There were 97 respondents who used the paper and pen survey tool, and 28 respondents responded thru Google Form. Responses were collected from the respondents within three weeks.

Data Analysis Methods

The trial copy of Statistical Package for Social Science version 21 was used to analyze the personal and academic characteristics of the respondents. After the frequency distribution and percentages were computed, it shows the different measurement categories and the number of observations in each category (Manikandan, 2011). The same software was used in determining the level of teachers' attitude towards technology and technology integration practice by computing its mean and standard deviation. A trial copy of AMOS version 20 was used to perform a confirmatory factor analysis on teachers' personal and academic characteristics. Similarly, it was used to perform structural equation modeling involving teachers' attitude towards technology and their technology integration practice. AMOS provides a very general and convenient framework for statistical analysis that includes several traditional multivariate procedures (Hox & Bechger, 1998).

Results

Profile of the Respondents

Table 1 shows the summary of the respondents' profile. Data revealed that majority of the respondents are within the age range of 20–30 (61%), but only a few (5%) are between 51–60 years of age. Majority of them have been serving the school as a faculty member for less than 10 years (84%). Lastly, the majority of the respondents are handling junior high school students (67%), and a few teaches in the grade school level (7%).

Level of Teachers' Attitude Towards Technology

Table 2 shows the summary of teachers' responses pertaining to their attitude towards technology.

Data in Table 2 revealed that USE1 (Item No. 1) has the highest mean ($\bar{x}$=4.58, $\sigma_{\bar{x}}$=.72), indicating that majority of the respondents strongly agree that technology in the form of any computer applications is useful for them as teachers. In contrast, USE5 (Item No. 5) has the lowest mean ($\bar{x}$=4.25, $\sigma_{\bar{x}}$=.67), indicating that respondents have various perception whether it is easy for them to become skillful in using technology in teaching. Nevertheless, majority of the respondents have a very favorable attitude towards technology in terms of perceived usefulness ($\bar{x}$=4.40, $\sigma_{\bar{x}}$=.72). Furthermore, EASE5 (Item No. 10) has the highest mean ($\bar{x}$=4.34, $\sigma_{\bar{x}}$=.63), indicating that they have fun using technology in teaching. EASE1 (Item No. 6) has the lowest mean ($\bar{x}$=3.98, $\sigma_{\bar{x}}$=.78), indicating that the respondents differ in perspective of whether learning to use the programs and the technology-hardware are easy for them to learn. Similarly, majority of the respondents have a very favorable attitude towards technology in terms of perceived ease of use ($\bar{x}$=4.14, $\sigma_{\bar{x}}$=70). Results of the survey reveal that the majority of teachers have a favorable attitude towards technology in terms of perceived use than perceived ease of use.

Level of Teachers' Technology Integration Practice

Table 3 shows the summary of teachers' responses to the survey about their technology integration practice in the classroom.

Table 1

Profile of the Respondents

Determinants		Frequency	Percentage
A. Personal Characteristic			
Age	20-30	76	61%
	31-40	24	19%
	41-50	16	13%
	51-60	6	5%
	No Answer	3	2%
B. Academic Characteristics			
Years of Stay	0-10	105	84%
	11-20	12	10%
	21-30	6	5%
	No Answer	2	1%
Grade Level Assignment	Grade School (1 to 6)	9	7%
	Junior High School (7 to 10)	84	67%
	Senior High School (11 and 12)	31	25%
	No Answer	1	1%
Sample Size (Observations)		125	

Table 2

Teachers Attitude Towards Technology

Item Number	Mean	Standard Deviation	Interpretation
Perceived Usefulness	4.40	.72	Highly Favorable
USE1	4.58	.72	
USE2	4.52	.69	
USE3	4.28	.75	
USE4	4.36	.78	
USE5	4.25	.67	
Perceived Ease of Use	4.14	.70	Highly Favorable
EASE1	3.98	.78	
EASE2	4.01	.75	
EASE3	4.14	.72	
EASE4	4.24	.61	
EASE5	4.34	.63	
Sample Size (Observations)		125	

Table 3

Teachers' Technology Integration Practice

Item Number	Mean	Standard Deviation	Interpretation
Teaching Tool	3.29	.70	High Integration Practice
TEACH1	4.32	.61	
TEACH2	3.84	.69	
TEACH3	3.77	.83	
TEACH4	3.90	.73	
TEACH5	4.03	.62	
Learning Tool	4.07	.70	Very High Integration Practice
LEARN1	4.06	.71	
LEARN2	4.11	.72	
LEARN3	4.11	.69	
LEARN4	4.00	.66	
Sample Size (Observations)		125	

Data in Table 3 revealed that TEACH1 (Item No. 1) has the highest mean ($\bar{x}$=4.32, $\sigma_{\bar{x}}$=.61), indicating that majority of the respondents strongly agree that they use technology to deliver curriculum content to their students. In contrast, TEACH3 (Item No. 3) has the lowest mean ($\bar{x}$=3.77, $\sigma_{\bar{x}}$=.83), indicating that the respondents have varying responses whether they direct students in the conventional use of tool-based software or not. Majority of the respondents highly integrate technology in their respective classes as a teaching tool ($\bar{x}$=3.29, $\sigma_{\bar{x}}$=.70). In addition, LEARN3 (Item No. 8) has the highest mean ($\bar{x}$=4.11, $\sigma_{\bar{x}}$=.72), indicating that majority of the respondents strongly agree that their students are using technology to collaborate with others, and they use technology to understand the content and add meanings to their learnings. LEARN4 (Item No. 9) on the other hand, has the lowest mean ($\bar{x}$=4.00, $\sigma_{\bar{x}}$=66), indicating that respondents have different views on whether their students use technology tools to solve real-world problems that are meaningful to them or not. Nevertheless, majority of the respondents have very high technology integration practice with technology as a learning tool ($\bar{x}$=4.07, $\sigma_{\bar{x}}$=.70). Results of the survey on technology integration practice of teachers revealed that they extensively used technology as a learning tool than a teaching tool.

Determinants of Teachers' Attitude Towards Technology

Figure 2 shows the confirmatory factor analysis I performed to identify the significant determinants of teachers' attitude towards technology.

Results revealed that the grade level assignment has the greatest impact on the attitude of the respondents towards technology (S β = -.12) with a p-value of .05. This indicates that a unit increase in the grade level will have a .12 decreased in the attitude of the respondents toward technology. In terms of age (S β = .09), for a unit increase, there will be a .09 point decrease in the attitude of the respondents towards technology. In terms of years of stay in school (S β = .08), for a unit increase, there will be a .08 point increase in the attitude of the respondents towards technology.

Association of Teachers' Attitude Towards Technology and Their Technology Integration Practice

I performed structural equation modeling to determine the items that greatly contribute to the association of teachers' attitude towards technology and their technology integration practice. Figure 3 shows the proposed model.

Measurement model development. I performed exploratory factor analysis using AMOS to determine the reliability and validity of a set of items in each latent construct, that is, items 1–5 for the latent construct USE (perceived usefulness of technology), items 6–10 for EASE (perceived ease of use of technology), items 1–5 for TEACH (use of technology as a teaching tool), and 6–9 for LEARN (use of technology as a learning tool).

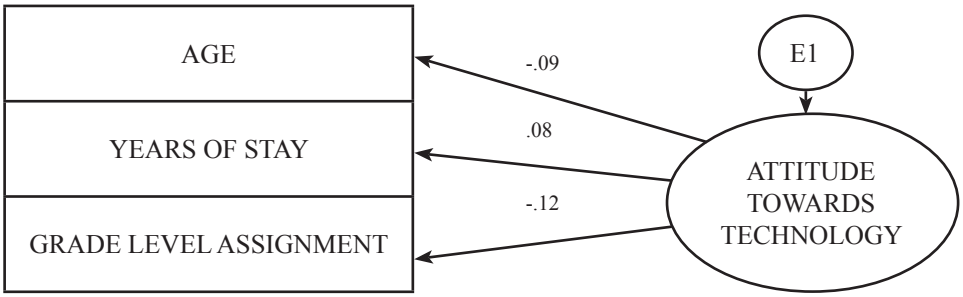

Figure 2. Confirmatory factor analysis.

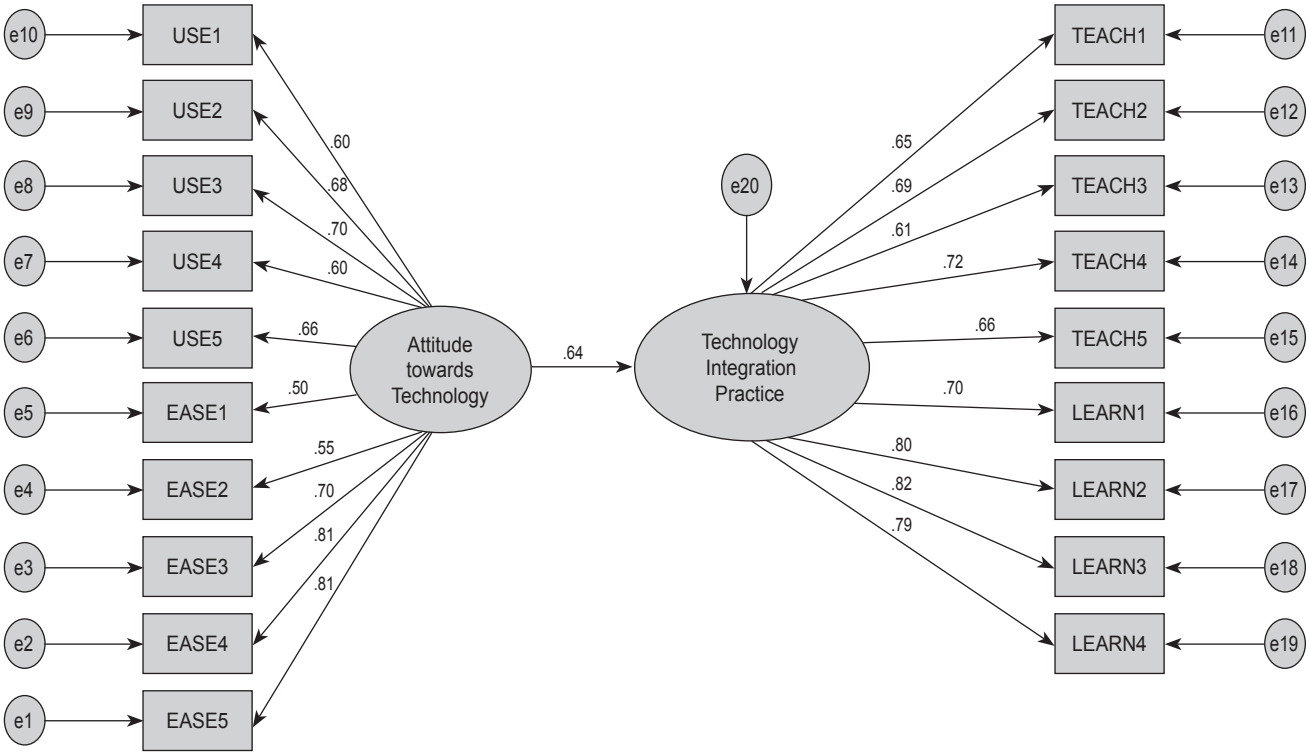

Figure 3. *Proposed model of association of teachers' attitude towards technology with their technology integration practice*

The internal reliability coefficient of each construct was also computed. According to Taber (2018), Cronbach's alpha score should at least be 0.7 to be acceptable for internal consistency. Reliability of each factor is shown in Table 4. The construct validity was examined by determining the convergent validity using composite reliability and average variance extracted. According to Hooper, Coughlan, and Mullen (2008), a common value used for composite reliability should be at least 0.7 and 0.5 or higher for average variance extracted. Table 4 shows that the loading value of each factor is greater than .50 with significance p-value <.001.

Discriminant validity was determined using correlation analysis among the four constructs. Fornell and Larcker (1971, as cited in Ab Hamid, Sami & Sedek, 2017) stated that the correlations among the items in two constructs should be less than the square root of the average variance extracted shared by the items within the construct. Table 5 shows the correlation among the four constructs.

Data in Table 5 shows that a moderate positive correlation exists between the perceived usefulness and perceived ease of use of technology (r =.579, p =.000). In addition, a moderate positive correlation is observed between technology as a teaching tool and technology as a learning tool (r =.707, p =.000). However, data reveal that there is a very weak correlation between the perceived use of technology and technology as a teaching tool (r =.272, p =.002) and as a learning tool (r =.302, p =.001). In terms of perceived ease of technology, it has a weak positive correlation with technology as a teaching tool (r =.416, p =.000) and as a learning tool (r =.446, p =.001).

Table 4

Construct Reliability

Factor	Item	Factor Loading	Composite Reliability	Average Variance Extracted	Cronbach's Alpha
USE	USE1	.76	.843	.451	.831
	USE2	.81			
	USE3	.83			
	USE4	.59			
	USE5	.53			
EASE	EASE1	.46	.780	.448	.828
	EASE2	.57			
	EASE3	.74			
	EASE4	.88			
	EASE5	.82			
TEACH	TEACH1	.67	.833	.449	.827
	TEACH2	.76			
	TEACH3	.66			
	TEACH4	.78			
	TEACH5	.66	.880	.59	.874
LEARN	LEARN1	.63			
	LEARN2	.88			
	LEARN3	.90			
	LEARN4	.79			

Table 5

Correlation Between Constructs

	Square Root of AVE	USE	EASE	TEACH	LEARN
USE	.672	1.00			
EASE	.669	.579 .000	1.00		
TEACH	.670	.272 .002	.416 .000	1.00	
LEARN	.768	.302 .001	.446 .000	.707 .000	1.00

*correlation is significant at .05 level (two-tailed)

In addition, the correlation between constructs is found to be smaller than the square root of the average variance extracted, eliminating the issue of multicollinearity among them.

Figure 4 shows the modified model with most of the criteria for indices satisfied.

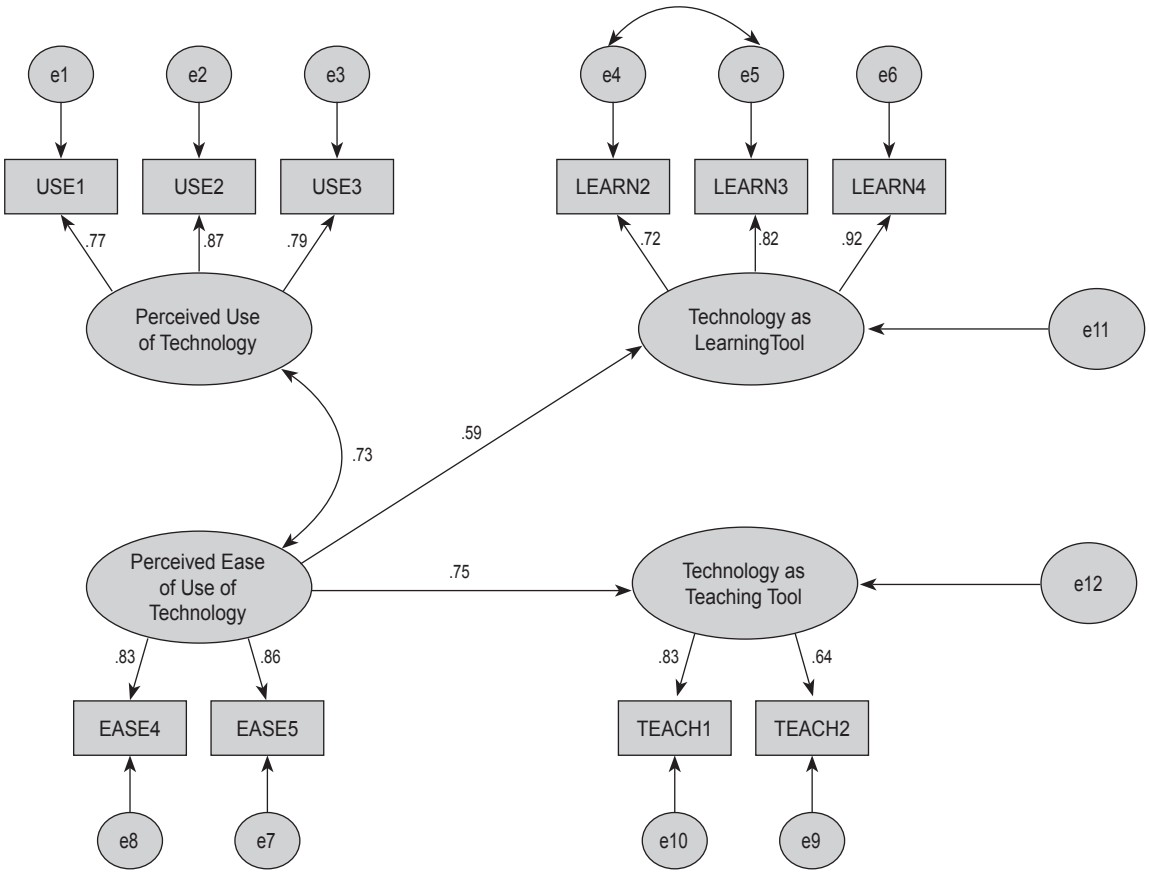

Figure 4. Modified model of association of teachers' attitude towards technology with their technology integration practice.

AMOS version 21 was employed to evaluate the goodness of fit of the structural model. This study examined the following to determine the model's goodness of fit: Tucker-Lewis index (TLI), relative fit index (RFI), comparative fit index (CFI), normed-fit index (NFI), and root mean square error of approximation (RMSEA). Hooper et al. (2008) stated that chi-square as a criterion in determining the goodness of fit of a model has limitations such as its sensitivity to the sample size. According to Hooper et al. (2008), the acceptable value of chi-square should range from 5.0 to 2.0. The small sample size used in this model has affected the value of its chi-square, 46.7, df=31, leading me to examine its other composition. Hooper et al. (2008) stated that the RMSEA value should be below .08 for the model to be a good fit. In addition, they suggested that NFI, CFI, TLI, and RFI's value should be ≥ .95. This value is satisfied by most of the indices in the modified model, making it close to a good fit. In addition, the proposed model has been modified by examining its covariances and correlation with one another. Table 6 shows a summary of the examination done among error terms. Hooper et al. (2008) stated that this is another way of improving the model.

The model suggests that only the perceived ease of use of technology significantly associates with the technology integration practice of the teachers. A unit

Table 6

Summary of Modified Model

Variables	Standard β	Standard Error	Model Summary	P-value
TTT←EASE	.75	.116	Chi Square=46.7	<.001
TLT←EASE	.59	.112	Df=31	
USE1←USE	.77		P Level=.035	
USE2←USE	.87	.116	TLI=.96	
USE3←USE	.79	.122	RFI=.88	
LEARN2<–TLT	.72		CFI=.98	
LEARN3<–TLT	.82	.091	NFI=.93	
LEARN4←	.92	.174	RMSEA=.064	
EASE5←EASE	.86			
EASE4←EASE	.83	.093		
TEACH2←TTT	.64			
TEACH1←TTT	.83	.201		

*TTT: Technology as Teaching Tool; TLT: Technology as Learning Tool; USE: Perceived Use of Technology; EASE: Perceived Ease of Use of Technology

Table 7

Covariances and Correlation of Error Terms

	Estimate	Standard Error	CR	P value	Correlation
EASE←>USE	.218	.042	5.227	<.001	.727
E4←>E5	.099	.039	2.530	.011	.502

increase in here would have a .59 increase in teachers' use of technology as a teaching tool. Furthermore, it would have a .75 increase in their use of technology as a learning tool with p-value < .001.

Results indicate that EASE and USE are covariance estimated at .218 significant at a p-value of < .001. Similarly, a strong positive correlation is observed between them (r =.727, p <.05). E4 (error term 4) and E5 (error term 5) are covariances as well estimated at .099 with a *p*-value of .011. In addition, the two error terms are found to have a moderate positive correlation (r =.502, p =.05).

Discussion

Effects of Personal and Academic Profile of the Respondents' to Their Attitude Towards Technology

The findings in this study suggest that the grade level assignment of the teachers as the respondents has the most significant association with their attitude towards technology. This can be attributed to the fact that majority of the respondents who participated in the study handle students from the junior high school level. This finding can be added to what had been found out by Williams (2015) on the favorable attitude of elementary teachers on using technology in the classroom. As such, the higher the grade level assignment of the teachers, the lesser will be their appreciation on the use of technology. In addition, this study found age and years of stay in school to have a weaker association with their attitude towards technology. This supports that findings of Cavas et al. (2009) in that teachers have varying attitudes towards technology depending on their age bracket, and Tezci (2010) in that teachers with more teaching experiences tend to have lesser appreciation on the use of technology.

Results of this study successfully reject the null hypotheses numbers 1 and 2 and accept the alternative hypotheses.

Association of Teachers' Attitude Towards Technology and Their Technology Integration Practice

The attitude towards technology was found in this study to have a significant association with the perceived technology-integration practice of the teachers. Both the perceived ease of use and perceived usefulness of technology have been found to be predictors of teachers' attitude towards technology (Alharbi & Drew, 2014; Fathema et al., 2015; Elkaseh et al., 2016). Similarly, technology as a teaching tool (Bang & Luft, 2014; & DeCoito & Richardson, 2018) and technology as a learning tool (Ruggiero & Mong, 2015) were found to be predictors of technology integration practice of teachers. However, the results of this study reveal that teachers utilized technology in their classroom more as a learning tool than as a teaching tool in contrast to what Bang and Luft (2014) had found out in their study. In addition, this study found a significant association of teachers' attitude towards technology with their technology integration practice (Howley et al., 2011; Thang et al., 2014; Pittman & Gaines, 2015; Zyad, 2016). However, the structural equation model revealed that only the perceived ease of use of technology is significantly associated with technology integration practice of teachers. This finding supports Ajzen's (1991) theory of planned behavior where the attitude to perform a behavior is captured by the individual's motivation, which depends on how hard and how much effort he/she needs to exert to perform the behavior. This indicates that teachers would better utilize technology if they find it easy to use, letting them spend little time in learning its application in their respective subjects.

The structural equation model generated in this study also presents the significant concerns that contribute to teachers' perceived use of technology. Majority of the respondents perceived that technology in any computer application is useful for them. It helps them improve their performance as a teacher and helps them learn more about the subject they are teaching. Lastly, most of them perceived that technology improves the efficiency of their life in general. With regards to their perceived ease of use, the majority of the teachers find technology easy to use if they add enjoyment to their teaching activities and fun to be used. In technology integration practice, they find it useful as a teaching tool in delivering curriculum contents to their students and in directing students in the conventional use of tool-based software. They find it useful as a learning tool in engaging students to collaborate with others, understanding the meaning of their subject contents and in solving real-world problems meaningfully. This indicates the application of Kearsley and Shneiderman's (1998) theory of engagement where students engage in a team effort to solve a task involving communication, planning,

management, and social skills (relate) and involving problem-solving in a specific context (create).

Results of this study successfully reject the null hypothesis number 3 and accept the alternative hypothesis stating that the attitude of teachers towards technology, specifically their perceived ease of use, significantly associates with their technology integration practice in the classroom.

Conclusion

This study concludes that the grade level assignment is a significant determinant of teachers' attitude towards technology. Findings suggest that the higher the grade level assignment of teachers, the lesser will be their appreciation on the use of technology in the classroom and vice versa.

In addition, this study found that technology is now being utilized more as a learning tool rather than as an extension of teachers' conventional teaching strategies.

The association of teachers' attitude towards technology and their technology integration practice has been proven to be true in this study. However, it is only their perceived ease of use of technology that was found to be significantly associated with using technology as a teaching tool and a learning tool as indicators of their technology integration practice.

A significant finding revealed in this study highlighted the relationship between the grade level handled by teachers and their attitude towards technology. With this, it would be interesting to pursue a study on how technology is being utilized in the junior high school, senior high school, and even in the college level that would best explain the significance of its application.

This study reveals that teachers had been using technology more as a learning tool. A qualitative study involving classroom observations, document analysis, and interview would provide a better explanation of how technology is integrated in the classroom.

Lastly, there is a need to conduct large-scale surveys to determine definitively this study's findings.

Declaration of ownership

This report is my original work.

Conflict of interest

None.

Ethical clearance

The study was approved by the institution.

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