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Development of A Model of Technology Integration at A K-12 Level

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Abstract

There is no doubt that the way people live, interact, communicate, and conduct business changes dramatically. This change is known as the "digital revolution," which refers to the progression of technology from analogue, electrical, and mechanical tools to the digital tools accessible today. Furthermore, technology has begun to alter education, influencing how learners gain the skill sets required to prepare for future education and a profession and how educators use digital technological instructional strategies to educate. Various studies have been published that address the challenges to technology integration and, of course, the efficacy of technology in the classroom. This research attempts to develop a method to comprehend the influence of technology integration on educators' teaching performance at a private K-12 school in Hanoi City. The respondents of this study consist of fifty (50) educators who apply educational technology in their teaching. The findings revealed that all with the teaching performance measured, educators were described as very satisfactory. The study's results demonstrated that technology integration had a considerable influence on teaching performance. It is suggested that School Leaders continue to offer programs, seminars, and training workshops on technology integration to improve educators' performance.

Keywords: eLearning, K-12 Education, Technology integration, Technology use

1. Introduction

Over a decade, there has been a tremendous shift in the classroom, particularly in imparting courses in the most comfortable manner. That is why many educators have become creative in terms of how they will deliver the knowledge effectively and efficiently. The factors that influence technology integration in classrooms and how digital technologies are used in teaching and learning have become critical issues in educational technology (Tondeur et al., 2008; Wastiau et al., 2013) Until then, that educator uses technology, which is growing at a rapid pace in society. Technology integration has opened up new possibilities for teaching and learning in our school. It also opens up new options for making the learning process more conducive, interactive, and fruitful for educators and learners. In May 2017, the Vietnamese Prime Minister issued Directive No.16/CT-TTG on "Strengthening Access to the Fourth Industrial Revolution," requesting a dramatic change in education in terms of policies, contents, and methods to provide human resources that are well adapted to constant changes and new technology trends in Industry 4.0 (Phuc, 2017). In accordance with this, the Vietnamese government has encouraged collaboration between educational institutions and international organizations to create technology-enhanced experiences that address curriculum content and improve teaching performance. As a result, an increasing number of educators across the country are being exposed to technological infusions that can assist them in improving their teaching performance. Furthermore, incorporating technology into the classroom is critical for increasing educator productivity and performance. The findings revealed that educators and learners are both competent members of the class due to their equipment and innovative pedagogical routines incorporating technology into the teaching and learning experience. Besides that, using technology to teach any subject produces optimal

results in terms of educator performance. It demonstrates that technology integration was successful in its mission to provide a positive response in education, particularly in innovating current education. Unfortunately, numerous studies call into question the benefits of incorporating technology into the classroom. The findings show that educators saw technology integration as beneficial to their learners' success; however, their practices and performance did not reflect this increased importance. Findings revealed that faculty members' lack of technological proficiency necessitates their inability to incorporate these new technologies into the classroom, resulting in many remaining unused. This is supported by the findings, which show that faculty members need to learn how to use technology and how to integrate technology into their curricula. As a result, this study aims to assess and evaluate the impact of technology integration in educators' teaching performance and determine the relationship between technology integration in teaching and educator productivity and find out the best model to apply at Horizon International Bilingual School. Furthermore, this research aims to assist school leaders in guiding their teaching staff to apply and deliver their lessons successfully with the use of technology to achieve the entire satisfaction of learning that the educator expects from his learners.

2. Literature Review

2.1 Technology integration and it's models;

Initially, technology integration in education was characterized as the use of technology only in classrooms. It is today characterized as a continuous and sustained process that helps the learning of students. However, the dilemma of how to actualize an integration process that can contribute to student learning is in the forefront at this time. Understanding and implementing a complex, multi-dimensional, dynamic process like technology integration is difficult, and various models have been produced to date (Sumba Nacipucha et al., 2020). Many integration models approach integration from various angles, and the indications of integration for each model varies in terms of objectives and elements (Kuskaya & Koçak, 2015).

The focus of the 5W1H (What?Why?Where?When?Who?How? Unified Integration Model is on student learning, and it is built on assessing and planning the process to improve student learning. While the emphasis in the Generic Model of Pedagogy, Social Interaction, and Technology is on the tool in the process and what the tool provides in various contexts, rather than on students and teachers (Wright et al., 2007). Also, the E-capacity Model takes a comprehensive view of the integration process, emphasizing schools as places where education is effectively realized. It is presumptively assumed that students, instructors, and tools are subunits of the school system, and that they can only be maintained if the entire system is improved. Contrary to popular belief, the use of ICT by instructors is not viewed as a dependent variable in this paradigm; rather, it is viewed as a process or an independent variable that leads to other outcomes (Wang, 2008).

2.2 Factors affecting technology integration in K-12 classrooms;

Several prior research has shown that integrating technology into classroom instruction is a gradual and challenging process driven by various factors (Levin & Wadmany, 2008; Snoeyink & Ertmer, 2001; Valcke et al., 2007). For example, research has identified an extensive range of teacher or school-related elements that substantially impact technology integration, including instructors' beliefs and attitudes. (Chen, 2008; Jimoyiannisa & Komisb, 2007; Lim & Chai, 2008; Lumpe & Chambers, 2001; Van Melle et al., 2003; Vannatta & Fordham, 2004; Wozney et al., 2006), computer and resource availability and access (Hohlfeld et al., 2008), and school support system (Davis et al., 2009; Ringstaff, & Kelly, 2002; Van Melle et al., 2003). Teacher factors were academic degree, gender, computer skills and years of experience in teaching. According to Mathews and Guarino (2000), Using data gathered from almost 3000 teachers from Southeast Idaho, researchers found that gender, years of experience, the number of computers and computer skills directly affect the use of technology; while technology usage experience directly affects computer skills. Mathews, & Guarino (2000) also indicated that years of teaching experience indirectly affected teachers' computer use.

2.3 The impact of technology integration in teaching performance

Integration of technology into teaching has a significant impact on teachers' performance. According to

Hero (2019), the critical predictor of technology integration was productivity and professional practice. Moreover, the development of technological integration opens new opportunities for teaching and learning. Furthermore, it provides another path for making the learning process more hospitable, participatory, and profitable for teachers and students (Schul, 2014). Also, research advocates that teachers and students constitute competent class members through their equipment with creative pedagogical routines, integrating technology in the teaching and learning experience. According to Trucano (2015), technology empowers teachers and students while also promoting the skills required for the 21st-century workplace. According to Wright and Akgunduz (2018), Educational Technology allows students to explore, discover, create, interact effectively and freely with instructors, complete and receive assignments and comments online, and create and participate in online discussions. Gadgets are exposed to the search for the content in all ways on mobile phones, tablets and digital boards, which enable learners in educational institutions to gain access and promote knowledge on an hourly basis.

2.4 Educators' pedagogical and content knowledge

Because technology-based training is learner-centred rather than educator-centred, educators' roles and duties, as well as the learning process, have changed fundamentally. Learners can use technology and education to help them understand without being constrained by time or location; in this environment, they can easily collect and analyze data, test hypotheses, design experiments, and draw conclusions. Because utilizing tools and technologies will reduce some limitations in the classroom (Zamani & Azimi, 2010). The use of technology suggests a variety of possibilities for advancing and expanding a traditional teaching and preparation paradigm primarily focused on new learning tools for educators. Educators would be able to coordinate various forms of online learning programs. They can shift classrooms from a static mood of understanding, from educators to learners, to a learner-centred approach with a dynamic process. Educator success in classrooms and other learning environments is contingent upon her educational philosophy, subject knowledge, professional skills and knowledge in classroom management, personal characteristics, teaching habits, and circumstances. Technological knowledge and its application influenced many of these components (Ayati et al., 2007).

3. Research Methods and Materials

3.1 Participants

The survey was conducted at the end of the 2020-2021 academic year with the sample of 50 educators at Horizon International Bilingual School offering Kindergarten, Primary, Secondary and High School education in Hanoi, Vietnam. Both female and male, part-time and full-time educators of mixed races, at the age between 25-50 years old have participated. The qualification of the research respondents was the educators who graduated from a university and have at least five years of experience using educational technology tools such as computers, iPads, tablets, Smartboards and other digital and online devices. According to the research, the sample size is around ten educators who hold Google Certification Level 1 and 2 and successfully use educational technology in their teaching.

Table 1 *Participants experience and education level*

Teaching Experience	Bachelor's degrees	Master's Degrees	Doctoral Degree	Google Certified Educator
< 5 years	5	5	0	5
5 - 9 years	20	5	0	5
10 - 20 years	1	3	1	0

3.2 Qualitative data collection

The goal of the survey was to begin collecting data that, when analyzed, would assist the researcher in determining educators' perceptions of the benefits and drawbacks of technology integration, educators' technology usage methodology, and proposing a technology usage model that educators with high learners' achievement use. The researcher divided the interviewed questions into four primary objectives, which were 1) determining educators'

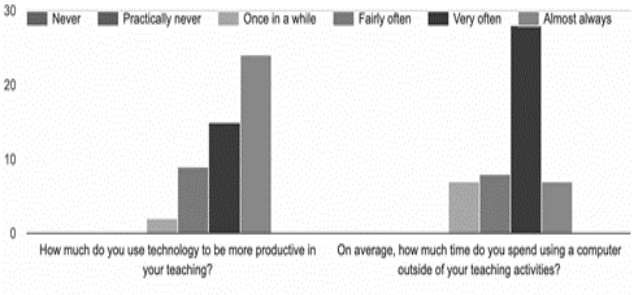
usage models of technology at a private school in Vietnam; 2) describing educators' perception of the advantages and disadvantages of technology integration at the school; 3) identifying educators' perception problems of technology integration at the school and lastly; and 4) proposing a technology usage model that educators with high learners' achievement use. The survey was conducted in a semi-structured format with several different types of survey questions. They range from structured to unstructured, with open-ended questions and much more content flexibility, in which the form of the questions and the order in which they are asked are determined prior to the survey (Merriam, 2009). This structure allowed the researcher to ask open-ended questions as well as numerous targeted questions. The researcher needed to change or remove questions based on the responses of the participants. According to the researcher, a mix of open-ended and guided questions provided the best opportunity for educators to discuss their classroom experiences while ensuring that all participants were asked the same essential questions to allow for result comparison. The researcher generated an initial set of questions for the educators before conducting the surveys. Before reaching a final decision on survey questions, the researcher examined the upsides and drawbacks of all questions with a research advisor.

The Content Validity of the Overall Scale (S-CVI) method was used to assess the content validity of the interview questions. The questionnaire was examined by four experts who were familiar with the research methodology and met the requirements for expert qualifications. The following criteria were used to select an expert panel to validate questionnaire items and interview questions: 1) hold a doctorate degree; 2) be an expert and have experience in the field of education, and 3) be a professor teaching at a university.

Four experts evaluated the 28-item questionnaire on a 4-point scale: 1 = not at all suitable, 2 = not suitable, 3 = suitable, and 4 = highly suitable. The results revealed that the experts who scored at least 2 and 4 are primarily. In computing the Content Validity Index, ratings of 1 and 2 are grouped at the same rate, while ratings of 3 and 4 are grouped at the same rate. Thus, the Validity of individual items (I-CVI) of this questionnaire was computed as 1.00, in accordance with the S-CVI procedure, which states that a rating of 3 or 4 is acceptable and that the I-CVI should be 1.00 when there are five or fewer judges (Polit & Beck, 2006). The average the I-CVIs was calculated by summing the Content Validity of individual items (I-CVI) and dividing by the number of items:

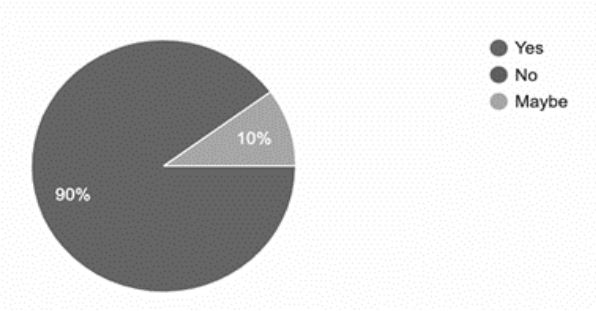
(1+1+1+

Figure 1 The graph of technology usage of Horizon educator



The researcher was attempting to comprehend what educators were attempting to achieve in the classroom by employing technology. Answering this question was essential in assessing the educator's perception of the effectiveness of technology integration in the classroom. According to the data, the majority of educators thought that technology is beneficial in the classroom. Furthermore, educators consider the creation of a learner-centred learning environment as indicated in Figure 2 to be one of the fundamental objectives of technology. Some educators seemed to believe that simply adopting technology in the classroom will elicit this good response.

Figure 2 Responses of educators about technology lead the class in such a way that it is still learner-centred learning



4.2 Opinions on the integration of technology in education

Most educators cited differentiating activities and making their lessons more interactive to motivate learners as one of the primary reasons they used technology. For example, Respondent 14 said the following when asked about the advantages of having educational technologies in his/her class;

"Learners can participate in the lesson with joy and are interested and motivated in learning. In addition, they are excited about the games created by educators using digital devices. As a result, they focus and quickly absorb the lesson content, and the logic of the lesson will be easier to understand."

In this case, the educator appeared to convey that the learners are pleased with the lesson. Another portion of respondents mentioned that it is effortless to reach out to the school documents and learners' data collection. For example, Respondent number 41 said that integrating technology within the school helped educators collect data about the learners' well-being and track their progress throughout the academic year. While Respondent number 43 highlighted the shared documents and how easy it is now to share and get the form from the school documents site. In addition to all of the aforementioned information, there were some respondents with different opinions about integration. For example, Respondent number 7 mentioned Mobile Device management needs at school. According to him/her, lack of this management may cause misusing the devices, distraction and difficulties of device content controlling. In addition, Respondent number 21 has mentioned that all the challenges can be reduced if the educator knows how to integrate and use educational technology in class.

Another aspect found during the research was that most educators indicated engagement as one of the positive responses induced by technology usage in the classroom. Many educators said observing an increase in the number of work learners did while utilizing technology to learn vs lessons that did not use technology. For example, Respondent number 10 mentioned that lectures are livelier, learners are more active and engaged. All of the technology-related activities mentioned in the questionnaires were nearly entirely based on educators' personal views on how to use technology to improve their learners' learning experiences. They believe that incorporating technology into the classroom inspires and engages learners in the learning process.

5. Conclusions

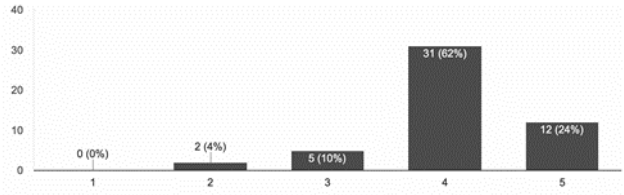
Based on the study's findings, the following conclusions were attained:

The purpose of the study was to develop a model of technology integration at school. The data demonstrate

that Horizon educators have a high level of technology integration in their classrooms. Their performance has been assessed as very satisfactory. In the previous five years, technology integration in the school has had a substantial impact on the teaching performance of all subject educators. Furthermore, productivity and professional practice were found to be significant predictors of technology integration. As a result, incorporating technology into the classroom was considered pedagogical innovation in the education paradigm, rather than just compliance with Department of Education rules.

Additionally, a satisfactory score demonstrates that educators were optimistic and confident in teaching using technology in class as shown in Figure 4.

Figure 3 The graph of educators using technology in instructional strategy in classes at Horizon



It also indicates that they were adhering to the current standards of 21st-century education. Finally, the findings revealed various implications that may help educators recognize that courses, seminar workshops, faculty development plans, and even extra time for school learning action cell sessions are needed to help them know how they would fully employ and integrate technology in teaching.

6. Recommendations

Based on the study's findings and conclusions, the following recommendations are made:

Educators would be more conscious of overcoming technology issues such as management concerns, health-related difficulties due to excessive use of technology, and learner safety considerations. To increase educators' awareness of technological difficulties, this topic might give different insights if included in Professional Developments and semestral training programs and school departmental meetings and discussions. If possible, in bilingual Languages so the Vietnamese educators could have a deeper understanding.

Those educators assure themselves and their learners the beneficial use of technology in the classroom that they utilize technology so that they learn from it. In such a way that the values of technology integration could be integrated into everyday education.

Reviewing factors affecting technology integration mentioned in the study's Literature review, the researcher also recommends that educators can employ research-based information and principles to improve professional practices as long as they adhere to government expectations. The school would benefit from undertaking enrichment training and discussions for each subject and application of Technological Pedagogical and Content Knowledge framework training to fully address subject educators' weaknesses in the use of research-based knowledge and principles to improve their professional practices as well as keeping updated about technology's fast-moving evolution.

Addressing another possible challenge, I would like to highlight that the school's internet security management system is insufficient to provide a secure and safe digital environment. Mobile Device Management (MDM) is suggested to be implemented as the top priority to overcome the safety and security challenges of Bringing Your Own Device (BYOD) policy. The school's educational technology coaches can research the most suitable MDM for each campus and enforce it with mutual agreement with the device owners.

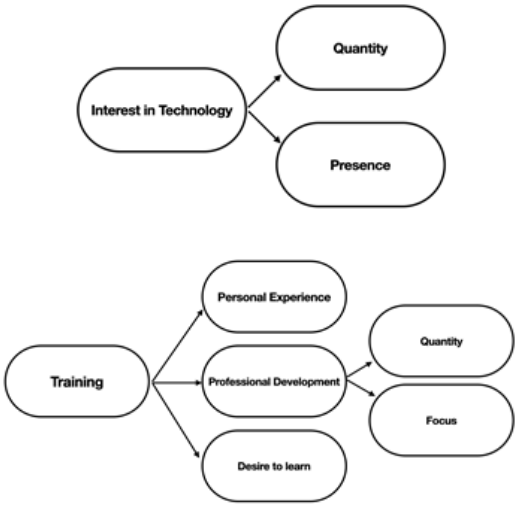
6.1 Recommendation for Technology Integration Model

Following the collection of the data, the researcher utilized methods of analysis frequently used in grounded theory research. Through this method, the researcher could discover major categories that assist in developing a model for technology integration.

The capability of an educator to properly integrate technology into the classroom is referred to as technology integration readiness. The majority of the educators surveyed mentioned this category when they have been asked their opinions on a tech educator promoting the application of classroom technology and how much they use technology to be more productive in their teaching. Most of

the teachers responded that various factors influence this readiness, which is best represented by its subcategories of technological interest of a teacher and training provided by the school as presented in figure 4.

Figure 4 Mind map representing the category of readiness for technological integration



Interest in technology. Almost all of the educators expressed a desire to learn more about technology. This interest in technology was visible throughout the educator's observations. They said their excitement while outlining how they use technology in the classroom and daily. This subcategory can be defined by its properties, quantity, and presence.

The number of technology tools and software that educators use daily is referred to as quantity. The amount ranges from practically none usage to extremely effective technology use. Educators stated that they used computers, iPads and other technological tools to communicate and provide the content.

The second property of interest in technology is presence. Presence refers to the quantity of technology used during instruction and class activities. The majority of educators used technology to organize and post-class materials online, create activities, plan lessons, and communicate. Furthermore, educators used the computer for online assessments, research, activity, and document creation, primarily in Google Docs, Google Sheets, and Google Classroom. Although the prevalence of technology varied slightly among educators, most shared similar experiences when discussing how technology was used in the classroom. It seems every educator has been striving to actively integrate technology into their teaching throughout the year. This seems to indicate that educators really want to use technology to better their instruction. Due to this apparent interest in technology and the increasing variety of technology tools available to schools, if educators are to use these tools to increase academic attainment, it is crucial for them to provide a great deal of professional development. This training requires educators to stay up to date with their tools and to better understand how these tools can improve their teaching practices and hence increase their learners' grasp of the subject.

Training. It is the second sub-category of readiness for technological integration. The training of educators refers to formal and informal activities that enable them to acquire the strategies used in classrooms. Training seems to have a bearing on both technological and pedagogical elements. Personal experience, professional development, and desire to learn are the best ways to describe training.

Almost all of the educators mentioned personal experience. Personal experiences aren't part of a formal professional development program but serve as a learning platform for a specific piece of technology. These unique experiences varied across all educators, but it appears that they played a role in assisting educators in growing as technology users. Thus, professional development is the second property of training.

The school district provides the educator's professional development. This type of training focuses on using technology in the classroom for both technological and pedagogical purposes. The quantity and focus of professional development are the best ways to describe it.

Quantity is the first aspect of professional development. Professional development concerning technology integration strategies was identified as a need by educators. Extensive workshops, online training, inviting educational technology coaches from sister schools could be some good descriptions of the conditions mentioned. As one Respondent said, "I want to receive specialized training in the field of applying technology in teaching." The data suggests that educators believe they need more educational

technology training, and the quantity of learning experiences could be increased.

The second aspect of professional development is a focus. The dimension's emphasis varies from technical training alone to technological and pedagogical training. The majority of the educators' training was essentially technical in nature. This type of training mainly focused on using technology tools or software, with little emphasis on how to use technology to help learners better understand the topic. One Respondent who teaches mathematics highlighted, "I would like to acquire more information on implementing technology in teaching math in the classroom...". It appears educators appreciate this type of training. All of the educators' training activities had little to do with improving pedagogy in incorporating technology into the content they teach. Still, it was clear that they considered the training worthwhile. It is difficult to argue that this type of training does not help educators understand the technology they have access to and teach them the fundamentals of how to use it. Educators, on the other hand, receive insufficient instruction to help them convey the subject matter for which they are accountable.

The desire to learn is the final property of training. All educators expressed a desire to continue receiving training and Professional Developments. As Respondent number 37 said, "With our lives working around technology, educators would benefit from embracing the use of technology in teaching. This way, learners will be more exposed and familiar with how to incorporate these in their learnings. Educators would have ample knowledge and continuous professional developments and a variety of tech tools to make not only teaching more up to date but engaging as well."

Interestingly, the learning experiences that learners and educators have daily appeared to be directly influenced by the educators' readiness for technology integration and how educators prepare for using technology in the classroom, as well as their personal experiences with technology at the school, appeared to be very important factors in the development of an educator's technical integration skills.

6.2 Recommendations for Further Research

Based on the above, it appears that future research might address the areas where educators would benefit from promoting technology-related activities rather than technological tools themselves. Further research that identifies these activities and gives instructional suggestions may assist educators in developing and implementing a curriculum that improves the learning environment. Additionally, educators may benefit from various training and professional development models. Currently, the standard training model is used to give instructional resources to educators who want to employ technology in the classroom. Additional research may be needed to determine whether educators would benefit from an in-class instruction model that emphasizes integration techniques in the context of their classroom and curriculum. A study that documents and evaluates various professional development models could assist this school in planning appropriate educator training, thereby increasing the level of technology integration.

Furthermore, it is evident that educators in today's world use technology in their daily lives. So, do the learners. This pervasive use of technology could be considered a cultural phenomenon. educators might use technology because they believe it is expected of learners in today's world and that they would be doing their learners a disservice if they did not. Research to see if educators are following cultural stigma to use technology in the classroom or honestly believe it will improve the learning experience would be beneficial.

Moreover, it is recommended to conduct similar research in more schools with similar profiles to observe the behavior of teachers regarding technology usage, which the results would enhance the development of technology integration aligned with the school context.

Finally, this study showed that the use of technology in school appears to be linked to a desire to provide learners with a motivating and engaging learning environment. Some educators believed that simply using technology in the classroom was enough to create this atmosphere. As technology advanced and became more prevalent, its use became less exciting, and it simply became one of the tools that this research employs to learn. A study that determines whether using technology in the classroom improves engagement and motivation or whether the initial gain is due to the novelty of using technology instead of traditional teaching methods would assist educators in

determining the most appropriate uses of technology in the classroom.

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