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| RESEARCH ARTICLE

PollEv Application as Web-Based Audience Response System and Digital Learning Delivery Management Tool for Tech-Voc Programs

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| ABSTRACT
Integrating Information and Communications Technology (ICT) in education is a vital part of improving learning outcomes. One such ICT-responsive technical-vocational (Tech-Voc) school is to utilize Poll Everywhere (PollEv) application as a web-based intervention and audience response system in online classroom teaching. This cross-sectional study was conducted on Grade 7 learners of the Strengthened Technical-Vocational Education Program at a public secondary school. PollEv was used as a teaching and management tool for thirty-one Tech-Voc learners during the school year 2020-2021. Analyzing the data through the Statistical Package for the Social Sciences, the mean was used to describe the pretest and posttest scores, while the Wilcoxon signed-ranks test for dependent samples was utilized to determine the significant difference in the learning outcomes before and after the intervention. The findings showed better performance and "very satisfactory" experience of learners using PollEv and became a tool for managing a Tech-Voc classroom considering the emotional, behavioral, and cognitive aspects involved in virtual environments. The behavioral intentions toward the PollEv application were influenced by its usefulness, ease of use, and satisfaction of learners. Once a technology is incorporated in online spaces, learners engage accordingly by keeping their attention to classroom tasks and achieving better academic results.

| KEYWORDS

Technical-vocational education, online learning, response system, Poll Everywhere, classroom management, information and communications technology

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1. Introduction

The growing demand to accelerate Education 4.0 has been an overarching discussion even by the World Economic Forum ([WEF], 2020). In particular, WEF literally stated that investing in the development of holistic skills in primary and secondary education will be critical in addressing the root causes of the worldwide skills gap, preparing the next generation of talent to engage in lifelong learning, and ensuring that future efforts in reskilling and upskilling pay off for individuals, businesses, and governments. In the context of this study, the special curricular program of the Department of Education ([DepEd], 2012a) in the Philippines aims to enrich the basic education curriculum by taking the part of Technology and Livelihood Education. Specifically, the Strengthened Technical-Vocational Education Program (STVEP) adopts the competency-based curriculum anchored on the Technical Education and Skills Development Authority or TESDA training programs (DepEd, 2012b). Furthermore, the contextualization of the core learning areas within the different Technical-Vocational or Tech-Voc areas of specialization is strongly encouraged to facilitate meaningful learning. With the new normal education setup, vocational education emphasizes the mastery of knowledge and skills. In the learning process, learners' perceptions can be used as evaluations to improve the quality of learning (Syauqi et al., 2020).

On the other hand, teaching since 2020 has been forced to have a short time shift to online modality because of the threats of the pandemic, and academic institutions' closure was one of the initiatives to suppress the transmission of the virus. The COVID-19

pandemic has both accelerated these trends and massively disrupted learning. It has also cast a new light on existing challenges and inequities within global education systems (WEF, 2020; Li & Lalani, 2020). Among the many changes generated by this crisis, all teaching became mediated by digital technologies (Pozo et al., 2021). There are, however, controversy and debate about the integration of Information and Communications Technology or ICT in education during pandemics, such as what to teach, how to teach, teachers' and students' workload, the nature of the virtual environment, and the consequences for equity in education and its sustainability (Manco-Chavez et al., 2020; Athanasios et al., 2021; OECD, 2021).

In response to the need for education during this uncertain time, there has been an introduction of the Basic Education Learning Continuity Plan or the BE-LCP (DepEd, 2020) to the Inter-Agency Task Force on Emerging Infectious Diseases. As stated, the learning continuity should be based less on method and more on objectives. With this method, four essential aspects of the learning continuity plan should be employed: communications, materials, learning activities and assignments, and assessments. To highlight, communications provide direct teaching, asking and answering questions, discussing the lesson, and communicating instructions about activities and other matters related to the course (NUADU Education, 2020).

Contextualizing communication's importance in education, Davies and Graff (2005) claimed that participation in online discussion forums serves a dual purpose: to improve learning and to provide support. It may, therefore, be the case that factors such as the frequency of the interactions are likely to be more important in providing support, whereas quality and dynamics of the interactions may be the more important influencing factors in learning and performance. As teachers experience the diaspora of modality in teaching Tech-Voc learners in the new normal, investigating interaction, student satisfaction, and teacher time investment (Turley & Graham, 2019) and effective modeling of online classroom management (Abrami et al., 2011; Cavanaugh, 2017) can build a better understanding of what is known in theory and how all these dimensions of virtual learning are acted on our teaching and management practices (Stamatis, 2021).

As the focus of the construct of this paper, Zachariah and Vonderwell (2005) said that there are various factors that influence participation in online learning, such as technology and interface characteristics, content area experience, student roles and instructional tasks, and information overload. To investigate further, this research project particularly put an emphasis on the integration of the Poll Everywhere (PollEv) application in online distance learning of Tech-Voc classes. The DepEd in the Philippines, through the Learning Delivery Modalities Couse 2 or LDM (2021), discussed the features of online distance learning where the teacher as facilitator engages learners' active participation through the use of various technologies accessed through the internet while they are geographically remote from each other during instruction. Moreover, the internet is used to facilitate learner-teacher and peer-to-peer communication (LDM Course 2, 2021).

In particular, the Strengthened Technical Vocational Education Program (STVEP) offered in a public secondary school implements online distance learning as a preferred mode of instruction by the learners and their parents. With this, one approach that has been hoped to help learners and teachers during online classes is the utilization of ICT in education—PollEv. To describe, this is a web-based Audience Response System or ARS (Shon & Smith, 2011) that uses cell phone-based texting to collect participant responses. The use of PollEv intended to maximize the participation (Anderson, 2018) of Tech-Voc learners in a high school setting and as an e-tool (Vareberg, 2018) in both teaching and managing a new normal classroom. Its functions include audience members who can submit their responses via computer if logged into the Poll Everywhere website. Gathering and displaying participant responses are the basic functions of any ARS (Herb & Laurie, 2011). Hence, responses are electronically summarized and displayed on the site. The aggregated responses can be displayed to the audience for feedback and discussion with a computer or laptop. In its general sense, teachers integrating ICT would engage learners during synchronous classes in a Tech-Voc education (Chinien, 2003; Dumaua-Cabautan et al., 2018; Wuttke & Seifried, 2020) in the Philippines aligned to DepEd's ICT strategic and learning continuity plans (DepEd, 2008; 2020; Ramos, 2021).

2. Methods

2.1 Participants and Data Collection

As a cross-sectional study, the participants (n=31) were the freshmen in the junior high school enrolled at the Strengthened Technical Vocational Education Program (STVEP) in a public secondary school for the school year 2020-2021. Implemented during the second quarter, the investigators measured the outcome and the exposures in the study participants at the same time (Setia, 2016). In this case, the use of the PollEv application became an intervention in learning the types of storage devices. Researchers observed the PollEv's effectiveness as a tool in the teaching and management practices in the new normal Tech-Voc program, which is digitally delivered at the secondary level of the basic education curriculum.

The purposive sampling technique was utilized in this study. This is a non-probability sampling method based on the researchers' strategic choice or judgment (Palys, 2008) in making sure that the delineated data from these participants were focused from the onset of their exposure to using PollEv in learning until the end of the intervention. With this, the intervention was implemented

accordingly to determine the effect of the PollEv application on learners' understanding of the types of storage devices. Following the ethical standards, learners were given their own nicknames to secure the anonymity of their participation during the conduct of the study. Procedures in gathering data from requesting the permission of the school, a consent form signed by the parents, and the assent form agreed by the learners were properly observed.

Employing the one-shot, pretest-posttest only design, which is widely used in educational research (Campbell & Stanley, 1963) controlling the timing of the independent variable (treatment) and most often utilized by behavioral researchers to determine the effect of a treatment or intervention on a given sample (Allen, 2017), the researchers introduced the intervention through a briefing or orientation to parents and learners. This approach established the readiness of the participants toward the PollEv application to be integrated into the STVEP class for a particular lesson in the second quarter. The researchers made sure that this was clearly understood by the participants of the study. Until then, the study commenced in gathering needed data on the PollEv application as a web-based audience response system and digital learning delivery management tool for a Tech-Voc program.

2.2 Data Gathering Instrument

In gathering the data, the researchers made use of a validated 25-item hybrid questionnaire inspired by the works of Noel et al. (2015) and Lund (2001) to explore how PollEv affected the learning experience in new normal Tech-Voc education implemented in a public secondary school. Before the PollEv application was incorporated in the teaching-learning process, a multiple-choice type of diagnostic test (pretest) was administered online to the participants. After the exposure to the PollEv as an intervention to introduce the types of storage devices, an uploaded assessment tool (posttest) was utilized as the research instrument to collect information on the learners' mastery of the essential learning competency during the quarter.

3. Data Analysis and Results

3.1 *Increase on the Learners' Score While Using PollEv Application*

Table 1 shows the mean pretest score of the STVEP learners that can be described as "Satisfactory" (M= 12.10, SD=2.612) while the mean posttest score indicates a "Very Satisfactory" (M=18.68, SD=4.045) mastery of learning competency about the types of storage devices. Notably, the mean score of the learners increased by 6.58.

Table 1. Mean Scores of the Students Before (Pretest) and After (Posttest) the Intervention

Category	N	Mean	Std. Deviation	Description
PRETEST	31	12.10	2.612	Satisfactory
POSTTEST	31	18.68	4.045	Very Satisfactory

Scale: Excellent (20.00 - 25.00), Very Satisfactory (15.00 – 19.99), Satisfactory (10.00 – 14.99), Poor (5.00 – 9.99), Needs Improvement (0.00 – 4.99).

The Wilcoxon-Signed Ranks Test results in Table 2 pointed out that the median post-test scores were statistically higher than the median pretest in types of storage devices after the learners' exposure to the intervention—PollEv. There is a significant difference in the learners' average pretest and post-test scores, Z=-4.725, p=.000. This illustrates that learners performed better after the exposure to the PollEv application implemented in a Tech-Voc program.

Table 2. Difference in the Mean Scores of the Students Before (Pretest) and After (Posttest) the Intervention

		N	Mean Rank	Sum of Ranks
POSTTEST - PRETEST	Negative Ranks	1[a]	7.50	7.50
	Positive Ranks	30[b]	16.28	488.50
	Ties	0[c]		
	Total	31		

Scale: Excellent (20.00 - 25.00), Very Satisfactory (15.00 – 19.99), Satisfactory (10.00 – 14.99), Poor (5.00 – 9.99), Needs Improvement (0.00 – 4.99).

	POSTTEST - PRETEST
Z	-4.725[b]
Asymp. Sig. (2-tailed)	.000

3.2 *Assessment of Learners' Perception regarding PollEv Application*

Table 3 displays a favorable reaction to the usefulness of the intervention. Learners considered PollEv to be "very useful", and they found that it helped them be more effective (M=3.68, SD=.475) during the online classes.

Table 3. The usefulness of PollEv Application

Usefulness	N	Mean	Std. Deviation
It helps me be more effective.	31	3.68	.475
It helps me be more productive.	31	3.58	.502
It saves me time when I use it.	31	3.65	.551
It does everything I would expect it to do.	31	3.52	.626
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Very Useful, 2.51 - 3.25 - Useful, 1.76 – 2.50 – Less Useful, 1.00 – 1.75 – Not Useful.

Table 4 shows that there is a high evaluation regarding the ease of use of the PollEv application in online learning. To mention, one of the items, "*It is user-friendly*", signifies that STVEP learners considered PollEv "very easy" to be utilized in an online class, M=3.84, SD=.374.

Table 4. Ease of Use of PollEv Application

Ease of Use	N	Mean	Std. Deviation
It is user-friendly.	31	3.84	.374
It is easy to use.	31	3.77	.425
I can use it without written instructions.	31	3.42	.672
Using it is effortless.	31	3.32	.791
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Very Easy, 2.51 - 3.25 - Easy, 1.76 – 2.50 – Difficult, 1.00 – 1.75 – Very Difficult.

As indicated in Table 5, the participants using the PollEv application were "highly satisfied", and the majority of the learners were having fun using the application in an online class (M=3. 87, SD=.428).

Table 5. Satisfaction for using PollEv Application

Satisfaction of Learners	N	Mean	Std. Deviation
It is fun to use.	31	3.87	.428
I would recommend it to a friend.	31	3.74	.445
It is wonderful.	31	3.74	.445
I am satisfied with it.	31	3.68	.475
It is pleasant to use.	31	3.68	.475
I feel that I need to have it	31	3.42	.564
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Highly Satisfied, 2.51 - 3.25 - Satisfied, 1.76 – 2.50 – Less Satisfied, 1.00 – 1.75 – Not Satisfied.

3.3 *Preference of Learners Using the PollEv as Digital Learning Delivery Management Tool*

In terms of the behaviour-related responses of the learners, Table 6 shows that the majority of the learners "highly preferred" the use of PollEv in online learning. Significantly, learners stated that they prefer to respond through real-time polling rather than speaking aloud in class (M=3.71, SD=.461). Meanwhile, the use of the application was only "preferred" by the learners when they like using a personal mobile device to engage in real-time polling during class, feel comfortable speaking up during discussions, and are identified while answering questions using real-time polling.

Table 6. Behaviour-Related Responses of the Learners Toward Using PollEv Application

Behavior-Related	N	Mean	Std. Deviation
I prefer to respond through real-time polling rather than speaking aloud in class.	31	3.71	.461
I become attentive when my instructor directs us to respond using real-time polling.	31	3.61	.495
I like that my polling responses are anonymous.	31	3.58	.564
I prefer using real-time polling when responding to controversial questions so that others do not see my responses.	31	3.58	.502

I like using a personal mobile device to engage in real-time polling during class.	31	3.48	.724
In class, I feel comfortable speaking up during discussions.	31	3.19	.703
I feel that respondents should be identified while answering questions using real-time polling so that each person is accountable.	31	3.00	.856
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Highly Preferred, 2.51 - 3.25 - Preferred, 1.76 – 2.50 – Less Preferred, 1.00 – 1.75 – Not Preferred.

Generally, results for the emotion-related items indicated a "highly preferred" response from the learners, for they felt more connected to the class when participating with real-time polling (M=3.74, SD=.445). As shown in Table 7, the use of PollEv in online classes became "less preferred" by the learners when in case they felt that the real-time polling became a waste of class time (M=2.06, SD=.998).

Table 7. Emotion-Related Responses of the Learners Toward Using PollEv Application

Emotion-Related Survey Items	N	Mean	Std. Deviation
I feel more connected to the class when participating in real-time polling.	31	3.74	.445
Using real-time polling in class makes me feel as if I have a voice to contribute during class discussions.	31	3.71	.461
Using mobile devices for real-time polling during class is fun.	31	3.52	.570
Conducting real-time polling during class is a waste of class time.	31	2.06	.998
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Highly Preferred, 2.51 - 3.25 - Preferred, 1.76 – 2.50 – Less Preferred, 1.00 – 1.75 – Not Preferred.

The majority of the cognitive-related responses revealed that learners "highly preferred" the use of PollEv in online learning. Given Table 8, learners perceived that using real-time polling during class helped them better understand the class material (M=3.90, SD=.301).

Table 8. Cognitive-Related Responses of the Learners Toward Using PollEv Application

Cognitive-Related Survey Items	N	Mean	Std. Deviation
Using real-time polling during class helps me to better understand the class material.	31	3.90	.301
I feel that using real-time polling during class enhances the quality of discussions.	31	3.65	.551
I see the benefits of using real-time polling after graduation in my professional life. (Example: meetings or training sessions).	31	3.58	.564
I would like to learn how to run real-time polling sessions in order to use them outside the classroom.	31	3.55	.506
I would feel comfortable administering a real-time polling session in another environment outside this class.	31	3.55	.506
I would use a real-time poll for a presentation in another class.	31	3.48	.570
Being able to administer real-time polling sessions would be an excellent marketable skill for me to demonstrate in the workforce.	31	3.45	.568
The use of real-time polling in class enhances controversial discussions.	31	3.42	.672
Valid N (listwise)	31		

Scale: 3.26 – 4.00 Highly Preferred, 2.51 - 3.25 - Preferred, 1.76 – 2.50 – Less Preferred, 1.00 – 1.75 – Not Preferred.

4. Discussion

This study assessed the PollEv application and its effects to improve learning engagement and participation during an online class in a technical-vocational program. The construct of the study focused on communication's importance in education, claiming that

participation in online discussion forums serves a dual purpose: to improve learning and to provide support (Davies & Graff, 2005). The teacher communication logs through PollEv showed a higher teacher time investment in the more interactive courses, with the highest time investment coming from reaching out to inactive learners (Turley and Graham, 2019). Developing activities using digital devices for participation can help with this issue (Anderson, 2018) related to online learning. With the ideal objective to integrate academic and technical contents and provide work-based experiences to learners (Stern et al., 2010), the STVEP has aimed to enrich the basic education curriculum by adopting a competency-based curriculum anchored on the Technical Education and Skills Development Authority or TESDA training programs (DepEd, 2012b). Looking into a Tech-Voc public secondary school context, educators have explored alternative strategies to boost interest and preparation in related pathways in high school (Warner et al., 2016) to increase participation in technology-based programs such as the STVEP.

Using the PollEv application, the mean pretest score of the students is described as "Satisfactory", while the mean posttest score is "Very Satisfactory", indicating mastery of the essential learning competencies set by DepEd-Philippines. This is contrary to the discussions of Syauqi et al. (2020) on online learning, which does not provide better experience and productivity in mastering competencies. To elaborate, a significant difference existed in the pretest and post-test scores developing their knowledge and skills about the types of storage devices through the PollEv application, an instructional and management tool for virtual learning. ICTs in distance education have resulted in a pedagogy, which is constructivist, collaborative and interactive (Wonacott, 2001). This has marked PollEv as a web-based audience response system utilized for online teaching among Tech-Voc learners.

The better performance and meaningful experience of learners using PollEv are similar to what was observed in the study of Turley and Graham (2019) that was explored on an interactive course which garnered a statistically significant higher rating from the learners. Along with this, the participants displayed a favorable reaction to the usefulness of the PollEv application. This revealed that online learning implemented in a Tech-Voc education could provide motivation and ease in learning (Syauqi et al., 2020). In particular, most learners had fun using the application and felt connected to the class when participating in a real-time polling application. More importantly, learners reported that real-time polling during the class helped them to better understand the material given to them. Through the PollEv application, the teacher has found a balance between the difficulty of online learning during a pandemic and making lessons interactive through its polling activities (Anderson, 2018; Vareberg, 2018) and other assessment strategies appropriate for special curricular programs in DepEd-Philippines (Paulino et al., 2022).

In terms of the constraints on the time investment of teachers and learners for online learning as well as on its interface and sustainability (Manco-Chavez et al., 2020; Athanasios et al., 2021; OECD, 2021), managing online classrooms must consider learners' assessment on the use of PollEv application in a TechVoc school. Using the core of STVEP on a needs-based approach and the demands of the industry, teachers as online administrators of virtual environments must understand the complexities involved in the learners' behavioral and emotional dimensions as psychological capital (Gambo & Musonda, 2022), their perceptions toward online learning (Syauqi et al., 2020), and the level of their satisfaction of the program (Ramos, 2021). Administrators or school heads must manage technology as part of the curriculum in teaching ICT skills, package learning content or MELCs for digital delivery, and complement this management tool just like the PollEv that can provide opportunities to practice skills taught and to extend learning by working with specific software applications (Kasworm and Londoner, 2000; Chinien, 2003) suitable for Tech-Voc programs in a digital delivery mode.

5. Conclusion

Managing online environments in a school setting starts with where the learners are and how ICT complements instructional content—the learning competencies. This study assessed the effect of a web-based response system on the learning engagement and participation of Tech-Voc learners in a public secondary school. As a special curricular program, the STVEP needs to provide interactive activities for the acquisition of knowledge and skills for the learners to be productive individuals, especially after completing the junior high school Tech-Voc program. This can address much debate on how learning can be actualized for Tech-Voc education, especially among countries just like the Philippines amidst the limitations during this uncertain time. The findings showed that there is an increase in the number of very satisfactory performing learners after the integration of PollEv, which revealed the usability and practical function of this digital communication tool to unpack competencies for the learners to master them. This study affirmed the practice of high school teachers in providing learning activities that promote ICT skills and appropriate assessment practices in special curricular programs. Also, the collection of ideas from the STVEP learners generated elaborations on the theories that built the framework of this study, such as the theoretical perspectives that revolve around the constructivist, collaborative, and interactive practices in the teaching-learning process.

Notably, learners displayed a positive perception toward the use of the PollEv application in an online class. As these young individuals are enjoined to be virtually engaged during class interaction, STVEP learners must be at the center of learning continuity with implications on how teachers and school administrators plan and manage the transfer of instructional content to the learners in digital delivery. To wit, behavioral and emotional aspects of learning in a digital world can ensure a high rate of learning

satisfaction, especially in offering a Tech-Voc education program in a new normal. In light of the COVID-19, school administrators should implement an In-Service Training (INSET) or Learning Action Cell (LAC) Session that exposes their teachers to explore cybergogy that fosters the integration of ICTs in education for Tech-Voc learners.

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