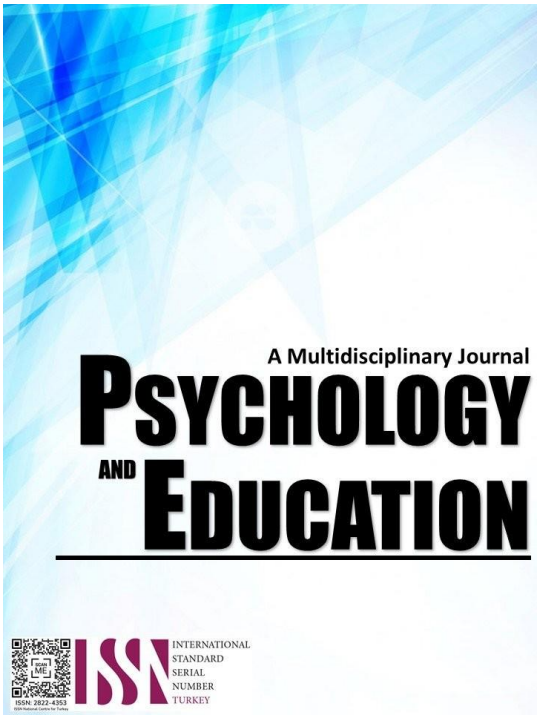
UTILIZATION OF SELECTED OPEN-ENDED TOOLS IN TECHNOLOGY AND LIVELIHOOD EDUCATION INSTRUCTION AMONG GRADE 8 STUDENTS: INPUT FOR A PROPOSED INTERVENTION PROGRAM



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Research Article

Utilization of Selected Open-Ended Tools in Technology and Livelihood Education Instruction among Grade 8 Students: Input for a Proposed Intervention Program

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Abstract

This study assessed the perceptions of teachers, administrators, and Grade 8 students regarding the use of selected open-ended tools in Technology and Livelihood Education (TLE) at Eusebio High School, Pasig City, during the school year 2022–2023. The findings served as the basis for developing an intervention program to enhance TLE instruction. Specifically, the study investigated: (1) student perceptions of open-ended tools in terms of active, authentic, collaborative, constructive, and goal-directed learning; (2) teacher perceptions of these tools in relation to actionable learning, interest, motivation, retention, and stimulation; (3) the competency levels of TLE teachers in classroom management, evaluation, implementation, and innovation as perceived by administrators and teachers; (4) differences in perceptions between administrators and teachers on teacher competencies; and (5) the proposed intervention program based on the findings. Using a quantitative research design and a modified survey questionnaire, data were collected from 20 administrators, 30 TLE teachers, and 289 Grade 8 students. Statistical treatments such as weighted mean, t-test, and z-test were employed for analysis. The results revealed that students and teachers rated the utilization of open-ended tools at a high extent, with grand weighted means of 3.76 and 3.79, respectively. Administrators and teachers similarly rated teacher competencies at a high extent (4.06), with no significant differences in their perceptions. Based on the findings, an intervention program was proposed to sustain effective instructional practices and maximize the benefits of open-ended tools in TLE.

Keywords: *utilization, open-ended, technology, livelihood, program*

Introduction

Stanford Articles (2021) stress that the world is now in the age of the fourth industrial revolution-Technology. As it transforms major industries, life has become more interconnected, blurring the lines between personal and professional. The growing number of sectors and companies becoming operationally mobile, the education industry continuously adapts, and attempts to accommodate these shifting demand trends, bringing with it a unique set of challenges.

As technology progresses substantially, at present, one can either attend traditional classes in brick-and-mortar learning institutions or virtual classes in online universities and colleges. Despite sharing some superficial similarities, the differences between a traditional class and an online class are remarkable. Both types of learning require instruction from teachers and have a comparable method of assessment. Face-to-face learning is an instructional method where course content and learning material are taught in person to a group of students. This allows live interaction between the learner and the instructor. It is the most traditional type of learning instruction.

Sarah Kesty (2021) explained that our brains tend to need several exposures to new ideas or places before our classrooms are officially reopened for face-to-face instruction. Research indicates that our brains cannot distinguish between what we are imagining or visualizing versus what we actually experience.

A preview, orientation style video or photos of the classroom setting can help when you store the videos in your Hãpara Workspace. Students can watch as many times as they need to in order to calm the inner dialogue of "what ifs" and worries. Similarly at the beginning of a "normal" school year, learning and practicing the expectations will take time. Students can demonstrate their understanding of the expectations before returning to school by playing kahoot games, create video examples and counterexamples to teach younger students. Embed your Q&A, preview videos, and other documents in the workspace, which will help student engagement and experience.

University of the Potomac (2020) shows that whether online or in a face- to-face instruction, sixty- seven percent (67%) of instructors believe online media and textbooks are necessary teaching tools, both learning situations are textbook dependent whereas, their difference are the tuition fee. Research conducted by Best Value Schools (2020) found that the University that offers online learning has a cheaper tuition fee than those that offer traditional learning. Online learning does not require a place or a building and needless to pay personal wages each month. As long as you have fast and efficient internet access to log in and complete your assignments. You will be able to save money immediately. Ivy Panda (2019) cited that online classes take the place of interaction that is common with traditional learning. On the other hand, learning in traditional classes involve direct interaction between the students and the teachers which is beneficial for both parties in establishing the learner-teacher bond. In addition, a student attending the traditional classroom often has to adhere to strict guidelines that have been established by the learning institution. As such, students have to adhere to the established time schedules. Meanwhile, students attending online classes can learn at their own time and pace. Lastly, advantage of traditional classes is all the doubts that students might have regarding a given course content can be cleared by the teacher on the spot, dissimilar with online learning, whereby such explanations might not be as instantaneous and coherent as the student deserve.

Conclusively, as regards to and classroom instruction, several published studies point to the undisputed fact that in-person classes remain the best option for the basic education.

Analyzing the effects of technology on student learning does present advantages, it presents opportunities, allows comfort, helped with students' willingness and engagement which ultimately enhances learning. The drawbacks however, are with the students' heavy reliance on technology which will lead detrimentally to the educational process.

Overall, technology has been viewed as a great resource to find solutions for source for both online and offline classroom education, with educators consistently looking for technological tools as they hope to enhance the learning of their students, with this in mind the Education Industry should not limit its boundary and continue to find solutions to the existing problems. Administrators, supervisors, teachers, parents and stakeholders may collaboratively work together in order to improve current teaching strategies and to provide a more adequate learning to our students.

As a consequence, recently defined in Dep Ed NCR Advisory No.311, s.2023 Dep Ed Region 7 Advisory No. 0219, 2023. The 5 th POTTE NATIONAL CONVENTION FOR EPP/TLE/TVL AND 2nd POTTE GAWAD PARANGAL SA NATATANGING GURO 2023. This was anchored on the theme, "Matatag Agenda: Redirecting EPP, TLE, AND TVL Educators towards Accessibility, Quality, and Resiliency in Education", 5 th National Convention will focus on the complexities of digital transformation in education by employing Industrial Revolution 5.0 in designing curriculum for quality EPP, TLE and TVL instruction. Emphasis on the integration of Higher Order Thinking Skills (HOTS), the promotion of inclusive education, and the utilization of Artificial Intelligence (AI) in achieving digital resiliency an accessibility in EPP, TLE, AND TVL education are paramount for quality 21 st century instruction. Discussion on High Impact Instruction (HI) is also given primary consideration through Futures Thinking and Design Thinking Models in preparing future-ready teachers and learners for various industry demands.

The above stated Dep Ed order explains the importance of competitions to enhance goals of progressive designs in allowing teachers to customize and create varying levels of support to the improvement of learning with technology by ensuring integration and curriculum development programs to revolutionize the learning process. More studies by Adem Yilmaz (2021) show that technology integration in the curriculum improves students' learning processes and outcomes. Teachers who recognize computers as problem-solving tools change the way of teaching approaches and strategies. Educational technology in the classroom allow teachers to improve and upgrade the centering of learner in the classroom. It enables the teachers to engage their students in unique, innovative, and equitable ways.

What are the benefits of open-ended tools? Open-ended tasks offer numerous advantages for both students and teachers. They aid in the development of deeper understanding, problem-solving strategies, and communication skills for students. Additionally, they can foster exploration and multiple perspectives and the ability to justify arguments. Open-ended tools, which are ICT resources, serve to make learning more meaningful and concrete, efficient, and encouraging. As Adtiya Shukla (2018) points out, psychologists, designers, educationalists/educationists, and many professors worldwide are working to enhance the quality of education for an entire generation. Therefore, the execution of this study aims to further elucidate the potential benefits and implications of utilizing open-ended tools in educational setting.

Research Questions

This study was conducted to provide benefits to the teachers, administrators and Grade 8 students on the utilization of selected open-ended tools to be used in Technology and Livelihood Education in Eusebio High School, Division of Pasig City, during the SY. 2022-2023 which served as basis for developing intervention program in Technology and Livelihood Education. Specifically, the study sought to answer the following questions:

1. How did the Grade 8 student respondents perceive the utilization of selected open-ended tools in Technology and Livelihood Education during the last quarter in terms of the following aspects:
    1.1. active;
    1.2. authentic;
    1.3. collaborative;
    1.4. constructive; and
    1.5. goal- directed?
2. How did the TLE teacher respondents perceive the use of selected open-ended tools in teaching TLE in terms of the following aspects?
    2.1. actionable learning;
    2.2. interest;
    2.3. motivation;
    2.4. retention; and
    2.5. stimulation?
3. What was the level of competencies of the TLE teachers as perceived by the school administrators and the teachers themselves as regards the use of selected open-ended tools according to the following criteria:

3.1. classroom management;
3.2. evaluation;
3.3. implementation; and
3.4. innovation?

4. Was there a significant difference between the perceptions of the school administrators and TLE teacher respondents on the level of competency relative to the use of open-ended tool in terms of the aforecited criteria?
5. What intervention program was proposed based on the findings of the study?

Methodology

Research Design

The researcher will employ quantitative research to determine the effects of face-to-face classroom instruction on the technology integration performance of the grade 8 students which will serve as basis for skills intervention program. According to CM Riddell (2018), quantitative methods of research are used to study the relationship between variables and express variable relationships through statistical analysis.

Quantitative research is a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Quantitative research collects information from existing and potential respondents using sampling methods and sending out online surveys and questionnaires.

Respondents

The data will be gathered through a convenience sampling. The Focal sources of data are the two-hundred and eighty-nine (289) students, thirty (30) teachers and twenty (20) school administrators sourced from selected sophomore students in the Division of Pasig City.

The data will be gathered from the respondents using the stratified random sampling of students and teachers in selected schools' division office of Pasig City. Table 1 presents the distribution of respondents by school.

Table 1. *Distribution of Respondents*

Respondents	*Frequency*	*Percentage*
Students	289	85.25 %
Teachers	30	8.85%
Administrators	20	5.90 %
Total	339	100%

In this, the consent of the participants will be sought of before their participation in this activity. The participants will be provided with sufficient questions should there be any queries regarding the conduct of the research and as to how their data would be used.

Instrument

The survey Questionnaire was employed as the main instrument for gathering information on the respondents in this study. The researcher constructed the survey questionnaire. This was validated by five (5) regular and permanent graduate school professors from the Marikina Polytechnic College and eight (8) external personnel.

Part one of the survey questionnaire was the respondents' perception of grade 8 students' performance in the face-to-face classroom instruction in the aspect of technology integration to (TLE) subject in the following aspects: active, authentic, collaborative, constructive and goal-directed.

Procedure

The researcher secured an endorsement from the Dean and thesis adviser of the Graduate school of Marikina Polytechnic College to conduct the study. Second, the researcher submitted an official letter to the schools division superintendent of the schools Division of Pasig City to secure a permit to conduct the study. After getting the approval, the researcher submitted an official letter to the principal/school head of the school and after getting the principals approval, the researcher encoded the validated survey questionnaire in google forms and test questionnaires. It was subsequently sent to the respondent's email and some test questionnaires were personally administered to the respondents. Data was collected from the said platform. The researcher ensured that data collection was ethical and effective along with the data privacy of the respondents. The researcher used a specific domain, so that only the researcher and respondents have access to the survey. The objective and significance of the study were explained to the respondents and assurance of confidentiality was secured.

Table 1 presents the distribution of respondents to the selected school in the school division of Pasig City. On the other hand, part two is the respondents' suggestions for teaching approaches utilizing open-ended tools in terms of actionable learning, interest, motivation, retention, and simulation.

Part three is the respondents' level of competencies as perceived by Technology and Livelihood Education (TLE) teachers and school administrators on the identified open-ended tools according to the criteria of classroom management, evaluation, implementation, and innovation.

Data Analysis

Weighted Mean. This was used to describe the following perceptions: the performance of grade 8 students respondents utilizing selected open-ended tools in Technology and Livelihood Education (TLE) during the last quarter; the open ended- tools that can be utilized in teaching approaches to grade 8 students and the level of competencies of TLE teachers on the use of identified open-ended tools.

Independent-Samples t Test. This was applied to examine the significant difference in the perception of the two groups of respondents on the level of competency on the use of open-ended tools in TLE 9.

Table 2. *Verbal Interpretation*

Scale	*Range*	*Verbal Interpretation*
5	4.21-5.00	Very High Extent (VHE)
4	3.41-4.20	High Extent (HE)
3	2.61-3.40	Moderate Extent(ME)
2	1.81-2.60	Low Extent (LE)
1	1.00-1.80	Very Low Extent(VLE)

Z test. This was utilized to see if there is a substantial difference between students perception in their performance in classroom instruction and the amount of student's utilization on the use of selected open-ended tools.

Results and Discussion

This section deals with the presentation, analysis and interpretation of the data gathered in this study.

Students' Perceptions on the Level of Performance Utilizing Selected Open- Ended Tools in TLE 9

Active. Table 3 presents the students' observation on their level of performance utilizing selected open- ended tools in TLE 9 as to active

Table 3. *Students' Perceptions on the Level of Performance Utilizing Selected Open-Ended tools in TLE 9 as to Active*

As a student, I observed that …open-ended tools utilization	*Students*	
	WM	*VI*
1. help me think and learn more deeply.	3.87	HE
2. will lead to non-productive struggle and frustration.	2.92	ME
3. find very engaging after initial exposure.	2.60	ME
4. empower me to control my own learning.	3.76	HE
5. is good to prepare me for the modern world.	3.85	HE
Overall Weighted Mean	3.40	ME

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

As shown in Table 3, the perceived performance utilizing selected open- ended tools in their TLE subject in terms of Active, have variation in their scores. In perceived performance, the overall weighted mean score of students respondents is 3.40 with verbal interpretation "Moderate Extent", while the weighted mean of open-ended tools utilization will lead to non-productive struggle and frustration is 2.92 with verbal interpretation of "Moderate Extent" and weighted mean score of open-ended tools utilization find naturally engaging after initial exposure is 2.60 with verbal interpretation of "Moderate Extent".

The findings imply that student respondents themselves perceived positive essential leaning in utilizing selected open-ended tools. What it only require is the time and effort between teachers and students because it works best if both parties have collaborations to create and apply innovations in the classroom to create active atmosphere. Lessons must always be displayed in the most interesting process. They also perceived that open-ended tools utilization help students think and learn more deeply, open-ended tools empower students to control their own learning and is the best tool to prepare students for the modern world. Hence, these results to verbal interpretation of "High Extent".

Consequently, students think that utilization of open-ended tools find boring and will only lead to non-productive struggle and frustration because of adaptability requirement.

In the article Participatory In Educational Research (PER), expresses student's engagement in technology integration is the quality and quantity of the student's psychological, cognitive, affective, behavioral, response and energize to participate in the learning process to achieve successful learning outcome.

In this article, explained the realities that as the key agents of educational change, teachers are required to embrace digital transformation for progressive and sustainable realization of stipulated educational outcomes. Considerable emphasis is put on the prompt acceptance

and integration of new technologies in teaching and learning.

The above discussion is supported by the initial findings of the survey of Kapur (2018) posits that social construction of knowledge takes place in various ways and but different locations. The teacher adopted various pedagogical strategies when integrating technology with a view to foster in the development of 21st century skills and competencies.

Implicating that active learning in the classroom must be a purposive struggle from a teacher to help learner's adopt the change and innovations.

Authentic. Table 4 presents the students' perceptions on their level of performance utilizing open-ended tools in TLE 9 as to authentic.

Table 4. *Students' Perceptions on the Level of Performance Utilizing Open- Ended Tools in TLE 9 as to Authentic*

As a student, I observed that …open-ended tools utilization	*Students*	
	WM	*VI*
1. needs ethical implications to consider before its application to protect privacy and data misuse.	4.31	VHE
2. needs proper limitations as regards the flow of data association of access.	4.19	VHE
3. must consider privacy concerns to avoid dangers.	4.20	HE
4. has environmental privacy impacts, financial and property rights, identity theft, and human dignity.	3.77	HE
5. has legal risks to consider associated with deceptive design.	3.66	HE
Overall Weighted Mean	4.02	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be observed in Table 4 that students perception utilizing open-ended tools overall weighted mean score is 4.02 with verbal interpretation of "High Extent". All statements from the aforesaid are with "High Extent" verbal interpretations.

The findings imply that the students respondents perception in terms of authentic level of technology integration is beyond instructional setting. They have awareness on the extent to which technology is used. Students have opportunities to apply technology tools to some content-specific activities that are related to their issues. Students are guided to a limited range of information and access of data information through the proper use of modern tools utilization. Students select appropriate technology tools according to their interests and needs through exploration and motivation. It equips them with practical and useful skills.

Thus, students agree that authentic use of technology prepare them for real-world problem skills through their perceptions of authenticity toward modern technology integration. The findings and inferences based on students' perceptions are reinforced by the article from the journal of Authentic Learning, Audrey Rule of the State University of New York (SUNY) at Oswego, Karen Ogen (2018) technology bridge the gap between the classroom and the real world providing access to information in a variety ways and through different perspectives. In an authentic learning environment, students have time to sustained inquiry. They must define the problem, gather and investigate resources, evaluate information, and ask questions to develop a solution.

Recent research Backfisch, Lachner, Hische, Loose, & Scheiter, (2020) as recent research demonstrated that teacher motivation as well as teacher behavior is largely contextual especially in early phases of innovation. Teacher motivation therefore could not (only) be regarded as a stable teacher characteristic but a distinct state which varies across teaching situations. Chauhan (2017); Mayer (2019); Zhu and Urhahne (2018) it can be assumed that technologies can predominantly enhance task-specific teaching quality. Teachers can, for example, establish cognitively activating learning activities (e.g., virtual simulations; and at time provide students with adequate individual learning support). However, it can on, such as the smoothness of the lesson, as most recent research was not explicitly designed on the classroom level to examine this research questions be speculated as to whether educational technology may affect task-general aspects of teaching quality.

Today, the use of technology has become a necessity, because technology is included in every aspect of our lives. Mobile phones, cars, apps, computers, smart homes, and many things constitute the abundance of examples of pervasive presence. According to "We Are Social-Digital (2020) April Global Statshot" report, fifty-nine percent (59%) (4.54 billion) of the world population is internet users, forty-nine percent (49%) (3.80 billion) are social media users, and sixty-seven percent (67%) (5.19 billion) are mobile users Kemp (2020). This shows how vital technology is in human life. Another area in which technology takes place is in education system. The education system must adapt to societal changes because its role is to prepare individuals for society and real life. The said research has shown that authentic learning fosters self-directed students engaging them in challenges, solving problems and making real-world connections to the content. Authentic learning provides students practice with tools and resources that will benefit them in their future endeavors.

Collaborative. Table 5 presents the students' perceptions on the level of performance utilizing open-ended tools in TLE 9 as to collaborative.

It can be gleaned in Table 5 that, the students' perceptions on the level performance utilizing open-ended tools in TLE 9 as to Collaborative have analogy in their scores. The overall weighted mean score in terms of collaborative is 3.79 with verbal interpretation "High Extent".

These findings imply that students have similar perceptions on their level of performance utilizing open-ended tools in TLE 9 as to collaborative.

Table 5. *Students' Perceptions on the Level of Performance Utilizing Open-Ended Tools in TLE 9 as to Collaborative*

As a student, I observed that …open-ended tools utilization	*Students*	
	WM	*VI*
1. can bring a whole new level of engagement to group work.	3.76	HE
2. kick start things with an open-ended prompt and let me post as much as I would like without the requirement for a specific type of response.	3.49	HE
3. allow me to work on my tasks it quicker and in more organized manner.	3.89	HE
4. like LMSs and live communication tools allow me to join in split to virtual groups where working together via video for a distraction-free alternative.	3.80	HE
5. can correspond me from another school or the other side of the world.	4.03	HE
Overall Weighted Mean	3.79	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

Students respondents presume that collaboration promote learners more actively involved in using open-ended tools to their improved performance. They find it easy to support each other in working collaboratively. They also expect that it can increase their performance.

The study conducted by Granikov (2021) and Wu (2018) there are number of dimensions through which collaborative learning can be understood and assessed, including measurement of knowledge construction, learning outcomes, social interaction, the visibility of work happening in the collaborative space, and how demographic factors influence communication, and emotional experiences.

Hence, students can work efficiently through collaboration, technology becomes the heart of every collaborative workforce. Collaboration starts with having the right tools. Teachers must make sure that the tools ultimately chosen will have all the features they want, as well as the scale to be required in order to easily delegate the work and keep organized.

This study was reinforced by Heil and Bornemann; Najafi-Tavani (2018) Collaborative innovation (CI) changes the rules that edict who can access and contribute to the creation of new products and services.

Constructive. Table 6 presents students' perceptions on the level of performance utilizing open-ended tools in TLE 9 as constructive.

Table 6. *Students' Perceptions on the Level of Performance Utilizing Open-ended Tools in TLE 9 as to Constructive*

As a student, I observed that …open-ended tools utilization	*Students*	
	WM	*VI*
1. help me access information, construct new ideas and produce new things by using this information.	4.07	HE
2. enable me to access many lessons and exercises as I want without considering individual differences among my peers in the classroom.	3.58	HE
3. help me answer the exercises faster and the teacher will instantly correct mistakes with instant feed backs.	3.59	HE
4. allows me to see the correct answer when I make a mistake via instant feedback and access the information on the subject.	3.74	VHE
5. makes it easier for me to access the sources of information which help me have the opportunity to access storage tools at any place and time.	3.96	HE
Overall Weighted Mean	3.79	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be perceived in Table 6 that students have the same perceptions on the level of performance utilizing open-ended tools in TLE 9 as to constructive. The overall weighted mean score of students' respondents is 3.79 with verbal interpretation "High Extent".

It can be perceived in Table 6 that students perceptions on their level of performance using open-ended tools as to constructive can be evaluated as effective because it ensures a good result outcomes.

The findings imply that students' respondents have the same perceptions on the productive result of their performance level utilizing open-ended tools as to constructive. It can be inferred that students utilizing modern technology characterize a meaningful learning environment. It create students active participation engaging the use of technology as a tool rather than passively receiving information from the technology. Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.

According to the study of Ifinedo (2020) indicate that teachers' technological knowledge either explicitly or implicitly contributes significantly to integrating ICT successfully, while teachers' ICT pedagogical practices have found the lowest technological predictor.

It is affirmed by the study of Brinkley-Etzkorn (2018) investigating the impact of teachers' training programs on their online teaching effectiveness. According to his survey, the findings revealed a significant change in teaching competencies and designing course syllabi in teachers, while no significant difference in teaching was observed according to their students' perceptions.

In the study of Dincer (2018), Alanazy and Alrusaiyes (2021) It indicates that technological knowledge and using technology in

pedagogical practices are two different concepts. Several studies and theories have been proposed to highlight this aspect. Briefly, it can be summarized that the effective use of technology in teaching practices is possible only if teachers are equipped with all the fundamental competencies.

Vongkulluksn (2018) highlights that the teachers prefer to spend more time teaching in the classrooms, who are good at utilizing technology. Furthermore, the technological competencies of teachers enable them to adapt other teaching strategies and approaches easily: as a result, the performance get enhanced.

Goal-Directed. Table 7 presents students' perceptions on the level of performance utilizing open-ended tools in TLE 9 as to goal-directed.

Table 7. *Students' Perceptions on the Level of Performance Utilizing Selected Open-Ended Tools in TLE 9 as to Goal-Directed*

As a student, I observed that …open-ended tools utilization	*Students*	
	WM	*VI*
1. develops insight and understanding of industry and its place in our culture.	3.88	HE
2. discover and develop talents of students in the technical fields and applied sciences.	3.85	HE
3. develop my technical problem- solving skills related to materials and processes.	3.77	HE
4. develop a measure of skill in the use of a common tools and machine.	3.67	HE
5. helps me to explore and develop human potentials related to responsible work.	3.90	HE
Overall Weighted Mean	3.82	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

As shown in Table 7, students' perceptions on their level of performance utilizing open-ended tools have the same verbal interpretations.

The overall weighted mean score of student respondents is 3.82 with verbal interpretation "High Extent" which shows that students perceived that their level of performance utilizing open-ended tools as regards to goal-directed is enhanced.

The findings imply that that students have perceptions of being directed by open-ended tools. They are motivated to reach certain goals toward improved performance in the teaching learning process using open-ended tools. Students are more likely to understand the progress on the components of accomplishing tasks. They are involved in designing and planning activities based on their knowledge of the goal as evidenced by their high extent results from given statements. As a result students reflect a more meaningful engagement in their schoolwork because they understand the goals, making them become more directed.

Based on the study of Demir and Akpinar (2018) discussed that new technologies include, but are not limited to mobile devices to transform our lives as they allow connectivity and communication. The use of digital technologies drives innovation and fosters creativity. Teachers and learners gain new knowledge, skills and experiences through the use of digital technologies in the classroom. Furthermore, Haseski (2018) indicated that computational thinking emphasizes the ideas, strategies, and mental behaviors that learners can use to solve unique problems, it guides learners in responding to the challenges they face in their daily lives. The researcher Cheung (2021) explained that digital technologies vary in scope in terms of their potential to promote development of 21st century skills and competencies in the classroom. Javier (2020) and Ventayen (2019) this study attempted to show that teachers who use technology tools in their classroom would improve student learning and motivation.

Summary. Table 8 presents the students' perceptions on the level of performance utilizing open-ended tools in TLE 9

Table 8. *Summary of Students' Perceptions on the Level of Performance Utilizing Open-Ended Tools in TLE 9*

Aspect	*Students*	
	Overall Weighted Mean	*Verbal Interpretation*
a. Active	3.40	Moderate Extent
b. Authentic	4.02	High Extent
c. Collaborative	3.79	High Extent
d. Constructive	3.79	High Extent
e. Goal-Directed	3.82	High Extent
Grand Weighted Mean	3.76	High Extent

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be observed in Table 8 that students' perception on the level of performance utilizing open-ended tools in TLE 9 in the aspect of active, authentic, collaborative, constructive and goal oriented have variations in the overall weighted mean scores and verbal interpretations.

It is found out that in the aspect of active, the overall weighted mean scores is 3.40 and with the verbal interpretation of "Moderate Extent". This implies that statement 2 has weighted mean scores of 2.92 with verbal interpretation of "Moderate Extent" which explained that some students interpreted open-ended tools utilization can be leading to non-productive struggle and frustration. Due

to this perception, teachers have the most important role to play in guiding students and motivating them to the active participation in utilization of open-ended tools in the classroom. They can make their lessons with the use of innovations to become more interesting and enhance students' participation through the reflections of productive learning. Setting goals, proper planning, monitoring of progress and implementation of adoptable training will be of great help to improve active levels of utilization of open-ended tools. Teachers need to be more trained and competent in using open-ended tools and applications to guide students' as well in learning and adapt innovations and creativity toward efficiency. Higher levels of class participation in class discussions, and collaboration among students resulted to a more active classroom. Active classroom environment created by the utilization of open-ended tools resulted to higher thinking skills among students.

In statement 3, the weighted mean scores is 2.60 and verbal interpretation of "Moderate Extent" which elaborated some of students' perceptions regarding utilization of open-ended tools, it was found that students find them boring after initial exposure. Therefore, teachers need to put more effort into making teaching and learning more fun and meaningful in order to arouse students' active interest in learning through technology integration. It is essential to implement more seminars, training, and workshops for teachers to enhance teachers' competencies in delivering strategies in classroom settings.

In the aspects of authentic the overall weighted mean scores is 4.02, collaborative and constructive overall weighted mean scores is 3.79, and goal oriented 3.82, the result of these in verbal interpretations is "High Extent" which only interprets the good perceptions of students in their level of performance in modern technology integration in TLE subject according to the statements of each given aspect.

It is found out that the grand weighted mean scores in all aspects is 3.76 and with the verbal interpretations of "High Extent". Therefore, these characteristics focuses on the extent to which technology facilitates, enables and support meaningful reflection and meta cognition in the teaching learning process.

This implies that students' perception in utilization of open-ended tools is of great help to improve their performance but only it needs the collaborative efforts between teachers and students in order to achieve the value of effective learning outcomes.

In the study conducted by Akram (2021) technology incorporated instructional practices not only enhance the quality of teaching but also enable students to develop their skills, boost their motivation, and enhance their knowledge and information efficiently. Xu (2021) and Liu (2022) also identified that technology-integrated learning increases the cognitive understanding and learning achievements of students. In addition, ICT incorporated teaching-learning practices also enable learners to stay connected with their instructors and peers (via various social media platforms), help students resolve their academic challenges and keep them participating actively in the learning activities. Recognizing the importance of students' active involvement in the learning activities, Liu (2021) also suggested teachers design collaborative activities via the Computer-Supported Collaborative Concept Mapping (CSCCM) technique to develop a collaborative classroom environment, which also enhances students' interest. By putting it briefly, ICT integrated teaching-learning is the requirement of time, which allows the learners to satisfy their learning needs and help teachers align their teaching approaches with global standards.

Teachers' Perceptions on the Level of Competency on the Open-Ended tools Utilized in Teaching Approaches in TLE 8

Actionable Learning. Table 9 presents the teachers' perceptions on the level of competency on the open-ended tools utilized in teaching approaches to grade 8 students regarding actionable learning.

It can be gleaned in Table 9 that the challenges encountered by teachers on the level of competency on the open-ended tools utilized in teaching approaches to grade 8 students as regards to actionable learning and its statements have similarities in their scores and verbal interpretations. The overall weighted mean score of teacher respondents is 3.83 with verbal interpretation "High Extent". All statements from the aforementioned aspect have verbal

Interpretation "High Extent". Therefore, based in actionable learning, the perception of teachers on their level of competency on the open-ended tools utilized in teaching approaches in (TLE) is effective.

Table 9. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 8 Regarding Actionable Learning*

As a teacher, I observed that …teachers	*Teachers*	
	WM	*VI*
1. utilize blogging that will give them real experience to see the value of writing for real audience and establishing their digital presence.	4.07	HE
2. facilitate students' productivity skills to enhance their language proficiency skills.	3.97	HE
3. go digital to help promote the "go paperless" and advocacy and to help level up the language learning experience of the students.	3.93	HE
4. use web chats to share research and ideas and stay updated in the field.	3.67	HE
use immersive learning tools in their classroom like the use of smartphone's camera.	3.53	HE
Overall Weighted Mean	3.83	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

The findings imply that teacher respondents perceive the same challenges in their level of competency on the open-ended tools utilization. Hence, the respondents agreed that they have high level of competency in terms of adopting and applying new strategies utilizing open-ended tools in their classroom. Teachers were innovative in exploring new integration of ideas in the teaching learning process.

A decade of research in LA has produced significant outcomes, especially in: mining patterns of student behavior based on trace data (Maldonado- Mahauad et al., 2018) deriving predictive models regarding performance and dropout (Ranjeeth, 2020) and providing dashboards to make sense of the behavioral data. Jorno and (Gynther, 2018) more impact is being sought to enable the main stakeholders (i.e., students and teachers), to take advantage of actionable insights provided by meaningful indicators and LA tools to authenticate contexts. Thus, there is an urgent need to study how LA solutions can be designed for effectively supporting pedagogical interventions and orchestration actions.

Interest. Table 10 presents teachers' perceptions on their Level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding interest.

Table 10. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 9 Regarding Interest*

As a teacher, I observed that …teachers	*Teachers*	
	WM	*VI*
1. ensures that the hardware and software used are Dep Ed verified.	3.77	HE
2. uses digital application in which in structure allow students to reflect and collaborate with peers.	3.90	HE
3. use game-based learning in the classroom to promote collaborative problem-solving activities.	3.37	ME
4. create a Google Classroom which enables posting commenting, and the facilitation of continuing classroom discussions and assignment submissions.	4.00	HE
5. uses a digital space where students and teachers can interact in a safe learning network.	3.50	HE
Overall Weighted Mean	3.71	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be perceived in Table 10 that the challenges encountered by teachers as to interest and its statements have variations in their scores between their perceptions on the level of competency on the open-ended tools utilized in teaching approaches in TLE.

In interest, the overall weighted mean score of teacher respondents is 3.71 with verbal interpretation "High Extent". All statements from the aforesaid aspect except statement 3 have verbal interpretation "High Extent" based on the perception of teachers.

The statement "Teachers use game-based learning in the classroom to promote collaborative problem-solving activities" get the mean score of 3.37 with the verbal interpretation "Moderate Extent" based on the perceptions of teachers.

The findings imply that the teachers themselves perceive the same challenges on their level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding Interest. Respondents agree that hardware and software's used must be safe and secure including the applications for a sound learning and work collaborations is highly recommended, teachers also perceive that ensuring the hardware and software used must be Dep Ed verified. Teachers' respondents also believe that through creating a Google Classroom, enable posting commenting, and the facilitation of continuing classroom discussions and assignment submissions is highly recommended. Teachers' also perceive a digital space for interactive learning with a safe network. Some teacher respondents believe that game-based learning in the classroom promote a collaborative problem-solving activities. Therefore, this sense that technology utilization allows teachers and students work together across to better understand the instruction for lessons and problem-solving activities and also stimulates interest in improving teaching and learning.

Based on the study of Jogezai (2021) explained that as it offers various tools which are used in traditional as well as online teaching spaces and assists in building a proactive classroom environment.

Furthermore, based on the study of Akram (2021) discussed that technology incorporated instructional practices not only enhance the quality of teaching but also enable students to develop their skills, boost their motivation, and enhance their knowledge and information efficiently.

Additionally, Xu (2021) and Liu (2022) also identified that technology integrated learning increases the cognitive understanding and learning achievements of students, in addition, ICT incorporated teaching-learning practices also enable learners to stay connected with their instructors and peers (via various social media platforms), help students resolve their academic challenges and keep them participating actively in the learning activities.

Motivation. Table 11 presents teachers' perceptions on their Level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding motivation.

As shown in Table 11, the challenges encountered by teachers as to motivation and its statements have variations in their scores on the level of competency on the open- ended- tools utilized in teaching approaches in TLE 9 by the teacher respondents themselves. In

motivation, the overall weighted mean score is 3.65 with verbal interpretation "High Extent". All statements from the above mentioned aspect have verbal interpretation "High Extent" except statements 2 and 4 which is "Moderate Extent" based on the perceptions of teacher respondents.

Table 11. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 9 Regarding Motivation*

As a teacher, I observed that …teachers	*Teachers*	
	WM	*VI*
1. provide a collaborative document creation and editing space for teams Microsoft Office 365 and Google's G Suite.	3.70	HE
2. motivate students in enabling to join Kid blog and Blogger to create a digital space for writing a blog.	3.43	ME
3. anticipate opportunities and threats from technological changes used in teaching and learning process.	3.97	HE
4. use applications which is useful for creating a wall of discussion.	3.37	ME
5. use digital technology in students learning to help them work through difficult concepts with multiple resources.	3.77	HE
Overall Weighted Mean	3.65	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

The statement "teachers anticipate opportunities and threats from technological changes used in teaching and learning process" has the highest mean score of 3.97, followed by "teachers use digital technology in students learning to help them work through difficult concepts with multiple resources" with mean score of 3.77, followed by "teachers provide a collaborative document creation and editing space for teams Microsoft Office 365 and Google's G Suite" with mean score of 3.70, all statements have verbal interpretation of "High Extent" based on the perceptions of teachers themselves.

The statement "teachers motivate students in enabling to join Kid blog and Blogger to create a digital space for writing a blog" with mean score of 3.43, followed by "teachers uses applications which is useful for creating a wall of discussion" with mean score of 3.37 have both verbal interpretation "Moderate Extent" based on the perceptions of teachers themselves.

These findings imply that the teachers themselves perceive the same challenges on their level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding motivation. Respondents agree that digital technology in students learning is highly recommended because it help students work through difficult concepts with multiple resources.

Teachers' respondents also perceived that providing a collaborative document creation and editing space for teams Microsoft Office 365 and Google's G Suite is highly encouraged because it is helpful for interactive learning. Teachers' respondents also anticipate opportunities and threats from technological changes used in teaching and learning process. Some teacher respondents moderately encouraged students in enabling to join Kid blog and Blogger to create a digital space for writing a blog. They also perceived that using applications is moderately encourage because it is useful for creating a wall of discussion.

Therefore, this sense that technology utilization with regards to motivation, must be carefully planned with the digital tools skillfully integrated. It helps students feel confident since it doesn't expose individual knowledge, it allows them to learn with pleasure and generates group work. It creates happy moments that increase motivation and improve learning. Modern technology utilization can improve both the teaching and learning aspects of education. It also encourage active engagement and interactivity of students to explore more fully, test ideas and receive feedback.

As stated in reseach by Fraillon, Ainley, Schulz, Friedman, and Duckworth (2019) integrating technologies into teaching has the potential to both support students' learning and enable them to participate in a digitalize society.

However, Stegmann (2020) research has shown that using technologies is not generally effective for supporting teaching and learning process but rather depends on how they are used during teaching.

Findings of the International Computer and Inflammation Literacy Study ICILS (2018) and Fraillon (2019) documented that less than fifty percent (50%) of the participating teachers reported that they used technologies frequently for teaching with large differences across educational systems.

Furthermore, the participating teachers reported that they exploit the distinct potential of technologies only to a limited extent and used technologies to substitute previous reaching processes, such as for presentations or as textbooks.

Retention.Table 12 presents the perceptions of teachers' on the level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding retention.

It can be gleaned in Table 12 that the challenges encountered by teachers on the level of competency on the open-ended tools utilized in teaching approaches to grade 8 students as regards to retention and its statements have similarities in their scores and verbal interpretations.

The overall weighted mean score of teacher respondents is 3.83 with verbal interpretation "High Extent". All statements from the

aforementioned aspect have verbal interpretation "High Extent". Therefore, based in the aspect of retention, the perception of teachers on their level of competency on the open-ended tools utilized in teaching approaches in (TLE) is effective and highly encouraged.

Table 12. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 9 Regarding Retention*

As a teacher, I observed that …teachers	*Teachers*	
	WM	*VI*
1. demonstrate effective management on the use of Ed App free platform micro learning to a short-form lessons.	3.93	HE
2. manage the use of gamification strategy to make learning more fun and engaging in the classroom.	3.87	HE
3. demonstrate knowledge of Brain Boost feature which key learning concepts are repeated at regular intervals	3.83	HE
4. manage mobile learning approach which give learners the opportunity to take their training at their own convenience.	3.93	HE
5. develop managerial strategies that integrate technology to meet knowledge retention in a Gametic game-based LMS platform.	3.57	HE
Overall Weighted Mean	3.83	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

The findings imply that teacher respondents themselves perceive the same challenges in their level of competency on the open-ended tools utilization. Hence, the respondents agreed that they have high level of competency in terms of all statements in the aspect of retention. Teacher respondents believe that "demonstrate effective management on the use of Ed App free platform micro learning to a short-form lessons and managing mobile learning approach which give learners the opportunity to take their training at their own convenience" is highly recommended with the weighted mean score of 3.93, with the verbal interpretation of "High Extent", followed by the statement "managing the use of gamification strategy to make learning more fun and engaging in the classroom" with the weighted mean score of 3.87 and with the verbal interpretation of "High Extent". This means that making learning more fun and engaging is highly recommended, followed by the statement "teachers demonstrate knowledge of Brain Boost feature which key learning concepts are repeated at regular intervals" with the weighted mean score of 3.83, with the verbal interpretation "High Extent". This only means that repetition of brain boost feature as key learning must be repeated at regular intervals is highly encourage, followed by the statement "teachers develop managerial strategies that integrate technology to meet knowledge retention in a Gametic game-based LMS Platform" with the weighted mean score of 3.57, with the verbal interpretation "High Extent". Teachers' managerial strategies in integrating technology to meet knowledge retention in a game-based LMS platform is highly encouraged. Therefore, technology improves knowledge retention of students who are interested in things they are studying. It is important to create effective retention strategies for students at every step. Developing strategies that focus on engagement is a great encouragement to boost students' overall learning experience.

There are studies on the other hand (Iyer, 2020) in which focus is educating people in conceptual learning, with more realistic examples of how to use technology to recreate the nature of practical understanding in the educational world and retain the students' knowledge.

Researchers (Al-Emram and Mezhuyev, 2019); (Arpaci, 2020) conducted a systematic literature review for research on knowledge retention and the effects of technology usage in education to provide a thorough review of the current studies and discuss the implications of the findings.

Researcher (Kosar and Bedir, 2018) the main findings achieved from examining both quantitative and qualitative information suggest that knowledge retention could be enabled by building up a learning climate viable with mind- based learning standards.

Stimulation. Table 13 presents teachers' perceptions on the level of competency on the open-ended tools utilized in teaching approaches in TLE 9 regarding stimulation.

Table 13. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 9 Regarding Stimulation*

As a teacher, I observed that …teachers	*Teachers*	
	WM	*VI*
1. guide learners in using the higher-level thinking during teacher-led classroom discussions.	4.10	HE
2. demonstrate to learners on the questioning to explore ideas and prompt students to think for themselves.	4.00	HE
3. expose the learners on the use a "text" guided by prompts from the teacher.	3.67	HE
4. encompass the learners in linking well-crafted, open-ended questions.	3.87	HE
5. provide a follow-up activity which enable students to synthesize what they've learned from their experiences.	4.10	HE
Overall Weighted Mean	3.95	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be gleaned in Table 13 that the challenges encountered by teachers on the level of competency on the open-ended tools utilized in teaching approaches to grade 8 students as regards to stimulation and its statements have similarities in their scores and verbal interpretations. The overall weighted mean score of teacher respondents is 3.95 with verbal interpretation "High Extent". All statements from the aforementioned aspect have verbal interpretation "High Extent". Therefore, based in stimulation, the perception of teachers

on their level of competency on the open-ended tools utilized in teaching approaches in (TLE) is highly recommended.

The findings imply that teacher respondents themselves perceive the same challenges in their level of competency on the open-ended tools utilization. Hence, the respondents agreed that they have high level of competency in terms of guiding learners in using the higher-level thinking during teacher-led classroom discussions and providing a follow-up activity which enable students to synthesize what they've learned from their experiences. These statements,

overall weighted mean scores of 4.10, with verbal interpretation of "High Extent". These strategies are highly encouraged. Statement, "teachers demonstrate to learners on the questioning to explore ideas and prompt students think for themselves has weighted mean score of 4.0 with verbal interpretation of "High Extent" so this questioning strategy is highly encouraged. Statement, "teachers encompass the learners in linking well-crafted, open-ended questions that provoke students to think critically" has weighted mean score of 3.87 with verbal interpretation of "High Extent" so, this strategy is highly recommended to provoke students into critical thinking. Followed by the statement, "teachers exposes the learners on the use a "text" guided by prompts from the teacher" has weighted mean score of 3.67 with verbal interpretation of "High Extent". Simply means that this strategy is highly encouraged. It is important that teachers always guide students in every use of texts to follow certain objectives and direction. The above findings imply that critical thinking skill is a central objective of education.

As stated in the study of Tathahira (2020) states that the challenge of bringing critical thinking concept into classrooms can be minimized by the existence of technology that ca be functioned to promote and stimulate students' critical thinking.

Several documented studies show a positive result as a response towards this current issue in which it is found out that the integration of technology is effective in stimulating students' critical thinking skills. Rusdin (2018), Janah (2020), Technology provides a lot of practical problems that can be used to stimulate students' critical thinking in which it also offers a space for the students to express and deliver their argument freely.

Summary. Table 14 presents teachers' perceptions on their Level of competency on the open-ended tools utilized in teaching approaches in TLE 9

Table 14. *Teachers' Perceptions on the Level of Competency on the Open-Ended Tools Utilized in Teaching Approaches in TLE 9*

Aspect	*Teachers*	
	Overall Weighted Mean	*Verbal Interpretation*
a. Actionable Learning	3.83	High Extent
b. Interest	3.71	High Extent
c. Motivation	3.65	High Extent
d. Retention	3.83	High Extent
e. Stimulation	3.95	High Extent
Grand Weighted Mean	3.79	High Extent

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It can be observed in Table 14 that teachers' perception on the level of performance utilizing modern technology integration in TLE 9 in the aspect of actionable learning, interest, motivation, retention and stimulation have similarities in the overall weighted mean scores and verbal interpretations.

It is found out that in the aspect of all statements, the grand weighted mean scores is 3.79 and with the verbal interpretation of "High Extent". This implies that all statements are highly encouraged.

Statements in actionable learning has weighted mean scores of 3.83 with verbal interpretation of "High Extent" which explained that with regards to actionable learning, all statements are highly recommended. Due to this perception, teachers can also integrate instructional strategies when using technology that evokes higher-level thinking.

In the aspect of interest, all statements are highly recommendable because the weighted mean scores is 3.71 and verbal interpretation of "High Extent" which explained that technology integration allows students to help each other and work together to better understand of the lesson. Teachers and learning through instruction is known to be highly effective for mastering a topic and solving problems.

In the aspect of motivation, the overall weighted mean scores is 3.65, retention overall weighted mean scores is 3.83 and stimulation, 3.95, the results of these in verbal interpretations is "High Extent" which only interprets that all statements of these aspects are highly encouraged.

Therefore, all statements in each aspect are highly recommended for better comprehension of students in which technology integration is an important strategy for classroom instruction. However, the success of these strategies is very much challenging on the part of teachers for modern technology integration in the classroom requires a lot of struggles.

This implies that teachers' perception in modern technology integration is of great help to improve students' performance. Utilizing different types of technology in the classroom creates learners pathways for differentiated instruction to meet the needs of students

within a broader classroom climate.

In the study conducted by Nicol (2018) explained the change from a teacher-centered learning to a student-centered learning environment. With the integration of technology creates challenges and creates opportunities for educators. Not all educators have the ability to embrace change. Those teachers who do not acknowledge the changes in learning preferences may find it more difficult to teach the new generation.

However, in the study of (Dominici, 2018) changing from a teacher- centered approach to a student-centered approach to instruction and learning may be difficult, and requiring the use of technology may seem too impersonal for educators to accept.

In the study of (Demirbag and Kilinc, 2018) explained the alignment which allows teachers to feel confident about the change process and more likely to be a user of technology. Educators may perceived learning to use the newly adopted technology may be meaningful, but the resistance prevents them from exploring further opportunities for using technology.

Level of Competencies as Perceived by TLE Teachers and School Administrators on the Identified Open-Ended Tools

Classroom Management. Table 15 presents teachers' and school administrators' perceptions on the level of competency on the identified open-ended tools as regards to classroom management

Table 15. *Respondents' Perceptions on the Level of Competency on the Identified Open-Ended Tools as Regards Classroom Management*

As a teacher, I observed that …teachers	*Respondents*			
	Teachers		*Administrators*	
	WM	*VI*	*WM*	*VI*
1. demonstrate model ideal behavior to see that modelling effectively teaches students how to act accordingly in an appropriate manner.	4.43	HE	4.55	VHE
2. encourage students to help build classroom expectations and rules to follow.	4.30	HE	4.50	VHE
3. address isolated discipline problems individually instead of punishing an entire class.	4.20	HE	4.15	HE
4. promote growth mindset, and inject variety into lessons, by allowing students to work ahead and deliver short presentations	4.13	HE	4.45	VHE
5. praise students sincerely for jobs well done to improve academic and behavioral performance and inspire the class.	4.27	VHE	4.15	HE
Overall Weighted Mean	4.27	VHE	4.36	VHE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

As depicted in table 15, the computed overall weighted mean score for teachers is 4.27 with verbal interpretation "Very High Extent", while on the computed overall weighted mean score for administrators is 4.36 with verbal interpretation "Very High Extent". This suggests that there is no significant difference between the perceptions of the two groups of respondents on the level of competency on the identified open-ended tools as regards to classroom management. The result implies that the perceptions of the two groups of respondents have similarities as to perceive classroom management.

It can be inferred that administrators and teacher respondents have the same views concerning classroom management towards the level of competency on the identified open-ended tools which. Teacher respondents perceived that they were competent. To them, they view their strategies applied in classroom management is effective since it resulted to "Very High Extent" result in the weighted mean scores. Whereas, in the perception of administrators, teachers are very much competent in statements "teachers demonstrate model ideal behavior to see that modelling effectively teaches students how to act accordingly in an appropriate manner" and statement "teachers encourage students to help build classroom expectations and rules to follow that should lead to mutually-understood and respected expectations for classroom culture".

Hence, administrators have the same perceptions on the weighted mean score results showing "Very High Extent" verbal interpretation. Teachers play various roles in a typical classroom, but surely one of the most important is that of classroom manager. Effective teachers appear to be effective with students of all achievements level. Integrating open-ended tools in the classroom must start first to an effective classroom management.

It is mentioned in the studies of (Casanova et al., 2020; Favez et al., 2021; Mei and May, 2018) technology enhanced learning environment yielded benefits in changing pedagogical styles and applying new teaching strategies, organizing and managing the learning and accessing the useful information sources.

In addition, in the study of Budhrani (2018) with the development of modern technology, it is useful to create a smart learning environment that learners could become smart learners with the equipment of smart room and smart pedagogies.

Researchers Glock and Kleen (2019), Hofman (2022) and Van Dreil (2022) Discussed about classroom management that it is a complicated process which teachers deal with unexpected situations and a changing teaching and learning environment to maximize students' learning achievements. Management competency required teachers to have knowledge and skills in managing classroom effectively, supporting learner during learning process, as well as identifying and interpreting situations could happen in the classroom.

Evaluation. Table 16 presents teachers' and school administrators' perceptions on the level of competency on the identified open-ended tools as regards to evaluation.

Table 16 reflected that the computed overall weighted mean score for teachers is 3.75 with verbal interpretation "High Extent", while on the computed overall weighted mean score for administrators is 3.93 with verbal interpretation "High Extent". This leads that there are no significant difference between the perceptions of the two groups of respondents on the level of competency on the identified open-ended tools as regards to Evaluation. It concludes that the perceptions of the two groups of respondents are similar as to perceive evaluation It can be inferred that administrators and teacher respondents have the same views concerning evaluation towards the level of competency on the identified open-ended tools.

Table 16. *Respondents' Perceptions on the Level of Competency on the Identified Open-Ended Tools as Regards Evaluation*

As a teacher, I observed that …teachers	*Respondents*			
	Teachers		*Administrators*	
	WM	*VI*	*WM*	*VI*
1. use Mentimeter for fun quizzes and formative assessments by creating a quiz made up of multiple choice.	4.07	HE	4.15	HE
2. use Socrative to build a comprehensive assessment full of multiple choice.	3.80	HE	4.00	HE
3. use Moodle for complex assignments and assessments where students can upload written work directly to Moodle.	3.43	HE	3.80	HE
4. use Flip that offers a unique and modern approach for video assessments.	3.63	HE	3.80	HE
5. create series of study materials and use Quiz-let for assessment preparation.	3.83	HE	3.90	HE
Overall Weighted Mean	3.75	HE	3.93	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

This implies that all teachers are using this application for evaluation purposes, its benefit to deliver contents to learners, assess them on the content, track their progress and recognize the achievements. That is why adopting new challenges in teaching and learning innovation is a struggle on the part of teachers. More training's and seminars for teachers development in advancing to the world of technologies must be given time and support.

Colthorpe (2018) mentioned formal assessment and students' self-evaluation are both important components of the teaching and learning process, as they serve as indicators of the effective acquisition of required knowledge and help students to refine their learning techniques. In addition, Gonski (2018) urges educators to "use new technology not for its own sake, but to adopt ways of working that are more efficient and effective".

According to the study of Looney (2018), Silseth and Gilji (2019) it is embedded in the teaching and learning process which id mediated by the tools used in assessment. Furthermore, the processes used in assessment and closely linked with the social interaction of learners and teachers, with the construction of knowledge achieved by a novice-expert relationship.

Implementation. Table 17 presents teachers' and school administrators' perceptions on the level of competency on the identified open-ended tools as regards to implementation.

Table 17 reflected that the computed overall weighted mean score for teachers is 4.08 with verbal interpretation "High Extent", while on the computed overall weighted mean score for administrators is 3.77 with verbal interpretation "High Extent". This leads that there is no significant difference between the perceptions of the two groups of respondents on the level of competency on the identified open-ended tools as regards to evaluation. It concludes that the perceptions of the two groups of respondents are corresponding as to perceive evaluation. It can be inferred that administrators and teacher respondents have the same views concerning implementation towards the level of competency on the identified open-ended tools.

Table 17. *Respondents' Perceptions on the Level of Competency on the Identified Open-Ended Tools as Regards Implementation*

As a teacher, I observed that …teachers use	*Respondents*			
	Teachers		*Administrators*	
	WM	*VI*	*WM*	*VI*
1. teaching aids to enhance or enliven classroom instruction.	4.23	VHE	4.25	VHE
2. instructional materials (IMs) to improve students' knowledge, abilities, and skills.	4.20	HE	4.00	HE
3. internet and communication technology tools like software infrastructure.	4.00	HE	3.75	HE
4. electronic/digital teaching aids in the classroom.	4.17	HE	3.55	HE
5. helpful visual and audiovisual as means of classroom instruction.	3.80	HE	3.30	ME
Overall Weighted Mean	4.08	HE	3.77	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

However, it can also be inferred that there are challenges achieving the level of competency on the identified open-ended tools as regards to Implementation because in some aspect, there is a significant difference between the perceptions of administrators and

teacher respondent on the "use of auditory, visual and audiovisual in classroom instruction because these tools are helpful". The result of the weighted mean score for teacher respondents on this statement is 3.80, with verbal interpretation "HE-High Extent". This implies that teachers perceived themselves as competent in the implementation of these open- ended tools in the classroom. On the other hand, the perception of administrators in this regard, the result shows that the weighted mean score of 3.30, with a verbal interpretation "ME-Moderate Extent".

This implies that administrators' perception is that not all teachers are implementing the use of auditory, visual and audiovisual in classroom instruction. This must be then encouraged because it is said to be helpful in teaching and learning process. Research has shown that displaying good visuals to audience is a key to understanding information more quickly than any other type. Administrators and teachers must work collaboratively for the implementation of audiovisual in classroom Instruction for effective teaching and learning.

Similarly, a study conducted by Holmes and Prieto-Rodriguez (2018) where mix research methods was employed to examine the perceptions of academic staff and students on various Learning Management Systems (LMS) can bring such as accessibility and interactivity. Findings revealed that he most effective element of LMS in course learning for teachers are: access of course materials; recorded face-to-face lectures; course blogs or wikis; and online discussion.

Researchers Fokides (2019) Kaimara (2020) mentioned that regarding the role of teachers, it is concluded that there have been several studies on teachers' (pre-service and in-service) attitudes towards ICT integration in schools, and their willingness to use innovative technology but not a sufficient number of studies on their intention to integrate gaming literacy within educational goals.

Roberts & Hernandez (2019) mentioned that although learning is in the classroom, it is also no doubt that in developing countries, like the Philippines, it possesses different challenges like accessibility and affordability.

Innovation. Table 18 presents teachers' and school administrators' perceptions on the level of competency on the identified open-ended tools as regards to Innovation.

Table 18. *Respondents' Perceptions on the Level of Competency on the Identified Open-Ended Tools as Regards Innovation*

As a teacher, I observed that …teachers	*Respondents*			
	Teachers		*Administrators*	
	WM	*VI*	*WM*	*VI*
1. help students focus on process rather than products of learning.	4.13	HE	4.05	HE
2. challenge students in Hands-on/minds-on activities to their open-ended nature.	4.13	HE	4.15	HE
3. give learners an open-ended task for a Learner-Initiated and Directed to take students into being self-directed.	4.10	HE	4.15	HE
4. help students in State of Flow Results to which students perform activity in fully immersed energized focus.	4.23	VHE	4.05	HE
5. understands that learning comes from natural consequences, mistakes, and successes.	4.17	HE	4.45	VHE
Overall Weighted Mean	4.15	HE	4.17	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

Table 18 reflected that the computed overall weighted mean score for teachers is 4.15 with verbal interpretation "High Extent", while on the computed overall weighted mean score for administrators is 4.17 with verbal interpretation "High Extent". This leads that there is no significant difference between the perceptions of the two groups of respondents on the level of competency on the identified open-ended tools as regards to Innovation. It concludes that the perceptions of the two groups of respondents are comparable as to perceive Innovation.

It can be inferred that administrators and teacher respondents have resembling views concerning innovation towards the level of competency on the identified open-ended tools showing the same overall weighted mean score results which is recommendable. Additionally, teachers and administrators perceived homogeneous challenges achieving the level of competency on the identified open-ended tools as regards to innovation because in all statements of innovation aspect, there is no significant difference between the perceptions of administrators and teacher respondents on the result of the overall weighted mean scores which has verbal interpretations "High Extent" in agreement with all statements weighted mean score encouraging results and verbal interpretation "High Extent".

Furthermore, open-ended tools and questions can help students develop and practice their critical thinking skills by challenging them beyond the surface level and explore multiple dimensions on a topic or problem. It develops innovation and creativity. Open-ended learning activities are provocative and stimulate divergent thinking about a topic. Teachers' attitudes, assessment criteria and procedures must also encourage students to take different paths and offer creative responses. Innovation in teaching and learning is a helpful strategy integrated with open-ended tools. This must be encouraged in the classrooms and administrators and teachers must support this strategies for students' progress

Ramirez-Montoya (2022), Gajdzik and Wlniak (2022) mentioned that they believe critical thinking to be responsible for independent obtaining of new knowledge, its systematic organization and a conscious process of choosing between available alternatives, which directly reflects the set key of competencies an "innovative person" should possess. Self-esteem, as an important personality feature,

affects the decision-making process in innovation.

Lendowski (2022) remarked in an open innovation model, they need to resort to introducing technical innovations and bold, non-trivial actions, and this increases the risk. Therefore, this does not need to be avoided, but to accept it as risk, assess its degree and manage it.

Joshi (2022) mentioned meta-awareness and growth mindset support well-being since all aspects of meta-learning directly affect a person's well-being and self-perception. By setting personal goals, believing in oneself and trying to live a thoughtful life, a person can better understand and formulate their sense of purpose and direction.

Summary. Table 19 presents the summary of respondents' perceptions on the level of competencies on the open-ended tools.

It can be observed in Table 19 that respondents' perception on the level of competencies on the identified open-ended tools in the aspect of classroom management, evaluation, implementation and innovation have correlation in the overall weighted mean scores and verbal interpretations.

Table 19. *Summary of Respondents' Perceptions on the Level of Competencies on the Identified Open-Ended Tools*

Criteria	*Respondents*			
	Teachers		*Administrators*	
	OWM	*VI*	*OWM*	*VI*
a. Classroom Management	4.27	VHE	4.36	VHE
b. Evaluation	3.75	HE	3.93	HE
c. Implementation	4.08	HE	3.77	HE
d. Innovation	4.15	HE	4.17	HE
Grand Weighted Mean	4.06	HE	4.06	HE

Legend: WM – Weighted Mean; VI – Verbal Interpretation; 4.21-5.00 (VHE) Very High Extent; 3.41-4.20 (HE) High Extent; 2.61-3.40 (ME) Moderate Extent; 1.81-2.60 (LE) Low Extent; 1.00-1.80 VLE) Very Low Extent

It is found out that there is no significant difference in the perceptions of administrators and teacher respondents in the aspect of all statements in classroom management, the grand weighted mean scores equivalence of teacher and administrator respondents' is 4.06 with the verbal interpretation of "High Extent". This implies that all statements are highly encouraged because of interchangeability of weighted mean scores and verbal interpretations.

Statements in classroom management based on the perceptions of teachers has weighted mean scores of 4.27 with verbal interpretation of "Very High Extent". According to the perception of administrators respondents, the weighted mean score is 4.36 with the verbal interpretation of "Very High Extent" explained that with regards to classroom management, all statements are highly recommended. Due to this perception, teachers and administrators respondents' must greatly consider open-ended tasks as regards to classroom management because of its many benefits for both students and teachers. They can help students develop deeper conceptual understanding, problem-solving strategies, and communication skills. They can also encourage students to explore multiple perspectives, justify their arguments, and reflect on their own thinking through teachers' proper guidance and management skills.

In the aspect of evaluation, all statements are highly recommendable because based on the perceptions of teacher respondents, the weighted mean scores is 3.75 and verbal interpretation of "High Extent". On the other hand, based on the perceptions of administrators, the weighted mean score is 3.93 and verbal interpretation of "High Extent". Which explained that there is no significant difference on the perceptions of both respondents on the aspect of statements in evaluation aspect because there is correlation on the results.

In the aspect of implementation, based on the perception of teacher respondents, the weighted mean scores is 4.08 and verbal interpretation of "High Extent". On the perceptions of administrator respondents, the weighted mean scores is 3.77 and verbal interpretations is "High Extent", which only interprets that all statements of these aspects are highly encouraged. Open-ended tools must be implemented to help teachers and the learners make their learning together concrete. The use of these tools play a vital role as it helps meet the demands of the learners in the 21st Century classrooms. Therefore, all statements in the aspect of implementation are highly recommended.

In the aspect of Innovation, based on the perception of teacher respondents, the weighted mean scores is 4.15 and with verbal interpretation of "High Extent". On the perceptions of administrator respondents, the weighted mean scores is 4.17 and with verbal interpretations is "High Extent", which only interprets that all statements of these aspects are highly encouraged. Innovation in classroom learning encompasses a variety of instructional strategies aimed at increasing student engagement, developing creativity, encouraging collaboration, and deepening understanding through the use of real-world issues. This is why all statements in innovation aspect are highly encouraged for there is a compatibility with both respondents' perceptions. Whatever are the challenges, It is on the common goals of administrators and teachers to attain the effective integration of open- ended tools in the teaching and learning.

Klette, (2018) mentioned that whole-class teaching is an important area for students, and it enhances the possibility of equality in the classroom. The results of this study show that teacher' questions serve different functions. Most prominent are the questions related to class and task management, but there are also other types of questions that are more using subject specific.

It is mentioned in the studies of Tosuntas, Cubukcu and Inci (2019) It is evaluated that the barriers to technology integration in

education, the first one is "resources" like lack of technology, lack of access to existing technology, lack of administrative support, lack of technical support, lack of time for course preparation and inadequate software. The second one is "knowledge and skills" which is the barrier to technology integration is teachers' perceptions of their inadequacy or lack of knowledge and skills. The third barrier is "institution" which is called institutional barriers and includes educational policies of institutions and countries. The fourth barrier is "attitudes" and "beliefs" which are the important factors affecting individuals' use of technology bare generally their attitudes and beliefs towards technology. The fifth barrier is "assessment" that teachers do not have enough time to plan and use technology in teaching because of national exams to evaluate students. The sixth barrier is "subject area culture" which include own content, pedagogy, and evaluation approach. The last barrier is "habitus" which is the tendencies that are formed as a result of the experiences of teachers in their own learning life.

Significant Difference between the Perceptions of the Teachers and Administrators on the Level of Competency on the Use of Open-Ended Tools

Classroom Management. Table 20 presents test of difference in the perception of the two groups of respondents on the level of competencies on the use of open-ended tools with respect to classroom management.

As displayed in Table 20, the computed t value of 0.81 is lesser than the critical t value of 2.01. At a 5% significance level, this indicates that the null hypothesis cannot be rejected. This means that there is no significant difference between the perception of the teachers and administrator respondents on the level of competency on the use of open-ended tools in TLE 9 pertaining to classroom management. This concludes that the perceptions of respondents are the same.

Table 20. *Test of Difference in the Perception of the Two Groups of Respondents on the Level of Competencies on the Use of Open-Ended Tools with Respect to Classroom Management*

Respondents	*n*	*OWM*	*s*	*Computed t Value*	*Critical t value*	*Decision*	*Interpretation*
Teachers	30	4.27	0.44	0.81	2.01	Fail to reject the H0	Not Significant
Administrators	20	4.36	0.32				

Note: n – Sample Size s – Standard Deviation H0 – Null Hypothesis Level of Significance, α = 5%

It can be inferred that both administrators and teacher respondents are competent on the use of open-ended tools with respect to classroom management since administrators and teachers support the implementation of consultative meetings, LAC sessions, attending different training's, seminars and workshops for the improvement of teacher's personality, well-being ethics and professionalism. Nevertheless, knowledge and skills to deliver technology integration in the classroom are very essential components for a face-to-face classroom education.

Administrators and teachers' respondents also identified the best practices in classroom management. These best practices serve as a springboard to the implementation of open-ended tools. Further, enhancement of the learning, both respondents agreed on the classroom observations, positive attitudes toward learning, support from stakeholders, local government units/barangays, constant teachers motivation are essential tools of learners' achievement.

Sabanci, (2018) mentioned that this study showed that the participating teachers found that stimulating educational activities, effective communication and building relationships/bonding with students were the most important factors in creating and maintaining effective behavior management.

Roohani and Dayeri, (2019) specified on their qualitative data collected that some participants preferred autonomous motivation to help students become successful and for personal success. These teachers found joy and pleasure in teaching, learning something new, and in seeking and overcoming personal goals. Comparably, the qualitative data showed that other participants preferred internalized forms of motivation, including excitement and a high interest in teaching, hope to improve social relations, achieving personal goals and helping other reach theirs. Both sections also showed that external motivations for teaching are just as important as internal reasons. Teacher interview results indicated that higher teacher burnout rates were related to low salary and an over scheduled workload.

Evaluation. Table 21 presents test of difference in the perception of the two groups of respondents on the level of competencies on the use of open-ended tools with respect to evaluation

As reflected in Table 21, the computed t value of 0.78 is smaller than the critical t value of 2.01. Therefore, at a 5% significance level the statistical decision is to fail to reject the null hypothesis. This shows that there is no significant difference between the perception of the teachers and administrator respondents on the level of competency on the use of open-ended tools in TLE 9 pertaining to evaluation. This concludes that the perceptions of respondents are parallel.

Table 21. *Test of Difference in the Perception of the Two Groups of Respondents on the Level of Competencies on the Use of Open-Ended Tools with Respect to Evaluation*

Respondents	*n*	*OWM*	*s*	*Computed t Value*	*Critical t value*	*Decision*	*Interpretation*
Teachers	30	3.75	0.81	0.78	2.01	Fail to reject	Not Significant

Administrators	20	3.93	0.75	the H0

Note: n – Sample Size s – Standard Deviation H0 – Null Hypothesis Level of Significance, α = 5%

It can be inferred that both administrators and teacher respondents are competent on the use of open-ended tools with respect to evaluation since administrators and teachers support the teachers' attitudes, assessment criteria and procedures which gives the encouragement to students for creative responses. Both respondents encourage students in classroom interaction the patterns of giving evaluation which allow students to give knowledgeable answers, stimulate further thought and exploration. Application of the art of questioning, using Socrates' theory that it is more important to enable students to think for themselves than to merely fill themselves with "right" answers, exploring ideas and prompt higher level thinking of students in the learning process. Therefore, open-ended questions during classroom discussion are greatly encouraged and supported by the administrators and teachers.

Administrators and teachers' respondents also identified open-ended tasks which have many benefits for both teachers and students. They also encourage students to explore multiple perspectives and reflect to their various ideas. Using open-ended questions are an effective way to challenge students and learn more about how they think.

Additionally, using automatic scoring in formative assessment as a replacement of human scoring with the scores supplied by an automatic system, raises some problems in the validity of these automatic scores according to some studies. This must be then considered by human corrector.

The role of a teacher is to cultivate, develop and enhance a students' potential in learning. Another important component in the teaching and learning process is assessment. Assessment is important as it involves the collection of information with regards to students' learning as well as lecturers' teaching. This can be observed by how a teacher spends most of their time designing and conducting assessment activities. (Smith, 2018)

There are two forms of assessment, namely traditional assessment (multiple choice question, fill in the blanks question, true and false question) and alternative assessment (projects, open-ended question, journal writing). The first focuses more on scores, however the latter focuses more on the students' performance in the process of learning. (Sulaiman, Abdul Rahim, Hakim and Omar, 2019)

Implementation. Table 22 presents test of difference in the perception of the two groups of respondents on the level of competencies on the use of open-ended tools with respect to implementation.

Table 22. *Test of Difference in the Perception of the 0.3 Two Groups of Respondents on the Level of Competencies on the Use of Open-Ended Tools with Respect to Implementation*

Respondents	*n*	*OWM*	*s*	*Computed t Value*	*Critical t value*	*Decision*	*Interpretation*
Teachers	30	4.08	0.52	1.78	2.01	Fail to reject the H0	Not Significant
Administrators	20	3.77	0.71				

Note: n – Sample Size s – Standard Deviation H0 – Null Hypothesis Level of Significance, α = 5%

Based on Table 22, the computed t value of 1.78 is below the critical t value of 2.01. Hence, the statistical decision is not to reject the null hypothesis at a 5% level of significance. This implies that there is no significant difference between the perception of the teachers and administrator respondents on the level of competency on the use of open-ended tools in TLE 9 pertaining to implementation. This concludes that the perceptions of respondents are conformed.

It can be inferred that both administrators and teacher respondents are competent on the use of open-ended tools with respect to implementation since administrators and teachers support more of the open-ended than traditional assignments and classroom instruction which can be challenging for students to finish activities. Because of this, it is important that teachers make instructions and expectations clear and outlined on how students will be assessed and graded and how the scoring rubric and criteria being outlined. This implementation process of using open-ended tools empower students to work toward achieving goals and objectives and make their work and performance productive. Additionally, using open-ended tools expose students to examples of mastery, provide students with the vocabulary to analyze work, teach students visual thinking strategies and also help them how to give peer critiques to improve further their collaborative work and projects. This teaching and learning strategies must be encouraged and enhanced for a more effective implementation through teachers seminar and more training's.

On the study conducted by Chen (2022) discussed the increasing use of Artificial Intelligence (AI) technologies in education, however these qualitative methods can be time intensive. With technology-based learning contexts and multisensory data becoming increasingly widespread, researchers are making use of multiple sources of behavioral data such as interaction logs, audio, video, eye gaze and physiological data, along with machine leading methods, to understand the process of learning as a function of time.

Conducted by Ramachandran, Huang, and Scassellati (2019) the authors suggest a link between motivation, actions, and the learning outcomes that underlies the learning process. They propose creating more effective tutoring interactions by finding observable behaviors that correspond to motivational factors and employing a robot to respond to these behaviors.

In a study conducted by Nasir (2021) the authors found that teams achieving higher learning gains in a robot-mediated human-human collaborative learning activity, may not necessarily perform well on the task. However, their speech, actions, emotions are distinctive

as compared to the teams with lower learning gains. Thus, behavioral analysis could allow for better discrimination between high and low learners.

Innovation. Table 23 presents test of difference in the perception of the two groups of respondents on the level of competencies on the use of open-ended tools with respect to innovation.

Table 23. *Test of Difference in the Perception of the Two Groups of Respondents on the Level of Competencies on the Use of Open-Ended Tools with Respect to Innovation*

Respondents	*n*	*OWM*	*s*	*Computed t Value*	*Critical t value*	*Decision*	*Interpretation*
Teachers	30	4.15	0.37	0.13	2.01	Fail to reject the H0	Not Significant
Administrators	20	4.17	0.52				

Note: n – Sample Size s – Standard Deviation H0 – Null Hypothesis Level of Significance, α = 5%

Table 23 depicted that the computed t value of 0.13 is less than the critical t value of 2.01. Thus, the statistical decision is not to reject the null hypothesis at a 5% level of significance. This concludes that there is no significant difference between the perception of the teachers and administrator respondents on the level of competency on the use of open-ended tools in TLE 9 pertaining to innovation. This concludes that the perceptions of respondents are compatible..

It can be inferred that both administrators and teacher respondents are competent on the use of open- ended tools with respect to innovation since these tools can be able to reuse, create, contextualize and collaborate. Teachers have a wide variety of material to draw and build upon for their own classes without having to start from scratch and are allowed to collaborate with their colleagues from different parts of the country or abroad. This innovation in the classroom teaching and learning has advantages as cost savings, access to education and collaboration. This reduce the cost of course materials for both teachers and students. Making use of open-ended tools instead of traditional textbooks can substantially inspire students creativity and exploration. Thus, administrators, teachers, parents, stakeholders and students themselves are encouraged to embrace a mindset of change. Teachers are recommended to build a flexible and create a productive learning environments for students, teach a problem- finding approach, allow students to take risk and fail, and use a flipped classroom model to develop innovation in teaching and learning.

On the study conducted by Miranda (2021) proposes dividing competencies into two groups and their development in higher education system. First, Transverse competencies: critical thinking, cooperation, collaboration, communication and creativity. Second, Disciplinary Competencies: Training and development of functional, technical knowledge and skill of successful work; development of research and design skills through creation and implementation of new technologies; use of the latest technologies and best practices in technological solutions.

Conducted by Podmetina (2018) have compiled an open innovation expert's profile .which needs a number of intrapersonal competencies, such as leadership and entrepreneurial skills, creativity, and risk-taking.

McPhillips (2022) have compiled a competence profile of open innovation in the context which includes creativity, entrepreneurship, communication, and networking, open minded thinking, risk-taking, and self- efficacy in digital skills.

Summary. Table 24 presents summary of test of difference in the perception of the two groups of respondents on the level of competencies on the use of open-ended tools

Table 24. *Summary of Test of Difference in the Perception of the Two Groups of Respondents on the Level of Competencies on the Use of Open-Ended Tools*

	Teachers		*Administrators*		*Computed t Value*	*Decision*	*Interpretation*
	OWM	*s*	*OWM*	*s*			
a. Classroom Management	4.27	0.44	4.36	0.32	0.81	Fail to Reject the H0	Not Significant
b. Evaluation	3.75	0.81	3.93	0.75	0.78	Fail to Reject the H0	Not Significant
c. Implementation	4.08	0.52	3.77	0.71	1.78	Fail to Reject the H0	Not Significant
d. Innovation	4.15	0.37	4.17	0.52	0.13	Fail to Reject the H0	Not Significant

Note: α = 5% Critical t Value = 2.01

It is observable in Table 24 that the perceptions of the teachers administrator respondents on the level of competencies on the use of open-ended tools in TLE 9 with regard to classroom management; evaluation; implementation; and innovation do not imply significant difference as seen in the corresponding computed t values which are lower than the critical t value. This concludes that the respondents' perceptions are the same.

It can be inferred that both administrators and teacher respondents value the competencies on the use of open-ended tools with respect to classroom management, evaluation, implementation and innovation since they are encouraged to value the advantages and benefits of using open-ended tools for productivity in facilitating learning in the classroom. These tools help teachers and students get things done faster, help set goals, assign tasks, create reports, track progress and communicate. Some teachers considered that the most valuable learning takes place when the teacher and the students manage computer projects together. These open-ended tools enhance teacher's lesson plan and allow the teacher to take their students beyond textbooks and boring lectures. Using the right tools in the right

ways will reduce fatigue and increase productivity. It will also improve work quality and reduce risk of injuries and accidents.

Additionally, teachers can show students colorful, stimulating examples with the use of open-ended tools. Subjects that are historically dry or difficult to grasp can be turned vibrant and interesting. Thus, classroom teaching and learning is encouraging with the use of open-ended tools..

On the study conducted by Zawadzka (2018) suggested that meta cognitive monitoring of one's learning creates a mere illusion of competence. At the same time, open -ended curricula have clashed with the inclination of the traditional breed of teachers to deliver content in a ready made, prefabbed form.

It is mentioned in the studies of Gorgen (2020), Liuta (2019) and Veldkamp (2020) students are expected to find interactive, open-ended instruction more resonant with their learning style than the classical methods based on unilateral expositions of information. A number of successfully implemented instructional methods incorporating games serve as testimony to the actuality of interactive, inherently playful education, especially for today's student cohorts heavily influenced by the video game culture.

Conclusions

Based on the findings of the study, the following conclusions were drawn.

While the student respondents perceived that there is an active, authentic, collaborative, constructive, and goal-directed utilization of open- ended tools in TLE, there are still some areas which need improvement particularly in aspects with lowest mean.

The researcher found out that the teacher respondents' perceptions regarding their competence in utilizing identified open-ended tools as teaching approaches are generally appropriate as indicated by the commendable weighted mean scores. However, there are areas that still needs intensified improvement, particularly in aspects with lower weighted mean scores, such as the teachers' perceived interest and motivation.

The researcher found out that there is no significant difference in the perceptions of teacher and administrator respondents concerning classroom management, evaluation, implementation and innovation. However, despite these favorable finding, there remains an area that needs improvement, with the evaluation aspect receiving the lowest weighted mean score according to the respondents' perception.

The researcher found out that there is no significant difference between the perceptions of the two groups of respondents regarding the utilization of identified open-ended tools as the result varies on both parties.

An intervention program was proposed to address the study's findings to ensure the consistent application of effective and efficient teaching approaches, strategies and pedagogies in the utilization of open-ended tools. Recommendations

Based on the findings of the study, as well as the conclusions drawn by the researcher, it is suggested that the concerned school may consider the following recommendations:

The school administrators and the (TLE) teachers may implement the enhanced intervention plan for students' improved performance in the utilization of open-ended tools especially in active aspect.

An intensified assessment of teachers may be conducted on the; level of competency as regards their utilization of open-ended tools especially on the aspects of interest and motivation for productivity and development through LAC sessions, seminars, and workshops.

The teachers can be trained more about the utilization of open-ended tools to further develop their skills, particularly in the areas of evaluation, to ensure the reliability and validity of the result.

A consistent regular review of the learning materials and open-ended tools in order to guarantee constructive alignment in the context of learning outcomes and students' performance.

Future researchers may instigate a parallel study on the utilization of open-ended tools approach in their schools, municipality-wide or city-wide.

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