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Abstract

With the onset of Education 4.0 and the VUCAD² world, the use of technology in instruction has been fully maximized. This study aimed to determine the teachers' utilization of computer-based technology in science instruction. The study used descriptive survey research using the Computer-Based Technology Inventory Survey Questionnaire (CBTI-SQ). A total of 41 science teachers in two state-owned secondary schools in Zambales, Philippines served as respondents in the study. Based on the findings, the computer-based technology (CBT) in science instruction is a trend in the 21st-century learning. Teachers utilized CBT in instruction to improve their teaching that significantly uplifts students' learning interests and concept understanding. However, teachers encounter difficulties due to low ICT literacy, unstable internet connection, power interruption, and sometimes they find it too expensive to use the CBT. The study recommends ICT training-workshop and encourages teachers to utilize appropriate CBT instruction based on the context of the students. The findings have important implications to policy development and curriculum enhancement.

Introduction

In today's generation with increasing demand of technology, it is very hard for teachers to get students attention when lessons are not connected with computer related programs. There are instances that students do not engage well in classroom discussions which later resulted to poor academic performance. It is a must for 21st century teachers to acquire computer skills to cope up with the needs of 21st century learners. The 21st century teacher should be flexible and adapt with the changing industry. They may use different computer and computer applications that can help the learners to be motivated and to be interested. Using computer-based technology must be further strengthened so that competent 21st century learners will be produced. Baterna et al. (2020) stressed that being digitally-literate will become an advantage for the students as they land on their jobs in the new industrial era. They also emphasized that teachers should use digital devices and information effectively and responsibly towards developing digitally-literate citizens.

According to Schindler et al. (2017), the utilization of computers, web, and cellphones is at its highest level amount to date and expected to persistent increment as innovation turns out to be progressively open, explicitly for clients in developing countries. According to Kozcu Cakir, Guven and Celik (2021), the variety in

technological products introduced with the technological development in the world increases the technological utilization by activating individuals' interests and inquisitiveness. Zamfir (2008) mentioned that education today "implies not only a singular, computational use of new technologies, but the promotion of engaged peer interactions with a shared computer activity" (p. 684). The shared dependent relationship of new advances, informative collaboration, the improvement of computer applications, the structure of computer-based undertakings and centered movement for students to become critical thinkers and creators of learning is the presence of the futuristic instructive model (Kimber et al. in Zamfir, 2008).

The 21st-century science classroom is currently associated with non-traditional teaching instruments, including laptops, measuring device, and individual advanced aides. With the utilization of this innovation, there was always an assumption that these devices will basically bring out progressive remodel in educating and learning process (Bang & Luft, 2013). The teachers and students were two important beneficiary groups in any struggle to integrate technology into schools; their convictions and views must be completely understood before any initiative takes place (Quing, 2007). In the education field it has affected every aspect of school working including administration, timetable, project work, evaluation, lesson delivery, and examination system etc. Computers enabled teaching-learning process more relevant for the learners wherein if connected the to real life situation. It is basically accepted as the modern instrumental tool which empowers the teachers to modify the teaching methods they used in order to strengthen the students' interest (Chandini, 2016).

Shi and Bichelmeyer (2007) mentioned that regardless with the huge expanded in accessibility of computers in schools and recessive progress in instructors' computer utilization, an examination of informative exhibits standing token coordination of computers by teachers. Such factors as insufficient of viable training and required for cooperation and contribution in making arrangements for computer use which interfered in the utilization of teachers' with computers in 1991 continued to exist in 2004. Yilmaz (2011) concluded that there were still struggles at present situation typically in the elements of foundation, instructional materials, educator training, and programming. The micro-level examinations, which were done at the dimension of individual schools, ought to be upheld. At that point, there will be better opportunities to influence the outcomes of studies into strategies for decisive reform. In the study of Windschitl and Sahl (2002), they stated that the condition of common technology did not establish the instructors' development toward constructivist guidance. The laptops were a catalyst that enabled one participant who had a pre-existing discontentment with teacher-centered practices in order to change the condition of her classroom through collaborative student work and inquiry-based learning.

In the study of Bruce and Levin (2001), they emphasized on the needs of educator training, nowadays, there were engaged with adapting new technologies, the consequences on students' learning, the budgetary costs, security, and plagiarism. In the study of Wozney, Venkatesh, and Abrami (2006), they found out: (a) individual utility of computers outside of teaching exercises was the most significant indicator of educator in using technology in the classroom; (b) teachers' utilization of computer advancements was generally for "instructional"; and (c)) looking forward for progress and observed esteem were the most significant issues in recognizing levels of computer use among instructors;" (e.g., CD-ROM and World Wide Web) and "expressive"

(e.g., Word processing) purposes. In this sort of condition, getting the basic data completely and on schedule; utilizing the obtained data in expert and self-development and in this manner getting to be and skilled instructor are largely legitimately identified with the competency to utilize the computer-based technology successfully for these aims (Konan, 2010).

Computer-based Technology

Computer-based technology implies computer programming or equipment utilized by the teachers and learners in the conveyance of an instructional program (The State Maryland, 2014). Susanto, Hobri and Nugrahaningsih (2021) suggested that the teachers must integrate multimedia technology in teaching STEM. Mumtaz (2000) stated that in a study he specified a number of factors which influence the teachers' decisions to use ICT-based in the classroom: quality of software and hardware, access to resources encouragement to change, support and companionable in their school, alleviation of use, school and national polices, dedication to professional learning and background in formal computer training and seminars. This paper aimed to identify the importance of computer-based technology in classroom instruction. It is the decision of the teacher to use computer as a tool in teaching-learning process. It is a great help for teachers in classroom instruction because in enough time it can result to an increase on the academic performances of the students.

Using Technology in Science Instruction

There are so many factors for educators to use computer-based technology in their classrooms. Gilakjani (2013) identified some of the key factors contributing to the use of computer-based technology by teachers. The study discussed computer self-efficacy, explain the teaching experiences and develop insufficient computer technology support. The ultimate goal is to investigate professional development in computer technology integration, (Gilakjani, 2013). Aslan (2021) stressed that enabling individuals to keep pace with this change has become the aim of education. Efe (2011) stated that it is impossible to ignore the importance of new technology in schools, particularly for science, as its use is likely to contribute to science education and learning by advancing and enhancing the production of work, supporting the development of collaborative knowledge, supporting investigation and experimentation, offering students greater duty and control through individual investigation and experimentation, advancing inspiration and commitment, and helping students to consider forms more definitely. In addition, he assessed that science student-teachers who were more skilled with educational technology had higher aspirations to use the technology so that their students are more likely to use technology and are considered more valuable.

In summary, science is always connected with the word technology, Science and technology, that is why one of the most effective strategies in teaching science is integrating technology. This is a big help for teachers and students. A help for teachers in a way that they can capture the interest of students that may lead to a better learning for the students, a help for students to have experiences and to remove ignorance in which a great use now in the era of computer technology. It is a must that teachers should be open in adapting the value of using

computer wherein at the end of the day, they can use it to uplift their teaching skills and professionalism in general.

Conceptual Framework

In the study of Mayer and Moreno (2002), their paper presented a multimedia learning cognitive theory that illustrates cognitive load theory, constructivist learning theory, and dual coding theory. Based on the theory, instructional design principles are derived and tested to promote multimedia learning. Results are consistent with a dual-procedure working memory model in which learners are more likely to build connections between words and corresponding images when they are held simultaneously in working memory (Mayer, Moreno, Boire, & Vagge, 1999). This study was based on Multimedia Learning Theory. The "principle of multimedia" states that "individuals learn more from words and images than from words alone" (Mayer, n.d.). This theory provides a guide and tools for everyone to use in classroom instruction. We can also find how we can utilize computer-based technology better and also know how to apply computer applications in a more convenient manner. Moreover, the different computer applications must be used in classroom instructions to provide interest and motivation where in the future can result to a good academic performance of students. Teachers must be knowledgeable in utilizing computer-based technology in science instruction so that students can also come up with the changing era of technology. Most of them like using computers and any computer related gadgets, as a teacher, they can use their interest to make the teaching-learning process more effective.

Figure 1 shows the different computer applications used by teachers in science instruction. It is composed of six categories namely: presentation software, word processing software, publishing software, multimedia software, spreadsheet software and educational software.



Figure 1. Computer-Based Technology in Science Instruction

Presentation software is a type of computer applications that is used to make a arrangement of text and graphics, and oftentimes audio and video, to synchronize a speech or public presentation. Some examples are Microsoft PowerPoint and Google Slides. Word processing software is a type of computer application that performs the task of document compilation, editing, formatting, and printing. Some examples are Microsoft Word and Google Docs. Spreadsheet software is a type of computer applications that capable of analyzing data in tabular form, organizing, and storing. Some examples are Google sheets and Microsoft excel.

Publishing software is a type of computer applications that allows you to organize page layouts that combine graphics and texts. These features are placed in frames that can be placed anywhere on the page. Some examples are Adobe InDesign and Microsoft Publisher. Multimedia software is a type of computer applications that allows you to use different film, pictures, sounds, and writing. Some examples are Windows Media Player and PowerDirector.

Educational software is a type of computer applications where the primary purposed is either technology-enhanced classroom teaching or self-learning of contents. Some examples are Microsoft Encarta and PhET Interactive Simulation. Web-based resources in Science are a type of computer applications that support students and teachers to explore the knowledge independently in the learning process. Some examples are Google and Science YouTube Channel. Science mobile applications is a type of software applications specifically designed for use on small, wireless computing devices such as smartphones and tablets as opposed to areas of work such as desktop computers or laptops. Some examples of Science mobile applications are YouTube and Google Drive.

Purpose of the Study

This study aimed to determine the knowledge and practices of teachers in two state-owned secondary schools in utilizing computer-based technology in science instruction. Specifically, the study sought to answer the following questions:

1. What is the degree of utilization of computer-based technology by teachers in science instruction in terms of:
 - 1.1.1. presentation software;
 - 1.1.2. word processing software;
 - 1.1.3. spreadsheet software;
 - 1.1.4. publishing software;
 - 1.1.5. multimedia software;
 - 1.1.6. educational software in science;
 - 1.1.7. web-based resources in science; and
 - 1.1.8. mobile applications in science?
2. Is there a significant difference in the utilization of computer-based technology in science instruction when grouped according to profile variables?

3. What are the advantages of using computer-based technology in science teaching?
4. What are the problems encountered by the teachers in utilizing computer-based technology in science instruction?

Method

Research Design

The study used descriptive survey research design with survey questionnaires to collect the data needed as the main tool. The present study surveyed the teachers' utilization of computer-based technology in Science instruction.

Respondents

The respondents of this study were 41 Science teachers of two state-owned secondary schools in Zambales during the school year 2018-2019. Table 1 shows the demographics of the respondents.

Table 1. Frequency and Percent Distribution of the Respondents' Profile

Age	Frequency (n=41)	Percent (100.0)
21 – 25	6	14.63
26 – 30	10	24.39
31 – 35	5	12.20
36 – 40	11	26.83
41 - above	9	21.95
Sex		
Male	11	26.83
Female	30	73.17
Civil Status		
Single	19	46.34
Married	20	48.78
Widowed	1	2.44
Separated	1	2.44
Teaching Position		
Teacher I	25	60.98
Teacher II	5	12.20
Teacher III	5	12.20
Master Teacher I	3	7.31
Master Teacher II	3	7.31
Length of Teaching Experience		
5 years and below	16	39.02
6 to 10 years	8	19.51

11 to 15 years	7	17.07
16 to 20 years	6	14.63
21 and above	4	9.76
Highest Educational Attainment		
BS/AB holder	7	17.07
BS/AB w/ MA/MS units	20	48.78
MA/MS holder	9	21.95
MA/MS w/ PhD/EdD units	4	9.76
PhD/EdD	1	2.44
Specialization		
Biological Science	13	31.71
General Science	19	46.34
Physical Science	7	17.07
Others:		
Math	1	2.44
BSIT	1	2.44

The respondents were chosen through non-proportional quota sampling technique. The researcher specified the minimum number of respondents sampled in each category in this method. Here, numbers that correspond to the proportions in the population are not concerned. Instead, it is simply to have enough to guarantee that even small groups in the population could be discussed by the researcher. This method was a non-probabilistic analog of stratified random sampling in which it was particularly used to ensure that smaller groups were proportionately represented in their sample (Trochim, 2006).

Out of the 41 respondents, 6 or 14.63% Junior High school Science teachers whose age were at 21 and 25, 10 or 24.39% under 26 to 30, 5 or 12.20% aged 31 to 35, 11 or 26.83% under 36 to 40, 9 or 21.95% for 41 and above. It was seen that majority of the respondents aged 36 to 40. The paper of Kumar and Muniandy (2012) the findings present that the overall of emotional intelligence is average; it has been shown that the level of EI among teachers has improved with age, grade, education and teaching experience where there has been no factors contribution from gender and prior work.

There were 30 or 73.17% female and 11 or 26.83% male. Majority of the respondents are female science teachers. Nowadays, teaching is not about the gender but the most essential thing is that teachers help students to learn and to become good human being in the society and responsible citizen of the country. The paper of Tzu-Chiang, Chin-Chung, Ching, and Min-Hsien (2013) expressed that female science instructors see higher self-confidence in academic learning yet lower self-confidence in technological information than males. In terms of civil status, 19 or 46.34% respondents were single, 20 or 48.78% of them were married, 1 or 2.44% respondent was widowed, and 1 or 2.44% was separated. Most teachers are married, earned a college degree, and further master's unit (Usop, Askandar, Langguyan-Kadtong, & Onotan-Usop, 2013). In terms of teaching position, 25 or 60.98% respondents dominantly said that they were Teacher I, 5 or 12.20% of them were

Teacher II, 5 or 12.20% were Teacher III, 3 or 7.31% were Master Teacher I and the lastly 3 or 7.31% claimed that they were Master Teacher II. Typically, Science teachers has been stocked as a Teacher 1 for some reasons but generally Science teachers continue their studies primarily to increase their salaries and uplift their educational attainment.

According to Ingersoll, Merrill, and May (2014), the research analyzes reveal the beginning instructors are broadly fluctuated in the pre-administration preparing they got. Some aspects of the education and planning received by beginning instructors were related with their attrition, while others were most certainly not. In terms of length of teaching experience; 16 or 39.02% Science teachers taught for 5 years and below in teaching, 8 or 19.51% Science teachers contributed about 6 to 10 years, 7 or 17.07% Science teachers spent about 11 to 15 years, 6 or 14.63% Science teachers worked about 16 to 20 years, and 4 or 9.76% Science teachers devoted about 21 years and above in teaching profession. There were dominantly new generation of Science teachers who rose the number of Science instruction. Teachers with 6 to 10 years of teaching experience face the most work stress and the least 0 to 5 years (Aftab & Khatoon, 2012). In terms of Highest Educational Attainment, there were 7 or 17.07% of science teachers who were college diploma holders, 20 or 48.78% of science teacher were dominantly college diploma holders with master units, 9 or 21.95% were master degree holder, 4 or 9.76% were master degree diploma with doctorate units, and 1 or 2.44% Science teacher was a doctorate degree holder. Majority of the respondents were taking master units to improve Science teaching and at the same time to earn bigger salary. Stated reasons behind quitting the teaching profession centered on low wages, blame for educators and absence of administration support (Curtis, 2012).

The Science teachers have different specialization areas. Thirteen or 31.71% of the Science teachers specialized in Biological Science, 19 or 46.71% of them dominantly specialized in General Science, 7 or 17.07% claimed that they specialized in Physical Science, and 2 or 4.88% were not specialized in science. Majority of the respondents were Science teachers who have a major of General Science who are helpful to the learners under K-12 curriculum where in the Science teaching depends on the 2st century Science instruction. In addition, it was shown that there were few science teachers teaching outside their area of expertise. The paper by Osman, Halim, and Meerah (2006) shows that multimedia integration and the use of English in science instruction are the most prevalent needs of Malaysian secondary school science teachers.

Research Instrument

The Computer-based Technology Inventory Survey Questionnaire (CBTI-SQ) served as the main tool for data collection. It consists of three parts. The first part consisted of the demographic profile of the respondents. The profile of the teachers included, age, sex, civil status, teaching position, length of teaching experience, highest educational attainment, and specialization. The second part determined the computer-based technology utilized by the teachers wherein it has a rating table which consisted of 42 items that included presentation software (5 items), word processing software (5 items), spreadsheet software (5 items), publishing software (5 items), multimedia software (4 items), educational software (5 items), web-based resources in science (5 items), and

mobile applications (8 items). The third part was the open-ended questions about the advantages and the problems encountered by the teachers in utilizing computer-based technology.

The survey tool was a researcher-made questionnaire. The most popular computer applications included in the inventory questionnaire was lifted from the ICT literature. The survey questionnaire was subjected to construct and content validity. Three experts checked the consistency of the items in each variable. A total of five teachers where the respondents for the testing wherein they were asked to answer the survey questionnaires. The researcher-made questionnaire was composed of 42 items and the Cronbach Alpha value is .782 which indicated high reliability index.

Data Collection and Analysis

The researcher-made instrument was subjected to construct and content validity prior to data collection. Then, the researchers asked permission to the school principals to float the research survey questionnaires. The administration of survey questionnaire was made face-to-face since the study was conducted during pre-pandemic era. The retrieval of the survey questionnaire was done on the same day.

Encoding of the data gathered on the Microsoft Excel followed. The Microsoft Excel 2013 and SPSS application were utilized for the processing of data. The statistical tools used to analyze and interpret data were frequency and percent distribution, weighted mean, standard deviation, and ANOVA. The thematic Analysis was utilized to analyze qualitative data and to methodically gain information and compassion about an individual, an interaction, a group, a circumstance, an association or a culture.

Ethical Considerations

To establish and safeguard ethics in conducting this research, the teachers' names were not mentioned in any part of this research. They were not emotionally or physically harmed just to be respondents of this study. The respondents can decide not to be included in the study due to some concerns and other priorities, this decision of opting not to join in the study was respected by the researcher.

Coding scheme was used in reflecting the respondents in the table for distribution of respondents. Proper document sourcing or referencing of materials were done to ensure and promote copyright laws. A communication letter was presented to the principal of each school to ask authority to gather the needed data on the contents of the syllabi and the number of science teachers. A communication letter was presented to the principal asking permission to float the questionnaire.

Results and Discussion

Computer-Based Technology in Science Instruction

Table 2 shows the different computer application software and the degree of utilization of computer-based technology by teachers in Science instruction.

Presentation Software. The MS PowerPoint showed the degree of utilization of computer-based technology by teachers in science instruction. In terms of presentation software, it was observed as “Always” with an overall mean of 3.56 and the standard deviation was 0.70. Science teachers mostly utilized MS PowerPoint because of the different animations, themes, graphics, and etc. which are essential to get the attention of their students. In the paper of Mitchell and Honore (2007), they emphasized that hybrid learning course is essential in classroom face-to-face learning process with the utilization of computer-mediated communication.

Table 2. Science Teacher’s Utilization of Computer-Based Technology Instruction

Computer Application Software	Mean	sd	VD
1. Presentation Software: MS PowerPoint	3.56	0.70	A
2. Word Processing Software: MS Word	3.85	0.47	A
3. Spreadsheet Software: MS Excel	3.78	0.56	A
4. Publishing Software: MS Publisher	3.17	0.93	O
5. Multimedia Software: Windows Media Player	3.37	0.82	O
6. Educational Software: Microsoft Encarta	2.34	0.95	R
7. Web-Based Resources: Google	3.63	0.76	A
8. Science Mobile Application: YouTube	3.73	0.59	A

Legend: 3.50 - 4.00 Always (A); 2.50-3.49 Often (O); 1.50 -2.49 Rarely (R); 1.00-1.49 Never (N)

Word Processing. The MS Word shows the degree of utilization of computer-based technology by teachers in science instruction in terms of word processing software. It was observed as “Always” with an overall mean of 3.85 and the standard deviation was 0.47. This is one of the most commonly used word processing tool by teachers in creating their worksheets, notes, hand-outs, periodical exams, and students reports. In writing instruction using the word processing it can provide users with educational benefits because it encourages text conceptualization and frees the user from the mechanical concerns (Bangert- Drowns, 1993).

Spreadsheet Software. The MS Excel presents the degree of utilization of computer-based technology by teachers in science instruction. In terms of Spreadsheet software was observed as “Always” with an overall mean of 3.78 and the standard deviation was 0.56. They are generally used by teachers especially to compute grades and to keep track of the progress of their students. According to Benatallah, Hoang, and Paik (2010), spreadsheet is known as data management, analysis and reporting tool with applicable but user-friendly functions.

Publishing Software. The MS Publisher expresses the degree of utilization of computer-based technology by teachers in science instruction. In terms of presentation software it was observed as “Often” with an overall mean of 3.17 while the standard deviation was 0.93. It is a computer publishing application that can be utilized by teachers to make a variety of publications especially for certificates and school program invitations. Green and Gutmann (2011) stated that Microsoft Research has constantly enhanced its interest in the application of computer science tools and technologies to upgrade science.

Multimedia Software. The Windows Media Player specifies the degree of utilization of computer-based technology by teachers in science instruction. In terms of multimedia software, it was observed as “Often” with an overall mean of 3.37 and the standard deviation was 0.82. It is mainly used by teachers for playing audios, videos, and viewing photos that are affiliated with their lessons. In the paper of Han, Cho, Kim, and Park (2019), they argued that multimedia technology has a positive impact on the perception and adoption of multimedia learning technology by the user.

Educational Software. The Microsoft Encarta presents the degree of utilization of computer-based technology by teachers in science instruction. In terms of educational software it was observed as “Rarely” with an overall mean of 2.34 while the standard deviation was 0.95. It is used for computer software which is made for educational purpose. According to Stanisavljevic-Petrovic, Stankovic, and Jevtic (2015), in the result of their research, they stated that nearly two-thirds of the students surveyed prefer to learn through educational software because they believe it is the best way to learn in school.

Web-Based Resources. Google shows the degree of utilization of computer-based technology by teachers in science instruction. In terms of web-based resources in Science it was observed as “Always” with an overall mean of 3.63 while the standard deviation was 0.76. Web-based are an invaluable base to establish information and for self-education for users. Many people use Google because of the information that they get back from their search. The effect of web-based learning technology demonstrates a positive connection between the utilization of learning technology and engaging students and developing learning (Chen, Guidry, & Lambert, 2010).

Science Mobile Application. YouTube applications express the degree of utilization of computer-based technology by teachers in science instruction. In terms of science mobile application it was observed as “Always” with an overall mean of 3.73 and the standard deviation was 0.59. Using mobile phones, tablets, or other mobile devices for mobile application are so much relevant in today’s generation. YouTube applications are used by many people to watch music videos, educational videos, shows, and also for video-sharing services and many more. Generally, Science teachers used this application in their classroom instruction because there are so many downloadable video clips that are related in science and they may use in their teaching. According to Economou and Gavalas (2010) that mobile devices are increasingly being approved as an appropriate medium for multimedia-rich applications to meet mobile device users ' needs.

Difference in the Computer-Based Technology Utilization by Profile Variables

Based on the ANOVA, there is a significant difference in the utilization of presentation software when grouped according to terms of civil status and length of teaching experience. However, there are no significant differences in the utilization of word processing, spreadsheet software, multimedia software, web-based resources and science mobile application by teachers' profile variables. In terms of publishing software, it is evident that the teachers' profile has no significant difference except age and length of teaching experience. Science teachers' utilization of educational software differ in terms of teaching position and highest educational attainment.

Advantages in Utilizing Computer-Based Technology in Science Instruction

Table 3 shows the advantages of utilizing computer-based technology in science instruction as perceived by teachers.

Theme 1. Boost students' interest. Using the computer-based technology in teaching science can motivate students' interest (R17) and it caters the different types of learners needs (R06) because it makes science real and interactive (R18) and they really understand the concept of the lessons easily (R41). According to Aloraini (2012), she concluded that finding the impact of using multimedia on female students ' academic achievement and the results showed that using multimedia in education is an effective way to achieve better learning.

Table 3. Advantages in Utilizing Computer-based Technology in Science Instruction

Theme	Description	Frequency
1. Boost students' interest	Students enhance their learning by motivating and getting their interest by using computer applications in teaching Science.	14
2. Information accessibility	Students easily get the information by the use of internet.	7
3. Easy IM preparation	Students appreciate more on IMs just because it is available every day and can easily make through the use of computer software.	9
4. Effectiveness in enhancing conceptual understanding	Students enrich the conceptual understanding and it is effective in teaching Science education.	12
5. Portable usage of computer applications	Students use computer applications at anytime and anywhere.	3

Moreover, the results of the study of Jinajai & Rattanavich (2015) the field of English language and creative writing, using the TLS method-based CAI are useful. Students in the ninth grade have significantly increased English performance, particularly in reading and writing skills, may explain the results of this study.

Theme 2. Information accessibility. Nowadays, people are living in the modern world, a world of information, media and computer. The information can be easily get by typing in different devices such as phones and computers. Moreover, through internet it is also easy to update the knowledge and information of the teachers even the students (R35). The National Research Council (2000) mentioned that PC based advances hold extraordinary guarantee both for expanding access to information and as a methods for advancing learning. Individuals are stimulated about the potentiality of information networks, such as the Internet, connecting students around the world into student communities. The Internet gives access to answer what's in their reading material. The present children are now acquainted with "Googling-it" to discover answers to questions. In-class Internet research gives teachers the opportunity to teach their students how to evaluate the quality of the information they find online while removing the one-sided restrictions of a textbook (Mata, 2015).

Theme 3. Easy IM Preparation. It is a well-known fact that computer lessen the burden of a user in different ways. One beneficiary of these are the teachers who always prepare instructional materials (IM). R29 said that using computer-based learning makes it easy for complicated IM to be prepared while R13 said it lessen the time in preparing the lesson. The Ministry of National Education (MONE) has made efforts to encourage the use of technology in education to meet an information society's new challenges. The government has sought assistance in introducing a number of projects aimed at improving educational quality. These include upgrading the curricula and instructional materials, revising student achievement tests, improving the teacher training system, and increasing the research component in education (Asan, 2002).

Theme 4. Effectiveness in Enhancing Conceptual Understanding. Using computer-based technology, students can easily understand the concept of the lessons (R10) and the teachers were able to teach science effectively (R04). Furthermore, computer-based technology in science teaching makes teaching science more real especially from concepts, which can't be taught just by lecture discussion because application and software provides simulation which helps teach students not just let them imagine (R28). R37 added that he could show more animation to let students visualize concepts more comprehensively. Higgins, Xiao and Katsipataki (2012) said that it appears to be plausible that progressively compelling schools and educators are bound to utilize ICT and advanced innovations more successfully than different schools. They have to find out about where and how it is utilized to most noteworthy, at that point the data can be utilized to help in enhancing the learning in different settings.

Theme 5. Portable Usage of Computer Applications. There are lots of computer applications that the teachers can use in teaching. R12 said that he can use different interactive applications in science and R03 added that he can use these applications anytime and anywhere. The studies of Cochran-Smith and Lytle (1993) providing suggestions for designers of professional development programs aimed at improving the development of science

teachers providing participating teachers with opportunities to build and sustain ' learning communities ' appears to have a positive impact on the integration of science teachers ' technology.

Problems Encountered by Teachers in Science Instruction

Table 4 shows the different problems encountered in utilizing computer-based technology in science instruction as perceived by teachers.

Table 4. Problems in Utilizing Computer-based Technology in Science Instruction

Theme	Description	Frequency
1. Unstable internet connection	Teachers experience difficulty in accessing internet because of low internet connection.	10
2. Power supply interruption	Teachers could not work and finish on time just because of power interruption.	17
3. Deficiency in ICT literacy	Teachers who live in traditional way might experience difficulty in using ICT.	6
4. Inadequacy of ICT materials	Teachers have a problem like insufficient ICT materials on their schools	7
5. Application errors	Teachers cannot access some of computer applications.	7
6. Costly	Teachers spend their money to provide ICT materials and computer applications just to access	7
7. Time-consuming	Teachers undergo difficulties on setting-up and preparing their ICT equipment	5

Theme 1. Unstable Internet Connection. Philippines has experienced poor internet connection and it is one of disadvantages in teaching science. R03 stated that the internet connection is not stable and R28 said that some applications are only available online. Internet connection may be slow or unreliable. Instructors need to be connected to the internet in order to be able to connect to the outside site, course sites and other servers. Moreover, the over-reliance of students on the Internet for research and students plagiarizes the internet work (Rallis, 2000).

Theme 2. Power Supply Interruption. One of the disadvantages of computer especially in the remote areas is electricity and sometimes it is the cause of problem in large schools. The study of Ken Akaninwor (1998) stated that electrical power failure seriously affects efficiency in the teaching – learning process in the schools. In addition, problems like this affects other departments such as mechanical and wood technologies where electrically operated equipment, such as jigs, etc, are often idle due to power failure.

Theme 3. Deficiency in ICT Literacy. Computers are still not available in some schools due to less equipment, the literacy of the students in ICT is not good enough to manipulate it. Teachers also don't know how to manipulate computers and software applications (R31). According to Rallis (2000), not all students have access to the internet off-campus and even on campus, which makes classes disadvantage by placing a heavy emphasis on internet use. For some commuters in rural areas outside the region dialing on their Internet Service Provider is a long-distance call and thus becomes very expensive. Not all students are comfortable using computers (in and out of the classroom).

Theme 4. Inadequacy of ICT Materials. R02 and R06 stated that there are no available computers that they can use in teaching science and as a result, students can't appreciate the lessons well. The challenges of integrating technology that are external (extrinsic) to the teacher, including access to resources, support, and training. The problem of technology integration, focusing on a case in Chile, condensed recommendations for effective technology implementation (Johnson, Jacovina, Russell, & Soto, 2016).

Theme 5. Application errors. Since the computer is human-made, there are still limitations of it. Like application errors, corrupted files, some applications are not free, while others are expensive. In most schools, technical difficulties have tried to become a major problem and a source of frustration for students and teachers and interrupt the process of teaching-learning. If technical assistance is lacking and no repair is required, teachers cannot temporarily use the computer (Jamieson-Proctor, 2013). Turel and Johnson (2012) revealed that technical problems for teachers are becoming a major barrier. These are low connectivity issues, virus attack, and non-functioning printer. However, there are a few exceptions. Schools in countries such as the Netherlands, the UK and Malta have identified the significance of technical support to help teachers use ICT in their classroom (Yang & Wang, 2012).

Theme 6. Costly. Teachers are known for their passionate and commitment on their job. Therefore, some of the technology, equipment and apparatuses came from their own money. R28 said that not all things are free but you have to invest on it. This is an advanced technological era where machines such as computers replaced the use of paper with its high-tech features and schools and colleges need a huge sum of money that can otherwise be spent on buying the necessary resources. You must also spend thousands of dollars updating outdated software which is incompatible with current technology (Beckett et al., 2008).

Theme 7. Time Consuming. One problem in computer-based technology is how long it will be set-up in the class, sometimes, it consumes half an hour to be ready and it is time consuming. The paper of Ngah and Masood (2006) the preliminary outcome of the first phase of a two-phase research project was presented in order to distinguish the ICT skills required by teachers with the ultimate goal of creating online access learning objects. At this point, the study results showed that although access to ICT is not a problem; teachers felt that they lacked the necessary skills to integrate ICT in their classroom. The skills identified by the teachers are many and varied, the final questionnaire was further refined to guide the teachers to focus on the five most needed teaching and learning skills. The five most frequently selected subjects will be created as learning objects. In

addition, it is very time-consuming to create computer-based materials for class, especially for beginning users. It takes a lot of time to learn the skills needed and keep up-to-date (Rallis, 2000).

Conclusion

Science teachers' utilized computer-based technology in teaching was observed as "Rarely". They typically used common software and application in Science instruction. There is a significant difference between Science teacher's utilization of presentation software, publishing software, and educational software as computer – based technology in science instruction and profile variables. Computer - based technology in Science instruction is a trend in the 21st century learning. The teachers sought its advantages. They utilize it to improve their teaching that greatly uplifts students learning interests. Due to various sources and applications, learning Science concepts and principles have been made easy. Preparation of instructional materials became light and interactive that made the teaching-learning process more effective. However, computer-based technology in Science instruction is a trend to the 21st century learning, not all of the teachers are ICT literate. They lack skills in maneuvering different computer applications. Due to deficient ICT literacy, it affects how they prepare and set – up computer-based instructional materials, multimedia, documents and the like. They also find it hard fixing computer and application errors. The availability of internet connections is a huge problem for the schools far from town. The computer-based instruction became unreliable when power interruption frequently happens. Due to these difficulties, teachers just find computer-based technology in Science instruction too expensive to provide.

Recommendations

ICT trainings subjecting to different usage and advantages of various applications and computer software must be offered to the teachers. Encourage teachers to utilize computer-based instruction regardless of profile. It uplifts their learning as well as huge factor in improving Science education. Due to the advantages of computer-based instruction, schools may emphasize its regular utilization. They must require all Science teachers to learn and to use computer-based instruction as a part of the teaching – learning process. ICT training – workshop may be offered to the teachers regardless of profile. The subjects should vary to; ICT literacy, trouble shooting, computer software and application exploration, multimedia integration and internet-based instructional materials. They should install ICT-based materials in every school, like computers with internet connection. In getting high or significant difference of Science teachers qualities and profile variables, it is recommended that the succeeding researchers may increase the number of respondents. The greater the number of respondents, the higher the chance to assess their qualities. Further studies may be conducted to validate the results of this study and to discover other variables which can improve and be observed the Science teachers to be effective in utilization of computer-based technology.

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