

EXPLORING THE ICT-RELATED REQUISITES OF SEASONED JUNIOR HIGH SCHOOL SCIENCE TEACHERS IN CANDABA-SAN LUIS, PHILIPPINES

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ABSTRACT

Integrating Information and Communication Technology (ICT) into Science Education improves teachers' and students' understanding of the nature of science. The ICT proficiency of seasoned teachers is critical for augmenting Science concepts and providing seamless opportunities for both teachers and students. The goal of this study is to determine the required level of ICT proficiency for Junior High School Science (JHS) teachers who teach Science subjects. This study collected data quantitatively, particularly, a descriptive method was used to describe the extent of ICT-related requisites of seventy (70) seasoned junior high school science teachers in nineteen (19) schools in Cluster V, Candaba-San Luis, in the Schools Division of Pampanga, Philippines. The level of teachers' use of ICT in their teaching-learning process was determined using a modified survey questionnaire. The analysis revealed that, on average, JHS Science teachers lacked proficiency with technology and had difficulty integrating it into their teaching-learning practices. Given the findings, it is recommended that training/seminars on ICT use in teaching-learning practice to be conducted. More so, teachers are encouraged to incorporate technology into daily instruction and LCDs/laptops may be purchased to assist teachers in delivering quality education.

Keywords: Information and Communications Technology, ICT integration, seasoned teachers, science teaching

INTRODUCTION

A seasoned teacher's ability to integrate Information and Communication Technology into 21st-century teaching and learning practices in science education is critical to providing seamless opportunities for scientific literacy using technology. In the 21st century, teachers' teaching-learning practices must incorporate information and communication technology. This ICT integration aims to enhance teachers' performance in delivering science instruction to students. According to Ratheeswari (2018), ICT is like Information Technology, but it focuses primarily on communication technologies. This information and communication technology (ICT) encompasses the internet and wireless connections, as well as mobile phones and other forms of technological

communication. The proliferation of ICT has become significant for education in the twenty-first century. New technology has a significant impact on how lessons are delivered and on the students' interest and motivation (Cubukcuoglu, 2013). Additionally, teachers can use ICT to accomplish a variety of educational goals and to support teaching and learning both in and out of the classroom. ICT in education can assist in communicating changes in instructional methods. For a developing country like the Philippines, ICT integration in education setup is a view as significant. However, Basargekar & Singhavi (2017), stressed that the age of teachers has a negative relation to the teacher's competence in utilizing ICT in their teaching practice. Seasoned teachers' counterpart is more enthusiastic about utilizing ICT in their practice.

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The incorporation of technology into education can create a personalized learning environment that is tailored to the unique characteristics of each learner, such as progression, pace, interests, learning style, and background. Furthermore, technology provides the necessary support and challenge for students to remain engaged and motivated to achieve their potential. Thus, incorporating ICT into science education can help students and teachers develop a greater enthusiasm for and understanding of the subject. One of the principles underlying the acquisition of scientific literacy is to improve science instruction using new strategies, new approaches, the availability and adequacy of laboratory facilities, equipment, and materials, and improved teacher services. Additionally, utilizing ICT in science education has the effect of expanding the pedagogical resources available to science teachers and enriching teachers' acquisition of knowledge and skills.

Notwithstanding, ICT has an impact on the educational system by introducing a new teaching philosophy and elevating and improving teaching practices. With the assistance of these technologies in education, interactive and advanced teaching can be provided. As such, seasoned teachers are viewed as technology migrants capable of adopting and utilizing ICT in their teaching careers. These technology migrants should work diligently to acquire the necessary ICT-related competencies and to develop into effective ICT-using teachers. Additionally, Haeggans (2012) stated that seasoned teachers have distinct learning requirements regarding technology utilization that differ from those of younger teachers. Whereas younger teachers have been exposed to and challenged to learn about technology, more experienced teachers have been introduced to and challenged to learn about it. According to Knowles, Holton III, and Swanson, as cited by Haeggans (2012), seasoned teachers do not have to seek out and learn new technologies; they simply must be willing to understand, particularly when their lives require it.

Teaching is now regarded as one of the most noble and difficult professions. Teachers must be prepared to employ a variety of strategies to address their students' varying needs. Teachers

in the Philippines are confronted with significant obstacles because of the K-12 curriculum. As such, teachers must adapt to the educational trends of the twenty-first century and to the needs of twenty-first century students. Gu, Zhu, & Guo (2013) argue that teachers cannot simply apply what they learned yesterday to today's students. Additionally, students' characteristics have shifted dramatically, and teachers' pedagogical approaches must adapt to the new generation's needs. As a result, teachers need to understand the digital natives' novel ways of thinking and processing information. As teachers develop their instructional strategies, integrating ICT into the process becomes a routine activity. ICT has the potential to significantly improve educational quality in a variety of ways, including increasing student motivation and engagement in classroom discussions and activities, facilitating the acquisition of necessary skills, and enhancing teacher training. The researcher used these statements about information and communications technology (ICT) to ascertain seasoned teachers' familiarity with ICT-related requirements for teaching Junior High School Science subjects.

OBJECTIVES OF THE STUDY

The study aimed to ascertain the ICT-related requisites for Junior High School Seasoned Science teachers. It sought to examine the level to which seasoned JHS Science teachers utilize ICT in their teaching-learning practices, assess their level of competence in various ICT-related requisites and investigate the difficulties teachers face when integrating ICT into the teaching of science subjects.

METHODOLOGY

This study employed a descriptive approach. The descriptive method was used to examine the variable, which were the use of ICT by junior high school seasoned science teachers. Furthermore, this section discussed technological adaptation and the extent to which information and communication technologies (ICT) are used in the classroom to teach science subjects. Seventy (70)



seasoned respondents were chosen through purposive sampling from the nineteen schools in Cluster V, Candaba-San Luis, in the Division of Pampanga. These seasoned teachers have a minimum of ten years of experience teaching in a public high school and have integrated technology into their practice.

More so, a modified survey questionnaire was used to collect data on the use of ICT in the teaching of science subjects at the junior high school level. The tool was adapted from Alharbi (2014) and tailored for this study. The instrument is made up of three components. The first section included a biographical sketch of the teacher. The second section evaluated the participants' ability to use information and communication technologies. The third section outlined the ICT-related requirements that teachers must adhere to when incorporating ICT into classroom instruction. The study used descriptive statistics to summarize the general trends in examining teachers' competence in integrating ICT into their classroom instruction. All statistical techniques were used to analyze and interpret data, including frequency counting, percentage distribution, weighted mean, and ranking. It assessed the central tendency and relative standing of teachers' competence when it comes to incorporating ICT into their teaching and learning practices.

RESULTS AND DISCUSSIONS

1. Utilization of ICT In Teaching Junior High School Science Subjects

Table 1
Frequency and Percentage Distribution of Respondents in Integrating Technology in Teaching

| | f | % |
|--------------|-----------|---------------|
| Yes | 65 | 92.86 |
| No | 5 | 7.14 |
| Total | 70 | 100.00 |

The frequency and percentage distributions of teacher-respondents integrating technology into their classroom instruction are shown in Table 1. The study revealed that the majority of the teacher-respondents integrate technology in the teaching-learning processes with 92.86 percent. However, it

is sad to note that there were also teachers who do not integrate technology into the delivery of instruction (7.14%). This shows that most of the teachers today are trying their best to adapt to changes and use technology in teaching. This affirmed the claim of Papadakis (2018) that teachers are open to using mobile devices and, thus, mobile learning in their daily teaching practices.

Table 2
Utilization of Technology in Teaching

| | f | % |
|-----------|-----------|---------------|
| Always | 9 | 12.86 |
| Often | 23 | 32.86 |
| Sometimes | 28 | 40.00 |
| Rarely | 9 | 12.86 |
| Never | 1 | 1.43 |
| | 70 | 100.00 |

Table 2 exhibits the frequency and percentage distribution of technology use among teacher respondents. It showed that majority of the teacher-respondents were “sometimes” integrating technology in teaching (40.00%). This result is quite alarming since the teachers are expected to have gained necessary trainings in technology and should use them in their delivery of instruction. Teachers should remember that the learners today are very much a depth and exposed to using different technological tools. This was followed by those teachers who “often” use technology (32.86%). Other teachers admitted that they “always” use technology in teaching (12.86%) and “rarely” use them with 12.86%. These results are contradicting and may be true only in some schools for some reasons like lack of available gadget and tools. However, it is sad to note that there was one teacher who “never” used technology and still preferred to use the traditional way (1.43%). This result, although very small, is not good since the teachers today should be able to teach the learners using technology. There are teachers who are still afraid to touch the mouse and manipulate a gadget. Teachers are encouraged to incorporate ICT into their pedagogical practices; however, it is the teachers' readiness to incorporate ICT into their instruction that determines the effectiveness of



ICT, not its mere presence in the classroom (Buabeng-Andoh, 2012).

Table 3
Number of Times Teachers Use Technology in Teaching

| | f | % |
|-------------------------|-----------|---------------|
| Every class hour | 10 | 14.29 |
| Once a day | 6 | 8.57 |
| Twice a day | 6 | 8.57 |
| Three times a day | 1 | 1.43 |
| Once a week | 7 | 10.00 |
| Twice a week | 13 | 18.57 |
| Three times a week | 9 | 12.86 |
| Once a month | 8 | 11.43 |
| Twice a month | 7 | 10.00 |
| Three times a month | 1 | 1.43 |
| Depends on the lesson/s | 2 | 2.86 |
| | 70 | 100.00 |

Table 3 summarizes the frequency with which teachers incorporate technology into their instruction. It revealed that some of the teacher-respondents use technology “twice a week” (18.57%). This may be due to the school lacking LCD projector for use by the teachers. There were teachers who used it “every class hour” (14.29%); once or twice a day (8.57%). The school administrators should find ways on how to assist their teachers, like generating resources and purchase technological tools and gadgets. This way, necessary assistance can be provided to the teachers and help them improve their delivery of instruction. However, there were teachers who used technology three times a week (12.86%) and worse is once a month, twice a month, or three times a month. Teachers should understand that learning with ICT integration approach deepens students’ understanding and has a greater impact on learning.

The traditional classroom is transforming in terms of appearance and functionality to meet the demands of 21st-century education, including ICT integration. Teaching with technology requires more significant efforts to teachers in employing it in their practices. Teachers should embrace and prepare for the use of various instructional technologies in their classroom teaching and learning practices to increase the engagement with teaching and learning. These instructional technologies can be classified as synchronous or

asynchronous. While synchronous technologies allow teachers and students to interact virtually, asynchronous technologies allow students to participate in educational activities independently and on their schedule.

Integrating technology into the classroom entails utilizing technology to reinforce, supplement, and extend existing abilities. Integration of ICT into the teaching and learning process has been a long-standing issue. Simple computer use does not necessitate the incorporation of ICT into the educational process. Gu, Zhu, & Guo (2013) define technology integration as the process of introducing, reinforcing, augmenting, and extending abilities using educational technologies. If a teacher teaches only computer skills in a classroom, the learner’s computer use becomes inextricably linked to the teaching processes. Without educational technology, the quality of instruction could not have improved to such an extent when a teacher decides how and when to incorporate technology into the teaching-learning process and develops instructional strategies to address instructional issues. Thus, integrating technology addresses these educational concerns or challenges.

2. The Level of Competence of Science Teachers in the Different ICT-Related Requisites in Teaching Junior High School Science Subjects

Table 4
Competence in Various ICT-related Requisites for Teaching Junior High School Science Subjects

| ICT Skills Ability | Mean | Verbal Interpretation |
|-------------------------------|-------------|-----------------------|
| Intellectual Ability | 2.54 | Competent |
| Instructional Ability | 2.62 | Competent |
| Technological Ability | 2.33 | Less Competent |
| Over-all Weighted Mean | 2.50 | Less Competent |

Table 4 presents the ICT-related requisites in terms of their intellectual; instructional; and technological ability. The study revealed that generally, the teacher-respondents were “less competent” in using technology with an overall weighted average of 2.50. Their being less

competent in using technology would have an impact on the learning of their students. This result was further supported by their having “less competent” in terms of technological ability, with a mean value of 2.33. However, the teacher-respondents were competent in instructional abilities with a mean value of 2.62 and intellectual ability with a weighted average of 2.56. The study confirms the findings of Buabeng-Andoh (2012) that teachers' attitudes toward and ability to use technology have a significant impact on their adoption and integration of technology in teaching. Additionally, the finding corroborates Schiler's (2012) study, which concluded that teachers' personal characteristics, such as educational level, age, gender, educational experience, prior experience using a computer for educational purposes, and attitude toward computer use in the classroom, all influence their adoption of technology. Teachers are urged to adopt and integrate ICT into teaching and learning activities, but it is the teachers' willingness to do so, not the technology's mere presence in classrooms, that determines the technology's effectiveness.

ICT integration is a broad term that refers to applying technology to data processing, storage, and communication to influence student comprehension (Srivastava, 2016). By enabling learning activities to be delivered anytime and anywhere, ICT improves possibilities for organizing knowledge about teaching and innovation in teaching processes. Computer-based teaching and learning increase learners' efficiency and interest, improving students' academic achievement. Numerous self-evident benefits of ICT are typically based on ICT's use in education. Collaboration between the system and the students is assumed to be advantageous. Successful implementation of ICT in education always entails numerous systematic changes to the classroom's entire activity environment. Thus, ICT contributes significantly to the development of novel theoretical perspectives on teaching practices.

Integration of ICT in education is inevitable. Technology evolves in lockstep with educational advancements. Teachers must remain current on technological advancements. As a result, they must adapt to these modifications. Students in the

twenty-first century are digital natives; they were born into an era of technology. Teachers' lives are impacted in previously unimaginable ways by technology. According to Haeggans (2012), as technology advances, baby boomers and subsequent generations face difficulties keeping up. ICT integration is a broad term that refers to applying technology to data processing, storage, and communication to influence students' comprehension (Srivastava, 2016). By enabling learning activities to be delivered anytime and anywhere, ICT enhances possibilities for organizing knowledge about teaching and innovation in teaching processes. Computer-based teaching and learning boosts learners' efficiency and interest, thereby improving students' academic achievement. Numerous self-evident benefits of ICT are typically based on ICT's use in education. Collaboration between the system and the students is assumed to be advantageous. Successful implementation of ICT in education always entails numerous systematic changes to the classroom's entire activity environment. Thus, ICT contributes significantly to the development of novel theoretical perspectives on teaching practices.

3. Issues Faced by Science Teachers When Using ICT To Teach Science

The following are arranged from highest to least as problems encountered by the seasoned teachers in teaching Science subjects. First is no internet connection, lack of LCD projector for all teachers to use, difficulty in getting a schedule to use the LCD projector, and problem in troubleshooting. Some cannot make own presentations; there are few computer units available. Some do not know how to manipulate computers and other multimedia. Some are not good in using computers, difficulty in operating computer during the learning activity since no assistant is assigned. There are insufficient ICT materials. There are unfamiliar words and commands in computer. The electric wirings/electrical outlet of classrooms are not enough and not properly attached on the wall. There is a problem in using shortcut keys, not all



times. Technology is used. Some computer parts and applications are complicated and there is difficulty in downloading video presentations for the lesson. Some do not know how to use and operate PowerPoint presentations and using multimedia is very complicated, from assembly to disassembly. Lastly, computer software is hard to understand, and some are too old to use computers.

Teachers play a critical role in instilling students with knowledge and information. Education is not a one-size-fits-all endeavor. Teachers must understand the importance and urgency of incorporating ICT into their teaching and learning practices. Additionally, the teacher's perception and attitude toward computer use are included in the teacher's characteristics, which provide valuable insight into the adoption and integration of ICT in the teaching and learning process. Teachers' perceptions are critical in adopting new technologies in the natural sciences, such as mobile devices (Kalogiannakis et al., 2018). Additionally, teachers' characteristics such as educational level, age, gender, educational experience, computer use for educational purposes, and teacher attitude toward ICT use in the classroom affect their technology adoption (Schiler, 2012).

Furthermore, it is believed that the teacher's age affects integrating ICT into teaching and learning processes. Age can be a factor in a teacher declining to perform specific tasks or activities due to deteriorating physical and mental capabilities. According to Damodoran & Ramondt (2013), later life is associated with sensory, physical, and cognitive changes such as impaired vision and hearing and decreased mobility. These circumstances may affect the teacher who is attempting to learn how to use it. Weakened visual functions impair teachers' ability to see what is projected on the screen, while problems with psychomotor functions, such as hand movements, make it difficult for older teachers to navigate or control computer hardware such as the mouse and keyboard. Additionally, some senior teachers may suffer from cognitive impairment. Several of these difficulties include absorbing information, remembering multiple instructions simultaneously, recognizing sequential procedures such as starting

the computer and maintaining concentration over an extended time.

Albion, Jamieson-Proctor, and Finger (2011) discovered that the age group for accessing and utilizing various technologies and their associated software is significantly different. It would be necessary to acknowledge that age-related differences in access, related experience, and confidence exist between and within age groups. These distinctions will prove highly beneficial when developing a proposal for teacher development programs that incorporate ICT. Given the rapid advancement of technology, it is also necessary for teachers to improve their ability to utilize it. Consideration must be given to the user's age, accessibility, and comfort level with ICT. Older teachers lack the confidence to use this technology and often struggle to navigate the technology's various hardware and software components.

CONCLUSIONS

This study demonstrates the critical nature of integrating ICT into instructional practices, especially in the Philippine context. The study uncovered, however, that while seasoned teachers used ICT in their classrooms, they did so sparingly or only when necessary. Although seasoned teachers lack technological ability, they excel in instructional and intellectual abilities. Additionally, the most frequently encountered difficulties in integrating ICT include no internet connection, lack of ICT tools, and difficulty troubleshooting by seasoned teachers. Integration of ICT into the educational system is critical for a developing country like the Philippines.

RECOMMENDATIONS

The administrator should encourage teachers to increase their knowledge of how to incorporate ICT into their daily instruction. Teachers should receive additional ICT training to further equip them with the knowledge and skills necessary to operate ICT equipment and stay current on new computer programs/applications. Likewise, the administration should develop a long-term plan that incorporates teacher training and seminars. Purchase additional LCDs or laptops for

teachers to use in their instructional delivery and investigate the possibility of turning the campus into a Wi-Fi hotspot. The researcher stressed that a study be conducted to determine the effectiveness of seasoned science teachers integrating ICT into their teaching practices. Additionally, it is recommended to seek out the perspectives and experiences of seasoned Science teachers regarding their classroom use of ICT.

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