# ICT application in teaching and learning

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**Abstract:** The purpose of this study was to investigate and assess the use of ICT in the teaching-learning process. This study assessed the senior high school students of PAU Excellencia Global Academy Foundation, Inc.'s students' attitudes toward ICT integration and the effectiveness of ICT use in the teaching-learning process. The effectiveness of using ICT in the teaching-learning process, as well as the level of attitude toward ICT among the secondary school students participating in the research, were evaluated by the researcher using a descriptive-correlational engaging quantitative approach. As to the findings , one of the most important contributing aspects affecting a student's success in various subjects and fields is their performance. Generous investments were justified by the firmly held belief that

technology may improve student academic achievement by enabling more effective and efficient ICT integration into teaching-learning process for students.

**Keywords:** ICT Tools, Teaching & Learning, Technology Issues & Challenges, Education, Philippines

*Introduction*

ICT can play a significant role in the educational process for students starting their academic careers. There is no limit to the positive development of young minds through the effective use of technology in the classroom, in conjunction with more conventional instructional processes - whether it is academic performance, enhanced creative thinking, or the development of skills that will prove useful later in life is crucial.

Students' cognitive growth can be enhanced through the ICT integration in the classroom, which can also boost student engagement and motivation. According to Suryani (2010), these three advantages are interactive, motivating, and cognitive. Students are cognitively capable of recalling the events of the story without the teacher's narration. Encourage them to enjoy the learning process so that it doesn't seem harsh or exhausting. With teachers and classmates, they can collaborate (Lavoie, 2008). This all contributes to the student's academic performance by keeping the student's information firm.

Virtual classrooms and other forms of technology can help teachers create students who are actively interested in their lessons. The use of technology opens up opportunities for personalized instruction to fulfill each student's specific learning needs within the context of the larger classroom environment (Kilag, et al., 2022).

It has been proven that integrating ICT into the classroom increases student motivation, enthusiasm, and engagement in the subjects they are learning. ICTs make it possible to use cutting-edge learning tools and educational materials, fostering more engaged student interaction and simultaneous access to technological information. Therefore, the purpose of this study is to determine and evaluate the effectiveness of ICT utilization in the teaching-learning process as well as attitudes toward ICT integration.

*Review of related literature*

The application of ICT is creating significant changes in the teaching and learning process. The traditional approach in teaching has stressed on content. For decades course materials were designed around textbooks. Teachers taught the content through lecture method and the activities were designed to enforce the content knowledge. Present day teachers need to create relevant and intriguing learning experiences for their students. Technology provides a remarkable role in

making education inclusive since it has the potential to improve educational performance of students (Sasan, 2021).

Furthermore, utilization of ICT facilitates learner-centered approach rather than conventional teacher-centered pedagogy. The present day curricula promote aptitude and performance of the learners, emphasizing on the application of the information rather than factual knowledge (Bindu, 2016). ICT facilitates the dissemination of knowledge based on the contemporary curricula. As a result, incorporating ICT in teaching helps both teachers and students since it has the potential to impart quality education if it is used effectively.

ICT-enhanced learning stimulates augmented learner involvement. The constructivist method views learning as realistic and learner-centered. ICT is an effective tool in constructivist approach of learning, where teachers can layout simulated and tailor-made learning conditions to students (Sasan, et al., 2022).

In this regard, applying educational technology as a constructivist device can help students to display their ideas, express their knowledge, examine, exploit, and process information, in a collaborative learning environment (Zhu, et al., 2010). For instance, software applications like databases and excel sheets foster inquiry-based learning activities. Multimedia is a powerful tool that assists thinking activities of learners and also helps them to share and express their knowledge. These software applications help students in understanding the concept by doing. It also facilitates in developing an independent approach towards problem -solving. In that sense computers help students in developing high order thinking

Also went in the same direction by stating that ICT integration helps in Constructivist learning where students interact with other learners, the teacher, sources of information, and technology. Such an atmosphere provides the learner with direction and settings to build their knowledge and skills. It also gives a rich collaborative learning condition providing the learner to mull over different perspectives in dealing with issues and solve problems. ICT also facilitates collaborative learning. Points out that "the flexible time-space accounted for by the integration of ICT into teaching and learning processes contributes to increasing the interaction and reception of information. Such possibilities propose changes in the communication models and the teaching and learning methods used by teachers, giving way to new scenarios which favour both individual and collaborative learning.

Teachers play a crucial role in integrating ICT. The present day teachers should know not only the content of their subject but also the pedagogy to impart the knowledge effectively by integrating technology. According to Bingimlas (2009) in order to integrate ICT in teaching teachers must recognize the usefulness of technology, they should believe that the application of technology does not disrupt the classroom climate. Moreover, they should also have the confidence to manage

technology. Nevertheless, research studies indicate that majority of the teachers do not take advantage of the potential of ICT to promote the quality of learning, even though they have a favorable attitude towards it Aver that the ICT's potential can be exploited only if confident teachers are ready to make use of the opportunities for transforming their classroom practices by utilizing ICT effectively. Thus, ICTs are exerting impacts on pedagogical approaches in the classrooms. Their contribution to changes in teaching practices, school innovation, and community services is considerable.

ICT is a powerful tool for promoting educational opportunities. It is transforming the processes of teaching and learning environment by including elements of vitality to the learning milieu. Present day education system insists on research, critical thinking, and evaluation skills since students have access to large variety of sources to get information. Hence, the learning environment provided should follow an effective application of knowledge that students are required to master, in order to avoid the attained knowledge being passive. Furthermore, teachers need to encourage students to be active learners so as to engage in active knowledge construction. This entails open-ended learning situations rather than a learning condition which focus on the sheer transmission of facts.

ICT has the potential to create powerful learning environments in various ways. It has the potential to access numerous information using various sources. It also helps in examining information from different perspectives, thus promoting the credibility of learning environments. Furthermore, ICT may also help to understand complex concepts through simulations, contributing to an authentic learning environment. Consequently, ICT functions as a facilitator of active learning and high-order thinking (Vidergor & Krupnik-Gottlieb, 2015).

Moreover, ICT can also function as an instrument of curriculum differentiation. It promotes opportunities to modify the learning material and activities to the requirements and capabilities of every individual learner, particularly by giving personalized feedback. As emphasize, ICT might appeal to an array of educational techniques, ranging from traditional to ingenious.

ICTs are also transformational devices, if used effectively, can shift the classroom atmosphere to a learner-centered environment. Therefore, it is necessary to equip the classroom with computers in order to enhance the learning opportunities for students through different curriculum activities. ICT environment develops the experience of both teachers and students so that they can utilize the learning time effectively. Hence, ICT-enriched learning is a motivating factor for both teachers and learners (Kilag, et al., 2022).

ICT can strengthen the quality of education in different ways. It can boost up the learner motivation and involvement, by providing the opportunity to gain basic

learning skills. Multimedia computer software can be used to provide an audio visual effect which helps to create interest and engage students in the learning process. Interactive software applications can also help students to get engaged in the lesson activities.

Research proves that students using ICTs for learning purposes are engaged in the process of learning. Since ICT can alter the learning tasks and nature of problems, it acts as a mediator of cognitive development, augmenting the acquisition of basic cognitive competencies which are essential in a knowledge society stated that students utilizing ICTs for educational purposes get immersed or involved in the process of learning. As a greater number of students utilize computers as a source of information and as an intellectual device the impact of the technology on promoting student learning will develop constantly (Sasan and Baritua, 2022).

Computers with Internet access can enhance learner motivation since it incorporates the media opulence and interactivity of different ICTs. It gives an opportunity to connect with real people and to get involved in real life situations. This is often stated as a reason influencing "ready adaptors of ICT". Consequently, the application of ICT in teaching and learning will not only improve the learning environments but also help next generation for their future lives and careers.

The relation between ICT integration and student performance has been the topic of research and discussion for the last two decades. Believe that ICT improves the performance of students since technology helps to improve teacherstudents' interaction. Meta-analysis study pointed out that, in general, students who used computer-based learning scored higher than students who learned without computers. ICT integrated learning helps students to grasp the concept better and also retain it for a longer period of time. ICT also help students to develop a positive attitude towards learning since they are engaged in the learning process (Sasan and Rabillas, 2022).

Several studies have recognized that ICT helps in developing constructivist learning techniques which changes students' approach towards learning as well as the content material encourage the utilization of asynchronous CMC devices to enhance student self-efficacy which improves their academic performance also illustrates the potential of tablets to enrich mathematics instruction. Therefore, successful integration of ICTs facilitates collaborative and constructive learning, which promotes the academic performance of students.

*Methodology*

The purpose of this research was to investigate and assess the use of ICT in the teaching-learning process. In order to assess the effectiveness of the use of ICT in the teaching-learning process and the level of attitude toward ICT among the secondary school participants in the research environment, the researcher used a descriptive-correlational engaging quantitative technique. A concise and detailed explanation of

descriptive correlational study is given by Sousa et al. (2007). These investigations describe the variables and the relationships that develop spontaneously between and among them.

The 23 teachers at PAU Excellencia Global Academy Foundation, Inc. participated in the survey as responders. The respondents were selected utilizing universal sampling. The following qualifications were required for inclusion: a) they must be a teacher of PAU Excellencia Global Academy Foundation, Inc. b) they must have worked in the field for more than a year; and c) they must agree to participate in the study. Furthermore, the 150 senior high school students also participated in this study partaking their attitude towards the utilization of technology in the classroom.

For the data collection, first, a letter asking for permission to perform the study was sent to the president of PAU Excellencia Global Academy Foundation, Inc. The questionnaires were individually given to the respondents after the letter was authorized. The questionnaire was delivered to the respondents with plenty of time—ideally 20 to 30 minutes. The statistician was then consulted to perform statistical analysis on the data that had been obtained. Under the direction of the research adviser, it was given more presentation, analysis, and interpretation.

The final text was delivered for review and editing.

These statistical techniques were employed by the researcher in the data presentation and interpretation.

Plain Percentage In terms of their age, gender, civil status, highest educational level, length of service, performance rating, pertinent training, seminars and workshops attended, and technology resources in schools, this revealed the profile of the respondent-groups.

Mean. Computation of the mean was employed to assess the level of effectiveness of utilization of ICT in the teaching-learning process in terms of delivery of instruction, student-centered learning, communication and interaction, and information literacy; as well as the level of attitude of the secondary school students towards ICT integration.

Chi-square. This determined the relationship between level of effectiveness of ICT integration and the level of performance in ICT-TLE among the Grades 7-10 learners.

*Result and discussion*

The effectiveness of ICT use in the teaching-learning process as perceived by the respondent groups is shown in the following tables in terms of instruction delivery, student-centered learning, communication and interaction, and information literacy.

Transmission of Instruction. This is the delivery of teaching using a technology medium, such as a computer, the internet, a television, a radio, a digital camera, a technological toy, or a computer.

Table 12

Delivery of Instruction

| Item | Weighted Mean | Interpretation |
|---|---|---|
| Technology improves the delivery of instruction among the teachers to their students | 5 | Strongly Agree |
| Technology makes complex tasks simpler | 4.86 | Strongly Agree |
| Technology increases productivity and efficiency in performing tasks | 4.92 | Strongly Agree |
| Use of technology has the power to transform teaching | 5 | Strongly Agree |
| Meets diverse student needs and support tailored approach | 4.96 | Strongly Agree |
| GRAND MEAN | 4.94 | Strongly Agree |

Legend: 4.21 - 5.00 Strongly Agree; 3.41 - 4.20 Agree; 2.61 - 3.40 Neutral; 1.81 - 2.60 Disagree; 1.00 - 1.80 Strongly Disagree

The first variable had a grand mean of 4.94, which indicates that the respondent groups strongly agree that teachers effectively use ICT in education to offer instruction.

The use of technology has the potential to alter education and has the highest weighted mean of all elements, scoring a perfect 5. Technology is increasing the delivery of instruction among teachers to their students. Meeting the varied requirements of students and providing a personalised approach, which had a mean score of 4.96, came in second place. Additionally, technology that makes tasks more productive and efficient received a score of 4.92, while technology that makes complicated jobs simpler came in last with a weighted mean of 4.86.

Technology brings about fundamental structural changes that can play a crucial role in generating considerable productivity gains. Technology is being used to enhance teaching and learning in classrooms. It expands course options, experiences, and learning resources; supports learning twenty-four hours a day, seven days a week; develops 21st century skills; boosts student engagement and motivation; and speeds learning. Technology can also revolutionize education by bringing about a new linked teaching paradigm. This strategy helps teachers enhance their own instruction and personalize learning by connecting them to their students as well as to professional knowledge, resources, and systems.

By accelerating the rate of learning, lowering expenses related to the delivery of programs or instructional materials, and better utilizing instructor time, online learning possibilities, the usage of open educational resources, and other technologies can boost educational productivity.

Learner-centered instruction. ICT can help students change their learning strategy from copying what others have said to creating their own knowledge. ICT

suggests a shift in the pedagogic approach from teacher-centered to student-centered learning.

Table 13

Student-Centered Learning

| Item | Weighted Mean | Interpretation |
|---|---|---|
| Technology should not replace teachers. Its main use is to enable students learn better through increasing their engagement in educational activities | 5 | Strongly Agree |
| Technology has to improve the learning process and aim at improving student's grades | 4.88 | Strongly Agree |
| Facilitate and stimulate individual learning | 4.9 | Strongly Agree |
| Students should use technology to learn on their own with limited help from teachers | 4.88 | Strongly Agree |
| It has increased student's engagement and motivation towards learning | 4.96 | Strongly Agree |
| GRAND MEAN | 4.92 | Strongly Agree |

With regard to the second indicator, it had a grand mean of 4.92, which similarly indicates that the respondent groups strongly agree that teachers' use of ICT in the classroom effectively promotes student-centered learning.

The primary purpose of technology, which has a perfect weighted mean of 5, is to improve student learning by boosting their engagement in educational activities, not to replace teachers. ICT came in second with a mean score of 4.96, increasing student engagement and motivation for studying. This is closely followed by encouraging and facilitating individual learning, which received a score of 4.9; meanwhile, technology needs to improve the learning process and aim to improve student grades; and students should be using technology to learn independently with minimal teacher assistance - received the lowest weighted mean of 4.88, each.

The world still needs teachers. Children need a good teacher to excite them, motivate them, and encourage them; computers cannot do that. No of our age, when we look back on our education to date, a person, not a piece of technology, always stands out as the one who supported us along the way. This is not to imply that technology is not essential or important to a sound education. For students today, who are accustomed to having phones, tablets, laptops, and other gadgets outside of school, completely banning technology is plain bewildering. As a result, keeping them out of the classroom widens the gap between education and life outside of it and does little to prepare them for it.

The most crucial thing is to ensure instructors are digitally literate since technology is woven into our everyday lives and, as such, should be knit into the fabric of schools. This would entail updating teacher preparation programs to ensure that the next generation of educators is prepared to teach while also ensuring that those who are already certified have access to sufficient professional development

opportunities to keep up with technological advances and become the best educators they can be.

Interaction and communication. Working collaboratively requires the capacity to discuss and explore options through communication. The development of inter-student inter-cognitive discourse is crucial to the teaching-learning process because it is a potent instrument for promoting learning and collaborative practice in technology education.

Table 14

Communication and Interaction

| Item | Weighted Mean | Interpretation |
|---|---|---|
| The use of technology improves the ability to communicate issues and problems | 4.94 | Strongly Agree |
| Technology facilitates interactions where there is an exchange of ideas | 4.9 | Strongly Agree |
| IT provides basic processing of transactions and services | 4.88 | Strongly Agree |
| IT system is designed to support decision when the problem is not structured. | 4.94 | Strongly Agree |
| Information technology facilitates in creating information sharing environment | 4.96 | Strongly Agree |
| Technology can easily consult each other across different department without any interruption | 4.76 | Strongly Agree |
| The use of technology makes it possible to use emails, text and chatting services to inquire something related to a given task at work | 5 | Strongly Agree |
| With work group support systems, group decision making becomes easier | 4.94 | Strongly Agree |
| With the help of database software, an organization stores all its relevant data on database | 5 | Strongly Agree |
| Information technology accounts in the development of communication technology like electronic mail and the like | 4.9 | Strongly Agree |
| GRAND MEAN | 4.92 | Strongly Agree |

Additionally, in regards to the following variable, which had a grand mean of 4.92, the respondent groups likewise strongly agree that teachers' use of ICT in education is well utilized in terms of communication and interaction.

With the aid of database software, an organization can store all of its pertinent data on a database, and the use of technology making it possible to use emails, texts, and chatting services to inquire about something related to a given task at work both received the highest weighted mean scores of 5, or 5. With a mean score of 4.96, information technology that facilitates the creation of an environment for information sharing came in second. Furthermore, the use of technology enhances the ability to communicate issues and problems; IT systems are designed to help decision when the problem is not structured; and with work group support systems, group decision making is made simpler - each of these factors received a score of 4.94. Information technology accounting in the development of communication technology, such as electronic mail and the like, received a score of 4.9, while technology consulting each other across different departments without any interruption came in last with the lowest weighted mean of all items of 4.76.

Students may easily utilize their laptops and mobile devices to continue learning outside of traditional classrooms thanks to technology. By allowing students to take notes in class electronically, precious study time is preserved. Additionally, a lot of students discover that using digital notes is more efficient than using handwritten ones because they can rapidly retrieve specific material by using keyword searches.

Learning can now take place outside of the classroom and the library thanks to technology. Students meet online, collaborate remotely, and produce content using technology. Technology frequently aids students in their academic study, idea sharing, and acquisition of particular abilities. Students can also use technology to interact with others in their field of study and build vital professional networks.

Information Literacy. This requires users to have the skills to use information and communication technologies and their applications to access and create information.

Table 15

Information Literacy

| Item | Weighted Mean | Interpretation |
|---|---|---|
| Technology increases information literacy | 5 | Strongly Agree |
| Technology develops proficiency with the use of the tools of technology | 5 | Strongly Agree |
| Technology ensures fast, accurate and reliable data | 4.86 | Strongly Agree |
| Technology keeps track with the latest information and data | 5 | Strongly Agree |
| Teachers and principals expressed a willingness and enthusiasm towards maximizing the benefits of ICT resources | 4.86 | Strongly Agree |
| GRAND MEAN | 4.94 | Strongly Agree |

The respondent groups, however, strongly agree that teachers' use of ICT in education is a successful tool for raising students' information literacy, as evidenced by the fourth and final indicator, which had a grand mean of 4.94.

Technology improved information literacy, developed technological tool competency, and kept up with the most recent data and information, all of which reached a perfect weighted mean of 5. With a mean score of 4.86, teachers and administrators who expressed a willingness and excitement to fully utilize ICT resources followed with technology delivering quick, accurate, and trustworthy data.

In our society, using technology is become a need. No matter how much or how little people profess to use technology, even the act of checking out food involves technology. Teachers must make effective use of technology to get children ready to be productive, literate citizens. Reading and writing abilities are no longer the exclusive criteria for developing literacy. Technology literacy is also necessary for people. So it makes sound educational sense to combine the two, literacy development and technology.

Technology-enhanced literacy development can take many different forms in educational contexts. It can both introduce new types of literacy into the classroom and complement already established ones. Google Docs and blogging allow students to collaborate on projects at different times, and they can help students explore their ideas by bringing readers and authors together in the same classroom. The capability of technology to enable pupils to remix disparate material is another significant aspect. The final work may incorporate both conventional writing and other new technology-driven genres. Technology serves as the link for developing an education system with no clear boundaries.

A summary of how effectively ICT is used in the teaching and learning process. In terms of instruction delivery, student-centered learning, communication and interaction, and information literacy, Table 15 summarizes the level of effectiveness of ICT use in the teaching-learning process as perceived by the respondent groups.

*Conclusion*

For the School Year 2021-2022, this study assessed how the Senior High School students of PAU Excellencia Global Academy Foundation, Inc. used ICT in the teaching-learning process and their attitudes toward ICT integration as the foundation for an instruction manual for ICT integration in curriculum. This study employed a descriptive-correlational engaging quantitative methodology to assess secondary school students' attitudes toward ICT as well as the effectiveness of ICT use in the teaching and learning process.

ICT and teacher professional development: Teachers need specialized opportunities for professional development to improve their ICT skills for formative assessment of students, tailored instruction, access to online resources, and encouragement of student cooperation and involvement. Such ICT training should improve instructors' attitudes toward ICT generally while also containing detailed guidance on ICT teaching and learning for each subject. Without this support, teachers commonly use competency-based applications with ICT, which might limit students' capacity for critical thought. Education managers, supervisors, teacher educators, and policy makers must use training to assist teachers in changing how they teach.

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