



EMPOWERING THE DIGITAL GENERATION: EXPLORING THE IMPLEMENTATION OF EDUCATION 4.0 FOR ENHANCED STUDENT LEARNING AND INVOLVEMENT IN INFORMATION AND COMMUNICATION TECHNOLOGY

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ABSTRACT

This study focused on determining the level of education 4.0 implementation and its relationship to the students' learning and involvement in Information Communication Technology. It specifically determined the level of implementation of Education 4.0, the level of students' learning and involvement in Information and Communication Technology, and the significant relationship between implementing Education 4.0 on student learning and student involvement in Information and Communication Technology.

It utilized the descriptive-correlational research design to identify the relationship between variables. It involved 120 respondents representing the students taking Information and Communication Technology at the Lumban-Kalayaan Sub-Office. A self-made questionnaire validated by the expert was used.

The following were the study's findings: The students successfully implemented Education 4.0 in their subject in Information and Communication Technology; there was a high extent of student learning and involvement in Information and Communication Technology. It was evident from the results that Education 4.0 had a significant relationship to students' learning in ICT, particularly communication, while cloud-based activities showed a significant relationship to all students' learning in ICT. Moreover, adaptive assessment showed a significant relationship with the students' involvement in ICT, particularly instructor-student interaction and personalized learning path; while inclusivity and ethical awareness showed a significant relationship with peer collaboration.

The implementation of Education 4.0 was observed to have a relationship in shaping students' communication skills and idea organization. Nevertheless, only the cloud-based activities showed a relationship in students' development of competencies in computer technicality, cyberspace navigation, idea organization, and information analysis. This signified an acceptance of the null hypothesis. Moreover, ethical awareness and inclusivity showed a significant relationship with students' involvement in peer collaboration, signifying acceptance of the null hypothesis. The adaptive assessment did not significantly affect students' involvement in ICT, which was based on consideration of students' availability affecting the frequency of usage and interaction.

From the conclusion, it is recommended that teachers strengthen the implementation of Education 4.0 in lesson delivery to address students' needs and learning styles through technology utilization. Teachers may provide a cloud-based and adaptive assessment strategy to implement Education 4.0 while evaluating students' competencies to increase mastery. The school may use paperless instruction through implementing Education 4.0 in the teaching-learning process to address student difficulty through constant feedback that may lead to mastery of competencies. Future researchers are advised to study the students' initiative to use ICT resources for independent learning and competency practice.

KEYWORDS: Digital Generation; students' learning; involvement

1. INTRODUCTION

The fourth industrial revolution and paradigm shift in education create innovation in teaching and learning strategies in every school to open limitless learning opportunities for learners to enjoy competencies aligned to the needs of the industry. Although students are well informed on the different functions of their gadgets, there are still threats when it comes to their attention and purpose of utilizing gadgets. Although it is considered functional in learning, particularly during the pandemic, it is observable that the increasing number of hours spent on gadgets was focused on pure entertainment rather than learning.

Education 4.0 is not only focused on using different office presentations during the discussion. It also includes teachers' creativity in incorporating the application to design instruction that facilitates the attainment of learning objectives through active learning, mitigating the use of different websites and applications among learners, making the learning process easier

but efficient. A wide understanding of different office presentations, websites, online applications, video editing, and many other related concepts facilitates the interactive implementation of learning experiences throughout the country.

With fast-growing technological growth, students affected can utilize tools and navigate the virtual world through access to various websites. As a result, they tend to be proficient in using ICT using different gadgets to deal with different tasks assigned.

Information communication technology has significantly impacted the development of young individuals during the 21st-century era. This influences how people deal with their everyday lives worldwide, which tends to depend on the fast-growing product of technology. Cell phones, laptops, and the internet are the basis of ideas and how things are done.

Drastic changes brought technology development opens opportunities for people to enjoy the features of information



communication technology integration in everyday activities in entertainment, communication, business, and education. It allows people to enjoy the features of the internet and computer in many activities, helping them continuously perform their duties and responsibilities flexibly. This allows the industry to maximize productivity and develop skills, knowledge, and innovative potential among workers. Information Communication technology in education during the paradigm shift allows teachers and students to rely on online learning and computer features to ensure the efficiency of the delivery of curriculum during distance learning. The teaching-learning process changes from traditional instruction to technology-aided learning. This brought great challenges to education sectors and teachers, who had to upskill and practice methodologies using computers and the internet during instruction.

With the existence of this education 4.0, primary, secondary, and tertiary levels of education are adjusting to implementing the trends in the teaching and learning process to attain sustainable learning and produce lifelong learners.

With this, the researcher develops the study to determine the level of Empowering the Digital Generation: Exploring the Implementation of Education 4.0 for Enhanced Student Learning and Involvement in Information and Communication Technology.

1.1 Statement of the Problem

Specifically, it sought to answer the following question.

- 1. What is the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of:
 - 1.1 Adaptive assessment
 - 1.2 Cloud-based activities
 - 1.3 Customized Learning
 - 1.4 Ethical Awareness, and
 - 1.5 Inclusivity?
- 2. What is the level of student learning in terms of:
 - 2.1 Communication
 - 2.2 Computer technicality
 - 2.3 Cyber Space Navigation
 - 2.4 Information Analysis, and
 - 2.5 Idea organization?
- 3. What is the level of student involvement in ICT in terms of:
 - 3.1 Instructor-student interaction
 - 3.2 Peer collaboration and
 - 3.3 Personalized learning path?
- 4. Does the Implementation of Education 4.0 significantly correlate to student learning in ICT?

- 5. Does the Implementation of Education 4.0 significantly correlate to student involvement in ICT?

2. METHODOLOGY

This study uses descriptive correlation research design to describe the effect of phenomenon in technological development in education set up and the effects of practices in the student learning and competencies. According to Aggarwal and Ranganathan (2019). Descriptive studies were cost-effective, efficient, and useful for resource planning, community evaluation, and disease-cause determination. They could identify regional and temporal variations in disease prevalence and develop complex designs. However, they can face ethical criticism if confidential information is sought. Despite this, they provide crucial insights into social problems and decision-making.

3. RESULTS AND DISCUSSION

This chapter enumerates the different results and discusses the results yielded from the treatment of the data gathered in this study. The following tabular presentations and discussions characterize the implementation of Education 4.0 and students' ICT learning and involvement.

Level of Implementation of Education 4.0 in Teaching Information and Communication Technology

This study tried to determine the level of implementation of education 4.0 in teaching learning process in information communication technology subjects. This included adaptive assessment, cloud-based activities, customized learning, ethical awareness, and inclusivity. This variable clarified the different strategies used in the teaching-learning process which facilitated the student's mastery of the competencies in 21st century education with technology.

The level of implementation of Education 4.0 was revealed in the following table, which shows the statement, mean, standard deviation and verbal interpretation.

Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Adaptive Assessment

Table 1 presents the level of implementation of education 4.0 in teaching information and communication technology in terms of adaptive learning. This table emphasizes the teaching methods that focus on students' availability and preferences. The table includes the statements, mean, standard deviation and remarks.

Table 1 *Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Adaptive Assessment*

STATEMENTS	MEAN	SD	REMARKS
1. As a student of information communication technology, I was exposed to performance tasks independently to show mastery.	3.38	0.60	Strongly Agree
2. As a student of Information Communication Technology, I experienced access written activities in google classroom to	3.31	0.60	



<i>accomplished based on my availability.</i>			Strongly Agree
<i>3. As a student of Information Communication Technology, I experienced address problems in the community through performance task assigned by the teacher.</i>	3.26	0.69	Strongly Agree
<i>4. As a student of Information Communication Technology, I experienced utilized applications like quizzes for drills of leaned concepts in the lesson.</i>	3.37	0.61	Strongly Agree
<i>5. As a student of Information Communication Technology, I experienced Used e-portfolio for submission for of complied written works that show competency in computer use.</i>	3.40	0.66	Strongly Agree
Weighted Mean	3.35		
SD	0.44		
Verbal Interpretation	Very Great Extent		

Table 1 illustrates the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of Adaptive assessment. It showed that the students obtained a very great extent ($M=3.35$, $SD=0.44$) in level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of adaptive assessment. This denoted that the learners had the experience of practicing varied assessment methods regarding their competencies in information and communication technologies in an innovative and technology-based manner.

Students of information communication technology under the technology in livelihood education subject strongly agreed ($M=3.40$, $SD=0.66$) on their experiences on education 4.0 with the use of e-portfolio for sto submitted written works that shows show This denotes that the learner uses a portfolio to monitor their progress through series of activities at their convenience level.

Learning through e-portfolios like Google Classroom improves

ICT and English language proficiency. Despite potential obstacles, proper planning, organization, and training can overcome them. Universities should consider student opinions for increased involvement. Instructors are incorporating technology into teaching-learning activities, and strategies for fostering learning using e-portfolios are essential, Muin et al. (2021).

On the other hand, although it is the least among the indicators, the students strongly agreed with ($M=3.26$, $SD=0.69$) on their experiences with Information communication technology as they address community problems through the teacher's performance task. This entailed that learners perceived problems in the community through the teacher's assessment method and address them by providing solutions as the application of their learned competencies. With varied exposure and observation processes needed to accomplish activities, the student's perceived problem within the community and reflect on possible alternatives based on learned concepts and competencies in the school.

Table 2 Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Cloud-Based Activities

STATEMENTS	MEAN	SD	REMARKS
<i>1. As a student of information communication technology, I have experience saving works in Google Drive for storage.</i>	3.37	0.72	Strongly Agree
<i>2. As a student of Information Communication Technology, I experienced allowing paperless submission through e-portfolios of complied activities.</i>	3.21	0.67	Strongly Agree
<i>3. As a student of Information Communication Technology, I experienced uploading e-portfolio in a teacher's Google classroom.</i>	3.13	0.75	Strongly Agree
<i>4. As a student of Information Communication Technology, I experienced practice paperless learning practice through cloud storage.</i>	3.21	0.73	Strongly Agree
<i>5. As a student of information communication technology, I have experience managing my own activities in cloud storage.</i>	3.31	0.73	Strongly Agree
Weighted Mean	3.25		
SD	0.52		
Verbal Interpretation	Very Great Extent		



Table 2 presents the level of implementation of education 4.0 in teaching information and communication technology in terms of cloud based activities. This table emphasizes the teaching methods utilized google drive and cloud storage on the internet in compiling students' outputs. The table included the statements, mean, standard deviation and remarks.

Table 2 shows the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of cloud-based activities. Evidently, the students obtained a great extent ($M=3.25$, $SD=0.52$) in Implementation of Education 4.0 in teaching Information and Communication Technology in terms of cloud-based activities. This denotes that the learners had the experiences on file management in cloud storage as they upload different learning task and perform different activities which serves as the evidence of their mastery and competency.

Students of information communication technology under the technology in livelihood education subject strongly agree ($M=3.40$, $SD=0.66$) on their experiences on education 4.0 as they save works in google drive for storage. This denotes that the learners practically used google drive as cloud storage to save activities and provide mode of verification for competency development in information communication technology utilization and practice.

More so, the students in information communication technology are strongly agree ($M=3.13$, $SD=0.75$) on their experiences to upload e portfolio in teacher's google classroom. This denotes that although it obtained least among the indicators, students had the experience to submit their work in the google classroom provided by the teachers to organize self-learning and received timely feedback about their performance.

Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Customized Learning

Table 3 presents the level of implementation of education 4.0 in teaching information and communication technology in terms of customized learning. This table emphasizes the teaching methods that consider the students' availability and ability. The table included the statements, mean, standard deviation and remarks.

Table 3 shows the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of Customized Learning. Evidently, the students obtained a great extent ($M=3.39$, $SD=0.43$) in the Implementation of Education 4.0 in teaching Information and Communication Technology in terms of customized learning. This denotes that the learners had experiences performing activities based on students' availability, ability weaknesses and strengths.

Table 3 Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Customized Learning

STATEMENTS	MEAN	SD	REMARKS
<i>As a student of Information Communication Technology, I experienced performing activities online based on time availability.</i>	3.36	0.66	Strongly Agree
<i>As a student of Information Communication Technology, I experienced search for additional resources that support learning.</i>	3.45	0.63	Strongly Agree
<i>As a student of Information Communication Technology, I aligned the learning experiences on computer technicalities and practice in own learning style.</i>	3.29	0.64	Strongly Agree
<i>As a student of Information Communication Technology, I experienced determine strength in usage of different websites on the internet.</i>	3.36	0.60	Strongly Agree
<i>As a student of Information Communication Technology, I experienced enhance own weaknesses in using computers through the personal experiences of challenges.</i>	3.46	0.61	Strongly Agree
Weighted Mean	3.39		
SD	0.43		
Verbal Interpretation	Very Great Extent		

Table 3 shows the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of Customized learning. Evidently, the students obtained a great extent ($M=3.39$, $SD=0.43$) through the personal experiences of challenges. This denotes that the activities provided by the teachers using computers helped the learners to address their difficulty in different competencies and aid them in improving on their least learned topics.

More so, it is evident on the table that learners with information communication technology subjects strongly agree ($M=3.29$, $SD=0.64$) on their experience with the implementation of education 4.0 as they had the chance to align the learning experiences on computer technicalities and practice in their own learning style. This indicated that learners in information communication technology subject had the opportunity to integrate their personal experiences with computer utilization into their learning style to process holistic learning and mastery of the competency.



Table 4 Level of Implementation of Education 4.0 in teaching Information and Communication Technology in Terms of Ethical Awareness

STATEMENTS	MEAN	SD	REMARKS
1. As a student of information communication technology, I have experienced identifying the significance of the rules and regulations in using the internet.	3.54	0.59	Strongly Agree
2. As a student of Information Communication Technology, I reflected on the pros and cons that affect the ICT integration practices.	3.36	0.64	Strongly Agree
3. As a student of information communication technology, I experienced filter information presented online that affects the effective use of ICT resources in learning.	3.34	0.63	Strongly Agree
4. As a student of Information Communication Technology, I experienced hands-on activities in using internet that reflect the etiquette in computer use.	3.36	0.64	Strongly Agree
5. As a student of Information Communication Technology, I experienced identifying penalties for violation of rules and regulation concerns in misconduct on computer use.	3.40	0.64	Strongly Agree
Weighted Mean	3.50		
SD	0.46		
Verbal Interpretation	Very Great Extent		

Table 4 presents the level of implementation of education 4.0 in teaching information and communication technology in terms of ethical awareness. This table emphasized the teaching methods in teaching ICT that focused on the ethical practices in utilizing internet and the web. The table includes the statements, mean, standard deviation and remarks.

Table 4 shows the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of ethical awareness. Evidently, the students obtained a great extent ($M=3.50$, $SD=0.46$) in the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of ethical awareness. This proves that the learners highly learned the different etiquettes in using different platforms using the internet as they understand the pros and cons of their behavior while using technology devices.

The table shows that the students strongly agree ($M=3.54$, $SD=0.59$) as they experienced the significance of the rules and regulations in using the internet. This probe that the learners develop their understanding of the laws that cover their practice in using internet and computers which affects their corrective actions in using the media.

Also, the learners strongly agreed ($M=3.34$, $SD=0.63$) on their experiences to filter information present online that affects

the effective use of ICT resources in learning. This entailed that the learners developed competency to validate the information on the internet in terms of reliability, usefulness and correctness based on the sources.

Table 5 presents the level of implementation of Education 4.0 in teaching information and communication technology in terms of inclusivity. This table emphasizes the teaching methods in ICT that focus on the students regardless of race, ability, and location. The table included the statements, mean, standard deviation and remarks.

Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Inclusivity

Table 5 shows the level of Implementation of Education 4.0 in teaching Information and Communication Technology in terms of inclusivity. It is evident that the students obtained a great extent ($M=3.41$, $SD=0.43$) in the Implementation of Education 4.0 in teaching Information and Communication Technology in terms of inclusivity. This proves that the learners highly experienced the inclusive education in terms of language, geographical location and students' strengths and weaknesses through education 4.0 implementation in information and communication technology subjects.



Table 5 Level of Implementation of Education 4.0 in Teaching Information and Communication Technology in Terms of Inclusivity

STATEMENTS	MEAN	SD	REMARKS
<i>As a student of Information Communication Technology, I experienced integrated community practice as example of a discussion of skills development in computer use.</i>	3.39	0.66	Strongly Agree
<i>As a student of Information Communication Technology, I experienced the use of video conferencing to address group activities concerning the distance of each member.</i>	3.35	0.60	Strongly Agree
<i>As a student of Information Communication Technology, I experienced the use of both English and Filipino during discussions to address students' difficulty in understanding computer technicalities.</i>	3.46	0.58	Strongly Agree
<i>As a student of information communication technology, I experienced a boost in my talents and expertise in computer technicalities.</i>	3.31	0.72	Strongly Agree
<i>As a student of Information Communication Technology, I experienced support from classmates to address my weaknesses in different activities concerned with computer utilization.</i>	3.48	0.63	Strongly Agree
Weighted Mean	3.41		
SD	0.43		
Verbal Interpretation	Very Great Extent		

Learners strongly agreed ($M=3.41$, $SD=0.43$) that they had experienced support from their classmates to address their weaknesses in different activities concerned with computer utilization. This emphasized that the learners experienced collaborating ideas with their peers as the teachers imposed the education 4.0 in information communication technology, where the in students had the opportunity to address the student weaknesses in computer utilization activity.

Also, it is evident from the table that the learners strongly agreed ($M=3.31$, $SD=0.72$) that their experience boost talents and expertise in computer technicalities. This denoted that the learners enhance their computer ability as there is consideration of their expertise and interest in computer utilization.

Level of Student Learning in ICT

This study determined the students' learning level, including communication, computer technicality, cyberspace navigation, information analysis and idea organization. The level of student learning is revealed in the following table, which shows the statement, mean, standard deviation, and verbal interpretation.

Table 6 presents the level of student learning in terms of articulate ideas, share experiences, respond to the message and ethical practices in communication regardless of the medium used. The table includes the statements, mean, standard deviation and remarks.

Table 6 Level of Student learning in Terms of Communication

STATEMENTS	MEAN	SD	REMARKS
<i>1. I see myself sharing ideas in the discussion online and face to face.</i>	3.54	0.63	Strongly Agree
<i>2. I see myself that I listen effectively to understand the content of idea.</i>	3.49	0.62	Strongly Agree
<i>3. I see myself that I respond to a message to express specific purpose.</i>	3.47	0.59	Strongly Agree
<i>4. I see myself that I utilize media to give feedback from the information.</i>	3.40	0.59	Strongly Agree
<i>5. I see myself that I practice ethics of receiving and sending message online.</i>	3.45	0.70	Strongly Agree
Weighted Mean	3.48		
SD	0.44		
Verbal Interpretation	Very Great Extent		

Table 6 shows the level of student learning in terms of communication. It is evident that the students obtained a great extent ($M=3.48$, $SD=0.44$) in terms of communication in student learning. This entailed that learners enhance their

communication ability in the implementation of education 4.0 in information communication technology as there are opportunities to express ideas and receive responses through the use of different communication applications in the teaching-



learning process.

The table provided evident data that learners strongly agreed ($M=3.48$, $SD=0.44$) that they could share ideas in the discussion through online and face-to-face platforms. This emphasized that the learners are confident in their ability to communicate their ideas in online classes and discussions as well as in a face-to-face setting. They develop the ability to communicate their thoughts effectively and share them with peers.

Moreover, the student was also strongly agreed ($M=3.40$, $SD=0.59$) that she had the ability to utilize media to give feedback from the information. This proved that the learners are confident in their ability to respond to different information in

different media by providing feedback and their own perception through reflection.

It suggests that these activities are an effective strategy for enhancing communication skills, as they progress progressively and linearly, indicating a significant improvement in students' English communication abilities.

Table 7 presents the level of student learning in terms of computer technicality. This table provided data about the students' ability to access the different parts of the computer with care, utilize different software and determine the problems upon using which allowed them to create alternative actions. The table presents the statements, mean, standard deviation and remarks.

Table 7 Level of Student Learning in Terms of Computer Technicality

STATEMENTS	MEAN	SD	REMARKS
1. I see myself that I process information through the use of different office presentation.	3.44	0.67	Strongly Agree
2. I see myself that I identify malfunction in computers while using.	3.29	0.64	Strongly Agree
3.I see myself that I utilize offline applications depending on purpose.	3.36	0.62	Strongly Agree
4. I see myself that I manage hardware and software related to computer.	3.31	0.70	Strongly Agree
5.I see myself that I use computer responsively and carefully to maintain durability.	3.45	0.63	Strongly Agree
Weighted Mean	3.37		
SD	0.48		
Verbal Interpretation	Very Great Extent		

Table 7 shows the level of student learning in terms of computer technicality. It is evident that the students obtained a very great extent ($M=3.37$, $SD=0.48$) in level of student learning in terms of computer technicality. This entailed that learners enhanced their knowledge technicality of computers and gadgets in the implementation of education 4.0 in information communication technology as there are opportunities to utilize different applications. They could utilize different hardware and software for the computers as they can identify the problems while responsibly utilizing computers for their assigned function.

The table shows that learners taking Information communication technology as their subject strongly agreed ($M=3.45$, $SD=0.63$) that they can use computers responsively and carefully to maintain durability. This denotes that the students are confident in their competencies learned in teaching in the learning process, that they can use the computer according to its function and responsible for maintaining its durability as they are aware of the different considerations in maximizing its functionality.

Further, the learners strongly agreed ($M=3.29$, $SD=0.62$) that they can identify malfunction in computers while using them.

It denoted that the learners are confident that they learned competencies in trouble shooting defects of the parameters, and conditional statements, and understand its practical computer hardware and software upon observing its operation during utilization. The learners were able to identify the defect and provide solution to address the technical difficulty in utilizing ICT resources.

Level of Student Learning in Terms of Cyber Space Navigation

Table 8 presents the level of student learning in terms of cyber space navigation. This table provided details on the students' development and learning regarding the utilization of different applications on the internet based on their function and goals aligned with ethical standards. The table presents the statements, mean, standard deviation and remarks.

Table 8 shows the level of student learning in terms of Cyber space navigation. It is evident that the students obtained a great extent ($M=3.42$, $SD=0.46$) in level of learning regarding cyber space navigation. This entailed that learners enhance their knowledge on proper use of websites and cyber space depending on its function with consideration to their personal to specific function.



Table 8 Level of Student Learning in Terms of Cyber Space Navigation

STATEMENTS	MEAN	SD	REMARKS
1. I see myself that I access different educational website to gain additional resources.	3.45	0.66	Strongly Agree
2. I see myself that I practice ethical standards while using internet resources.	3.41	0.68	Strongly Agree
3. I see myself that I process uploading and downloading of information through internet.	3.38	0.61	Strongly Agree
4. I see myself that I access different website depending on the purpose of activities.	3.41	0.60	Strongly Agree
5. I see myself that I protect private information by creating firewall for malwares.	3.40	0.69	Strongly Agree
Weighted Mean	3.42		
SD	0.46		
Verbal Interpretation	Very Great Extent		

It is evident on the result that learners strongly agreed ($M=3.45$, $SD=0.66$) that they can access different educational websites to gain additional resources. This entailed that learners develop the ability to access different websites available on the internet to support their learning and provide supplemental resources for in-depth understanding of the lesson leading to mastery of the competency.

Although landed as the least, the learners who took information communication technology strongly agree ($M=3.38$, $SD=0.61$) that they can process uploading and downloading information through internet. This internet was downloaded into their devices and the capacity to share data from their gadget to the cyberspace through uploading.

Level of Student Learning in Terms of Information Analysis

Table 9 presents the level of student learning in terms of information analysis. This table provided details on the student's learning on evaluating the validity and reliability of information based on its web sources. The table reflects the statements, mean, standard deviation and remarks.

It indicates the level of student learning in terms of information $SD=0.48$) in level learning in terms of information analysis. This entailed that learners understand the process of obtaining information on the internet and checking its validity, reliability and functionality by comparing the facts and opinion.

Table 9 Level of Student Learning in Terms of Information Analysis

STATEMENTS	MEAN	SD	REMARKS
1. I see myself accessing information from different reliable educational websites.	3.43	0.67	Strongly Agree
2. I see myself that I evaluate the validity of information through proper referencing from reliable websites.	3.37	0.63	Strongly Agree
3. I see myself that I identify the application of information obtained from the internet to personal learning.	3.40	0.63	Strongly Agree
4. I see myself creating a concrete idea from the information on different websites.	3.36	0.66	Strongly Agree
5. I see myself that I distinguish facts from opinion of the information present in the internet.	3.38	0.69	Strongly Agree
Weighted Mean	3.39		
SD	0.48		
Verbal Interpretation	Very Great Extent		

It is evident from the survey result that learners strongly agreed ($M=3.43$, $SD=0.67$) that they can access information from different reliable educational websites. This showed that the learners are aware of the process of validating the reliability of different websites on the internet by processing information and checking the correctness through comparison with other websites.

Although landed least among the indicators, the learners

strongly agree ($M=3.36$, $SD=0.66$) that they can evaluate the validity of information through proper referencing from reliable websites. This indicated that the learners perform fact checking of information based on the sources of information which should be aligned on the perceived functionality of both the website and information.

Level of Student Learning in Terms of Idea Organization

Table 10 illustrates the level of student learning in terms of idea



organization. This table shows data that supports the student's learning in terms of information arrangement leading to holistic idea and concrete basis for learning. It includes the statements, mean, standard deviation and remarks.

Table 10 indicates the level of student learning in terms of idea organization. It is evident that the students obtained

very great extent ($M=3.39$, $SD=0.48$) in level of student learning in terms of information analysis. This entailed that learners learned to arrange information based on their own cognitive process making one concrete idea. This shows that learners were also able to synthesize information and interpret ideas for easy understanding.

Table 10 Level of Student Learning in Terms of Idea Organization

STATEMENTS	MEAN	SD	REMARKS
1. I see myself that I identify the relationship of ideas obtained from the websites.	3.48	0.58	Strongly Agree
2. I see myself arranging information obtained on the internet from simplest to complex.	3.41	0.57	Strongly Agree
3. I see myself that I categorize data obtained in the websites according to its importance.	3.42	0.66	Strongly Agree
4. I see myself that I create a concept of ideas from the internet for easy understanding.	3.46	0.61	Strongly Agree
5. I see myself comparing the differences of ideas on different educational websites.	3.40	0.64	Strongly Agree
Weighted Mean	3.44		
SD	0.42		
Verbal Interpretation	Very Great Extent		

The table shows that learners strongly agreed ($M=3.48$, $SD=0.58$) that they can identify the relationship of ideas obtained from the websites. This proved that the learners were able to arrange ideas depending on the perceived relationship upon analysis that contributes to one whole idea.

More so, the learners also strongly agreed ($M=3.41$, $SD=0.57$) that arrange information obtained in the internet from simplest to complex. This denoted that the learners could weight the simplest information to complex based on their level of understanding.

Level of Student Involvement in ICT

This study identified the level of students' involvement, including instructor-student interaction, peer collaboration and personalized learning path.

The level of students involvement in information communication technology is revealed in the following table, which shows the statement, mean, standard deviation and verbal interpretation.

Level of Student Involvement in terms of Instructor-Student Interaction

Table 11 presents the level of student's involvement in terms of instructor-student interaction. It is evident that the students obtained very great extent ($M=3.37$, $SD=0.45$) in level of involvement in ICT in terms of student-teacher interaction. This entailed that learners had the chance to exchange idea with the teacher concerning the discussion and clarified topics which may lead to practice of competency though the use of information communication technology resources.

Table 11 Level of Students' Involvement in Terms of Instructor-Student Interaction

STATEMENTS	MEAN	SD	REMARKS
1. As a student of Information Communication Technology, I experienced exchange idea regarding the experience in the use of technology with teacher during discussion.	3.43	0.59	Strongly Agree
2. As a student of Information Communication Technology, I experienced ask question regarding my difficulties in using technology task after the discussion.	3.42	0.62	Strongly Agree
3. As a student of Information Communication Technology, I experienced share paperless activities with my teachers through internet.	3.29	0.64	Strongly Agree
4. As a student of Information Communication Technology, I received feed-back on performance tasks from teachers using google classroom.	3.36	0.67	Strongly Agree
5. As a student of Information Communication Technology, I experienced conducting instant meetings with teacher for consultation using	3.31	0.71	Strongly Agree



google meet.			
Weighted Mean	3.37		
SD	0.45		
Verbal Interpretation	Very Great Extent		

It is evident that students strongly agreed ($M=3.43$, $SD=0.59$) on their experience exchanging ideas regarding the experience in the use of technology with teacher during discussion. This

indicated that the learners use information communication technology resources to communicate with the teacher to discuss the topic.

Table 12 Level of Student Involvement in ICT in Terms of Peer Collaboration

STATEMENTS	MEAN	SD	REMARKS
1. As a student of Information Communication Technology, I experienced plan progress of group activities with peer using Google Calendar.	3.37	0.70	Strongly Agree
2. As a student of information communication technology, I have experience conducting instant meetings with classmates through Google Meet.	3.25	0.73	Strongly Agree
3. As a student of information communication technology, I have experience collaborating on ideas in one activity on time, regardless of geographical location, through Google Docs.	3.35	0.67	Strongly Agree
4. As an Information Communication Technology student, I experienced sharing academic references with classmates through Mendeley's software.	3.24	0.68	Strongly Agree
5. As a student of Information Communication Technology, I experienced aid in accomplishing computer-related tasks from peers through constant reminders in the group chat.	3.30	0.64	Strongly Agree
Weighted Mean	3.30		
SD	0.50		
Verbal Interpretation	Very Great Extent		

Moreover, although landed as least among the indicators, learners still strongly agreed ($M=3.43$, $SD=0.59$) on their experience of sharing paperless activities with my teachers through internet. Meaning, that the learners enjoyed the paperless activity submission as they utilized information communication technology resources by using cloud storage and classroom in monitoring own progress in the subject.

Table 12 indicates the level of student involvement in ICT terms of peer collaboration. It is evident that the students obtained a great extent ($M=3.30$, $SD=0.50$) in level of student involvement in ICT in terms of peer collaboration. This ensures that learners have the chance to exchange ideas with classmates in accomplishing their academic responsibilities with the aid of information communication technology resources that offer constant feedback among participants.

The data indicated that the learners strongly agreed ($M=3.37$, $SD=0.70$) they had experience in planning the progress of group activities with peers using google calendar. This denotes that the google calendar shared with the group member provides constant reminders to their academic responsibility. Also, the google calendar allows the learners to share meeting reminders

and link.

Also, the respondent strongly agreed ($M=3.24$, $SD= 0.68$), on their experience to share academic references with classmates through Mendeley's software. This denotes that the learners practice sharing of references that serves as additional learning resources and practice proper citation upon using published material online in their studies. This also signified that learners use other references assigned from the textbook content to address their clarification and attain mastery of the topic.

Level of student involvement in ICT in terms of Personalized learning path

Table 13 indicates the level of student involvement in ICT terms of personalized learning path. The students obtained a great extent ($M=3.37$, $SD=0.47$) in the level of student involvement in ICT in terms of the personalized learning path. This entails that learners had the experience of managing their own learning based on their preferences and schedules through different websites to support their study habits.



Table 13 Level of Student Involvement in ICT in terms of Personalized Learning Path

STATEMENTS	MEAN	SD	REMARKS
As a student of Information Communication Technology, I experienced a set of performances in utilization of computers in google classroom aligned to learning style.	3.35	0.62	Strongly Agree
As a student of Information Communication Technology, I experienced search additional resources to support learning in computer technicalities.	3.33	0.66	Strongly Agree
As a student of Information Communication Technology, I experienced accessing website that supplies additional support that addresses my question regarding the website's technical problemste.	3.36	0.65	Strongly Agree
As a student of Information Communication Technology, I experienced manage own learning schedule in computer usage by arranging schedules in google classroom.	3.31	0.69	Strongly Agree
As a student of Information Communication Technology, I experienced practice skills in website making aided by the internet.	3.46	0.59	Strongly Agree
Weighted Mean	3.37		
SD	0.47		
Verbal Interpretation	Very Great Extent		

It is evident that the learners strongly agreed ($M=3.46$, $SD=0.59$) that they experience practicing their skills in website making aided by the internet. This proved that the learners had the chance to use the information and communication technology in the internet either written or video tutorial in creating websites through the help of the internet.

Evidently, learners strongly agreed ($M=3.31$, $SD=0.69$) that they experienced managing their own learning schedules in computer usage by arranging schedules in Google Classroom. This denotes that through the use of computers the students develop their competency through independent learning practices aided by the computer. The students had the chance to perform the task based on their preferred schedule and difficulty level using application and communication software.

This research also determined the significant relation between independent variable and dependent variable particularly the level of implementation of education 4.0 and student learning in Information and Communication Technology.

Significant Relationship Between the Implementation of Education 4.0 and Student Learning in Information and Communication Technology

The significant relationship between variables is revealed in the following table, which shows the independent variable, dependent variable, p-value and data analysis.

Table 14 presents the significant relationship between the Implementation of Education 4.0 and student learning in ICT. Based on the computed r-values from the test, it was observed that implementation of education 4.0 in terms of adaptive assessment showed significant relationship to students' learning in ICT particularly in communication and idea organization as it obtained p-value less than the alpha level of 0.05. Moreover, it can be gleaned from the table that implementation of education 4.0 in terms of cloud-based activities showed significant relationship to all student's learning in ICT. Moreover, implementing education 4.0 in terms of customized learning, ethical awareness and inclusivity only showed significant relationship to student communication skills in learning information communication technology as obtained p-value lower than alpha level.

Table 14 Significant relationship between the Implementation of Education 4.0 and student learning in Information and Communication Technology

		Students Learning in Information and Technology Communication				
		Communic ation	Computer technicality	Cyber Space Navig ation	Informati on Analysis	Idea organization
Implementation of Education 4.0						
Adaptive assessment	Pearson					
	Correlation	0.49	0.438	0.35	0.364	0.468
	Sig. (2-tailed)	0.002	0.577	0.145	0.343	0.026
	N	120	120	120	120	120
	Analysis	Significant	Significant	Signifi cant	Significan t	Significant
Cloud based						
	Pearson	0.433	0.349	0.36	0.387	0.412

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	N	120	120	120
	Analysis	Significant	Not Significant	Significant
Customized Learning	Pearson			
	Correlation	0.454	0.486	0.495
	Sig. (2-tailed)	0.581	0.052	0.573
	N	120	120	120
	Strength	Not	Not	Not
Ethical Awareness	Analysis	Significant	Significant	Significant
	Pearson			
	Correlation	0.501	0.457	0.602
	Sig. (2-tailed)	0.378	0.033	0.332
	N	120	120	120
Inclusivity	Strength	Not		Not
	Analysis	Significant	Significant	Significant
	Pearson			
	Correlation	0.558	0.508	0.6
	Sig. (2-tailed)	0.339	0.023	0.323
	N	120	120	120
	Strength	Not		Not
	Analysis	Significant	Significant	Significant

Furthermore, the implementation of education 4.0 in terms of ethical awareness and inclusivity showed a significant relationship to only in peer collaboration of student engagement in information communication technology. This implies that the students' ethical awareness of utilizing information communication technology resources enables them to become responsible digital citizens, allowing them to communicate effectively with peers and practice assistance in academic responsibilities. Also, inclusive education through online learning and flexible platform of curriculum delivery aids the students' exchange of ideas and sharing expertise among classmates as they assist co-students in competencies which they encounter difficulty.

Learning through ICT in the classroom is a highly effective method for teachers and students. However, educators must possess the necessary knowledge and skills to utilize ICT in their teaching methods effectively. A "trial and error" stage is necessary before teachers feel comfortable using it. Recommendations include digital literacy assessments, hands-on activities, seminars, and pieces of training, and student action research to identify and resolve issues with ICT use and challenges in teaching and learning (Tayaban, 2022).

4. CONCLUSION AND RECOMMENDATIONS

Based on the results of the study, the following conclusions were made: All of the indicators of implementation of education 4.0 were observed to have a relationship with students' communication skills. At the same time, only the cloud-based activity showed a significant relationship with students' ICT learning, and only the adaptive assessment showed a significant relationship with idea organization, signifying the null hypothesis's acceptance. Learners' development of idea articulation and organization for communication, as well as competencies in the utilization of computer technicality, were influenced by provided technology-based assessment in the discussion, while the activities enhanced the students' learning in different

competencies related to information communication technology.

Furthermore, the implementation of Education 4.0 particularly cloud-based activity showed a significant relationship between two of the students' involvement in ICT, particularly the instructor and student interaction and personalized learning path. Also, only inclusivity and ethical awareness showed a significant relationship to peer collaboration, thus signifying acceptance of the null hypothesis, which was based on consideration of students' availability of resources in performing tasks through technology affecting the frequency of usage and interaction.

The following recommendations are offered:

1. Teachers may strengthen the implementation of Education 4.0 in lesson delivery to address students' needs and learning styles through technology utilization and promote inclusivity.
2. Schools may use paperless instruction through the implementation of Education 4.0 in teaching learning process to address student difficulty through constant feedbacking that may lead to mastery of competency.
3. Teachers may design collaborative activities that allow learners to exchange ideas with peers and experts leads to self-understanding of the concept.

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