
ICT Capability: Impact on Teachers' 21st Century Skills

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ABSTRACT: Today's students have grown up with the internet, cellphones and gadgets as a part of their growth and development. This is why it is essential for the teachers to guide these students in becoming productive and responsible individuals. This study investigated the ICT capabilities and 21st-century skills of 172 junior high school teachers in Misamis Oriental Division during the School Year 2024-2025. The study's focus included technology operations, concept, social and ethical considerations, pedagogical applications and professional growth. Descriptive-correlational and causal research design were used to establish relationships between the independent and dependent variables. The study used researcher made questionnaire that passed the validity and reliability tests. Statistical tools like Mean and Standard Deviation, Pearson's Product-Moment Correlation Coefficient and Multiple Linear Regression were used. Results indicated that teachers' ICT Capability was at Capable Level while their 21st Century Skills was at Highly Observed Level. All ICT capability of teachers in this study were the biggest predictors on their 21st century skills. It is recommended that school administration may offer teachers training sessions to further their skills and capability in ICT as well as on their 21st Century Skills.

KEYWORDS: 21st century skills, ICT capability, teachers, technology

I. INTRODUCTION

Today's students have grown up with the internet, cellphones and gadgets as a part of their growth and development. The majority of them have less knowledge or ability to remember what life is like without the internet and their gadgets. These individuals may feel overwhelmed by the fact that they grew up with all of these devices and access to a wealth of knowledge. This is why it is essential for the teachers to guide these students in becoming productive and responsible individuals. Teachers can adequately prepare students for the future workforce only if they themselves possess strong ICT capabilities and 21st-century skills.

Abdulloh et al. (2022) reported that many countries are improving their 21st-century education systems, particularly at the elementary and secondary levels. From early childhood to higher education, the importance of teachers in fostering 21st-century skills is consistently emphasized. These skills are crucial for student success. In today's interconnected world, integrating information and communication technology (ICT) into education is essential. Technology's potential to enhance learning and prepare students for the future is well-documented. Given that technology is capable of improving both teaching and learning, educational institutions are working hard to include it in their respective lectures. Successful usage, limited access to technology continues to be a substantial barrier, particularly for educators in public schools. This study focuses on the abilities and obstacles that these educators confront in maximizing this are investigated.

The lack of adequate ICT infrastructure significantly impact both teaching effectiveness and student involvement, which includes limited computer access, poor internet connectivity, and outdated software and hardware. The skill gap is further exacerbated by the limited options for training and professional development that are available to teachers, which additionally makes it challenging for them to adapt to new technology. There are also those educators who are reluctant or skeptical about the use of information and communication technology, which highlights the importance of cultivating a positive attitude and driving real reform (Molano, 2020).

Since teachers are under a considerable amount of obligation to complete their work, it is difficult for them to learn and apply new technology. There is a persistent problem of reluctance to change, since some teachers may experience feelings of intimidation when confronted with innovative instructional approaches. Helping is essential to assist them in recognizing the advantages of the incorporation. Utilization that is effective can make learning more interesting and improve the effectiveness of

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teaching. Nevertheless, the insufficient availability of necessary resources and competence in schools is a barrier to the delivery of successful lessons (Durante, 2020).

The purpose of this investigation is to design a based-on needs strengthening capacities strategy by assessing the competencies in information and communication technology (ICT) and requirements of public-school teachers. The purpose of this endeavor is to improve the educational opportunities available to learners and to make the transition toward the online environment easier for educators by identifying and addressing the obstacles that they face.

Lesson planning, grading, meetings, and everything else you can think of are just some of the things that educators have to deal with. It is possible that attempting to incorporate education and the utilization of modern technology into a schedule that is already crowded can be a daunting endeavor. One of the issues that kept coming up is resistance to change. However, the utilization of information and communication technology by educators is hampered by several obstacles. A few of these obstacles included the fact that providing instruction without the use of electronic devices can be boring for students. Learners can maintain their attention and do well in their classes with the assistance of technology. Additionally, it expedites and improves the work that teachers do.

Considering this, the purpose of this research is to offer useful knowledge by studying the amount of proficiency educators exhibit with information and communication technology (ICT) while recognizing the challenges that they face. Additionally, there is a need to recognize the issues, but we also need to figure out how to make the transition to the digital era of education easier for educators and give members the confidence to come to terms with it. It is important to remember that fully prepared teachers are the source of enhanced learning chances for students.

The study was anchored on Lev Vygotsky's Sociocultural Theory of Cognitive Development, specifically the concept of the Zone of Proximal Development (ZPD). Vygotsky posited that children acquire cultural values, beliefs, and problem-solving strategies through collaborative dialogues with more knowledgeable others. This socially mediated process, occurring within the ZPD, allows children to achieve tasks they cannot accomplish independently. Proximal Development Zone (ZPD), as defined by Sage (2022), is the gap between what a young child can achieve on their own and what they can execute with the assistance of an experienced adult. The ability of the youngster who is just beginning to learn is included in this zone. In a never-ending loop, children pick up new information from others who are more experienced. In these circumstances, social interaction promotes cognitive progress to bridge the gap between their expertise and the child's knowledge, social partners employ cultural resources like language. The child's zone moves up as they age, enabling them to accomplish more tasks by themselves and engage in higher-order thinking. To promote cognitive development, teachers should plan classes so that they fall within the ZPDs of their students. Since each child has a unique ZPD, teachers should provide both individualized support and group projects in the classroom.

According to Vygotsky's theory, as cited by Abdulloh et al. (2022), social and cultural experiences are the most significant way to understand child development, wherein a social connection is considered a growth factor. The child gradually learns to function cognitively on her own with the help of more seasoned members of the social environment. Thus, a person's cognitive growth is mediated by the social world. This method offers new approaches to evaluating student's mental capacity and to teach Reading, Mathematics, and Writing by highlighting the socially mediated nature of cognitive processes.

In addition, teachers may find it helpful to comprehend the Zone of Proximal Development. Teachers may conduct an initial skill level assessment with pupils in classroom settings. Then, teachers may deliver instruction that pushes every student beyond their comfort zone. There might be an initial need for a more knowledgeable teacher or classmate to help the student. It will not take long for their zone of proximal development to grow. To support this growth, educators can organize and plan lessons and instruction for the classroom.

Moreover, in this study, the competence in Information and Communication Technology among Public School Teachers is used as a variable that is dependent. This capacity is based on the four National ICT Competency Standards (NICS) domains for educators: Technology Operations and Concepts, Social and Ethical Use, Pedagogical Applications, and Professional Growth. Several initiatives, including research comparisons on current industry best practices in the Philippines and other countries, focused group discussions or consultation with numerous public and private organizations, agencies, academe, and stakeholders, and validation of shops (Elfert, 2019).

ICT, which stands for Information and Communications Technology, provides access to information through various forms of interaction technologies, allowing individuals to engage in the virtual world. The continuous advancement of technology is resulting in substantial changes to educational practices. A descriptive analysis assessed teachers' ICT competence levels across different skill sets using a standardized survey questionnaire adapted from the National Information and Communications Technology Competency Standards (NICS-Basic) (Opena, 2022). The use of digital technologies has an enormous potential for documenting not only the process of student learning but also the overall achievement of students. Thus, there is an urgent need to develop new methods to make effective use of these abilities (Tomaro, 2019).

II. METHODOLOGY

This study utilized correlational and causal research designs, a quantitative approach that describes population characteristics and explores relationships between variables without manipulation. As a non-experimental design, it observed and measured existing variables in their natural setting, providing an accurate portrayal of the characteristics of the studied group. This allowed for the discovery of new insights, description of existing conditions, and determination of the frequency and categorization of information, variable relationships, and statistical data treatment.

This method was an accurate and systematic description of something, which referred to the extent of the phenomenon, or characteristics such as feeling or attitude. Further, it was also a systematic description of someone, and this may have been an individual, group, or community.

Statistical treatment of the data provides guidance for the researcher to achieve the same treatment for each of the following problems. Problem 1, 2 and 3 will use the Mean and Standard Deviation in determining the instructors' degree of ICT proficiency, complexity, and 21st century abilities. The Pearson Product Moment Correlation Coefficient, or Pearson *r*, will be used in Problem 3 to ascertain whether there is a substantial correlation between the participants' 21st century talents and their level of ICT capability. In Problem 4, multiple linear regression analysis will be used.

III. RESULTS AND DISCUSSION

Problem 1. What is the teachers' level of ICT capability in terms of:

- 1.1 technology operations and concepts;
- 1.2 social and ethical considerations;
- 1.3 pedagogical practices, and
- 1.4 professional growth?

Table 1. Overall Teachers' ICT Capability

Indicators	Mean	SD	Description	Interpretation
Technology Operations and Concepts	4.20	0.69	Often	Capable
Social and Ethical Considerations	4.25	0.69	Always	Highly Capable
Pedagogical Practices	4.21	0.72	Always	Highly Capable
Professional Growth	4.00	0.76	Often	Capable
Overall Mean	4.17	0.72	Often	Capable

Note: 4.21 – 5.00 Highly Capable 3.41 – 4.20 Capable 2.61 - 3.40 Somewhat Capable 1.81 - 2.60 Slightly Capable 1.00 - 1.80 Not so Capable

Table 1 showcases the teachers' overall ICT proficiency level. With a mean score of 4.17 overall and a standard deviation of 0.72, it was classified as "Often" and interpreted as "Capable Level." These findings suggest that teachers possess a high degree of ICT proficiency. This mean that the teachers can manipulate and utilize ICT based strategies and gadgets. Teachers are keeping up with the demands of technology advancement so that they can teach the students with their utmost capacity and capability. The teachers also recognize the importance of technology integration and so they do not hesitate in doing it.

According to (Akram et al., 2022) large percent of the teachers have the capability to utilize technologies. The government is also doing their part by providing gadgets that can be utilize by the educators and learners in their learning activities. The Department of Education launched the computerization program wherein schools are given laptops and tablets so that the students are exposed to these gadgets and be able to operate and manipulate it to elevate their learning experience.

In the same table, the variable, *Social and Ethical Considerations*, was rated the highest with the Mean of 4.25 with SD=0.69, described as Always and interpreted as Highly Capable Level. The data imply that the teachers value the knowledge, skills and importance of ethics and etiquette in utilizing the internet and social media sites. They make sure that they are protected as well as their students. Students are vulnerable and minors therefore they must be given guidance and assistance so that they will not get bad influences from the videos that they are watching. According to Paje et al. (2021) discipline and respect should always be implemented and observe wherever the person is. If the students are taught to be respectful and discipline, they will also employ it while browsing and surfing the internet.

Meanwhile, the variable, *Professional Growth*, was rated the lowest with the Mean of 4.00 with SD=0.76, described as Often and interpreted as Capable Level. The data imply that the teachers value the knowledge, information and skills they learn about ICT that can enhance their capability as teachers. They consider it as part of their growth that can be beneficial to them as to their students. They attend to trainings and seminars even at their own expense when they feel and realized its urgency and

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importance. According to Bandico-Brasileño and Bidad (2021) teachers do not just rely on government led trainings and seminars but even attend those organized by the private sector. This is because they want to learn more and also want to check on different approaches and strategies that they can use.

Problem 2. What is the teachers' level of 21st-century skills in terms of:

- 2.1 communication, and
- 2.2 creativity?

According to Hernando-Malipot (2022) 21st century skills is a must for the students to have better chance of earning a living whether they are here in the Philippines or working abroad. The country is one of the exporters of manpower services. Thus, every student should have better 21st century skills to be ready and competitive.

In the same table, the variable, *Communication*, was rated the highest with the Mean of 4.23 with SD=0.71, described as Strongly Agree and interpreted as Very Highly Observed. The data imply that the teachers value the importance of communication. They also want to impart the abilities and understanding of communication among their pupils. As a result, the students will have less difficulty in expressing their thoughts and ideas which can avoid barriers from others. The students will also not feel inferior as they mastered the strategies of communicating and expressing their ideas. According to Tomaro (2019) communication is essential to the teaching and learning process and even in information dissemination and distribution. Teachers need to master it so that they can relay the message of their communication well and that the receivers will not get confused.

Table 2. Overall Teachers' 21st-Century Skills

Indicators	Mean	SD	Description	Interpretation
Communication	4.23	0.71	Strongly Agree	Very Highly Observed
Creativity	4.16	0.76	Agree	Highly Observed
Overall Mean	4.20	0.74	Agree	Highly Observed

Note: 4.21 – 5.00 Very Highly Observed 3.41 – 4.20 Highly Observed 2.61 - 3.40 Moderately Observed
1.81 - 2.60 Lowly Observed 1.00 - 1.80 Very Lowly Observed

Meanwhile, the variable, *Creativity*, was rated the lowest with the Mean of 4.16 with SD=0.76, described as Agree and interpreted as Highly Observed. The data imply that the teachers value the importance of creativity in the things they do at school. This is because it can catch the attention of the students during the teaching and learning process as well as convince the parents to support their causes that can help the struggling students elevate themselves. Being creative is nice and advantageous but the teachers definitely need support from parents and stakeholders to make their plans and vision turn into reality. According to Balaba (2022) teachers need to be creative in all aspect of their action and even in their classroom management implementations as when the students become familiar with the rules implemented, they also get the chance to discover on how to dodge them. But with consistent innovations, they will be keep guessing as well.

Problem 3. Is there a significant relationship between teachers' ICT capability and their 21st-century skills?

Table 3. Test of Correlation Between Teachers' ICT Capability and 21st Century Skills

Independent Variables	r-value	p-value	Description	Interpretation
Technology Operations and Concepts	0.792	0.000	High Positive	Significant
Social and Ethical Consideration	0.582	0.001	Moderate Positive	Significant
Pedagogical Practices	0.757	0.000	High Positive	Significant
Professional Growth	0.546	0.001	Moderate Positive	Significant

****.** Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the correlation analysis between teachers' ICT capability and their 21st century skills. The independent variable is ICT capability regarding the concepts and operations of technology, social and ethical considerations, teaching methods, and professional development.

Concepts and Procedures of Technology registered a computed r-value of 0.792 with the computed p-value of 0.000. The computed p-value is less than the p-critical value at 0.05 level of significance. This data imply that High positive correlation was established between teachers' ICT capability and their 21st century skills when Consideration is given to technology operations and concepts. Consequently, the null hypothesis is disproved. Technology Concepts and Operations is essential for the teachers as

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they need these skills to help them save time in making their reports and paper works that are needed to present data and information to the students and their parents. They also need to submit reports on the tasks assigned to them. Teachers are able to display and use technology-based gadgets in their teaching and learning activities in addition to their other work-related duties.

Making use of technology has enabled instructors to perform more efficiently and effectively because it reduces how much time they must dedicate to preparation, while simultaneously ensuring that the outputs they provide are of a high quality. Teachers make it a point to stay current with the latest technologies, whether they are in the form of software or gadgets, so that they may better connect with their students and ensure that the activities and materials they use in their lessons are in line with the requirements that are currently being met by the students (Cabunoc, 2024).

Social and Ethical Consideration registered a computed r-value of 0.582 with the computed p-value of 0.001. The computed p-value is less than the p-critical value at 0.05 level of significance. This data imply that moderate positive correlation was established between teachers' ICT capability and their 21st century skills when Social and Ethical Consideration is taken into consideration. Thus, the null hypothesis is rejected. Social and Ethical Consideration allows the teacher to be grounded as well as being aware of the dos and don'ts in navigating the internet and in using the social media sites. They are also inclined to educate their students in fact checking as well as on being able to avoid themselves from scammers, hackers and even bullies. When it comes to protecting their own identity, integrity, and most importantly, the students' privacy, teachers are completely aware regarding the rules and restrictions that ought to be followed in order to protect their children.

In addition, the educators are aware of the importance of acknowledging the rights of the original creator or proprietor of the content, such as worksheets or videos, that they use into their instructional and educational initiatives. It is important for educators to exercise caution when engaging in activities online because doing so can call into question their morals and ethics. While it is simple to post harmful and derogatory comments on the internet, the ramifications of doing so can sometimes result in legal action being taken against the user (Opena, 2022).

Pedagogical Practices registered a computed r-value of 0.757 with the computed p-value of 0.000. The computed p-value is less than the p-critical value at 0.05 level of significance. This data imply that high positive correlation was established between teachers' ICT capability and their 21st century skills when Pedagogical Practices is taken into consideration. Thus, the null hypothesis is rejected. Pedagogical Practices in terms of ICT integration is crucial to the teachers' teaching and learning activities as today's generation are exposed to the advancement of technology. The teacher needs to apply technological concepts and applications to their lesson so that the students can relate and focus on the lessons presented to them.

Teachers have the ability to search for and make use of things that may be accessed on the internet as a component of their instructional resources for the activities and processes that they engage in with their students, including teaching and learning. This is a skill that should be had by teachers since it will enable them to become more sensitive and particular when selecting an acceptable movie or other learning resources that can be accessed on the internet. The incorporation of activities and materials that are based on with the use of technology, educators may create more up-to-date materials that will further capture students' interest and motivate them to participate. The teachers will find it simpler to impart knowledge to the children because this opportunity (Elfert, 2019).

Professional Growth registered a computed r-value of 0.546 with the computed p-value of 0.001. The computed p-value is less than the p-critical value at 0.05 level of significance. This data imply that moderate positive correlation was established between teachers' ICT capability and their 21st century skills when Professional Growth is taken into consideration. Thus, the null hypothesis is rejected. ICT knowledge and skills acquired by the teachers can be considered as part of their professional growth. This is because they do not only use it for their own consumption but apply it to their teaching and learning activities to share it with their students and their co-teachers as well. In this way, they can also contribute meaningfully to the school and the community. The teachers think that their capacity One aspect of their professional development is learning how to use information and communication technology. They can accomplish their work more effectively and efficiently with the new strategies and skills they pick up.

Information and communications technology (ICT) training courses and seminars-related issues are attended by educators so that they can keep themselves up to date and become acquainted with the various forms of technology that are accessible via the internet. In exchange, they are able to learn the knowledge and abilities that will allow them to successfully make full use of the technologies and devices that will contribute to making their lesson and the implementation of activities more participatory and more interesting to them (Molano, 2020).

Problem 4. Which of the independent variables singly or in combination influenced the teachers' 21st-century skills?

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Table 4. Regression Analysis on Teachers' ICT Capability and 21st Century Skills

Independent Variables	Unstandardized Coefficients		Standard Coefficient Beta	T-value	Sig.
	B	SE	β		
(Constant)	0.3411	0.3861		10.309	0.001
Technology Operations and Concepts	0.8998	0.8749	0.9771	6.858	0.001
Social and Ethical Consideration	0.9843	0.8759	0.8630	6.408	0.001
Pedagogical Practices	0.9617	0.9342	0.8798	7.815	0.001
Professional Growth	0.8979	0.9876	0.9869	8.771	0.001
		R=0.728	R ² =0.699	F=64.812	Sig=0.000

a. Dependent Variable: Culturally Responsive Teaching Pedagogy

b. Predictors: (Constant), Teaching Methods, Cultural Integration, Assessment

Table 4 shows the Regression Analysis on teachers' ICT capability and their 21st century skills. Technology Operations and Concepts (B=0.9771, t-value =6.858, p-value=0.001), Social and Ethical Consideration (B=0.8630, t-value =6.408, p-value=0.001), Pedagogical Practices (B=0.8798, t-value =7.815, p-value=0.001) and Professional Growth (B=0.9869, t-value =8.771, p-value=0.001) have positively affects educators' 21st century abilities. In addition to explaining 70% of the variance, this suggests that teachers' ICT proficiency is a significant determinant of their development of 21st century abilities, with the remaining 30% being ascribed to elements not covered in this study.

Therefore, encouraging and enhancing teachers' 21st century skills require a focus on technology operations and concepts, social and ethical considerations, pedagogical practices, and professional development. Teachers play a crucial part in attaining such high performance because they are the ones who ensure that 21st century skills and technology-related applications and methods are well presented, integrated and embedded in the teaching and learning process.

According to Abdulloh et al. (2022) it is important that the lessons are integrated with technology-based concepts as it will become closer to the students considering they are exposed to it at their home and through them gadgets. This will allow them to realize that those technology and gadgets we're not made available just for fun and gaming but on more valuable purpose that they can utilize to further develop their state of being techy as well as in developing their 21st century skills. Thus, it is beneficial to the teachers and them students as well.

IV. CONCLUSIONS

These conclusions are developed in light of the study's findings:

1. Teachers possess the requisite ICT expertise and abilities.
2. Teachers possesses 21st century skills.
3. Teachers' ICT utilization connects their 21st century competencies.
4. The greatest predictor of teachers' 21st century skills in this study were their overall ICT proficiency.

V. RECOMMENDATIONS

Based on the findings and conclusions of the study, it is advised that the:

1. A high degree of ICT integration may be maintained by teachers and utilization on their teaching activities. They can improve their professional growth through attendance on ICT related seminars and enrolled for master's or doctorate degree program.
2. High level of practices to guarantee that students are exposed to a variety of creative production and presentation methods, 21st century skills must be maintained.
3. To improve students' proficiency with ICT and 21st century skills, educators should consistently incorporate ICT-related activities, concepts for better performance.
4. The school administration may offer teachers training sessions to further their skills and capability in ICT as well as on their 21st Century Skills.

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