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Influence of Technology on Teaching Learning Approaches and Modalities among Elementary School Teachers

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ABSTRACT

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In the current global scenario, the internet is increasingly becoming a central informational medium, transforming how people learn, teach, and communicate. There is inadequacy in providing ICT facilities to schools, which hinders the use of ICT inside the classroom to enrich the teaching-learning process and modalities. This research used descriptive and correlational research designs to determine the influence of technology on teaching-learning approaches and modalities. The researcher used simple random sampling by using Slovin's Formula. The study was conducted in the elementary schools of the Division of Tacurong, Philippines. The mean, standard deviation, and Pearson Product Moment correlation were utilized, the hypothesis was tested, and result was less than .05. The study revealed that Technology exerts a very high influence on education, particularly through digital devices, software applications, and

ICT. Teaching-learning approaches are effectively implemented to a full extent, as reflected in the strong agreement among respondents. Educational institutions employ multiple teaching-learning modalities to a high extent, with face-to-face learning remaining the most preferred. These results emphasize the need for continued investment in educational technology to foster more dynamic and effective learning environments and highlight the importance of integrating ICT-driven strategies to support distance learning while also enhancing the role of digital tools in traditional and blended settings.

INTRODUCTION

In the current global scenario, the internet is increasingly becoming a central informational medium that is transforming how we learn, teach, and communicate (Al-Sharqi & Abbasi, 2020). It shows that teachers should know about technology in their everyday teachings. However, If teachers are not provided with effective professional development on new technologies, they will not be capable of using them to their full potential (Johnson et al., 2016).

The pacing of technology is phenomenal. Teachers in many countries of the world are working with 'digital natives' who are growing up with technology as a non-remarkable feature of their world, in the same way as an earlier generation took radio or television for granted. Within these developments, technology brings a new set of challenges and pressures for educational institutions (Lim et al., 2013).

According to the study of Mastul et al. (2023), the Philippines is a good avenue to explore technology in schools with its ideal culture, economic development, and progress in tourism and skilled workers. However, since the Philippines is an archipelago with a vast range of territory producing many schools with a huge number of students, it is a challenge to know the use of technology in all schools. Moreover, the capacity of every school to employ educational technology is important. DepEd aims to provide teachers with equipment, software content, and skills for their daily classroom teaching. The program also envisions providing laptops, smart TVs, and lapel speakers to each teacher and classroom. There is also a need to consider the preparedness of teachers to use these materials and the impact they have had on every student. The study made the same statement: the world has been experiencing a digital revolution, and the Philippines has the opportunity to play an enormous role. Digital technology has allowed Filipinos to be more than just informed and updated on the latest trends in technology (Bacsarpa, 2023).

Digital literacy encompasses a wide range of skills, all of which are necessary

to succeed in an increasingly digital world. At present, it plays an important role in the teaching and learning process (Yazon et al., 2019). However, many Filipino high school students face significant barriers to developing these competencies (Mangarin & Climaco, 2024). Based on a literature review (Parinasan et al., 2024), their Findings revealed various educational programs offered by multiple institutions. However, challenges persist in aligning education with contemporary demands. These challenges include a gap between theory and practice, limited resources for faculty development, and a reluctance to embrace emerging trends like digital transformation.

In Region XII, specifically in Koronadal, South Cotabato, a study was conducted, concluding that the ICT competencies of teachers in the City Division of Koronadal are at the Basic Level. It suggests further that teachers can only perform some of the basic ICT operations and use ICT sometimes at least once a week as a tool for teaching. The ICT capabilities of Schools in the City Division of Koronadal are satisfactory and need upgrading in all aspects. There is inadequacy in providing ICT facilities to schools, which hinders the use of ICT inside the classroom to enrich the teaching-learning process (Jabido, 2016).

It is not so great to be educated if a place has limited technology that can be used daily . Some might be called "left behind" if technology does not affect our education system's learning process in schools with little access to technology. This study aims to explain the influence of technology on deeply teaching learning approaches and modalities among elementary teachers in the City Schools division of Tacurong.

FRAMEWORK

This study used the learning theories of three influential psychologists (Brunner's Constructivist Theory, Piaget's Cognitive development theory, and Dewey's Learning by doing). Jerome Bruner believed that children construct knowledge and meaning through active experience with the world around them (McLeod, 2008). Jean Piaget's theory of cognitive development focuses not only on understanding how children acquire knowledge, but also on understanding the nature of intelligence (Cherry, 2024). His innovative ideas about education focused on the idea of experiential learning - the idea that we can learn best by actively engaging with the material rather than passively listening to lectures or memorizing facts (Main, 2023). Their theories have helped teachers understand how the learners understand and learn in life. These theories emphasize the importance of experience in shaping the learners' knowledge.

To ensure the quality of technology in teaching-learning approaches and

modalities, the DEPED has issued guidelines for implementing technology to enhance the teaching-learning process, operation processes, programs, and policies to meet the challenges of the modern age.

In the DepEd Order No. 016 s. 2023 states that DepEd is continuously taking appropriate steps to make education accessible to all and to accelerate the delivery of basic education facilities and services. Some of its objectives include providing complete and quality computer laboratory packages and smart TVs to all public schools. To provide relevant and necessary software, hardware, training, and programs to support all DepEd personnel. To upgrade and strengthen the ICT competencies of learners, teachers, and school leaders and build capability, ensuring the ICT infrastructure and systems utilization (Department of Education, 2023).

Regarding the teaching-learning approaches teachers can use with the learners, the DepEd Order No. 021, s. 2019 issues the K to 12 Basic Education Program guidelines. It includes a policy that states, as prescribed by Republic Act No 10533 that the curriculum of the K-12 BEP shall be learner-centered, relevant, and appropriate. The curriculum shall be collaborative and reflective learning that involve analyzing and thinking critically. The K-12 BEP also includes national, and community needs and demands through its mission to strengthen the values of the Filipinos in school and the competencies that learners need to improve their experience in learning.

Regarding the modalities according to the DepEd Order No. 012, s. 2020, (DepEd, 2020), the schools are encouraged to choose the most appropriate modality based on the context of their students, availability of resources, and health conditions. Different learning modalities for distance learning were introduced as an alternative to Face-to-Face classes until the situation became normal. The different learning modalities used amid the pandemic are Modular Distance Learning (MDL), Online Distance Learning (ODL), and Blended Learning.

After the pandemic, Face-to-Face classes returned. According to DepEd Order No. 44, s. 2022, the DepEd ensures the effective implementation of the K to 12 curriculums amid the challenges posed. As such, this study looked into the influence of technology, including software applications, digital devices, and ICT, on teaching-learning approaches such as collaborative, critical thinking, experiential learning, learner-centered learning, and values integration and modalities such as blended, face-to-face, modular, and online.

The independent variable is the "Influence of Technology (Software Applications, Digital Devices and ICT)" and the dependent variables are "Teaching Learning Approaches (Collaborative learning, Critical Thinking,

Learner- Centered and Valus Integration)" and "Modalities (Blended, Face to face, Modular and Online)."

OBJECTIVES OF THE STUDY

The study investigates the influence of Technology on Teaching Learning Approaches and Modalities among Elementary School Teachers in the City Schools Division of Tacurong. This study seeks to understand (1) the extent of the influence of technology; (2) the extent of the teaching-learning approaches I; (3) the extent of the modalities; (4) the relationship between the influence of technology and teaching-learning approaches; and (5) relationship between the influence of technology and modalities.

METHODOLOGY

Research Design

This research used descriptive survey and correlational research designs to determine the influence of technology on teaching learning approaches and modalities. Descriptive and correlational research designs describe the variables and measure the extent of the relationships between and among the variables.

Research Site

The research was conducted in five districts (North, South, East, West, and Central) in Tacurong City. Six schools were from the North Cluster, eight from the South Cluster, four from the West Cluster, seven from the East Cluster, and one from the Central Cluster, for a total of 26 schools.

Respondents of the Study

The respondents were Elementary teachers from the five districts of Tacurong City (North District, South District, East District, West District, and Central District). These teachers taught from grades 1 to 6. They range in age from the mid-20s to the mid-60s. They were male and female teachers with regular positions and permanent items for the SY 2024 - 2025, and they have been in the teaching service for more than a year.

The data gathered in this study were collected using a three-part adapted survey questionnaire for the selected teachers in the five districts of Tacurong, Sultan Kudarat.

The first part of the questionnaire is to determine the extent of technology's influence. It contained 15-item questions adapted and used from Rakes et al.

(2014) assess the importance of the three parts of technology's impact, which include software applications, digital tools, and ICT.

The second part of the questionnaire is intended for the teaching learning approaches. The item contains 25 item questions adapted from the study of Impedovo and Laquinta (2023) assessed the extent of the five parts of the teaching-learning approaches, which includes the collaborative learning, critical thinking, experiential learning, learner-centered learning, and Values Integration.

The third part of the questionnaire determines the extent of the Modalities. It contains 20 questions adapted and used from Yen's (2018) study assessed the extent of the four parts of the teaching modalities, which include blended, face-to-face, modular, and online.

Research Ethics Protocol

Consent was obtained from the teacher participants to ensure their involvement in the study; secure data protection measures were implemented to maintain the confidentiality of the respondents; and suitable procedures were followed to secure permissions from City School Division of Tacurong and it a letter was signed by the Division Superintendent to allow the study to be conducted.

Data Gathering Procedures

After finding out the research instrument was valid and reliable, the graduate school's approval to conduct the study was secured. Subsequently, upon securing the request from the graduate school, a letter request was forwarded to the City School Division of Tacurong Superintendent for approval. With the consent of the Division Superintendent, the same letter was drafted and sent to the Cluster heads and School Heads as a recommendation. After getting the approval of the public-school heads to conduct the study under their permission, the distribution of the research instrument to the respondents was automatically followed. The researcher took a short orientation to the respondents before answering the questionnaires. They were given time to answer the survey questionnaires. The survey questionnaires were retrieved as soon as the respondents were finally done answering all of the items.

Statistical Treatment

To answers from problems 1 to 3, the extent of the influence of technology, the extent of teaching-learning approaches, and the extent of teaching modalities, mean and standard deviation, were highlighted.

On the other hand, to answer problems 4 and 5, the Pearson Product Moment

correlation (Linearity) was highlighted to determine the significant relationship between the influence of technology and teaching-learning approaches and teaching modalities.

RESULTS AND DISCUSSION

Table 1

Summary of the Extent of the Influence of Technology

Indicators	Mean	SD	Description	Interpretation
1. Digital Devices	4.30	.60	Very Highly Influential	To a full extent
2. Software Application	4.17	.64	Highly Influential	To a high extent
3. ICT	4.15	.66	Highly Influential	To a high extent
Overall	4.21	.63	Very Highly Influential	To a full extent

Table 5 describes how the summary of the influence of technology is "very highly influential" as indicated by its overall result (Mean = 4.21, SD= .63). The Very Highly Influential ratings show that technology influences teachers in their teaching activities, progressing in their career, and enhancing the learner's engagement in their class. Technology has become increasingly important in improving students' teaching and learning processes. To achieve these goals, teachers must have the skills to introduce technology into their teaching practice (Fernández-Batanero et al., 2021). Technological advancements have transformed education; introducing education has made it simpler for instructors to transfer information and for pupils to retrieve it. Integrating technology into education has made learning more entertaining (Ghory & Ghory, 2021).

Overall, the findings support Bozkus' (2021) study that revealed a strong relationship between the infrastructure of digital devices within the school and teachers' capacity to use digital devices, and developing the infrastructure of digital technologies could provide practical benefits for students. If schools do not use technology adequately, they cannot increase students' academic achievement. The same study states that Wang (2021) found that digital devices can improve students' learning interests and motivation. Due to children's active tendency towards digital devices, especially touch devices, digital devices can stimulate children's interest in learning.

Table 2

Summary of the Extent of the Teaching-Learning Approaches

Indicators	Mean	SD	Description	Interpretation
1. Values integration	4.59	.56	Strongly Agree	To a full extent
2. Learner-centered	4.43	.56	Strongly Agree	To a full extent
3. Critical thinking	4.41	.60	Strongly Agree	To a full extent
4. Experiential learning	4.27	.61	Strongly Agree	To a full extent
5. Collaborative learning	4.25	.62	Strongly Agree	To a full extent
Overall	4.39	.59	Strongly Agree	To a full extent

Table 11 describes how the summary on the extent of the teaching-learning approaches is perceived to be "Strongly Agree" as indicated by the overall result (Mean = 4.39, SD .59). The findings show that teaching-learning approaches influence teachers' professional development and teaching practices. Teachers act as facilitators rather than traditional lecturers, encouraging them to be more reflective and responsive to learners' needs. Integrating various teaching strategies also requires flexibility, pushing teachers to incorporate technology, adapt lessons, and address diverse learning styles. According to Kimeli and Kuboja (2023), the role of teaching approaches in shaping students' academic performance is a subject of enduring interest and significance in education. The role of teachers is important in students' learning. Their teaching and learning conceptions impact the planning and implementation of pedagogical practices. Teachers have differences in the way they understand themselves as professionals. The result is reflected in the conceptions and practices of teaching and learning, which materialize in how they organize daily activities and understand students' assessments (Ferreira & Marques, 2024).

Overall, these results connect with the study of Parojenog (2020), which states that teachers are known to be versatile. They are equipped with different knowledge and skills to be prepared to handle the diversity of learners. They have various ways of how they should be taught in school. Other approaches have been proposed to accommodate the needs of every learner. Teaching approaches are an important aspect of teaching in school (Bonnes & Hochholdinger, 2020). Teachers' approaches to teaching at undergraduate universities have long been considered significant for students' learning. Teachers can develop critical thinking skills in students at this stage, which in turn aids problem-solving, which is essential to a nation's social and economic development (Iqbal et al., 2019).

Table 3

Summary of the Extent of the Modalities

	Indicators	Mean	SD	Description	Interpretation
1.	Face to face	4.38	.80	Strongly Agree	To a full extent
2.	Modular	3.98	.77	Agree	To a high extent
3.	Online	3.89	.82	Agree	To a high extent
4.	Blended	3.86	.56	Agree	To a high extent
	Overall	4.03	.74	Agree	To a high extent

Table 16 describes how the summary on the extent of the teaching modalities is perceived to be "Agree" as indicated by its overall result (Mean= 4.03, SD= .74). It implies that the following modalities are essential in learning because they offer flexible, adaptable, and inclusive learning environments that cater to the diverse needs and preferences of learners. During the Covid Pandemic, the United Nations Educational, Scientific and Cultural Organization (2020) stated that changes in learning systems force schools to implement distance education or online learning, e-learning, distance education, correspondence education, flexible learning, and massive open online courses (Calimlim et al., 2021). The DepEd has promulgated the issuance of flexible learning materials, stipulated in DepEd Order No. (DO) 21 s. 2019, Policy Guidelines on the K-12 Basic Education Program. It sets forth flexible learning options (FLOs), which cover different forms of learning delivery and accompanying learning materials sensitive to learners' needs (Solomon & Alforja, 2021).

Overall, this supports the study of Solomon and Alforja (2021), which states that each learning modality impacts how teachers instruct students. For successful teaching, teachers must choose the best learning modality that meets the needs of both the students and the school. The DepEd (2020) embarked on developing the BE-LCP (Basic Education Learning Continuity Plan) to enable basic education learners to continue learning and for teachers to deliver instruction in a safe work and learning environment. It ensures learning continuity through K-12 curriculum adjustments, alignment of learning materials, and deployment of multiple learning delivery modalities.

Table 4

Significant Relationship Between the Influence of Technology and Teaching-Learning Approaches

Variables		Indicators	r	p-value	Sig	Interpretation
Software App	vs	Collaborative	.510**	p < .05	.000	Moderate correlation
		Critical Thinking	.545**			Moderate correlation
		Experiential	.555**			Moderate correlation
		Learner-Centered	.518**			Moderate correlation
		Values Integration	.510**			Moderate correlation
Digital Devices	vs	Collaborative	.583**	p < .05	.000	Moderate correlation
		Critical Thinking	.645**			Moderate correlation
		Experiential	.610**			Moderate correlation
		Learner-Centered	.607**			Moderate correlation
		Values Integration	.612**			Moderate correlation
ICT	vs	Collaborative	.574**	p < .05	.000	Moderate correlation
		Critical Thinking	.537**			Moderate correlation
		Experiential	.594**			Moderate correlation
		Learner-Centered	.583**			Moderate correlation
		Values Integration	.456**			Moderate correlation

The results shown in Table 17 illustrate the correlation coefficients between the influence of technology (Software Applications, Digital Devices, ICT) and teaching learning approaches (Collaborative, Critical Thinking, Experiential, Learner-centered, and value integration. The results show a significant relationship between the influence of technology and teaching-learning approaches, with a moderate correlation, suggesting that technology has an interesting impact on education, but its effect is not overwhelmingly strong. The moderate correlation implies that technology is a very important tool for education, but its impact depends on the proper implementation of the teachers and an overall supportive learning environment.

According to Haleem et al. (2022), educational technology applications may save time and energy by automating or partially automating day-to-day operations like attendance tracking and performance monitoring. Using digital resources in

the learning process puts teachers and students in a position to identify and use the most appropriate platforms and tools to support collaborative learning. In the study of Kiong (2022), Based on the findings, it appears that technological advancements have improved the educational experience by giving students more opportunities to learn, more ways to learn, more control over their learning, and more ways to further their education.

Table 5

The Significant Relationship Between the Influence of Technology and Modalities

Variables		Indicators	r	p-value	Sig	Interpretation
Software App	vs	Online	.386**	p < .05	.000	Low correlation
		Modular	.399**			Low correlation
		Blended	.297**			Low correlation
		Face-to-Face	.263**			Low correlation
Digital Devices	vs	Online	.336**	p < .05	.000	Low correlation
		Modular	.351**			Low correlation
		Blended	.236**			Low correlation
		Face-to-Face	.242**			Low correlation
ICT	vs	Online	.411**	p < .05	.000	Moderate correlation
		Modular	.469**			Moderate correlation
		Blended	.340**			Low correlation
		Face-to-Face	.265**			Low correlation

The results shown in Table 18 illustrate the correlation coefficients between the influence of technology (Software Applications, Digital Devices, ICT) and modalities (Online, Modular, Blended, and Face to face). This implies that technology has somehow influenced the modalities teachers use to channel learning to the learners. While online and modular learning benefit from strong ICT support, face-to-face and blended learning can still be effective without heavy reliance on technology. However, incorporating technology thoughtfully into all modalities can enhance student engagement, provide greater flexibility, and improve learning outcomes, making professional development for teachers.

According to Subramaniam et al. (2023), Successful deliveries of different modalities lie in creativity and creative use of technology driven by the achievement of targeted learning outcomes. Using teaching and learning modalities through

ICT encourages pedagogical innovation and constant updating. Teachers can use new educational tools and approaches, adapt teaching content and methods, and provide a more personalized and effective education. This contributes to improving the quality of education and preparing students for the challenges of today's world (Avalos Pérez et al., 2023).

CONCLUSIONS

Technology exerts a very high influence on education, particularly through digital devices, software applications, and ICT. The full extent of this influence underscores the importance of continuously integrating technology into educational settings to enhance teaching, learning, and administrative operations.

Teaching-learning approaches are effectively implemented to a full extent, as reflected in the strong agreement among respondents. The integration of collaborative learning, critical thinking, experiential learning, learner-centered strategies, and values education contribute significantly to student development. These approaches should remain fundamental components of the teaching-learning process to foster well-rounded, engaged, and ethical learners.

Educational institutions employ multiple teaching-learning modalities to a high extent, with face-to-face learning remaining the most preferred. However, modular, online, and blended learning approaches are also widely implemented, highlighting the need for diverse and adaptable instructional strategies to meet evolving educational demands.

Technology moderately influences teaching-learning approaches, with digital devices showing the strongest correlations. The integration of software applications, digital devices, and ICT enhances collaborative learning, critical thinking, experiential learning, learner-centered instruction, and values integration. These results emphasize the need for continued investment in educational technology to foster more dynamic and effective learning environments.

The influence of technology on teaching modalities varies in strength, with ICT demonstrating a moderate impact on Online and Modular Learning. Software Applications and Digital Devices, while still significant, exhibit weaker correlations with teaching modalities, suggesting that their use alone does not dictate the instructional delivery method. These findings highlight the importance of integrating ICT-driven strategies to support distance learning while also enhancing the role of digital tools in traditional and blended settings

TRANSLATION RESEARCH

Based on the conclusions, recommendations are for the improvement and practical application of the study. The DepEd and the City School Division of Tacurong may further investigate and take steps to enhance digital devices and software applications, especially ICT applications and functionality, in the teaching and learning approaches and modalities of elementary teachers. Educational institutions may enhance the integration of technology in teaching-learning approaches by investing in digital infrastructure, providing continuous training for educators, and developing policies that support the effective use of software applications, digital devices, and ICT to maximize student learning outcomes. Educational institutions may focus on strengthening ICT infrastructure to further support online and modular learning, while also exploring innovative ways to integrate Software Applications and Digital Devices in all teaching modalities to enhance instructional delivery and accessibility. Future researchers could investigate the role of emerging technologies, such as artificial intelligence and virtual reality, in shaping the future of teaching and learning. Comparative studies across different educational institutions and disciplines may also provide valuable insights into best practices for optimizing technology-enhanced education.

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