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AI in Inclusive Classrooms: Assessing Teachers' Use and Perceived Effectiveness in Quezon Province's Public Schools

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Abstract—This study assessed the use and perceived effectiveness of artificial intelligence (AI) tools in inclusive classrooms among public school teachers in the 4th District of Quezon Province during the Academic Year 2025–2026. Specifically, it examined the extent of AI tools usage in terms of the types of AI tools utilized, frequency of use, and instructional purposes. It also determined the extent to which AI tools are integrated into inclusive classroom instruction through teaching strategies and methods, activities or subject areas, and learner groups that benefit from their use. Furthermore, the study evaluated the perceived effectiveness of AI tools in enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction for learners with diverse educational needs. The study employed a descriptive-evaluative research design involving 100 public school teachers handling inclusive classrooms in the 4th District of Quezon Province. A researcher-made questionnaire, Use and Perceived Effectiveness of AI Tools in Inclusive Classrooms, served as the primary instrument for data collection. The gathered data were analyzed using frequency count, percentage, weighted mean, rank, and the Wilcoxon Mann–Whitney U-test. The findings indicated that AI tools are widely used by teachers in inclusive classrooms, particularly for lesson preparation and delivery, classroom assessment, and providing instructional support to learners with diverse needs. Teachers also perceived AI tools to be effective in increasing classroom accessibility and participation, enhancing students' learning outcomes, and supporting differentiated instruction. Despite these positive perceptions, respondents also identified challenges related to limited training opportunities, inadequate technological resources, and barriers to the effective implementation of AI in classroom instruction. The findings suggest that AI tools have significant potential to strengthen inclusive education by providing more accessible, personalized, and responsive learning experiences. Based on the results, the study recommends strengthening the integration of AI tools into classroom instruction, expanding professional development opportunities for teachers, and improving access to technological resources. It also proposes the development of a professional development module on the effective use of AI tools in inclusive classrooms to promote their sustainable and meaningful integration into the basic education curriculum.

***Index Terms*—adaptive learning, AI tools, artificial intelligence, differentiated instruction, educational technology, inclusive classrooms, inclusive education, public school teachers.**

1. The Problem and its Background

Education is often described as the great equalizer, yet for many children with disabilities, true equality in learning remains out of reach. In the Philippines, the passage of Republic Act No. 11650, or the Inclusive Education Act of 2022, was a milestone in the fight for educational equity. It promised a future where every learner, regardless of disability or learning need, could thrive alongside their peers in mainstream classrooms. The law envisions inclusive learning resource centers, trained Special Education (SPED) teachers, and strong support services. However, in practice, especially in rural and resource-challenged schools, these promises are far from fully realized. Many classrooms still lack SPED teachers, assistive learning materials are scarce, and the technological infrastructure needed to support inclusion is often inadequate. For teachers on the ground, this means struggling to translate inclusive education policies into everyday practice.

Amid these challenges, Artificial Intelligence (AI) has emerged as a new possibility that could ease the burden on teachers and open more doors for learners. Unlike traditional tools, AI can adapt to the unique needs of both teachers and students. For example, ChatGPT can help teachers quickly design lessons or adjust instruction to different learning levels. Tools like QuillBot support learners who find writing difficult, while Kurzweil 3000 and NaturalReader give struggling readers or students with visual impairments a voice through text-to-speech. Similarly, Otter.ai makes it possible for students with hearing impairments to follow lessons by turning speech into text in real time. Beyond these, adaptive learning platforms powered by AI can personalize content, adjusting lessons based on a child's pace and progress. These tools, when used effectively, do not just enhance accessibility, they make learning more personal, engaging, and inclusive.

While other countries are beginning to integrate AI into their classrooms and are already reporting positive results, the Philippine context tells a different story. In rural towns like Tagkawayan, Guinayangan, Lopez, and Calauag in Quezon Province's 4th District, access to these innovations remains limited. Few studies have looked at how AI is actually being

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used in local inclusive classrooms, what challenges teachers face, or how effective these tools truly are in supporting learners with dyslexia, ADHD, autism, hearing and visual impairments, and other special learning needs. This lack of local evidence leaves a gap between what global research suggests AI can do and what is really happening in our schools.

This study aims to address that gap by examining the extent to which AI tools are used in inclusive classrooms in Quezon Province's 4th District, how teachers apply them in daily instruction, and how effective they are perceived to be in supporting diverse learners. By focusing on the real experiences of Filipino teachers working in resource-limited settings, the study seeks to provide insights that are not only academically relevant but also practically useful. The findings will contribute to the ongoing conversation on how AI can be harnessed for inclusion, offering guidance for teacher training programs, informing DepED policies, and helping AI developers create tools that are more culturally and contextually suited to Philippine schools.

Ultimately, this research is about bridging the gap between vision and reality—between the inclusive education policies we aspire to uphold and the classroom realities teachers and learners face every day. By exploring the potential of AI in this context, the study hopes to shine a light on new possibilities for building classrooms where every learner, regardless of their challenges, has a fair chance to succeed in the digital age.

A. Theoretical Framework

This study is anchored on two interrelated theories: the Universal Design for Learning (UDL) Theory and the Technology Acceptance Model (TAM). The combination of Universal Design for Learning (UDL) Theory and the Technology Acceptance Model (TAM) is vital to this study because it allows for a more complete understanding of how AI tools are used in inclusive classrooms.

Firstly, UDL Theory (Meyer, Rose, & Gordon, 2014) provides the educational foundation by focusing on how AI can help address the diverse needs of learners. It reminds us that students learn in different ways and need different supports to succeed. By using UDL as a guide, this study looks beyond simply whether AI tools are used—it examines whether these tools truly help make learning more accessible, engaging, and meaningful for all students, especially those with disabilities or learning difficulties.

Secondly, TAM (Davis, 1989) offers a psychological perspective by exploring what influences teachers to use AI tools in the first place. It highlights two key factors: whether teachers see AI as useful in their teaching, and whether they find these tools easy to use. Understanding teachers' perceptions is important because no matter how advanced or promising a technology is, it will not make a difference if teachers are not willing or ready to use it in their classrooms. Together, these two theories are important because they: Help shape the study's objectives, survey questions, and data analysis to ensure that both teaching goals and teachers' perspectives are considered; Provide a strong basis for interpreting the findings by looking at both the benefits of AI for learners and what makes teachers accept or reject these tools; Guide practical recommendations for teacher training and policy improvements, focusing not only on the technology itself but also on how it can be integrated effectively in real classrooms; and Strengthen the credibility of the study by grounding it in well-established educational and behavioral theories.

Overall, using UDL and TAM together allows this study to take a holistic look at AI in inclusive education. It helps ensure that AI tools are not only available but are also meaningful and practical in supporting teachers and learners in Quezon Province's public schools, paving the way for more equitable, accessible, and effective teaching practices.

B. Conceptual Framework

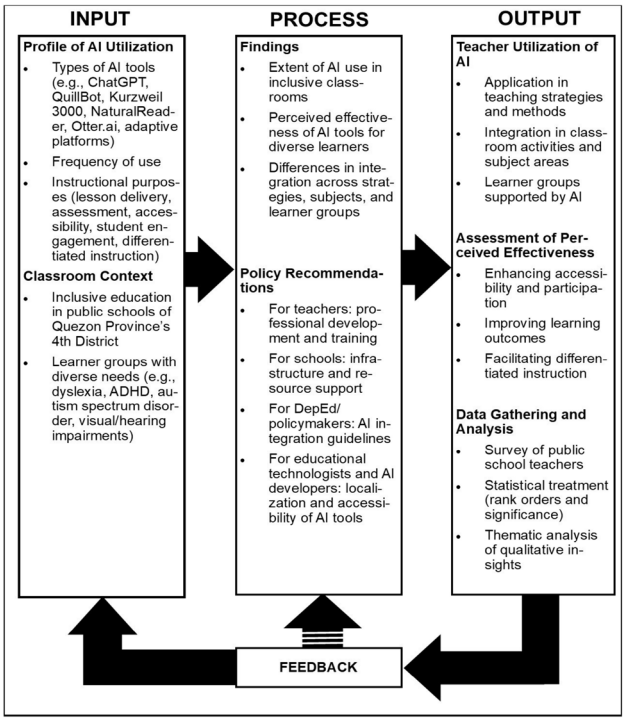


Fig. 1. The conceptual paradigm of the study

The conceptual framework of this study is built on the theoretical foundation and breaks down the key ideas into practical, understandable components. It serves as a roadmap, guiding the research while clarifying its main focus and purpose. Using a system approach, the study is organized around the Input–Process–Output (IPO) model.

The input consists of the essential elements that shape the study. First, it looks at how teachers use AI tools in their classrooms. These include familiar technologies like ChatGPT, QuillBot, Kurzweil 3000, NaturalReader, Otter.ai, and other adaptive platforms. The study examines how often these tools are used and for what purposes—whether for lesson delivery, assessment, increasing accessibility, engaging students, or supporting differentiated instruction. Second, the study considers the classroom context, focusing on inclusive education in public schools within Quezon Province's 4th District. Special attention is given to students with diverse needs, such as those with dyslexia, ADHD, autism spectrum

disorder, and visual or hearing impairments, to understand how AI tools help teachers create more inclusive learning experiences.

The process involves exploring how these inputs are put into action. It looks at how teachers integrate AI into their teaching strategies and methods, the classroom activities or subjects where AI is applied, and the groups of learners who benefit most. At the same time, the study examines teachers' perceptions of how effective AI tools are whether they help students participate more fully, improve learning outcomes, and allow instruction to be tailored to individual needs. To gather these insights, the study uses questionnaires, interviews, and classroom observations, analyzing both numbers and narratives to paint a complete picture of AI in action.

The output reflects the results and recommendations that come from this process. The findings will describe how AI tools are being used, how effective teachers perceive them to be, and whether certain tools or approaches work better for different subjects, strategies, or learner groups. From these results, practical recommendations will be made. For teachers, the focus is on professional development and training to help them use AI confidently and responsibly. Schools are encouraged to provide adequate resources and infrastructure, while the Department of Education and policymakers can benefit from clear guidelines to ensure consistent and effective AI integration. Finally, educational technologists and AI developers are advised to make their tools more accessible, culturally relevant, and responsive to the needs of Filipino learners with diverse abilities.

In essence, the IPO framework shows a clear flow: the inputs, AI tools and classroom context go through a careful process of teacher application and analysis, resulting in outputs that can guide better teaching practices, policy decisions, and technology development. This framework not only structures the study but also emphasizes its practical value in making inclusive education more achievable and meaningful for students and teachers alike.

C. Statement of the Problem

This study assessed the use and perceived effectiveness of AI tools in inclusive classrooms among public school teachers in Quezon Province for the Academic Year 2025-2026.

Specifically, it sought answers to the following problems:

1. What is the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District, in terms of:
    1.1 Types of AI tools utilized,
    1.2 Frequency of use, and
    1.3 Specific instructional purposes for which AI tools are employed?
2. How significant is the difference on the rank orders on the extent of AI tools usage between Special Education teachers (SPED) and General Education teachers?
3. What is the extent of utilization of AI tools in inclusive classroom instruction, in terms of:
    2.1 Teaching strategies and methods supported by AI,
    2.2 Activities or subject areas where AI is integrated, and
    2.3 Learner groups that benefit from the use of AI tools?
4. How significant is the difference on the rank orders on the extent of utilization of AI tools in inclusive classroom instruction between SPED and GEN. ED teachers?
5. What is the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of:
    3.1 Enhancing accessibility and participation,
    3.2 Improving learning outcomes, and
    3.3 Facilitating differentiated instruction?
6. How significant is the difference on the rank orders on the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms between SPED and GEN. ED teachers?
7. What are the various challenges encountered when integrating AI tools within an inclusive classroom setting?
8. How significant is the difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between SPED and GEN. ED teachers?
9. What policy recommendations can be derived from the findings of the study?

D. Hypothesis

Based on the statement of the problem and the objectives of the study, the following null hypotheses were formulated to guide the analysis:

There is no significant difference in the rank orders of the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District, in terms of types of AI tools, frequency of use, and specific instructional purposes.

There is no significant difference in the rank orders of the extent to which AI tools are utilized in inclusive classroom instruction, in terms of teaching strategies and methods, activities or subject areas, and learner groups that benefit from AI integration.

There is no significant difference in the rank orders of the perceived effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction.

There is no significant difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between the two groups

E. Scope and Limitation of the Study

This study centers on examining how public-school teachers use and perceive the effectiveness of Artificial Intelligence (AI) tools such as text-to-speech (TTS), speech-to-text (STT), adaptive learning platforms, and AI-assisted assessment tools in managing inclusive classrooms within the 4th District of Quezon Province. It particularly covers the municipalities of Tagkawayan, Guinayangan, Lopez, Calauag, and nearby areas, and will be conducted during the Academic Year 2025–2026. The study seeks to understand how these AI tools are integrated into classroom instruction and how they help address the

learning needs of students with disabilities and diverse learning profiles.

Specifically, it explores the types of AI tools being used by teachers, how often they are utilized, and for what purposes they are applied in teaching and learning. It also looks into teachers' perceptions of the effectiveness of these tools in improving accessibility, enhancing learning outcomes, and supporting differentiated instruction.

To achieve these objectives, the study will use a mixed-method approach, combining data gathered through researcher-made questionnaires, interviews, and classroom observations. The insights derived from this research aim to inform educational policies, strengthen teacher training programs, and promote the thoughtful and effective use of AI in inclusive education.

However, the study is limited to public elementary and secondary schools within the 4th District of Quezon Province. It does not include private schools, higher education institutions, or schools outside the specified areas. The participants are confined to teachers and key informants, such as school heads and SPED coordinators; thus, students, parents, and other stakeholders are not part of the study. In addition, the research relies mainly on self-reported data rather than direct assessments of student performance. It will not evaluate AI tools that are not currently being used in the participating schools, nor will it involve technical or software-level analyses of the tools themselves. Instead, the study focuses on the practical use and perceived effectiveness of AI tools as experienced by teachers in inclusive classroom settings.

F. Significance of the Study

This study on the use and perceived effectiveness of AI tools in inclusive classrooms among public school teachers in Quezon Province's 4th District is significant for several groups:

Teachers. The findings of this study will give teachers valuable insights into which AI tools and practices are effective in their inclusive classrooms. By understanding the types, uses, and perceived benefits of AI tools, teachers can integrate technology more confidently and purposefully to meet the diverse needs of their students.

School Leaders and Administrators. For school heads and administrators, this study will shed light on how AI is currently being used in their schools. The results can guide decisions about allocating resources, planning professional development programs, and purchasing the right AI tools to better support teachers in inclusive teaching.

Learners with Diverse Needs. Students, especially those with disabilities and learning difficulties, will directly benefit from this study. By identifying effective AI tools and practices, the research can help create classrooms that are more accessible, engaging, and supportive, ultimately leading to better learning experiences and outcomes for all students.

The Department of Education (DepEd). As the primary agency overseeing basic education, DepEd can benefit from the study's findings to enhance its inclusive education programs. Evidence from this research can support the formulation of policies, allocation of resources, and development of training modules that align with the Inclusive Education Act of 2022, the Enhanced Basic Education Act of 2013, and other national education initiatives.

Policy Makers and Education Program Implementers. This study will provide evidence-based insights that can inform policies and programs promoting AI integration in inclusive education. It can support the implementation of national laws such as the Enhanced Basic Education Act of 2013 and the Inclusive Education Act of 2022 by ensuring that technology becomes a meaningful tool for supporting learners with diverse needs.

Educational Technologists and AI Developers. The findings of this study can guide the design, functionality, and adaptability of AI tools for inclusive classrooms. Educational technologists may use the insights to align technology integration with pedagogical goals, while AI developers can improve features to better serve learners with disabilities, enhance user-friendliness for teachers, and ensure accessibility across various classroom contexts.

Future Researchers. Finally, this study will contribute to the limited body of literature on AI use in Philippine public school inclusive classrooms. Future researchers can build on these findings to explore AI effectiveness further, identify barriers to integration, or develop intervention programs to strengthen inclusive education practices.

By documenting current practices and evaluating teachers' perceptions of AI tools, this study contributes to improving inclusive education in the Philippines. It highlights the importance of using technology to ensure that all learners, regardless of their abilities or challenges, have access to quality, meaningful, and equitable education.

G. Definition of Terms

For clarity and consistency, the following key terms are defined as they are used in this study:

Accessibility and Participation refers to the ability of students, particularly those with diverse learning needs, to access learning materials and actively engage in classroom activities through the support of AI tools.

Activities or Subject Areas refers to the different academic subjects or learning activities where AI tools may be integrated in teaching, such as language, mathematics, science, social studies, and other classroom learning tasks.

Artificial Intelligence (AI) Tools refers to digital applications or software that use artificial intelligence to assist teachers and students in teaching and learning activities. In this study, AI tools include technologies such as text-to-speech, speech-to-text, adaptive learning platforms, AI chatbots, and AI-based assessment tools used in inclusive classrooms.

Differentiated Instruction refers to a teaching approach where instruction, materials, and learning activities are adjusted to address the diverse learning needs, abilities, and learning styles of students with the support of AI tools.

Effectiveness of AI Tools refers to the extent to which AI tools support teaching and learning in inclusive classrooms, particularly in enhancing accessibility, improving learning outcomes, and facilitating differentiated instruction for students

with diverse needs.

Frequency of Use refers to how often AI tools are used by teachers in classroom instruction, categorized in this study as never, rarely, sometimes, often, or very often.

Inclusive Classroom refers to a learning environment where students with diverse abilities, including those with disabilities or special educational needs, learn together with their peers in the same classroom setting.

Instructional Purposes refer to the specific reasons or objectives for using AI tools in teaching, such as delivering lessons, providing practice activities, assessing student learning, and supporting learners with diverse needs.

Learner Groups refer to the different categories of students who may benefit from the use of AI tools, including students with visual impairments, hearing impairments, learning disabilities, gifted learners, and regular learners.

Learning Outcomes refers to the academic progress or improvement in students' understanding, skills, and performance as influenced by the use of AI tools in classroom instruction.

Public School Teachers refer to educators currently teaching in government-funded schools in the 4th District of Quezon Province who handle inclusive classrooms and serve as respondents in this study.

Teaching Strategies and Methods refer to the instructional approaches used by teachers to facilitate learning, such as collaborative learning, formative assessment, and differentiated instruction, which may be supported by AI tools in the classroom.

Types of AI Tools Utilized refer to the different categories of artificial intelligence technologies used by teachers in instruction, including text-to-speech tools, speech-to-text tools, adaptive learning platforms, AI chatbots, and AI-assisted assessment systems.

2. Review of Related Literature and Studies

This section presents the important concepts & studies from different literature that are helpful and needed in this study. The information given by other researchers would provide a deeper and clearer understanding of this study.

A. Types of AI Tools Utilized

Artificial Intelligence (AI) was first introduced in 1956 as a branch of computer science. Copeland (2023) defines AI as the capability of computers or robots to perform tasks that typically require human intelligence. AI is an old concept that has recently gained widespread attention due to generative AI, resulting in numerous applications commonly called AI tools. These AI tools have become significantly popular, particularly those designed for educational purposes. AI tools can assist, enhance, and streamline teaching and learning processes. While AI tools offer various benefits, ethical issues have also been raised. These tools are readily available on the internet in free and paid versions. Golen (2022) mentions several AI tools suitable for academic purposes, such as Semantic Scholar, Penelope.ai, Elicit for literature reviews, Writefull, Coschedule Headline Analyzer, Quilbot, Wordtune, ChatGPT for writing, Cohere for combined literature review and writing, and DALL-E 2 for creating figures. The field of AI has already invaded the field of higher education. Therefore, it has a natural impact on academic libraries and their services as well. International library-related associations and organizations have already begun to acknowledge the role of AI in the future of librarianship. Recent studies show AI's impacts on librarianship and library services.

The following are some examples of applying artificial intelligence to support learning, such as 1) Virtual Mentor, for example, Blackboard, to publish notes, homework, quizzes, and tests that allow students to ask questions and submit assignments for the assessment process. Applications are widely used by professors/lecturers to publish notes, homework, quizzes, and tests that allow students to ask questions and submit assignments. Applications can also be used for assessment/assessment. 2) Voice Assistant, for example, Google Assistant (Google), Siri (Apple), Cortana (Microsoft), and others. Voice Assistant allows students to search for materials, reference questions, articles, and books by simply speaking or mentioning keywords. Voice Assistants allow interaction with various learning materials without communicating with the teacher. 3) Smart Content to share and find programmable digital book and material content more easily and quickly. Common examples of the application of this technology are found in various digital libraries today, both in schools, universities, and public libraries. For example, Cram101 finds and categorizes digital books quickly and in a structured way. Then, Netex Learning offers a personalized cloud platform with virtual training, conferences, and more. It also looks for material or topic; this platform will recommend various multimedia such as books, videos, and virtual training. 4) Presentation Translator. This technology also has an important role for those who have limitations in terms of language and vision, so this technology has been widely adopted for various needs. 5) Global Courses, for example, MOOCs, Udemy, Google AI, Alison, Khan Academy, edX, Udacity, Coursera, and others. There is a personalization feature that allows us to be notified about course progress, material that needs to be studied, test accumulation, total scores, relevant course recommendations, and various other features. AI-based solutions will help schools and universities that have international programs to create classes based on the curriculum and customize learning experiences that are tailored. Automatic Assessment, for example, the Kejarcita platform for online automatic assessment and question correction purposes. The use of features like this makes it easier for teachers and tutors to prepare and conduct quizzes and tests easily and practically. Teachers and tutors no longer need to make and correct questions manually. The use of features like this makes it easier for teachers and tutors to prepare and conduct quizzes and tests easily and practically. Personalized Learning, for example, Ruanguru (https://www.ruangguru. com/), and more. This allows students or users to get services like personal assistants. AI technology has a significant impact on improving the quality and learning patterns to be more practical and effective. AI in education enables schools or educational institutions to create

more personalized learning experiences. Educational Games, for example, Duolingo, Khan Academy Kids. Quick Brain and Puzzle Kids. Educational games are games that are designed to learn, but can still offer play and fun. Educational games are all forms of games that are created to provide an educational experience or learning experience to the players of the game. This children's educational game is not just a picture-matching game, but many tricks that hone children's memory, Mom. This game is suitable for training memory, concentration, accuracy, attention, thinking speed, and logic skills. 8) Intelligent Tutoring System (ITS), also known as Intelligent Computer-Aided Instruction, is a system to provide teaching that can adapt to students' abilities.

An assistant or a chatbot that can understand and respond to written or spoken language. It's been trained on a large dataset of text from the internet, and it can be used for a variety of tasks such as answering questions, translating languages, and even writing creative text. For example, it could be used in education to create an intelligent tutoring system that can understand and respond to student inquiries, or in customer service to help people with their questions. (Perez J., 2023) Artificial Intelligence has already permeated many industries, including education. AI is unquestionably beneficial to the education sector, particularly when combined with excellent teaching resources that include instructions and materials (Lee & Koh, 2020). The National AI Roadmap and the National Centre for AI Research (N-CAIR), spearheaded by the Philippine government, show the nation's resolve to adopt AI technology as a strategic direction that calls for curriculum customization in the educational system. However, the term artificial intelligence (AI) refers to a broad range of technologies. For instance, in the Philippines, colleges and universities are beginning to embrace the idea of smart campuses, utilizing next-generation digital infrastructure technologies like big data, cloud access control, machine learning, artificial intelligence, and the Internet of Things (IoT) to enhance operational efficiency and provide convenient experiences for staff and students. Several Philippine universities have already started implementing smart campus initiatives. Mariano Marcos State University, for example, received a PHP24.9 million grant from the Commission on Higher Education (CHED) to improve its IT infrastructure. The University of Northern Philippines, on the other hand, has started implementing smart classroom initiatives to improve student access to and quality of learning resources (PNA, 2021; PIA, 2021). AI-infused smart campus technologies provide several advantages, including increased campus security, better user interfaces, and the ability to customize living and learning spaces for students. The AI world is vast. A comprehensive compilation of widely used digital tools and resources for educators and learners in higher education, encompassing e-learning platforms, digital pinboards, collaborative tools, and lesson planning applications. Additionally, a significant portion of the student and teacher population now uses Google and other search engines for research; according to 94 percent of teachers, students now associate using Google with "research" (Scijournal, 2022). Flashcard makers are among the additional digital resources and tools available. Educational quiz apps such as Quizlet, citation generators, plagiarism detectors, copywriting tools, and even virtual assistants are examples of digital tools and resources that offer a wealth of information and let teachers and students work together in creative and novel ways, revolutionizing conventional teaching and learning approaches. Surprisingly, the development of AI can help the Philippine education system by improving classroom instruction, faculty training and development, ensuring that teachers have the tools they need to incorporate AI into their instruction approaches, necessitating continual support and professional development. AI is now a reality that requires multifaceted solutions rather than just a science fiction endeavor. It is also recognized that educators do not want to be replaced by computer programs. Still, there is a lot of promise in creating virtual human guides and facilitators for use in therapeutic and educational contexts. The goal of this field of study is to produce virtual characters with human-like traits, enabling them to behave, think, react, and interact naturally. These virtual humans aim to create characters that are hard to tell apart from actual humans. They are made to respond to both verbal and nonverbal communication. Although this technology is still in the early stages of development and may not be available anytime soon, it is an exciting field of study with great potential. The relationship between AI technology management and the motivation of learners is a complex and evolving area within education. Therefore, the following are some of the key aspects of the relationship: personalized learning paths, adaptive learning systems, real-time feedback, gamification and rewards, predictive analytics for early intervention, natural language processing, task automation efficiency, and innovative learning experiences (Fels, Sydney, 2021).

Chatbots are AI-based applications developed to mimic human interactions and engage in real-time, spontaneous conversations with humans. Their role within classroom learning, particularly in language education, is tangential (Yin et al., 2021). Previous relevant studies focus on how they comprehend human conversations and motivate students' learning. Research on chatbot competency (i.e., comprehension) suggested that their ability to engage in authentic conversation can be limited. First-generation chatbots developed in the 2000s as language learning tools could be frustrating for learners to interact with. For example, students needed to spell input correctly. Furthermore, chatbots were not always able to respond to the student's questions accurately on track the flow of a conversation (Yin et al., 2021). Often, their responses were vague and sometimes misled students. These early developed chatbots had very little educational value. However, over the last decade, chatbots have improved (Yin et al., 2021). For example, Shah and colleagues found modern chatbots have significantly higher scores from users than first-generation chatbots that were built using early natural language processing. A chatbot evaluation study conducted by Coniam revealed that most modern chatbots can present grammatically acceptable responses. These improvements increase the potential for chatbots to be used for learning, but more evidence

is needed to relate chatbots to learning success. For example, Smutny and Schreiberova (2020) reported that their evaluation of 47 educational chatbots on the Facebook Messenger platform for higher education indicated that chatbots were in the early stage of becoming teaching assistants and needed improvements. Notwithstanding the lack of breakthroughs in chatbot language communication skills, students still find them comfortable, interesting, and fun to play with (Yin et al., 2021). For example, a study conducted by Hill and colleagues revealed that university students held significantly longer conversations with chatbots than with other humans; however, the users used shorter sentences with simple vocabularies for communications. Yin and colleagues (2021) found that university Students who engaged with chatbot-based learning environments significantly had greater intrinsic motivation than those who did not. These findings imply that students felt at ease and had greater conversational engagement when learning with chatbots. Most of these studies were conducted in higher education. In K-12 education, students can have less sophisticated self-regulated learning skills and a wider diversity of learning needs. Therefore, chatbot competency is crucial to school-age students, particularly low-achieving or proficient students. These students need more accurate responses from chatbots and are more likely to give up more easily when feeling confused or facing failure during learning. Past and recent research related to the effects of learning technology on student expertise indicated a trend that instructional design with technology could have differentiated benefits for low and high-achieving students (Chiu et al., 2020). The main recommendation of the research is that more effort should be made to cater to learner diversity. For chatbots, it is also likely that high-achieving students will benefit more from interacting with them than low-achieving students. For example, if responses from chatbots are confusing or vague, high-achieving students are more able to ask additional follow-up questions to clarify the responses or ask more specific questions. However, low-achieving students may not know how to interpret the response or take actions to clarify understanding, while their questions may be inaccurate, increasing the likelihood of confusing responses from the chatbot. Hence, how school students with different learning expertise interact with chatbots deserves further examination. According to Rahman M., et.al. (2023), the fundamental objective of this study is to highlight the application of ChatGPT in academic research by demonstrating a practical example with some valuable recommendations. This study draws upon a demo research topic and investigates the potential and limitations of ChatGPT in drafting and writing an academic research paper. The study revealed that ChatGPT has several advantages for researchers regarding new idea generation, outlining a research topic, and even writing abstracts using prompts etc. Second, the researchers recommend that academic researchers use this tool to summarize large texts and identify key findings from the literature. However, the researchers also observed several limitations of ChatGPT in writing an academic article. For instance, ChatGPT sometimes misleads in writing the research problem, questions, and gaps since it provides hypothetical problem statements and research gaps with fake references. However, it should only be used to write part of the literature review section, as the tool cannot synthesize literature and generates made-up citations and references. Besides, ChatGPT cannot conduct statistical analysis because it cannot access the dataset. Thus, the researchers recommend not using ChatGPT to write a research article alone; human control should be apparent. Instead, this tool can be used as an e-research assistant that can complement different works of a researcher and improve work efficiency. Since accountability and research integrity are two major concerns in academic publishing, researchers should take full accountability for using ChatGPT in research and mention its use in the article. As this is one of the first studies that assess the application of ChatGPT in academic research, the findings will have full and crucial implications for theory and practice.

Students' use of Artificial Intelligence (AI) in the classroom has been the topic of much debate among educators, school districts, and parents. But what about AI for teacher use? While only 18% of teachers report that they use AI in the classroom, 55% believe that AI can have a positive impact. The divide between the perception of AI and its use may stem from a lack of understanding around how teachers can effectively use this type of innovation. Stacey Williams, PhD, internship coordinator for special education and senior lecturer at the University of Maryland College of Education, encourages student teachers in her program to use AI tools. For this issue of Office Hours, she shares three AI platforms with special education applications that all educators can use to assist with planning, instruction, accessibility, differentiation, and more! AI for Education is a great resource for educators new to AI. Williams highly recommends their Free Resource Center, specifically their Prompt Library, which provides educators with sample AI prompts to help with activities such as writing lesson plans and assessments, incorporating social/emotional learning in the classroom, and communicating with parents. The prompts are designed to be both specific and customizable, helping educators get the best results from any AI platform. The Special Education page includes prompts for designing tiered assignments, creating leveled texts, and modifying lessons for specific student needs. The Universal Sandpit offers AI tools specifically designed for special education teachers and educators in inclusive classrooms. Williams shares that one of her favorite tools is the Task Analysis Tool, which breaks down tasks into simple, detailed steps. To use the tool, simply enter a task, and the tool will generate a list of detailed steps to accomplish it. "As a special educator, I might need to teach my students how to properly wash their hands. I used to map out the steps myself and develop the materials to support them. This tool provides all the steps in just one click," says Williams. Teachers can expand their task analysis for student learning and include visual prompts generated through AI as well. They should consider the use of AI resources as thought partners to reduce their workload in generating resources. Another valuable tool from The Universal Sandpit is the Social Scripts Generator, which produces stories to help students understand and prepare for new social interactions. These scripts help

students predict the behavior of others and adjust their own to align with social and classroom expectations. Williams notes that this tool is especially helpful for autistic students learning to navigate general education classrooms. “Years ago, I had to write a script to teach my students how to engage in a friendly way or make eye contact, if culturally appropriate.” Now, the Universal Sandpit’s social scripts generator can reduce this workload. While the Universal Sandpit can create the text, Williams suggests using ChatGPT to generate illustrations for additional support. For example, by entering the prompt: “Create a comic book social story based on the following text” and pasting in a social script from The Universal Sandpit, ChatGPT can create an illustrated cartoon comic that engages young learners. Williams advises teachers using ChatGPT for illustrations to use specific prompts to help ensure that the images are not only appropriate for the learning environment but also representative of the students, teachers, and any important context. Diffit allows educators to tailor texts and resources to various reading levels and languages. Using the “Literally Anything” function, teachers enter a topic or question and input a student’s reading level and language, and Diffit generates customized resources such as reading passages, summaries, vocabulary words, worksheets, and assessments. If an educator already has text that they wish to use, they can use the Text or PDF feature to change the reading level of any passage up to 8,000 words. While Williams cautions against limiting students’ exposure to grade-level content and advanced subject matter, she underscores the importance of providing students with accessible content, explaining: “Changing the readability level of a text is one way to ensure that your students can be fully included in accessing information.” While educators should adhere to local school and district regulations and policies around the use of generative AI, Williams emphasizes the value of these platforms for both educators and their students. “I consider generative artificial intelligence a form of assistive technology that can be used to support educational access and reduce teacher workload for administrative tasks and material creation. I see it as a gift if we're strategic about how we use it,” she says. Despite the controversy, AI can be an invaluable tool for teachers searching for ways to make lessons more inclusive. Williams encourages educators to use AI for Education, The Universal Sandpit, and Diffit to help create classrooms that are equitable for all learners.

B. Frequency of Use

This is the first study to examine systematically AI tool usage among SLIIT students for academic purposes, revealing that 99% of these students use AI for their academic activities. Data analysis indicates that ChatGPT is the most popular AI tool among SLIIT students, with many using the free version. This finding supports Albayati’s (2024) prediction that ChatGPT would become widely used, especially among undergraduate students. The analysis shows that most students use AI tools to check grammatical errors and highlight issues with their English grammar knowledge. Additionally, a significant number of students use AI to enhance subject knowledge, and more than half use AI, particularly generative tools like ChatGPT, to generate study notes. This trend indicates that students prefer using AI tools over traditional course materials to gain knowledge. Moreover, students use AI tools for developing computer codes, which aligns with Haensch et al. (2023) findings on students using AI for programming. Nearly three-fourths of students use AI tools for research purposes. Almost half of them use AI to find suitable research topics, set objectives, and summarize research papers and literature. Over half of the students specifically use ChatGPT for research, with the use of other tools being significantly lower. This outcome aligns with Megawati et al. (2023), who found that researchers often use ChatGPT to finalize research topics and plan research questions or hypotheses. When examining the students’ attitudes towards AI usage, many students believe that the use of AI in academics may reduce critical thinking skills.

When asked if using AI tools constitutes cheating, a significant number of Students expressed neutrality or disagreement, aligning with Bego (2023), who reported that most students do not consider using AI for engineering Assignments to be cheating. Lastly, this study shows that 90% of respondents are aware of how to use AI ethically in academic endeavors. The top three most-used AI tools among respondents are ChatGPT (94% response rate), Quill Bot (88%), and Grammarly (79%). 89% of respondents use the free version of AI tools, while 11% have purchased the paid version. The survey found that 73% used AI for grammar checking, 68% for enhancing subject knowledge, 67% for summarizing content, 64% for exam preparation, 63% for assignment writing, 57% for presentations and study notes, and 54% for paraphrasing. Almost half used AI for programming, 42% for references, and nearly 1/3 for receiving feedback on their work. Three-fourths (3/4) of respondents used AI for research activities. From it, 51% used AI tools for finding a suitable research topic, 46% used AI for summarizing research papers, 37% used AI tools to write literature reviews, and 23% and 19% used AI for citation and formulating reference lists, respectively. Most students used Chat GPT as a research support AI tool. More than half of the responses indicated it. Many respondents learned about this tool or its usefulness in research through social media and friends. Very few respondents (10%) had gained formal knowledge about the above-mentioned AI tools by attending formal online forums.

C. Specific Instructional Purposes

The role of Artificial Intelligence (AI) technology is increasingly evident in various sectors, including the education sector. The presence of AI technology has transformed the educational curriculum, especially in the fields of technology, science, mathematics, and engineering. But AI will also change the face of the world of education. One technology that has recently received attention is Artificial Intelligence (AI). This technology has an important role in facilitating various job functions, including in the field of education. AI can also be implemented in the world of education. Teachers/lecturers can understand student needs more easily and more deeply (Fitria, 2021). The students can also learn according to their needs

without encountering difficulties. Artificial Intelligence (AI) is believed to be able to help humans learn better and achieve educational goals more effectively. So, it's not surprising that currently many AI-based innovations and breakthroughs are being applied and will be applied to support the learning process to make it more practical and effective. So, when AI is present in the education sector, which then raises concerns among teachers, it is a challenge that must be faced so that the existence of education continues. Some of the strong beliefs that teachers cannot be replaced by AI are that teachers collaborate with AI in the implementation of learning. Teachers need to have skills in utilizing science and technology (Science and Technology). So that teacher can take advantage of AI in terms of completing school administration, such as making lesson plans, student attendance lists, reporting student learning outcomes, making learning media, and learning resources.

The integration of AI in teaching effectively realizes learner-centered learning. AI-powered tools and applications improve educational measurement, including testing, assessment, and evaluation. These tools can provide educators with valuable insights into student performance, learning outcomes, and instructional effectiveness. For example, AI-powered assessment tools can analyze student responses to assignments and provide personalized feedback to help students identify areas of strength and weakness (Nazaretsky et al., 2022). These tools can also provide teachers with insights into the effectiveness of their instruction and identify areas where they may need to adjust their teaching strategies. In addition, AI-powered tools can help automate many aspects of the assessment process, saving time and reducing the burden on teachers. For example, AI-powered grading tools can analyze students' essays and provide feedback on grammar, structure, and content, reducing teachers' time grading assignments (Huang et al., 2023). AI-powered tools can also help identify students at risk of falling behind or benefit from additional assistance or remediation (Delgado et al., 2020). These tools can analyze students' data, such as test scores and attendance records, and identify patterns that may indicate a need for intervention. This can help teachers provide targeted support to students who need it most. Therefore, the development of AI-powered tools and applications has revolutionized the field of education by providing educators with valuable insights into student performance, learning outcomes, and instructional effectiveness. As this technology continues to evolve, it has the potential to transform education by providing personalized, data-driven instruction to students and enabling teachers to optimize their teaching strategies to improve student outcomes.

AI has been transforming education in recent years. This increasing significance of AI has garnered the interest of numerous scholars actively exploring diverse methods to incorporate various AI tools within the classroom environment (Halaweh, 2023; Mena-Guacas et al., 2023; Papapicco, 2020). With the increasing availability of data and the growing sophistication of machine learning algorithms, AI has the potential to revolutionize the way we learn, teach, and assess student progress. Several benefits of using AI in education have been advanced. For example, Adiguzel et al. (2023) presented some benefits of using AI for administrators, teachers, and learners. AI has been found to play a crucial role in motivating students (Lin et al., 2021; Xia et al., 2022), raising their engagement levels (Huang et al., 2023a; Nazari et al., 2021), learning interest (Hou et al., 2022), learners' interaction, anxiety reduction (Hawes & Arya, 2023; Ren, 2020), prediction of students' future outcomes (Luo et al., 2022), and academic performance (Khan et al., 2021). This section discusses how AI tools can be used in educational measurement and assessment. The following are specific ways AI can be applied in educational assessment. 1. Personalized learning: Tools and systems based on AI have the potential to customize learning experiences, boost the productivity of teachers, and heighten student engagement (Mena-Guacas et al., 2023). AI can help create personalized learning plans for individual students based on their learning progress, strengths, and weaknesses. AI can identify students' learning needs by analyzing data from multiple sources, such as assessments, homework, and quizzes, and provide targeted feedback. Besides preparing lesson contents and learning experiences, AI tools can also be used for individualized instruction (Adiguzel et al., 2023). This can help students learn at their own pace and focus on areas where they need more support. AI-powered adaptive learning software, such as DreamBox and Knewton, uses data analysis to create personalized learning plans for students based on their strengths and weaknesses. For example, students can complete a pre-assessment test that generates a personalized learning plan with specific goals and recommendations. 2. Intelligent tutoring systems (ITS): AI-powered tutoring systems can provide personalized support and feedback to students. These systems can adapt to students' learning styles and provide tailored instruction and support, helping students to improve their learning outcomes. These systems can help students stay motivated and engaged with their learning by providing immediate feedback. Carnegie Learning's AI-powered mathematics tutoring system provides immediate feedback and customized learning paths based on students' strengths and weaknesses. The system adapts to each student's learning pace and provides interactive instruction and practice problems. Educators can use ITS to provide individualized instruction, monitor student progress, and identify areas where students need additional support. Examples include ALEKS, Carnegie Learning, and Knewton. 3. Automated grading: AI can help automate the grading process, saving time for teachers and providing students with immediate feedback on their assignments. AI can provide feedback on grammar, spelling, and syntax by analyzing essays, reports, and other written assignments. By using automated grading systems, teachers can focus more on essential tasks such as lesson planning and supporting students, resulting in significant time savings (Adiguzel et al., 2023). This can help students to improve their writing skills and reduce the workload for teachers. For example, Turnitin's AI-powered software uses natural language processing (NLP) to analyze essays and provide grammar, spelling, and syntax feedback. The software can also detect plagiarism, helping teachers to grade assignments more efficiently and accurately. 4. Predictive analytics: AI can

analyze student attendance, engagement, and performance data to predict future outcomes. This information can be used to identify students who may need additional support, enabling teachers to provide targeted interventions. For instance, the University of South Florida uses predictive analytics to identify at-risk students who may need additional support. The university's Student Success Center uses data analysis to monitor students' progress and provide targeted interventions. 5. Natural language processing: AI-powered NLP tools can help students learn languages and improve their writing skills by providing grammar, spelling, and punctuation feedback. These tools can also help students develop their critical thinking skills by analyzing and evaluating arguments and evidence. These tools also enable educators to analyze and interpret natural language data, such as student essays, discussions, and social media posts, to gain insights into student learning and engagement. For example, Grammarly's NLP-powered software provides real-time feedback on writing, including suggestions for grammar, punctuation, and sentence structure. This can help students improve their writing skills and produce higher-quality written work. Other examples include Google Cloud Natural Language, IBM Watson, and Microsoft Azure Cognitive Services. 6. Intelligent content: AI can help create and curate learning materials tailored to individual students' needs and learning styles. By analyzing student behavior data, AI can identify students' learning preferences and create customized learning materials that are engaging and relevant. For instance, EdTech startup Smart Sparrow uses AI to create interactive, adaptive learning materials customized to individual students' needs. For example, a biology course might use AI to generate different lab scenarios based on students' learning progress and interests. 7. Virtual assistants: AI-powered virtual assistants can help students with administrative tasks such as scheduling, reminders, and task management. These tools help students stay organized and focused, enabling them to manage their time and complete their coursework more efficiently. For instance, AI-powered virtual assistants such as Brainly provide students with immediate support and answers to their academic questions. The platform uses machine learning to provide personalized support and connect students with tutors. 8. Automated transcription and translation: AI can help transcribe and translate lectures and other educational materials, making them accessible to a wider range of students. This can help students who may have difficulty understanding the language used in their coursework or may have hearing impairments. It can also help make educational content more inclusive and accessible. For instance, Otter.ai uses AI-powered speech recognition to transcribe real-time lectures and other educational materials. The software can also translate spoken content into multiple languages, making educational content more accessible to students who may speak different languages. Other examples include Amazon Transcribe, Dragon Naturally Speaking, and Google Voice. 9. Learning management systems (LMS): These are platforms that allow educators to create, deliver, and manage learning materials, assignments, assessments, and evaluations for students. Educators can use LMS platforms to administer online assessments, monitor student progress, and provide feedback on student performance. Examples include Blackboard, Canvas, and Moodle. 10. Automated essay scoring (AES) software: AES software uses NLP algorithms to evaluate and grade essays and written assignments. Educators can use AES software to provide students with immediate feedback on their writing, save time on grading, and ensure consistent and objective evaluation. Examples include e-rater, Grammarly, and Turnitin. 11. Learning analytics tools: Learning analytics tools use data mining and AI algorithms to analyze student learning data and provide insights into student performance, engagement, and learning outcomes. Educators can use learning analytics tools to monitor student progress, identify at-risk students, and make data-informed decisions to improve student learning outcomes. Examples include Learning Analytics and Knowledge (LAK) and Open Learning Analytics (OLA). 12. Computer-based testing (CBT) platforms: CBT platforms allow educators to administer online assessments, including multiple-choice, true/false, and essay questions. Educators can use CBT platforms to assess student knowledge, save time on grading, and provide students with immediate feedback (Bassey et al., 2020). Examples include ExamSoft, JAMB CBT, UNICAL Postgraduate e-exams, and Questionmark. ProProfs, and 13. Gamification tools: Gamification tools use game-based elements to motivate and engage students in learning activities and assessments. Educators can use gamification tools to increase student engagement, promote student learning, and provide students with immediate feedback on their performance. Examples include Classcraft, Kahoot!, and Quizlet. 14. Virtual reality (VR) and augmented reality (AR) tools: VR and AR tools use immersive technologies to provide students with interactive, experiential learning experiences. Educators can use VR and AR tools to engage students in hands-on learning activities, provide real-world experiences, and enhance student learning outcomes. Examples include Google Expeditions, Merge Cube, and Nearpod VR. 15. Formative assessment tools: Formative assessment tools enable educators to monitor students' learning in real-time, provide feedback, and adjust instruction based on their performance. Examples include Mentimeter, Nearpod, and Socrative. 16. Online polling tools: Online polling tools allow educators to gather student feedback on specific topics or questions. Examples include Google Forms, Kahoot!, and Poll Everywhere. 17. Interactive whiteboards: Interactive whiteboards enable educators to present and annotate digital content, engage students in interactive activities, and collaborate with students in real-time. Examples include Google Jamboard, Promethean ActivPanel, and SMART Board. 18. Video conferencing tools: Video conferencing tools allow educators to facilitate virtual classroom sessions, provide remote instruction, and connect with students in remote locations. Examples include Google Meet, Microsoft Teams, and Zoom. 19. Digital portfolios: Digital portfolios enable students to collect and showcase their work, reflect on their learning, and receive feedback from educators and peers. Examples include Google Sites, Seesaw, and WordPress. 20. Data visualization tools: Data visualization tools enable

educators to analyze and present data in visual formats, such as graphs and charts, to gain insights into student performance and learning outcomes. Examples include Google Data Studio, Infogram, and Tableau. 21. Social media platforms: Social media platforms enable educators to connect with students, share learning resources, and promote student engagement in learning activities. Examples include Facebook, Instagram, and Twitter. 22. Plagiarism detection: AI-based plagiarism detection software uses NLP algorithms to analyze student work and detect instances of plagiarism. Examples include Copyscape, Grammarly, and Turnitin. 23. Classroom response systems: Classroom response systems allow educators to pose questions and receive real-time student feedback using electronic devices. Examples include iClicker, Poll Everywhere, and Top Hat. 24. Digital assessment tools: Digital assessment tools provide educators with the ability to assess student knowledge and skills using a variety of question types, including multiple-choice, short answer, and essay. Examples include Edulastic, ExamView, and Google Forms. Large language models (LLMs) are a specialized form of AI that are purpose-built for comprehending, generating, and manipulating human language. By leveraging NLP principles and machine learning principles, LLMs are designed to process and interpret vast quantities of text data (Dergaa et al., 2023). The "large" in their name refers to the massive datasets they are trained on and the numerous parameters they possess, which enable them to grasp the subtle nuances and intricacies of human language. LLMs can generate human-like text and are designed to understand and generate text in a contextually relevant and coherent way. LLMs are part of the family of generative models (Ingraham et al., 2019), which means they can generate new text based on the patterns and structures learned from the data used to train them. LLMs have many applications, including NLP, conversational AI, text generation, machine translation, sentiment analysis, and content creation. They can be used in various industries, such as healthcare, finance, customer service, marketing, and entertainment, to automate tasks, provide insights, and improve user experiences. One of the key features of LLMs is their ability to understand and conversationally generate text (Kasneci et al., 2023). They can engage in interactive and dynamic conversations with users, respond to queries, provide information, and generate relevant and coherent responses. LLMs are trained to understand context, tone, and style, making them capable of generating text that closely mimics human-like conversation. The development of LLMs can be considered among the greatest scientific advancements or breakthroughs in AI. Examples of LLMs include BARD AI (Google), BERT (Google), Chat GPT (OpenAI), DistillBERT (Hugging Face), ELECTRA (Google), MarianMT (Microsoft Translator), Megatron (NVIDIA), RoBERTa (Facebook), T5 (Google/DeepMind), UniLM (Microsoft Research), and XLNet (Carnegie Mellon University/Google). LLMs can play a significant role in various stages of the educational assessment process, such as test planning, item generation, preparation of test instructions, item assembly/selection, test administration, test scoring, test analysis, interpretation, appraisal, reporting, and follow-up. Further elaborations on how LLMs can serve useful purposes in educational measurement are documented. W. A. S. C. Weerasinghe, H. M. P. P. K. Abeysinghe, 2024., Usage of Artificial Intelligence (AI) Tools for Academic Activities by Undergraduate Students: Quantitative Study at the Sri Lanka Institute of Information Technology (SLIIT) Library

D. Teaching Strategies and Methods Supported

The use of generative AI tools like ChatGPT in education has garnered significant attention for its potential to enhance teaching methodologies and improve learning outcomes, particularly in the domain of critical thinking. This literature review explores the evolving role of AI in education, focusing on its impact on critical thinking skills, the benefits of interactive and adaptive learning, And the challenges associated with its integration. Critical Thinking Development Through AI: The development of critical thinking skills is a primary objective in modern education, given its importance in preparing students for complex problem-solving and informed decision-making. Traditional educational approaches often emphasize rote learning and memorization, which may not adequately foster critical analysis or evaluative skills. In contrast, AI tools like ChatGPT offer interactive learning experiences that can stimulate critical thinking. By engaging students in dynamic dialogues, AI facilitates exploration of different viewpoints, encourages questioning of assumptions, and provides instant feedback. Research suggests that interactive AI environments can create opportunities for students to practice reasoning, analysis, and synthesis, which are core components of critical thinking. The ability of AI to pose challenging questions and simulate real-world scenarios further contributes to the development of these skills, enabling students to apply their knowledge in practical contexts. Benefits of Interactive and Adaptive Learning: Generative AI tools offer significant benefits in terms of interactive and adaptive learning. Unlike traditional educational tools, which often provide static content, AI tools like ChatGPT engage students in ongoing interactions that adapt to their individual needs. This adaptive learning capability is particularly valuable in fostering critical thinking. Thinking allows for personalized instruction that aligns with each student's learning style and pace. AI can adjust the complexity of questions and provide tailored explanations based on real-time feedback from students. This personalized approach helps address diverse learning needs and ensures that students receive support that is relevant to their specific level of understanding. Studies have shown that adaptive learning environments can enhance student engagement and motivation, leading to improved academic performance and deeper cognitive development. The integration of AI tools like ChatGPT into teaching strategies has important implications for how educators approach critical thinking instruction. AI's interactive and adaptive capabilities enable teachers to implement more dynamic and personalized learning experiences. This shift from traditional methods to AI-supported instruction can enhance the development of critical thinking skills by providing students with opportunities to engage in complex problem-solving and analytical tasks.

However, educators must also be mindful of the challenges associated with AI integration and work to address data privacy, algorithmic bias, and access issues to ensure that the benefits of AI are realized equitably and responsibly. The literature highlights the transformative potential of AI tools like ChatGPT in enhancing the teaching of critical thinking skills. By providing interactive, adaptive, and personalized learning experiences, AI can support the development of essential cognitive abilities. However, addressing challenges related to data privacy, bias, and equitable access is crucial for maximizing the effectiveness of AI in education. Continued research and development in these areas will be essential for realizing the full potential of AI in fostering critical thinking and improving educational outcomes. An interactive process encourages students to think more deeply and critically about the material, enhancing their analytical and evaluative abilities. Interactive and Adaptive Learning Benefits: The interactive and adaptive nature of ChatGPT has significantly contributed to personalized learning experiences, which are crucial for developing critical thinking. ChatGPT's capacity to adjust its responses based on individual student inputs allows for a tailored learning experience that meets each student's unique needs. This adaptability ensures that the difficulty of questions and the complexity of explanations are aligned with the student's current level of understanding. As a result, students receive instruction that is both challenging and supportive, facilitating a more effective learning process. The ability of ChatGPT to provide personalized feedback helps students identify areas for improvement and build on their strengths, leading to enhanced cognitive development and critical thinking skills. Engagement and Motivation: Student engagement and motivation have been notably improved through the use of ChatGPT. Traditional methods of instruction often struggle to maintain student interest, particularly when dealing with abstract or complex topics. ChatGPT's interactive nature makes learning more engaging by offering immediate responses and creating a conversational learning environment. This increased engagement is linked to higher levels of motivation and the integration of generative AI tools like ChatGPT into educational practices has yielded insightful results, particularly in enhancing critical thinking skills among students. This section discusses the outcomes observed from deploying ChatGPT in various educational settings and explores the implications for teaching strategies and student learning. Enhanced Critical Thinking Skills: The use of ChatGPT in educational settings has demonstrated significant improvements in students' critical thinking skills. By engaging in interactive dialogues with AI, students have had the opportunity to explore complex concepts and practice reasoning in a dynamic environment. ChatGPT's ability to pose challenging questions, simulate real-world scenarios, and provide instant feedback has been instrumental in fostering deeper cognitive engagement. Students reported increased comfort in analyzing different perspectives and evaluating information critically. For instance, when faced with a problem, students can interact with ChatGPT to explore multiple approaches, debate various solutions, and refine their arguments based on AI-generated insights. This interactive process encourages students to think more deeply and critically about the material, enhancing their analytical and evaluative abilities. Interactive and Adaptive Learning Benefits: The interactive and adaptive nature of ChatGPT has significantly contributed to personalized learning experiences, which are crucial for developing critical thinking. ChatGPT's capacity to adjust its responses based on individual student inputs allows for a tailored learning experience that meets each student's unique needs. This adaptability ensures that the difficulty of questions and the complexity of explanations are aligned with the student's current level of understanding. As a result, students receive instruction that is both challenging and supportive, facilitating a more effective learning process. The ability of ChatGPT to provide personalized feedback helps students identify areas for improvement and build on their strengths, leading to enhanced cognitive development and critical thinking skills. Engagement and Motivation: Student engagement and motivation have been notably improved using ChatGPT. Traditional methods of instruction often struggle to maintain student interest, particularly when dealing with abstract or complex topics. ChatGPT's interactive nature makes learning more engaging by offering immediate responses and creating a conversational learning environment. This increased engagement is linked to higher levels of motivation and participation in the learning process. Students are more inclined to actively participate in discussions, ask questions, and seek further information when interacting with AI, leading to a more immersive and stimulating educational experience. The interactive format of ChatGPT helps sustain student interest and encourages active exploration of content, which is essential for developing critical thinking skills. The integration of ChatGPT into teaching strategies has significant implications for how educators approach the development of critical thinking skills. AI tools provide opportunities for more interactive, personalized, and engaging learning experiences, which can enhance the effectiveness of instruction. Educators can leverage ChatGPT to create dynamic learning environments that foster critical thinking and problem-solving abilities. However, it is essential to address the challenges associated with AI integration to maximize its benefits and ensure that all students have access to these advanced learning tools. The deployment of ChatGPT in education has led to notable improvements in critical thinking skills, enhanced student engagement, and more personalized learning experiences. However, addressing challenges related to data privacy, algorithmic bias, and equitable access remains crucial for realizing the full potential of AI in education. Continued research and development in these areas will be key to optimizing the integration of AI tools and supporting the development of essential cognitive skills.

The integration of generative AI tools like ChatGPT into educational settings represents a significant advancement in enhancing teaching methodologies and learning outcomes, particularly in developing critical thinking skills. By leveraging AI's interactive and adaptive capabilities, educators can offer personalized, engaging, and effective learning experiences that foster deeper cognitive skills. ChatGPT's ability to simulate

real-world scenarios, pose challenging questions, and provide immediate feedback supports students in exploring complex concepts, evaluating different perspectives, and improving their analytical abilities. The potential benefits of AI in education include enhanced personalization, which tailors instruction to individual learning needs and preferences, and improved student engagement through interactive dialogues. These advancements contribute to a more dynamic learning environment where critical thinking can be developed more effectively. However, the integration of AI tools also presents challenges, such as ensuring data privacy, addressing algorithmic biases, and providing equitable access to technology. To maximize the benefits of AI in education, it is crucial to address these challenges proactively. Implementing robust data protection measures, developing fair and inclusive AI systems, and bridging the digital divide are essential steps in creating an equitable educational environment. As AI technology continues to evolve, its role in education will likely become more integral, offering opportunities to further enhance teaching strategies and student learning experiences. The integration of AI tools like ChatGPT has the potential to transform education by enhancing critical thinking and providing personalized learning opportunities. By addressing associated challenges and leveraging the strengths of AI, educators can create more effective and inclusive learning environments that prepare students for the complexities of the modern world.

E. Activities or Subjects Where AI Is Integrated

Artificial intelligence and machine learning have been integrated into numerous online e-learning platforms. Applications such as Duolingo, Busuu, and Coursera's courses on music composition and video game development utilize machine learning to provide tailored immediate feedback to students based on multimodal input, helping experimental courses toward tailored teaching. Chatbots have been implemented on some university websites to help students navigate the website and solve problems. CAPSULE was developed to assist instructors and curriculum designers in a Programmed Learning System (PLS). The Cognitive Tutor is an adaptive e-learning tool that provides instruction by delivering individualized tutoring to students. The system employs AI techniques to adapt, on a student-by-student basis, to the student's performance and "seeking behavior" during problem solving [10]. Cognitive Tutor is also a web resource utilizing artificial intelligence. LON-CAPA (Learning Online, Networked, Computer-Assisted Personalized Approach) conducts thousands of assessments every semester across seven universities. It provides typed answers from a deep learning bi-directional LSTM. Our WebWise demonstration on AI proposed using these technologies to provide and evaluate typed student answers. The EdTech Top 40 of 2021 in K-12 education list includes five tools purported to utilize machine learning to support student learning. At the university level, numerous tools use AI to support learning. A sex education chatbot built into a newly adopted health class at a large university has been shown to increase students' learning. Students interact with the chatbot and then fill out a pre-test questionnaire based on suggestions by the chatbot, like what they would in homework exercises. The control class has the students fill out the questionnaire at the beginning of class. The chatbot class outperforms the control class, with males showing an even greater increase in learning from interacting with the chatbot.

F. Learner Groups Benefiting From AI Use

According to the report, the revolutionary features of generative AI extend beyond the learning environment. People may have the opportunity to be freed from mundane tasks in the classroom and administrative work (Educause, 2023). ChatGPT represents the current state of artificial intelligence, processing information in an efficient, systematic, and informative way, and is said to reform education. Different AI chatbots are available for training and can be used to support different learning outcomes. AI Chatbots are intelligent systems developed in the one hand, the use of AI chatbots in education can bring about many benefits, including increased student engagement, collaboration, and access, on the other hand, these tools can cause a range of new issues and concerns, particularly to scientific integrity and academic plagiarism (Cotton et al., 2023). The effectiveness of AI chatbots depends on their ability to understand text and produce human-like text. The comprehension capability of this tool is based on the data and algorithms it encompasses. Since AI chatbots, so-called generative AI technologies, have the potential to influence teaching and learning processes and methods unconventionally and require educators to develop new ways of thinking and keep up with the transformation, it is emphasized that the potential benefits of the technology should be used carefully and cautiously (Bozkurt, 2023). As ChatGPT becomes more widely used in educational settings, its applications need to be managed responsibly and ethically (Mhlanga, 2023). In terms of the advantages of AI chatbots in education, among the advantages of AI chatbots for students, increased motivation to learn, language skill development, and increased learning performance are the most frequently encountered themes in the research. The advantages of AI chatbots for the educator include cost-effectiveness, reducing workload, and providing educational resources. In systematic literature reviews on the integration of technology-supported tools into the educational environment, student engagement and motivation come to the fore (Banihashem et al., 2023; Dehghanzadeh et al., 2023). The integration of AI chatbots into education can be examined in a similar framework.

The rapid advancement of Artificial Intelligence (AI) is transforming various sectors, and education is no exception. AI plays a significant role in both general and higher education, influencing students' academic development by offering a mix of opportunities and challenges (Edtech, 2020). From personalized learning experiences to intelligent tutoring systems that provide tailored guidance, support, and feedback based on individual learning patterns and knowledge levels (Hwang et al., 2020), AI has the potential to revolutionize education (Holmes et al., 2019) and address the diverse needs

of learners. However, positive educational outcomes are not guaranteed solely by the adoption of advanced AI technologies (Castaneda & Selwyn, 2018; Du Boulay, 2000; Selwyn, 2016). The integration of AI in academic environments raises critical questions related to equity, accessibility, and the evolving role of traditional teaching methods. The influence of AI on education is transformative and multifaceted. AI enables personalized learning by adapting educational content to meet the unique needs of individual students (Hennekeuser et al., 2024). Studies have shown that students in personalized learning environments exhibit improved self-efficacy and a more positive attitude toward their education (Johnson & Smith, 2019). These experiences are increasingly achievable through AI-driven tools that analyze vast amounts of data to identify learning gaps and tailor interventions accordingly (J. A. Baker, 2021). For instance, AI-powered platforms, such as adaptive learning systems, have been shown to enhance student engagement and performance by providing real-time feedback and customized learning pathways (Luckin et al., 2016; Zawacki-Richter et al., 2019). In traditional education, students are encouraged to take an active role in their learning process by developing skills in exploration, analysis, and problem solving. Critical thinking skills are essential for shaping students' overall learning experiences. Educators often rely on questioning techniques, collaborative activities, and assignments to enhance students' ability to evaluate information and develop independent perspectives (Facione, 2020). However, the rapid information processing and insightful responses provided by AI challenge traditional learning methods, raising questions about the distinctions between human learning and machine-based learning. For example, while AI can efficiently process and analyze data, it may lack the nuanced understanding and creativity inherent in human cognition (Luckin et al., 2016). This underscores the need for a balanced approach to AI integration, ensuring that it complements rather than replaces human interaction and the development of critical thinking skills (Wu, 2023). Waheed Aslam, Skander Gasmi, 2024., Integrating AI Tools in Education: Teaching Strategies for Critical Thinking with ChatGPT.

G. Enhancing Accessibility and Participation

The results of this systematic review are organized according to the guiding research questions, focusing on how artificial intelligence (AI) supports accessibility and personalization in inclusive education and identifying the challenges faced by institutions in its implementation. Each set of findings is accompanied by figures that illustrate key trends and patterns across the literature. RQ1: How does artificial intelligence enhance accessibility and the personalization of learning for students with special needs or disabilities? The studies reviewed concur that AI facilitates both accessibility and personalization in inclusive learning environments. However, each study highlights distinct ways in which these technologies contribute to more equitable and adaptive educational practices for students with disabilities. For instance, Toyokawa et al. (2023) and Patiño-Toro et al. (2023) emphasize the use of adaptive educational platforms to foster inclusion.

Toyokawa et al. (2023) show that AI enhances active reading by identifying students' learning strengths and challenges in real time, enabling educators to tailor content and strategies to individual needs. Meanwhile, Patiño-Toro et al. (2023) demonstrate that MOOCs designed for deaf students can eliminate communication barriers and expand equitable access to higher education.

Tuna (2022) provides a complementary perspective by exploring the use of humanoid robots and virtual agents in the education of children with autism spectrum disorder (ASD). The findings indicate that these technologies not only personalize learning by adapting to the pace and style of the student but also foster cognitive and social skills, creating a meaningful environment that addresses both their academic and emotional needs. Furthermore, technologies such as virtual agents enable students with disabilities to interact in simulated social contexts, thereby developing their communication skills and enhancing their confidence in real-life situations. Together, these applications demonstrate AI's potential to create inclusive and meaningful educational experiences in various learning contexts. Despite these benefits, several studies note that the effectiveness of AI depends on infrastructure availability and teacher preparedness. Without adequate resources and professional development, the potential of AI to improve inclusion remains limited. High costs and technological complexity may also hinder its implementation in low-resource contexts, underscoring the need for context-sensitive approaches to ensure equitable access. Most studies focus on how AI enhances accessibility and the personalization of learning. However, Sghaier et al. (2022) explore the metaverse as an immersive educational environment, emphasizing its ability to offer interactions tailored to individual needs, especially for students with motor or communication disabilities. Although its implementation faces technological challenges, these immersive environments, along with intelligent tutoring systems, enable teaching to be adjusted to each student's pace and progress. These applications highlight AI's potential to create inclusive and meaningful educational experiences in diverse learning contexts. On the other hand, Tzimiris et al. (2023) adopt a contextual approach, analyzing how remote teaching and digital platforms facilitated or complicated educational access for students with special needs during the pandemic. Although this study does not specifically address the personalization of learning through AI, it highlights the importance of maintaining a continuous connection to educational environments, despite the challenges posed by limited technological resources and parental resistance to digital tools. These results collectively indicate that while AI has the potential to transform inclusive education, its effectiveness is influenced by broader systemic factors, such as digital inequality and sociocultural acceptance. Addressing these barriers will require collaborative efforts among educators, policymakers, and technology developers to design solutions that are both innovative and accessible. Figure 8 provides an integrated view of the analyzed studies, highlighting how AI and emerging technologies transform

educational models by adapting to students' individual needs. The key elements identified include MOOCs, which eliminate barriers for students with specific needs, and the diversity of educational materials, which facilitates active participation in learning. Furthermore, flexible pedagogical strategies that enable pressure-free learning, adjusted to each student's pace, are emphasized.

Student engagement is a critical factor in fostering academic success and promoting deeper learning. Engagement refers to the level of involvement, interest, and emotional investment students exhibit in their learning activities. It has been shown to significantly influence both cognitive and affective outcomes in education. This literature review explores the concept of student engagement, its dimensions, and factors that enhance or hinder engagement, with a focus on recent research and developments. Student engagement is generally divided into three interrelated dimensions: behavioral, cognitive, and emotional. Each of these dimensions contributes uniquely to students' overall engagement and their academic performance. Behavioral engagement refers to students' active participation in academic activities, such as attending classes, completing assignments, and contributing to discussions. It is often considered the most visible form of engagement. In a study by Okafor et al. (2023), students who participated in interactive activities, such as collaborative projects and peer teaching, showed higher levels of behavioral engagement. These students were more likely to complete assignments on time and contribute meaningfully to class discussions. Cognitive engagement involves the mental investment students make in their learning, which includes strategies for self-regulation, critical thinking, and problem-solving. This dimension is particularly important for fostering deeper learning. Umeh and Okonkwo (2023) found that students who utilized metacognitive strategies and engaged in complex problem-solving activities exhibited greater cognitive engagement, which was linked to higher academic achievement. AI-driven learning tools that adapt to individual student needs have also been found to support cognitive engagement by providing personalized challenges that encourage higher-order thinking (Adebayo et al., 2023). Emotional engagement pertains to the feelings students experience towards their learning, including their interest, enthusiasm, and motivation. Positive emotional engagement is often linked to higher motivation and academic persistence. Adeniran and Folarin (2024) noted that students who felt supported and recognized in the classroom were more emotionally engaged, which in turn contributed to their persistence and overall academic success. The use of gamification and AI-powered tools, such as virtual learning environments, has been shown to increase emotional engagement by making learning more interactive and enjoyable (Adetunji & Alabi, 2024). Effective teaching strategies play a crucial role in fostering student engagement. Approaches that emphasize active learning, collaboration, and real-world problem-solving are associated with higher levels of engagement. Adebayo et al. (2023) demonstrated that incorporating project-based learning (PBL) and flipped classrooms into the curriculum led to higher student engagement, particularly among students who struggled with traditional lecture-based teaching. Similarly, the integration of AI tools that personalize learning experiences has been found to enhance engagement by catering to individual learning preferences (Adetunji & Adeoye, 2023). The classroom environment, including both physical and social factors, can have a significant impact on student engagement. Positive teacher-student relationships and a supportive classroom atmosphere are key to fostering emotional engagement. Okafor et al. (2024) found that students in classrooms where teachers encouraged open communication and provided timely feedback demonstrated greater emotional and behavioral engagement. Moreover, creating an inclusive environment where diverse perspectives are valued has been shown to increase student engagement, particularly for students from underrepresented groups (Olawale & Folarin, 2024). The use of technology in the classroom, particularly AI-driven educational tools, has been shown to increase engagement. Adaptive learning systems, which provide personalized learning experiences, help students stay engaged by challenging them at an appropriate level. Umeh and Okonkwo (2023) found that AI-based tools such as virtual reality (VR) and interactive simulations significantly boosted engagement in STEM courses by providing immersive and hands-on learning experiences. Furthermore, mobile apps and gamified learning platforms have been shown to keep students motivated by offering instant feedback and rewards, which foster both cognitive and emotional engagement (Adeniran & Folarin, 2024). Collaboration and peer interaction also play a significant role in enhancing student engagement. Peer teaching, group discussions, and collaborative projects allow students to share ideas, solve problems collectively, and engage in meaningful dialogue. Okafor et al. (2023) noted that students who engaged in collaborative learning experiences were more likely to demonstrate both cognitive and behavioral engagement. In classrooms that encouraged peer interaction, students not only gained new insights but also felt a greater sense of belonging and motivation to participate.

Recent studies suggest that, if properly implemented, AI can significantly enhance students' active participation and equity in learning (Toyokawa et al., 2023; Sghaier et al., 2022). However, the introduction of AI in inclusive education also raises ethical and technological challenges, such as data privacy, equitable access to technology, and resistance from some communities to its adoption (Choez Calderón & Miranda Bajaña, 2024; Hong et al.; Klimova et al., 2023). An example of these challenges can be observed in the study by Choez Calderón and Miranda Bajaña (2024), where a school implemented an AI-based intelligent tutoring system that collected sensitive data about students' performance and needs. Although the tool improved learning personalization, the Lack of clear policies regarding data management raised concerns among parents about privacy and the potential misuse of information. This case highlights the importance of establishing robust ethical standards to safeguard the rights of students and their families. Despite its potential benefits, there is a lack of research that comprehensively synthesizes findings on the use of AI in inclusive education. Although Toyokawa et al. (2023)

address AI-supported active reading and Tuna (2022) studies humanoid robots for children with autism, there are still no studies that analyze how these technologies could benefit students with multiple disabilities in underserved contexts. This systematic review aims to fill this gap by providing a detailed analysis of the impact of AI on learning accessibility and personalization, while also identifying the main challenges and limitations faced by educational institutions in implementing AI in inclusive settings. Given the emerging nature of this field, this study adopts an exploratory approach to synthesize existing findings and provides a broad understanding of the potential applications and challenges of AI in inclusive education. By taking this approach, this study seeks to address key dimensions of this underexplored topic, identifying trends and gaps to guide future research efforts. Furthermore, the current practices, benefits, and ethical dilemmas associated with AI use will be evaluated to provide recommendations that can guide future research and inclusive educational policies. This study is structured around three main research questions: How does AI enhance the accessibility and personalization of learning for students with special needs or disabilities? According to the reviewed studies, 60% (3/5) of the authors highlight how AI alleviates teachers' workload by automating repetitive tasks, such as grade management and academic progress tracking. This enables educators to dedicate more time to meaningful pedagogical activities, enhancing the learning experience and improving job satisfaction. Toyokawa et al. (2023) point out that automating the monitoring of academic performance facilitates more timely and personalized interventions, allowing teachers to focus on direct student engagement. Tuna (2022) emphasizes that humanoid robots and virtual agents not only support personalized learning for students with Autism Spectrum Disorder (ASD) but also assist teachers in planning activities, reducing their administrative burden, and enabling better pedagogical support. In remote education contexts, Tzimiris et al. (2023) highlight that digital platforms helped maintain educational continuity during the pandemic. However, they also identified challenges, such as parents' lack of familiarity with technology, which in some cases affected student participation. Additionally, data literacy, promoted among both teachers and students, is key to preparing them for a future where decision-making based on data will be essential. Despite these benefits, the increasing reliance on AI for administrative tasks raises concerns about over-automation, which could reduce opportunities for direct human interaction in educational settings. These findings highlight the need to strike a balance, ensuring that AI complements rather than replaces pedagogical engagement. Moreover, successful implementation still depends on the investment in infrastructure and teacher training, especially in low-resource contexts. Although not all studies explicitly focus on the administrative workload, Patiño-Toro et al. (2023) concentrate on inclusion through the creation of accessible MOOCs. This approach, more oriented towards inclusive educational design, reflects how AI can facilitate the participation of students with specific needs, even if it does not directly address administrative optimization. Sghaier et al. (2022) point out that the metaverse allows teachers to efficiently manage personal data and coordinate activities, streamlining information transfer and task planning. This immersive technology not only optimizes resource management but also enhances learning environments by providing more dynamic educational experiences. Despite these promising examples of AI applications, some things might be viewed as drawbacks to AI, especially in the education sector. AI limits human interaction, the development of social skills, and the ability to build relationships. AI can also be a problem for developing countries because of its relatively high cost and because of insufficient internet connectivity to operate AI.

AI solutions also make the learning process so dependent on computing systems and infrastructure that it can become a target for cyberattacks and experience various technical problems. AI technology is also allegedly triggering the emergence of new methods of plagiarism. With increasingly sophisticated AI algorithms, this tool can paraphrase the original document, change conjunctions, and so on without changing the meaning. So that this plagiarized writing becomes like the original work. To overcome this, experts recommend that educational institutions implement plagiarism checker solutions that are also AI-based. Recent innovations allow developers to teach computers to perform complex tasks. This leads to opportunities to improve the learning process. However, the "teacher" is irreplaceable. AI provides many benefits for students and teachers. First, for the student. 1) Education can be done at any time. By physically attending class, it's clear that it is time-consuming, traveling at least. AI-based applications provide the opportunity to study in your spare time, spending ten or fifteen minutes, without the need to attend class. In addition, students can get feedback from tutors or instructors directly. 2) Various options to suit student needs. AI-based solutions can adapt according to the student's level of knowledge, topics of interest, and so on. 3) AI-based systems will tend to help students with their weak sides. It offers learning materials based on their weaknesses. For example, students take a test before starting to use the app; The app analyzes them and provides the appropriate assignments and courses. 4) Virtual mentors. The AI-based platform offers virtual mentors to track student progress. Of course, only "human" teachers can better understand student needs, but it's worth getting instant feedback from a virtual tutor.

With AI, it can help identify superior talents or identify learning difficulties faced by students. Learning in AI systems is technology-based and personalized learning, so that it can foster the independence of students, which will improve their learning experience. AI learning that emphasizes individual systems can increase student learning focus. AI can identify concepts like what students don't understand, so that later AI can adjust and find new ways to help student learning. Thus, the right way of teaching students can be analyzed through artificial intelligence. Second, for teachers and school institutions. 1) Opportunity to see the "weaknesses" of students. Different training courses make it possible to see gaps in students' knowledge. For example, AI can tell the teacher if many students choose the wrong answer for a particular question. As

a result, the tutor can pay attention to the requested topic. 2) Better engagement. Modern technologies such as VR and gamification help engage students in the educational process, making students more interactive. Various AI-enabled algorithms can analyze user knowledge and interests and provide recommendations and training programs that can be further personalized. 3) Automatic curriculum creation. Teachers benefit greatly from AI development. Currently, they do not need to create a curriculum from scratch. As a result, tutors spend less time searching for the necessary educational materials. 4) Opportunity to find good teachers. With this online educational platform and the availability of "teachers" to choose from, students can communicate with specialists from other countries. AI-enabled educational platforms offer suitable tutors, depending on teaching experience and soft skills.

With AI, making media or teaching materials will become easier; teachers do not need to understand technology in detail. There are already many applications and platforms available; teachers just need to sort and choose according to their needs. In terms of assessment, with AI, teachers no longer need to spend a lot of time assessing student assignments. Assessment of student assignments can be done automatically, and even item analysis can be obtained directly without the teacher having to do the analysis one by one. Students also get direct scores thanks to the application of AI in education. They don't have to wait long to find out their value. With the help of the teacher's task in minimizing the time in assessing, the teacher will have more time to focus on the teaching and learning process. With the application of AI, learning activities can be carried out at any time. The presence of AI-based applications provides opportunities to learn anytime and anywhere, not limited by space and time. In addition, students also have the opportunity to find teachers other than the teachers at the school. With this online education platform and the availability of "teachers" to choose from, students can communicate with other teachers, even with teachers from other countries. The learning experience and abilities of students will certainly be able to develop better. With the implementation of AI in education, in a pandemic situation like today, where the learning process has been forced to use the online mode, it is very useful. Learning activities are changed from conventional to online to facilitate the delivery of information and communication between teachers and students, so that learning can continue. With the presence of AI in education, education is expected to be better and able to develop according to the times. The presence of AI technology is a breakthrough in the field of education to facilitate learning and can foster independence, it does not have to depend on the role of a teacher who is too dominant, but teachers can shift to a level that provides enlightenment with substantial keywords and more importantly, must be returned to the essential teaching is moral education that must be maintained. Changes in the demands of education require innovation and creativity in the learning process. With the development of artificial intelligence in the field of education, it to help process daily activities, including teaching and learning. Therefore, the teacher's intelligence is unmatched as the natural teacher's intelligence that has been bestowed by the creator. However, a gift needs to be maintained properly and optimally. Artificial intelligence that emerged as the industrial revolution is also the result of the creative minds of human natural intelligence. So that, when compared, the two will never have an equal position. Artificial intelligence can collaborate with natural intelligence to become a perfect whole. In the future progress of science and technology, teacher work such as correcting, student attendance, giving daily tests and exams, explaining knowledge, making administrative reports, and other systemic work can be submitted to be completed by technological devices. Teachers can save more energy and can focus more on non-systematic work to create a golden generation with more character and quality, with natural intelligence that robots cannot.

H. Improving Learning Outcomes

The integration of Artificial Intelligence (AI) in education is revolutionizing traditional teaching methods. AI-based instructional strategies are being increasingly implemented in classrooms to enhance student engagement and improve learning outcomes. These strategies include AI-driven personalized learning, adaptive learning platforms, and intelligent tutoring systems. The integration of Artificial Intelligence (AI) into educational settings has led to transformative shifts in classroom instruction, student engagement, and learning outcomes. AI-based instructional strategies, such as personalized learning systems, intelligent tutoring systems, and adaptive assessments, offer promising ways to tailor education to individual students' needs. This study explores how these AI-driven strategies influence student engagement and learning outcomes in classrooms, focusing on the potential benefits and challenges they present. AI has emerged as a valuable tool in modern education, enabling personalized learning experiences that adapt to students' abilities, interests, and learning speeds. AI-powered systems, like intelligent tutoring systems, use machine learning algorithms to assess students' knowledge levels and provide targeted instruction and feedback, which helps students progress at their own pace and bridges learning gaps more efficiently than traditional instruction. For instance, adaptive learning platforms can modify content and offer additional exercises when students struggle, thus creating a more student-centered learning environment. Student engagement is a critical factor in academic success, encompassing behavioral, emotional, and cognitive dimensions. AI-based instructional tools can boost engagement by making learning more interactive and relevant. Personalized recommendations, gamified learning experiences, and real-time feedback can capture students' attention and keep them motivated. Studies have shown that gamified AI learning environments can improve both engagement and retention, as students enjoy immediate rewards and challenges that sustain their interest. Furthermore, AI can help educators identify disengaged students by analyzing behavioral data, such as frequency of interactions and quiz performance, enabling timely intervention. Research has shown that AI-based instructional strategies can have a positive impact on student learning

outcomes, especially in terms of improving knowledge retention, critical thinking, and problem-solving skills. By offering customized instruction and allowing students to work at their own pace, AI tools help maximize learning potential. In mathematics, for example, AI-enabled tutoring systems have led to measurable improvements in student performance by providing individualized problem-solving exercises and explanations that cater to each student's level. The instant feedback that AI provides allows students to learn from mistakes quickly, reinforcing their understanding of core concepts and encouraging higher-order thinking (Zheng et al., 2020). While AI-based instructional strategies offer significant benefits, they also present challenges, particularly regarding equity, accessibility, and data privacy. The effectiveness of AI in education often depends on access to technological resources and infrastructure, which may vary widely across educational institutions and regions. Additionally, there are concerns about the ethical implications of data collection and privacy, as AI systems rely on large amounts of student data to provide personalized instruction (Holmes et al., 2021). Ensuring that AI applications are equitable, transparent, and respectful of student privacy is essential to maximizing their positive impact on learning outcomes. Artificial Intelligence (AI) is rapidly transforming instructional strategies in education, enhancing teaching effectiveness and improving learning outcomes. Its integration into education is evident across various levels, from personalized learning experiences to automating administrative tasks. This literature review explores the application of AI-based instructional strategies, their effectiveness, and the associated challenges, with a focus on recent studies and relevant references.

AI enables personalized learning by tailoring content, pace, and methods to individual learner needs. For instance, adaptive learning systems such as DreamBox and ALEKS utilize AI algorithms to analyze student performance and adjust learning pathways dynamically. Studies have shown that such systems significantly improve learner engagement and comprehension (Nguyen et al., 2023). In Nigeria, the adoption of AI in education remains nascent but promising. A study by Olaleye and Adekunle (2022) highlights the potential of AI-powered systems to bridge the learning gap in under-resourced schools. However, challenges such as inadequate infrastructure and technical expertise limit widespread implementation. AI fosters collaborative learning by facilitating peer-to-peer interactions and group projects. Tools like chatbots and AI-assisted discussion forums enable students to engage in meaningful dialogue, guided by AI-generated prompts. Research by Adeniran et al. (2024) indicates that AI-supported collaborative learning enhances critical thinking and problem-solving skills among secondary school students in Lagos State. Moreover, collaborative platforms powered by AI, such as Google Classroom and Microsoft Teams, have become vital in post-pandemic education. These tools not only support real-time interaction but also provide insights into group dynamics and individual contributions, ensuring balanced participation. AI simplifies administrative tasks such as grading, attendance tracking, and content delivery, allowing educators to focus more on teaching. Systems like Gradescope and Turnitin automate grading and plagiarism detection, ensuring consistency and efficiency (Baker et al., 2023). In Nigeria, institutions like the University of Lagos are piloting AI-driven platforms to manage course allocations and student assessments, as reported by Ajayi and Okonkwo (2024). These innovations reduce the administrative burden on educators, enabling them to dedicate more time to instructional design and student mentoring. AI-powered tools like Grammarly and Ecree provide instant feedback on writing assignments, helping students improve their skills iteratively. Research by Wang and Li (2023) demonstrates that such tools significantly enhance academic writing proficiency among undergraduates. Similarly, AI-based formative assessments, such as quizzes generated through platforms like Quizlet, provide immediate feedback, reinforcing learning and identifying areas for improvement. In Nigerian universities, AI-driven feedback systems are being integrated into e-learning platforms to ensure timely and constructive feedback (Ogundele et al., 2023).

I. Facilitating Differentiated Instructions

Artificial intelligence (AI) is a branch of computer science that deals with creating smart machines that can do jobs usually only capable by human intelligence. This includes recognizing objects, understanding, and speaking languages, making decisions, and translating between different languages. The purpose of AI is to create machines that can learn independently on their own and get better at solving tasks over time. Large amounts of data and complex instructions are being processed by today's AI systems to help machines understand information, gain knowledge from what they do, and become more efficient as they learn more. Significant advancements in various fields have been achieved through the evolution of AI, including healthcare, finance, and autonomous driving, demonstrating its potential to transform industries and impact every aspect of our daily lives. It is important to understand how the evolution of AI can be effectively integrated into various educational contexts, including differentiated instruction classrooms (Johler & Krumsvik, 2022). The integration of AI in education helps in promoting personalized learning, where it can customize the content of lessons to suit students' individual needs and provide a more beneficial and meaningful learning experience. This study contributes to the growing body of research on AI in education and provides valuable insights for educators, policymakers, and researchers. There is significant evidence that the use of AI in education enhances the quality of teaching and learning. For instance, Chen et al. (2020) observed a remarkable improvement in the efficiency and effectiveness of administrative tasks handled by educators due to AI. Seo et al. (2021) also reported that AI systems provide significant assistance in online education, promote personalized student learning experiences, efficiently organize routine tasks for instructors, and enable adaptive evaluations. Furthermore, research by Kim and Kim (2023) indicated that most STEM educators have had positive experiences with AI, particularly in its role as an advanced support mechanism for learning. The interest in the use of Artificial Intelligence (AI) in education has

increased significantly over the years among researchers. A systematic review by Chen et al. (2020) found that AI has shown remarkable improvement in terms of the efficiency and effectiveness of administrative functions performed by instructors, such as reviewing and grading students' assignments. The study also highlighted that AI systems have been able to tailor and personalize curriculum and content according to students' needs, therefore improving learners' experience and the overall quality of learning. Results from an experiment by Essel et al. (2022) found that students show a positive response in the form of academic performance when they interact with a chatbot compared to interacting with the course instructor. The students react positively in regards of the chatbot's integration into the course. Kim and Kim (2023) conducted a qualitative study on STEM teachers' perceptions of using AI for scientific writing. The study revealed that most STEM teachers positively experienced AI as a source for superior scaffolding. However, they also raised several issues caused by using AI, such as the change in the role played by teachers in the classroom and the transparency of the decisions made by the AI system. Celik (2023) surveyed 428 teachers to understand their knowledge of integrating AI into education. The study found that if teachers have more knowledge to interact with AI-based tools, they will have a better understanding of the pedagogical contributions of AI. However, only technological knowledge is not sufficient for the educational integration of AI-based tools. For teachers to deploy AI in education efficiently, technological knowledge is meaningful when it is combined with pedagogical knowledge. A systematic review by Chichekian and Benteux (2022) emphasizes the need to better understand, empirically evaluate, and design learning experiences about the impact of AI-driven technologies on students' academic success. A study by Seo et al. (2021) found that AI systems offer effective support for online learning and teaching, including personalizing learning for students, automating instructors' routine tasks, and powering adaptive assessments. Although AI systems have been positively recognized for improving the quantity and quality of communication, for providing just-in-time, personalized support for large-scale settings, and for improving the feeling of connection, there were concerns about responsibility, agency, and surveillance issues. Besides that, a study by Lai et al. (2023) on the influence of AI on adolescent social adaptability found that the application of artificial intelligence in education (AIEd) negatively affects adolescents' social adaptability, and that family support (a form of social support) plays an intermediary role between AIEd and social adaptability. Finally, a systematic review by Celik et al. (2022) showed that AI offers teachers several opportunities for improved planning (e.g., by defining students' needs and familiarizing teachers with such needs), implementation (e.g., through immediate feedback and teacher intervention), and assessment (e.g., through automated essay scoring) of their teaching. In conclusion, AI presents significant advantages in enhancing teaching methodologies and the educational system at large. It empowers educators to fully realize their students' potential. Nonetheless, it is important for teachers to actively assume their roles, ensuring that students derive the utmost benefit from the integration of AI in education. Differentiated Instruction (DI) is an instructional approach that allows teachers to meet the diverse needs of students in a classroom. It involves modifying the content, process, product, and learning environment to cater to the individual learning styles, readiness, and interests of students. A study by Ismail and Abdul Aziz found that teachers are aware that DI is an excellent strategy and can fulfill academic needs. However, they struggle to implement it due to challenges such as designing differentiated lesson plans, time constraints, and a lack of funding. Similarly, Nayman and Altun (2022) found that teachers do not implement DI because they do not know the method, there are central exams, a lack of materials, and class size. On the other hand, teachers implement DI because they believe that each student learns differently and administrative support for the instructional model. Krishan and Al-Rsa'i (2023) found that the use of technology-oriented DI helps in increasing students' motivation towards learning science. Shareefa (2023) found that longer teaching experience does not guarantee better use of DI in teaching. The implementation of DI is the result of an intentional attempt combined with adequate knowledge and intention to really use it and engage in the process. Sulistianingrum et al. (2023) found that teachers with a longer educational background and tenure have a better ability to implement students' sensory learning styles in creating differentiated content so they can manage the class well. However, Smets et al. (2020) found that teachers struggled in assessing students' differences. Moreover, teachers' responsibility appeared to be determined. These studies highlight the need for professional development and support for teachers to effectively implement DI in their classrooms. Pozas et al. (2021) found that teachers' DI practice is positively associated with students' school well-being, social inclusion, and academic self-concept. However, teachers do not implement DI frequently as DI is a demanding and challenging approach. Zakarneh et al. (2020) revealed that teachers find it challenging to strike a balance between weak, average, and fast learners in mixed-ability classrooms. Bidari (2021) reported that DI was not even close to the initial stage of implementation due to large class size, syllabus constraint, time constraint, lack of teacher professional development events, and digital incompetence during the COVID-19 pandemic. In conclusion, while DI has the potential to cater to the diverse needs of students, its implementation is not without challenges. Training, resources, and administrative backing are some of the supports needed by teachers to implement DI effectively in their classrooms. The TPACK framework is an important model to understand the complex interaction of technology, pedagogy, and content knowledge necessary for effective teaching. It outlines the idea that successful instructional technology integration requires understanding not just of the technology itself but also of how it relates to pedagogical techniques and subject matter content. Brianza et al. (2022) emphasize the importance of context in TPACK development, promoting a comprehensive view that supports different educational settings. Zhang and Tang (2021) extend this perspective by

reviewing TPACK literature and proposing model adaptations that encourage experiential learning for pre-service teachers. The practicality of TPACK is further validated through the work conducted by Juhaevah and Kaliky (2023), who explore the implementation of the framework in microteaching scenarios within mathematics education, including online platforms. In addition, a case study from Australia conducted by Gromik et al. (2023) observes the incorporation of TPACK within teachers' professional expertise. The role of innovativeness in adopting TPACK is highlighted by Çoklar and Özbek, who insist that a teacher's readiness for innovation significantly influences their technological competencies and intentions. Tondeur advocates for a personalized approach to pre-service teacher education in digital competencies, challenging the effectiveness of uniform educational strategies. A revision of the TPACK framework by Mishra was proposed to make it accurately represent the contextual knowledge necessary for technology integration in teaching. This modification calls for semantic consistency within the diagram to reflect the evolving understanding of TPACK. The integration of Artificial Intelligence (AI) into teaching practices is an expanding field of interest in the education domain. This study aimed to focus on teachers' perceptions of incorporating AI into their teaching practice in the context of differentiated instruction classrooms. The research addresses two important questions: What are teachers' perceptions of the integration of AI in their teaching practice? And what are teachers' perceptions of the integration of AI in differentiated instruction classrooms? The survey includes various elements of AI integration in teaching, including Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Technological Pedagogical and Content Knowledge (TPACK), and integrating AI in Differentiated Instruction (AIDI). The results revealed that teachers express optimism in their ability to use AI-based tools, with mean scores ranging from 3.50 to 4.67 on a scale of 1 to 5. However, there were certain areas where teachers felt less confident. In the TK category, teachers felt most optimistic about initiating tasks using AI-based technologies, but in contrast, they sought more improvement in the context of their overall knowledge of AI-based tools. This suggests that teachers feel uncertain about their capabilities and skills in using AI while feeling confident in integrating the AI-based tools in their teaching practice. Thus, further training or resources are needed to fully optimize the AI-based tools available for teaching. In the TPK category, teachers strongly agreed that AI-based tools provided valuable benefits to adapt their teaching materials. This is in line with the study by Akram et al (2022), where teachers exhibit positive attitudes towards the integration of technology in pedagogical methods. However, uncertainties in choosing the appropriate AI-based tools for their practice dominate their thoughts. This indicates that teachers know the potential AI tools that can enhance their practice, but more guidance and exposure are needed in choosing the suitable tools for their specific teaching contexts. In the TCK category, teachers show positive attitudes in their ability to use AI-based tools to find educational material. However, they felt slightly less confident in their ability to use specific AI-based tools in their teaching field. More exposure or training that involves field-specific AI tools is needed, even though they feel comfortable using AI tools. A study by Marzuki et al. (2023) supports this observation, indicating that while teachers acknowledge the benefits of AI writing tools in improving students' writing quality, they are also aware of the need for more specialized training to fully utilize these technologies. In the TPACK category, teachers feel strongly confident in using AI-based tools for personalized learning. However, they felt unsure in their ability to take a leadership role in integrating AI-based tools among their colleagues. This suggests that when it comes to guiding and motivating their colleagues in using AI tools in their respective teaching practices, teachers may feel less prepared, even though they can apply it themselves. Previous study by Kim (2023) suggests that effective teacher enhance their subject expertise and build capacity through data-informed methods and reflective assessment. Teachers need to develop their data literacy and teamwork skills, alongside anticipating AI tools, to possess TPACK competencies and conflict resolution abilities. In the AIDI category, teachers strongly agree that significant improvement is present in the form of student engagement after integrating AI in their DI classroom. However, the teachers felt less confident in employing DI based on students' various learning styles and abilities. This gives the impression that despite seeing the increasing student engagement when using AI, they still feel the need for more support in implementing DI using AI tools. Generally, teachers are excited about using AI-based tools in their practice, but they agree on the need for further training to fully understand the most effective way to integrate AI into their practices. Teachers observe the potential and benefits of AI in enhancing student engagement and personalizing their learning experience, but they feel the need for extra support in implementing DI strategies and guiding their colleagues in promoting the use of AI in their respective teaching practices. These findings highlight the importance of providing teachers with ongoing support and training in using AI tools effectively. Professional development courses that focus on AI integration in teaching should be provided by the state education department and the Ministry of Education (MOE). Courses such as workshops on how to choose suitable AI tools according to their teaching context, seminars on the latest AI trends in education, and collaborative learning communities where teachers can share sessions amongst themselves to share their efforts should be promoted by the ministry.

The integration of artificial intelligence (AI) systems into education has the potential to revolutionize the approach to inclusive learning. By harnessing AI, educators can create personalized learning experiences that cater to the diverse needs of students, break down barriers, and ensure equitable access to quality education. This perspective aligns with the foundational theories of personalized learning and adaptive instruction, which emphasize the critical importance of customizing educational content and delivery to meet the specific needs, abilities, and learning styles of individual students (Maghsudi

et al., 2021). The principles of personalized learning and adaptive instruction provide a strong theoretical basis for the integration of AI into inclusive education approaches are rooted in the belief that education should not be a uniform process, but rather one that is tailored to the unique requirements of each learner. AI systems, with their capacity to analyze extensive student data, are particularly well-equipped to fulfill this role. They can identify patterns, preferences, and areas of strength and weakness, thereby enabling the creation of customized educational materials and teaching strategies. This degree of personalization not only improves learning outcomes but also cultivates a sense of empowerment and engagement among students, particularly those from underserved or marginalized communities (Kamalov et al., 2023; Gurrib, 2023). Inclusive education has become a fundamental strategy to ensure that all students, regardless of their abilities or backgrounds, have equitable access to quality education. This approach underscores the necessity for schools to accommodate diverse learning needs and to provide all students with the opportunity to succeed. In recent years, artificial intelligence (AI) has gained prominence in the field of education as a powerful tool to enhance personalized learning experiences. AI technologies have evolved rapidly, offering a range of applications that can be leveraged to support differentiated instructions. AI holds the potential to revolutionize how educators address the varied needs of their students through intelligent tutoring systems, adaptive learning platforms, and automated assessment tools. By analyzing extensive datasets on student performance, AI systems can generate insights into individual learning styles, preferences, and areas requiring additional support. This data-driven approach allows for the customization of educational content, enabling educators to create more inclusive learning environments in which all students can thrive. Furthermore, the concept of "AI-powered democratization of education" underscores the potential of AI to break down traditional barriers to learning and provide equitable access to high-quality educational resources. This is particularly relevant for students from underserved or marginalized communities, who may face geographical, cultural, or linguistic barriers to education. AI-powered educational platforms can connect learners with similar profiles, promote collaborative learning, and foster a sense of community. This is in line with the core goals of inclusive education, which aim to ensure that all learners, regardless of their backgrounds or abilities, can participate and succeed (Bulathwela et al., 2021). The integration of AI into inclusive education also supports instructional frameworks by providing rapid, consistent feedback, personalized content, and adaptive learning pathways. For example, AI-powered intelligent tutoring systems can analyze student performance and adjust the complexity and pace of the content accordingly, ensuring that each learner receives the appropriate level of challenge and support (Maghsudi et al., 2021). Additionally, AI-driven learning analytics can help educators identify learning gaps and provide targeted interventions, enabling timely and effective responses to individual students' needs. This adaptive approach not only supports differentiated instruction but also helps create a more inclusive and empowering educational ecosystem (Bulut et al., 2024).

J. Synthesis

The reviewed literature and studies from 2020 to the present demonstrate that Artificial Intelligence (AI) is transforming education by providing tools that support teachers in addressing the diverse needs of learners, particularly in inclusive classrooms. AI is no longer just a futuristic concept but an active component in educational delivery worldwide.

AI tools range from general-purpose applications to specialized educational technologies. Generative AI tools such as ChatGPT, Cohere, and Quillbot are used for drafting, summarizing, and rephrasing content, aiding teachers in lesson preparation and academic writing tasks (Rahman et al., 2023; Golen, 2022). Text-to-speech and speech-to-text software improve accessibility for learners with reading or writing difficulties (Perez, 2023). Intelligent tutoring systems (ITS) provide adaptive, personalized instruction, adjusting to students' learning pace and style (Lee & Koh, 2020). Other tools include virtual mentors like Blackboard for publishing course materials and assessments, voice assistants (e.g., Siri, Google Assistant) for quick information access, and smart content platforms like Netex Learning for curated digital learning materials.

In inclusive education, specialized tools like The Universal Sandpit's Task Analysis Tool break tasks into manageable steps for learners with disabilities, while Social Script Generators help students prepare for social interactions, enhancing their classroom participation. Diffit adapts texts to various reading levels and languages, supporting differentiated instruction (Williams, 2023). Educational games like Duolingo and personalized learning platforms (e.g., Ruanguru) also utilize AI to maintain engagement while targeting skill acquisition.

Although AI use among teachers varies, studies show that a growing number recognize its potential to enhance teaching efficiency. Teachers commonly use AI tools for lesson planning, creating instructional materials, differentiating texts, automating assessments, and providing real-time feedback (Williams, 2023; Fels, 2021). AI assists in automating repetitive tasks, allowing teachers to focus on direct instruction and student support. In the Philippine context, while implementation remains at an early stage, the National AI Roadmap and smart campus initiatives signal a readiness to integrate AI systematically within the education sector (PNA, 2021; PIA, 2021).

AI tools facilitate various inclusive teaching strategies, including scaffolding through adaptive learning platforms, gamification to boost engagement, immediate formative assessment, and task analysis for students with special needs. They enable personalized learning paths, allowing students to progress at their own pace, and provide multimodal representations of content to accommodate diverse learning styles (Lee & Koh, 2020; Yin et al., 2021).

AI integration spans language learning, reading and literacy, STEM education, and social-emotional learning. Chatbots, for example, are used for conversational practice in language education, while adaptive math platforms tailor problem sets

based on learner performance. Presentation translators and smart content systems support cross-linguistic access to curricular materials, expanding participation among learners from multilingual backgrounds (Perez, 2023).

Research highlights that AI tools especially benefit learners with disabilities and those requiring differentiated support. Students with learning disabilities, language barriers, cognitive delays, and behavioral challenges gain increased access through AI's assistive features such as speech recognition, personalized task instructions, and multimodal feedback (Williams, 2023; Yin et al., 2021). However, studies also caution that AI tools must be carefully selected and integrated to ensure they do not exacerbate existing inequities in access.

Evidence shows that AI tools contribute significantly to: Enhancing accessibility and participation by providing alternative input and output modalities for learners with disabilities; Improving learning outcomes through adaptive content and targeted practice (Fels, 2021); Facilitating differentiated instruction, enabling teachers to modify content and assessments efficiently based on students' needs (Williams, 2023).

However, the effectiveness of AI tools is contingent upon teachers' knowledge and confidence in integrating them, institutional support, and alignment with inclusive education policies (Lee & Koh, 2020; Rahman et al., 2023). Additionally, ethical considerations such as data privacy, equity of access, and teacher workload implications must be addressed in AI integration efforts.

In summary, literature and studies underscore that AI has vast potential to support inclusive education, particularly when used to complement teacher expertise rather than replace it. While international and national efforts promote AI integration in schools, there is limited research documenting how AI tools are specifically used in Philippine public school inclusive classrooms. This study bridges that gap by assessing the use and perceived effectiveness of AI tools among teachers in Quezon's 4th District, providing evidence that can inform policies, teacher training, and school technology planning to uphold inclusive, equitable, and quality education for all learners.

3. Research Methodology

This section presents the research design, Research Local, Population and Sampling, Respondents of the Study, Research Instrument, Data Gathering Procedure, and the Statistical Treatment of Data.

A. Research Design

This study will employ a Descriptive-Evaluative Research Design. The descriptive aspect of the study will focus on identifying and documenting how AI tools are currently being used by public school teachers in inclusive classrooms in Quezon Province's 4th District. It will describe the types of AI tools utilized, how frequently they are used, and the specific instructional purposes for which teachers integrate them into their lessons. It will also examine how these tools are utilized in classroom instruction, including the teaching strategies and methods they support, the activities or subjects where AI is integrated, and the learner groups benefiting from their use.

The evaluative aspect of the study will assess teachers' perceptions of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms. This includes evaluating how teachers perceive AI tools in terms of enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction. It will also explore the challenges teachers face in integrating AI tools into their teaching practices and determine the rank order of the extent of AI tool use, utilization, and perceived effectiveness to identify which tools or practices are most significant in inclusive teaching.

This Descriptive-Evaluative Research Design is deemed appropriate because it allows the study to systematically document existing practices while also assessing the perceived value and impact of AI tools from the teachers' perspectives. The design will generate comprehensive findings that can inform policy recommendations, teacher training programs, and future AI integration strategies to promote more inclusive, accessible, and effective education for all learners.

B. Research Local

This study will be conducted in the 4th Congressional District of Quezon Province, Philippines—formerly known as Tayabas. The district is one of the four congressional districts in Quezon and has been represented in the House of Representatives of the Philippines since 1987. It encompasses a diverse cluster of municipalities situated along the Tayabas Isthmus and Alabat Island, namely: Alabat, Atimonan, Calauag, Guinayangan, Gumaca, Lopez, Perez, Plaridel, Quezon (municipality), and Tagkawayan.

These municipalities collectively form a geographically and socio-culturally diverse area that includes coastal, island, and mainland communities. This diversity reflects varying socio-economic conditions, access to educational resources, and community development levels—factors that are essential to understanding the implementation and perception of Artificial Intelligence (AI) tools in inclusive education. Such variations in context will enable the study to capture a broad and realistic picture of how AI technologies are being utilized in public school settings that differ in resources, infrastructure, and learner demographics.

As of the 19th Congress, Quezon's 4th District is represented by Hon. Keith Micah Tan of the Nationalist People's Coalition (NPC). The inclusion of schools from multiple municipalities ensures that the study covers a wide range of experiences among public school teachers handling inclusive classrooms. This is particularly relevant in examining how AI tools are applied across schools with differing levels of technological advancement and readiness.

The 4th District represents both rural and semi-urban educational environments, making it an ideal setting for this research. Schools in this district serve as microcosms of the challenges and opportunities faced by Philippine public schools in integrating digital and AI-assisted learning approaches. Public schools within these municipalities implement inclusive education programs that cater to learners with diverse needs,

including those with disabilities, learning difficulties, and other exceptionalities. Hence, they provide an appropriate context for assessing the use and perceived effectiveness of AI tools in supporting differentiated instruction and inclusive classroom practices.

Furthermore, the selected schools operate under the supervision of the Department of Education (DepEd) – Division of Quezon, adhering to national policies such as Republic Act No. 11650, or the Inclusive Education Act of 2022.

This ensures that the study is aligned with the current educational framework promoting accessibility, equity, and quality education for all learners.

Overall, the 4th District of Quezon serves as a significant and strategic research locale, offering a comprehensive view of how AI integration in inclusive education unfolds within the context of Philippine public schools, balancing innovation, resource limitations, and the commitment to inclusivity.

C. Population and Sampling

This study will employ purposive sampling to select teachers who have direct experience with inclusive teaching and, ideally, have utilized AI tools in their classrooms. The sample will include public school teachers from approximately 10 to 15 schools within the 4th District of Quezon Province. An estimated minimum of 100 teacher-respondents will be involved to ensure that the findings are comprehensive, meaningful, and reflective of the varied contexts and teaching realities across the district's inclusive education settings.

D. Respondents of the Study

The respondents of this study will be the public-school teachers handling inclusive classrooms in the 4th District of Quezon Province during the Academic Year 2025–2026. These will include: Special Education (SPED) teachers who teach in self-contained SPED classes or resource rooms, working directly with learners who have disabilities and General Education (GenEd) teachers who teach regular classes but also accommodate learners with diverse needs, such as students with disabilities, learning difficulties, or other exceptionalities, within inclusive classroom settings.

E. Research Instrument

The researcher will utilize four (4) sets of the researcher-made questionnaires for the AI in Inclusive Classrooms: Assessing Teachers' Use and Perceived Effectiveness in Quezon Province's Public Schools for School Year 2025-2026.

These will be shown to his adviser for corrections, suggestions and recommendations. Series of validation processes will be made before the questionnaires are given to the respondents.

Data sharing agreement will be secured before administering the instrument.

Part I will be for the extent of AI tools being used by public school teachers in inclusive classrooms in Quezon's 4th District, as described in terms of: Types of AI tools utilized, Frequency of use, and Specific instructional purposes.

Part II will be for the extent of the utilization of these AI tools in inclusive classroom instruction, along with: Teaching strategies and methods supported, Activities or subjects where AI is integrated, and Learner groups benefiting from AI use.

Part III will be for the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, particularly in terms of: Enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction Part IV will be for the various challenges encountered when integrating AI tools within an inclusive classroom setting.

The Rating Scale below will be utilized:

Table 1
Rating scale

Number Scale	Range	Interpretation
4	3.50 to 4.00	**Always (A)**
3	2.50 to 3.49	**Often (O)**
2	1.50 to 2.49	**Sometimes (S)**
1	1.00 to 1.49	**Never (N)**

F. Data Gathering Procedure

Since this study will be conducted through an online survey, a Google Form will be used as the main questionnaire to make it easier for teachers to access anytime and anywhere. The survey link will be shared with Special Education (SPED) teachers who teach learners with disabilities in the identified schools. It will be distributed through platforms that are convenient for them, such as email, school group chats, or messaging apps like WhatsApp, so they can answer using their smartphones, tablets, or computers, depending on what is most accessible to them.

Before answering the survey, teachers will be given simple and clear instructions explaining the purpose of the study, how their responses will be kept confidential, and how to fill out each part of the form. They will also be asked to read and agree to an informed consent statement to confirm that they are participating voluntarily. After this, they can proceed to answer the questionnaire honestly based on their own experiences and perceptions.

G. Statistical Treatment of Data

The following statistical tools and methods will be used to analyze the data gathered in this study. Descriptive statistical methods such as mean, frequency, percentage, and ranking will be used to summarize and interpret the quantitative data collected.

Frequency Count and Percentage will be used to describe the distribution of respondents' profiles (e.g., teaching position, years of experience) and to identify the types of AI tools utilized by public school teachers in inclusive classrooms.

Weighted Mean will be computed to determine: The extent of use of AI tools by teachers, based on their responses to the Likert-scale items; The extent of utilization of AI tools in various teaching strategies, subjects, and learner groups; and the perceived effectiveness of AI tools in enhancing accessibility, improving learning outcomes, and facilitating differentiated instruction.

Rank Order will be used to identify and rank the AI tools, instructional uses, and perceived effectiveness indicators from

highest to lowest, showing which aspects are most prominent among respondents.

The Wilcoxon Mann Whitney U-test was used to determine the significant difference on the rank orders of the effectiveness of AI tools in inclusive classrooms among public school teachers in Quezon Province for the Academic Year 2025-2026. (Siegel & Castellan, Jr. 1988).

4. Presentation, Analysis, and Interpretation of Data

This section presents the data gathered, their analysis and interpretation which would provide the answers to the questions raised in section 1. The data is presented in tabular form in accordance with the specific question prepared by the researcher for the extent of AI tools usage.

Table 2 shows the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District in terms of Types of AI Tools You Use. The results show the weighted mean score of 3.76, which corresponds to the descriptive interpretation of "Always" takes on a deeper meaning when we consider that the respondents are a mix of Special Education (SPED) and General Education (Gen Ed) teachers. In an inclusive classroom, these two groups must collaborate to ensure no child is left behind. This high score suggests that AI has become the "common language" between them, a tool that allows Gen Ed teachers to handle diverse needs and SPED teachers to scale their specialized support.

All indicators rated "Always", were: AI educational games, (3.88); Adaptive learning software (e.g., Khan Academy, DreamBox), (3.78); AI chatbots or virtual assistants (e.g., ChatGPT), (3.78); AI-based assessment tools (e.g., Gradescope, Quillionz), (3.74); Speech-to-Text tools (e.g., Google Voice Typing, Otter.ai), (3.72); and Text-to-Speech tools (e.g., Natural Reader, Speechify), (3.64).

The highest-rated indicator, Integration of AI tools in daily lesson delivery (3.78), represents the "Inclusive Frontline." For a Gen Ed teacher managing a large class, AI allows them to deliver a single lesson that can be instantly adapted for different learners. For the SPED teacher, this frequent integration ensures that their students are not pulled out of the classroom for "separate" instruction but are instead participating in the same daily flow as their peers. This high frequency indicates that AI is the glue holding the inclusive environment together, making the "daily delivery" flexible enough for everyone.

On the other hand, the Use of AI for student remediation or extra practice (3.52) is the lowest-rated indicator, likely due to the "Human Intervention" philosophy shared by both SPED and Gen Ed educators. When a student fails to grasp a concept, teachers especially those trained in Special Education often believe that the most effective remedy is a personalized, face-to-face intervention. While they trust AI to deliver a lesson or provide captions, they are more hesitant to leave a struggling student alone with a computer for remediation. This lower score reflects a professional boundary where teachers prioritize their role as the primary "healer" of learning gaps, using AI as a support tool rather than a replacement for the intensive, one-on-one encouragement that struggling learners require.

According to Lee & Koh, 2020, artificial Intelligence has already permeated many industries, including education. AI is unquestionably beneficial to the education sector, particularly when combined with excellent teaching resources that include instructions and materials.

Table 3 shows extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District in terms of Frequency of use. The results show the weighted mean score of 3.68, which corresponds to the descriptive interpretation of "Always" reveals that for Special Education (SPED) and General Education (Gen Ed) teachers in Quezon Province's 4th District, AI has become a foundational pillar of their daily workflow. In an inclusive classroom where the primary challenge is balancing a standard curriculum with diverse learning needs these scores reflect a "work smarter, not harder" evolution. For these educators, AI serves as the "common language" that allows them to scale their efforts, ensuring that inclusion is not just a policy, but a functional daily reality. All indicators rated "Always", were: Integration of AI tools in daily lesson delivery, (3.78); Use of AI to provide accessibility support (e.g., text-to-speech, captions) for learners with special educational needs, (3.76); Utilization of AI to simplify or localize instructional materials to match the diverse reading levels of the students, (3.75); Application of AI in classroom assessment and grading, (3.58); and Use of AI for student remediation or extra practice, (3.52).

The highest-rated indicator, Integration of AI tools in daily lesson delivery (3.78), reflects the "Inclusive Frontline." For a Gen Ed teacher managing a large class, AI allows them to deliver a single lesson that can be instantly adapted for different learners. For the SPED teacher, this frequent integration ensures that their students are not pulled out of the classroom for "separate" instruction, but are instead participating in the same daily flow as their peers. This high frequency indicates that AI is the glue holding the inclusive environment together,

Table 2
The extent of AI tools usage among public school teachers in inclusive classrooms in Quezon province's 4th district in terms of types of AI tools you use

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Text-to-Speech tools (e.g., Natural Reader, Speechify)	3.64	A	6	3.64	A	6	3.64	A	6
2. Speech-to-Text tools (e.g., Google Voice Typing, Otter.ai)	3.72	A	5	3.72	A	5	3.72	A	5
3. Adaptive learning software (e.g., Khan Academy, DreamBox)	3.74	A	3.5	3.82	A	2	3.78	A	2.5
4. AI-based assessment tools (e.g., Gradescope, Quillionz)	3.74	A	3.5	3.74	A	4	3.74	A	4
5. AI chatbots or virtual assistants (e.g., ChatGPT)	3.76	A	2	3.80	A	3	3.78	A	2.5
6. AI educational games	3.84	A	1	3.92	A	1	3.88	A	1
Average	**3.74**	**A**		**3.77**	**A**		**3.76**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

Table 3
The extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th district in terms of frequency of use

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Integration of AI tools in daily lesson delivery.	3.64	A	2	3.92	A	1.5	3.78	A	1
2. Use of AI for student remediation or extra practice.	3.18	O	5	3.86	A	3	3.52	A	5
3. Application of AI in classroom assessment and grading.	3.42	O	4	3.74	A	5	3.58	A	4
4. Use of AI to provide accessibility support (e.g., text-to-speech, captions) for learners with special educational needs.	3.72	A	1	3.80	A	4	3.76	A	2
5. Utilization of AI to simplify or localize instructional materials to match the diverse reading levels of the students.	3.58	A	3	3.92	A	1.5	3.75	A	3
Average	**3.51**	**A**		**3.85**	**A**		**3.68**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

providing the flexibility needed to keep all students regardless of their abilities on the same page every single day.

Conversely, the Use of AI for student remediation or extra practice (3.52) stands as the lowest-rated indicator. While still used consistently, its position at the bottom of the list suggests a lingering commitment to the human-to-human connection during the most vulnerable moments of learning. When a student is struggling and requires remediation, both SPED and Gen Ed teachers likely feel that a "personal touch" or a direct, empathetic explanation is more effective than an algorithm. They are willing to let AI help *deliver* the lesson (the highest score), but they are more cautious about letting it be the sole provider of "second-chance" learning. This highlights a healthy professional boundary where teachers prioritize their role as the primary "healer" of learning gaps, using AI as a supportive tool rather than a replacement for human intervention.

This finding supports Albayati's (2024) prediction that ChatGPT would become widely used, especially among undergraduate students. The analysis shows that most students use AI tools to check grammatical errors and highlight issues with their English grammar knowledge. Additionally, a significant number of students use AI to enhance subject knowledge, and more than half use AI, particularly generative tools like ChatGPT, to generate study notes. This trend indicates that students prefer using AI tools over traditional course materials to gain knowledge.

Table 4 shows the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District in terms of Purpose of Using AI Tools. The results show the weighted mean score of 3.35, which corresponds to the descriptive interpretation of "Often" suggests that while AI is a frequent guest in the inclusive classrooms of Quezon Province's 4th District, its role is more specialized than in daily delivery. When Special Education (SPED) and General Education (Gen Ed) teachers look at the purpose behind the technology, they are clearly prioritizing the "behind-the-scenes" preparation and the fundamental mission of inclusion over the actual delivery of the lecture itself.

The indicators rated "Always", were: AI tools are used to support students with diverse learning needs, (3.65); and AI tools are used to assist in lesson planning and the creation of instructional materials, (3.63), while the indicators rated "Often", were: AI tools are used to provide extra exercises or practice, (3.32); AI tools are used to assess student learning, (3.26); and AI tools are used to deliver lessons more effectively, (2.88).

The highest-rated indicator, supporting students with diverse learning needs (3.65), underscores the heart of the inclusive classroom. This "Always" rating shows that AI is being used as a primary bridge for equity. For a SPED teacher, this might mean using AI to translate a complex concept into a simplified visual; for a Gen Ed teacher, it means ensuring that a student with a disability has the same access to information as everyone else. This peak in the data confirms that teachers view AI first and foremost as an accessibility tool designed to level the playing field, ensuring that "diversity" in the classroom is met with "versatility" in instruction. This is closely followed by lesson planning and material creation (3.63), revealing that AI is the primary engine reducing the massive administrative burden of tailoring one lesson into multiple formats.

In contrast, the lowest-rated indicator is using AI to deliver lessons more effectively (2.88). While still practiced "Often," its significantly lower score compared to the others points to a vital human truth: teachers still believe they are the best messengers for learning. While they are more than happy to let AI help them plan the lesson or modify the materials for diverse needs, they are less likely to let the AI take the lead during the actual delivery stage. Both SPED and Gen Ed teachers know

Table 4
The extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th district in terms of purpose of using AI tools

Indicators	SPED teachers			General education teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. AI tools are used to deliver lessons more effectively.	3.64	A	5	2.12	S	5	2.88	O	5
2. AI tools are used to provide extra exercises or practice.	3.72	A	4	2.92	O	3	3.32	O	3
3. AI tools are used to assess student learning.	3.74	A	2.5	2.78	O	4	3.26	O	4
4. AI tools are used to support students with diverse learning needs.	3.74	A	2.5	3.56	A	1	3.65	A	1
5. AI tools are used to assist in lesson planning and the creation of instructional materials.	3.76	A	1	3.50	A	2	3.63	A	2
Average	**3.72**	**A**		**2.98**	**O**		**3.35**	**O**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

Table 5
The summary of the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon province's 4th district

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Types of AI Tools You Use	3.74	A	1	3.77	A	2	3.76	A	1
2. How Often You Use AI Tools	3.51	A	3	3.85	A	1	3.68	A	2
3. Purpose of Using AI Tools	3.72	A	2	2.98	O	3	3.35	O	3
Average	**3.66**	**A**		**3.53**	**A**		**3.59**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

that the magic of a lesson often comes from eye contact, reading the room, and emotional encouragement tones that an AI cannot replicate. This result highlights a professional pride where teachers use AI to sharpen their tools, but insist on being the ones to swing the hammer.

Conferring to Fitria, 2021, the role of Artificial Intelligence (AI) technology is increasingly evident in various sectors, including the education sector. The presence of AI technology has transformed the educational curriculum, especially in the fields of technology, science, mathematics, and engineering. But AI will also change the face of the world of education. One technology that has recently received attention is Artificial Intelligence (AI). This technology has an important role in facilitating various job functions, including in the field of education. AI can also be implemented in the world of education. Teachers/lecturers can understand student needs more easily and more deeply.

Table 5 shows the summary of the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District. The results show the weighted mean score of 3.59, which corresponds to the descriptive interpretation of "Always" serves as a powerful testament to the digital transformation occurring within the inclusive classrooms of Quezon Province's 4th District. This summary suggests that for Special Education (SPED) and General Education (Gen Ed) teachers, AI has moved from being a "tech experiment" to a "standard operating procedure." It paints a picture of a teaching force that is no longer asking if they should use AI, but rather how it can best serve their diverse student population.

The indicators rated "Always", were: Types of AI Tools You Use, (3.76); and How Often You Use AI Tools, (3.68). While the indicator rated "Often" was Purpose of Using AI Tools, (3.35). The highest-rated indicator in this summary is the Types of AI Tools Used (3.76).

This reflects the versatility and curiosity of the teachers. In an inclusive setting, a "one size fits all" approach is a recipe for failure; therefore, teachers are reaching for a wide variety of tools from gamified learning to chatbots and accessibility features to build a multi-layered support system. This high score suggests that SPED and Gen Ed teachers are highly resourceful, constantly curating a "digital toolbox" that can be pivoted at a moment's notice to support a student with a specific learning gap or disability.

On the other hand, the Purpose of Using AI Tools (3.35) stands as the lowest-rated indicator, moving into the "Often" category. While this score is still strong, it reveals a fascinating professional nuance: teachers are very clear about what tools they have (Types) and how frequently they use them (Frequency), but they are slightly more selective about the intent behind the usage. This suggests that while AI is always "on" and present in the room, teachers are carefully guarding certain pedagogical boundaries. They are "Always" using the tools to support the classroom environment, but they may only "Often" use them for specific tasks like high-stakes assessment or direct lesson delivery. It highlights a human-centric approach where the purpose is driven by the teacher's professional judgment rather than just technological capability.

Table 6 shows the results of the significant difference on the rank orders significant difference on the rank orders on the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District between the SPED and Gen. Ed teachers. The summation of the ranks of the SPED teachers along with; Types of AI tools utilized 42, Frequency of use 40, and Specific instructional purposes for which AI tools are employed 15, while the summation of the ranks of the Gen. Ed. teachers in and Gen. Ed teachers in Types of AI tools utilized 36, Frequency of use 15, and Specific instructional purposes for which AI tools are employed 40. The Wilcoxon Mann-Whitney U-Test was used to determine whether there exists a significant difference on the rank orders of the empowerment roles of school heads in the utilization of the technologyenhanced instruction.

The computed z-values were Types of AI tools utilized -0.40 ($p>0.05$), Frequency of use -2.51 ($p<0.05$), and Specific instructional purposes for which AI tools are employed -2.51 ($p>0.05$). Thus, the null hypothesis was rejected except Types of AI tools utilized.

Table 6
The significant difference on the rank orders on the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon province's 4th District between the SPED and Gen. Ed teachers

Indicators	Types of AI tools utilized	Frequency of use	Specific instructional purposes for which AI tools are employed
Summation of the Ranks of SPED teachers	42	40	15
Summation of the Ranks of Gen. Ed teachers	36	15	40
Total Number of Cases	12	10	10
Computed z	-0.40	-2.51	-2.51
Probability Associated with the Z	0.3446	0.0060	0.0060
Decision on H0	Accepted	Rejected	Rejected
Significant Difference	Not Significant	0.05	0.05

Table 7
The extent of utilization of AI tools in inclusive classroom instruction, in terms of teaching strategies and methods supported by AI

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Utilizing AI to provide varied content or activities that match the unique cognitive levels of students with diverse needs.	3.76	A	2	3.60	A	1	3.68	A	1.5
2. Using AI tools to facilitate group activities where students with and without disabilities can contribute equitably.	3.84	A	1	3.52	A	4	3.68	A	1.5
3. Leveraging AI analytics to track individual student growth and intervene immediately when a learner struggle.	3.74	A	3.5	3.58	A	2	3.66	A	3
4. Employing AI to efficiently plan lessons that incorporate Universal Design for Learning (UDL) principles.	3.74	A	3.5	3.56	A	3	3.65	A	4
5. Using AI (e.g., automated prompts or simplified text) to provide temporary assistance to students until they can perform a task independently.	3.48	O	5	3.50	A	5	3.49	O	5
Average	**3.71**	**A**		**3.55**	**A**		**3.63**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

Based on the results, the researcher decided to reject the null hypothesis on the Frequency of use, and Specific instructional purposes for which AI tools are employed. This is because the probability values were less than 0.05. Analytically, we can say that there is significant difference on the rank orders of the extent of AI tools usage among public school teachers in inclusive classrooms in Quezon Province's 4th District between the SPED and Gen. Ed teachers. While the researcher decided to accept the null hypothesis on the Types of AI tools utilized because the probability value is greater than 0.05. We can say that there is no significant difference on extent of AI tools usage among public school teachers in inclusive classrooms between the two groups of respondents.

The statistical analysis reveals a nuanced landscape regarding how AI is integrated into inclusive classrooms in Quezon Province's 4th District, suggesting that while the types of AI tools used are relatively uniform across the board, the behavioral application of these tools differs significantly between SPED and General Education teachers. The acceptance of the null hypothesis regarding the types of AI tools utilized implies that both groups have access to and are aware of a similar technological toolkit, likely driven by standardized DepEd resources or common digital literacy levels. However, the significant differences found in frequency of use and specific instructional purposes (both $p < 0.05$) indicate a divergence in how these tools are prioritized and operationalized. SPED teachers, who recorded higher rank summations in frequency and variety of types, may be leaning more heavily on AI to meet the intensive demands of Individualized Education Programs (IEPs), whereas General Education teachers might be utilizing AI for different, perhaps more administrative or broad-scale, instructional goals.

These findings imply a need for more targeted professional development that moves beyond what tools to use and focuses on how and how often they should be applied to maximize inclusivity. Since the null hypothesis was rejected for the majority of the categories, it is evident that the professional context whether one is teaching in a specialized or general capacity fundamentally shapes the integration of AI. For school administrators, this suggests that a one-size-fits-all AI training program may be ineffective. Instead, support should be tailored to bridge the gap between these two groups, ensuring that General Education teachers are empowered to use AI with the same frequency and instructional depth as their SPED counterparts to better support diverse learners in an inclusive setting.

Table 7 shows the extent of utilization of AI tools in inclusive classroom instruction, in terms of Teaching strategies and methods supported by AI between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.63, which corresponds to the descriptive interpretation of "Always" signifies that AI has become a foundational pillar for both SPED and Gen. Ed. teachers.

The indicators rated "Always" were: Utilizing AI to provide varied content or activities that match the unique cognitive levels of students with diverse needs, (3.68); Using AI tools to facilitate group activities where students with and without disabilities can contribute equitably, (3.68); Leveraging AI analytics to track individual student growth and intervene immediately when a learner struggle, (3.66); and Employing AI to efficiently plan lessons that incorporate Universal Design for Learning (UDL) principles, (3.65). While the indicator rated "Often" was Using AI (e.g., automated prompts or simplified text) to provide temporary assistance to students until they can perform a task independently, (3.49).

The highest-rated indicators utilizing AI for varied content and facilitating equitable group activities (both 3.68) highlight a primary professional drive to solve the differentiation problem. These scores suggest that teachers are leaning heavily on AI to eliminate the logistical barriers of traditional instruction, allowing them to instantly level materials and create collaborative environments where students with disabilities can participate as equals. This is further reinforced by the high score for UDL-based lesson planning (3.65), which reveals that teachers are proactively using AI as an architectural tool to design flexible learning experiences that anticipate student needs from the outset.

In contrast, the indicator regarding AI driven scaffolding and temporary assistance (3.49) emerged as the lowest-rated item, falling into the "Often" category. While this still reflects frequent usage, the relative dip suggests a strategic pedagogical boundary where teachers prioritize the human element. Scaffolding the delicate process of providing and then gradually withdrawing support is a deeply intuitive task rooted in the teacher-student relationship. The lower score indicates that while teachers always trust AI for the heavy lifting of content

Table 8
The extent of utilization of AI tools in inclusive classroom instruction, in terms of activities or subject areas where AI is integrated

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Using AI (e.g., Text-to-Speech) to support reading, writing, and language instruction for learners with different verbal abilities.	3.76	A	3	3.60	A	1	3.68	A	3
2. Utilizing AI tools to simplify complex math concepts or provide drills for students struggling with numeracy.	3.86	A	2	3.58	A	2.5	3.72	A	1.5
3. Using AI-driven platforms to provide extra support for "at-risk" students or advanced activities for fast learners.	3.74	A	4	3.58	A	2.5	3.66	A	4
4. Utilizing AI chatbots or tools to facilitate group work where students of varying abilities can contribute equally.	3.88	A	1	3.56	A	4	3.72	A	1.5
5. Using AI to localize or simplify lesson content to meet diverse comprehension levels	3.64	A	5	3.50	A	5	3.57	A	5
Average	**3.78**	**A**		**3.56**	**A**		**3.67**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

creation and data analytics (3.66), they are more selective when it comes to delegating the fading of assistance. This reflects a cautious, human-centric approach, where educators prefer to use their own professional judgment to determine when a student is truly ready to transition from AI assisted help to independent mastery.

Table 8 shows the extent of utilization of AI tools in inclusive classroom instruction, in terms of Activities or subject areas where AI is integrated between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.67, which corresponds to the descriptive interpretation of "Always" indicate that AI is not merely an occasional supplement but a consistent, foundational component of classroom instruction. This "Always" rating suggests that both groups of educators recognize AI as a vital bridge for closing the achievement gap, shifting the instructional paradigm from a one-size-fits-all approach to a more personalized, responsive framework that accommodates diverse learner profiles.

All indicators rated “Always” were: Utilizing AI tools to simplify complex math concepts or provide drills for students struggling with numeracy, (3.72); Utilizing AI chatbots or tools to facilitate group work where students of varying abilities can contribute equally, (3.72); Using AI (e.g., Text-to-Speech) to support reading, writing, and language instruction for learners with different verbal abilities, (3.68); Using AI-driven platforms to provide extra support for "at-risk" students or advanced activities for fast learners, (3.66); and Using AI to localize or simplify lesson content to meet diverse comprehension levels, (3.57).

The highest-rated indicators, both sitting at 3.72, focus on simplifying complex math concepts and facilitating group work. The peak score in numeracy support highlights a shared recognition that math is often a high-anxiety subject where students with varying cognitive abilities struggle most; AI provides the immediate, repetitive drills and visual scaffolding necessary for mastery. Simultaneously, the high score for AI-facilitated group work reflects a sophisticated use of technology to foster social equity. By using chatbots or collaborative tools, teachers are ensuring that students with disabilities or communication barriers are not sidelined, allowing them to contribute to peer discussions on equal footing with their Gen. Ed. counterparts.

While still falling under the "Always" category, the indicator regarding localizing or simplifying lesson content received the lowest mean score of 3.57. This relative dip may be attributed to the complexity of localization compared to simplification. While AI is excellent at summarizing text or changing reading levels, localizing content which involves adapting lessons to specific cultural, regional, or community contexts often requires a level of human nuance and pedagogical touch that current AI tools may not yet fully automate. Teachers likely spend more manual effort on this task, or perhaps find that generic AI outputs require more significant editing to meet the specific cultural needs of their local student body.

Table 9 shows the extent of utilization of AI tools in inclusive classroom instruction, in terms of Learner groups that benefit from the use of AI tools between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.81, which

Table 9
The extent of utilization of AI tools in inclusive classroom instruction, in terms of learner groups that benefit from the use of AI tools

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Students with ADHD, Autism, or Dyslexia who benefit from AI’s structure, focus tools, and reading assistance.	3.82	A	3	3.86	A	1	3.84	A	2
2. General education students who use AI to reinforce lesson mastery and improve the quality of their academic outputs.	3.90	A	1	3.80	A	3	3.85	A	1
3. Students struggling with academic delays or low motivation who benefit from AI’s interactive and gamified support.	3.76	A	4	3.84	A	2	3.80	A	4
4. Students with limited physical resources who use offline-capable AI tools to catch up on missed lessons.	3.88	A	2	3.78	A	4	3.83	A	3
5. Students with visual or hearing difficulties who use AI for alternative sensory input (e.g., image descriptions or captions).	3.72	A	5	3.70	A	5	3.71	A	5
Average	**3.82**	**A**		**3.80**	**A**		**3.81**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

corresponds to the descriptive interpretation of "Always" beneficial across all student demographics. This high score suggests that both SPED and Gen. Ed.

teachers view AI as a universal design for learning (UDL) tool rather than a niche intervention. The data indicates that AI is successfully bridging the gap between mainstream and specialized instruction, ensuring that no learner group is left behind.

All indicators rated "Always" were: General education students who use AI to reinforce lesson mastery and improve the quality of their academic outputs, (3.85); Students with ADHD, Autism, or Dyslexia who benefit from AI's structure, focus tools, and reading assistance, (3.84); Students with limited physical resources who use offline-capable AI tools to catch up on missed lessons, (3.83); Students struggling with academic delays or low motivation who benefit from AI's interactive and gamified support, (3.80); and Students with visual or hearing difficulties who use AI for alternative sensory input (e.g., image descriptions or captions), (3.71).

The highest-rated indicator (3.85) pertains to General Education students using AI for lesson mastery and academic output. This is a significant finding because it shows that AI is not being pigeonholed as remedial technology. Instead, teachers recognize its power to elevate the performance of the general student body, helping them refine their work and engage in deeper learning. Closely following this at 3.84 is the benefit for students with ADHD, Autism, or Dyslexia. This high ranking is likely due to AI's ability to provide a predictable structure and sensory-friendly focus tools such as noise cancellation or simplified interfaces which are critical for neurodivergent learners. The narrow margin between these two scores suggests that teachers see AI as equally effective for high-level academic enhancement and essential cognitive support.

The indicator with the lowest mean score, though still interpreted as "Always," is the use of AI for students with visual or hearing difficulties (3.71). While still a very strong score, the relative position at the bottom of the list may be due to the specialized nature of hardware required for these sensory inputs.

While software can provide image descriptions or captions, the effectiveness of these tools often depends on high-speed internet or specific peripheral devices that may not be as widely available as the general apps used for ADHD or academic mastery. Furthermore, the pedagogical training required to integrate AI specifically for the deaf or blind communities is often more specialized than general gamified or structural AI tools.

According to Edtech, 2020, the rapid advancement of Artificial Intelligence (AI) is transforming various sectors, and education is no exception. AI plays a significant role in both general and higher education, influencing students' academic development by offering a mix of opportunities and challenges.

Table 10 shows the summary of the extent of utilization of AI tools in inclusive classroom instruction in Quezon Province's 4th District between SPED and Gen. Ed. Teachers. The results show the weighted mean score of 3.70, which corresponds to the descriptive interpretation of "Always" interpretation signifies that AI integration has transitioned from an experimental phase to a standard professional practice for both SPED and Gen. Ed. teachers. This high level of utilization suggests a systemic shift in the district's pedagogical approach, where AI serves as the primary engine for maintaining inclusivity in diverse classrooms.

All indicators rated "Always", were: Learner groups that benefit from the use of AI tools, (3.81); Activities or subject areas where AI is integrated, (3.67); and Teaching strategies and methods supported by AI, (3.63).

The highest-rated category is Learner groups that benefit from the use of AI tools (3.81). This peak score is significant because it shifts the focus from the technology itself to the human impact. It suggests that the primary driver for teachers in Quezon Province is the visible success and engagement of their students. The fact that Learner Groups leads the summary indicates that teachers are student-centric in their AI adoption; they are not using AI because it is a trendy tool, but because they have observed it directly meeting the specialized needs of neurodivergent, at-risk, and general education students alike. For these respondents, the why of AI benefiting the children is the most established and consistent aspect of their practice.

While still firmly in the "Always" category, Teaching strategies and methods supported by AI (3.63) emerged as the lowest mean score in the summary. This relative difference suggests that while teachers clearly see the benefits for students (3.81) and know which subjects to apply it in (3.67), the actual evolution of their methodology is a more gradual process. Integrating AI into core teaching strategies such as lesson planning, assessment design, or real-time feedback loops requires a higher level of technical proficiency and pedagogical adjustment. It is often easier to provide a student with an AI tool for a specific activity than it is for a teacher to fundamentally restructure their entire teaching method around AI capabilities.

The Wilcoxon Mann-Whitney U-Test was used to determine whether there exists a significant difference on rank orders on the on the extent of utilization of AI tools in inclusive classroom instruction between SPED and GEN. ED teachers.

Table 11 shows the results of the significant difference on the

Table 10
The summary of the extent of utilization of AI tools in inclusive classroom instruction in Quezon province's 4th district between SPED and Gen. Ed. teachers

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Teaching strategies and methods supported by AI	3.71	A	3	3.55	A	3	3.63	A	3
2. Activities or subject areas where AI is integrated	3.78	A	2	3.56	A	2	3.67	A	2
3. Learner groups that benefit from the use of AI tools	3.82	A	1	3.80	A	1	3.81	A	1
Average	**3.77**	**A**		**3.64**	**A**		**3.70**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

Table 11
The significant difference on the rank orders on the on the extent of utilization of AI tools in inclusive classroom instruction between SPED and GEN. ED teachers

Indicators	Teaching strategies and methods supported by AI	Activities or subject areas where AI is integrated	Learner groups that benefit from the use of AI tools
Summation of the Ranks of SPED teachers	20	15	25
Summation of the Ranks of Gen. Ed teachers	35	40	30
Total Number of Cases	10	10	10
Computed z	-1.46	-2.51	-0.42
Probability Associated with the Z	0.0722	0.0060	0.3372
Decision on H0	Accepted	Rejected	Accepted
Significant Difference	Not Significant	0.05	Not Significant

rank orders significant difference on the rank orders on the on the extent of utilization of AI tools in inclusive classroom instruction the two groups. The summation of the ranks of the SPED teachers along with; Teaching strategies and methods supported by AI 20, Activities or subject areas where AI is integrated 15, and Learner groups that benefit from the use of AI tools 25, while the summation of the ranks of the Gen. Ed. teachers in and Gen. Ed teachers in Teaching strategies and methods supported by AI 35, Activities or subject areas where AI is integrated 40, and Learner groups that benefit from the use of AI tools 30.

The computed z-values were Teaching strategies and methods supported by AI -1.46 ($p>0.05$), Activities or subject areas where AI is integrated -2.51 ($p<0.05$), and Learner groups that benefit from the use of AI tools -0.42 ($p>0.05$). Thus, the null hypothesis was rejected except Teaching strategies and methods supported by AI and Learner groups that benefit from the use of AI tools.

Based on the results, the researcher decided to reject the null hypothesis on the Activities or subject areas where AI is integrated. This is because the probability values were less than 0.05. Analytically, we can say that there is significant difference on the rank orders on the extent of utilization of AI tools in inclusive classroom instruction in Quezon Province's 4th District between the SPED and Gen. Ed teachers. While the researcher decided to accept the null hypothesis on the Teaching strategies and methods supported by AI and Learner groups that benefit from the use of AI tools because the probability value is greater than 0.05. We can say that there is no significant difference on the rank orders on the extent of utilization of AI tools in inclusive classroom instruction between the two groups of respondents.

The results of this study yield several critical implications for the implementation of inclusive education within Quezon Province's 4th District. The significant difference observed in the activities and subject areas where AI is integrated suggests a lack of curricular synchronicity between SPED and General Education teachers. It implies that while both groups are utilizing AI, they are doing so in parallel worlds, perhaps with SPED teachers focusing on specialized literacy or communication aids while General Education teachers apply AI to core academic content like Mathematics or Science. For the inclusive classroom, this disparity could lead to a fragmented learning experience for students with special needs, who may find AI support available in one subject but absent in another, hindering the continuity of their learning journey.

Conversely, the lack of significant difference regarding teaching strategies and targeted learner groups points toward a burgeoning professional consensus on the "how" and "who" of AI utility. This implies that both groups of educators are aligned on the pedagogical value of AI, likely viewing it through the lens of Universal Design for Learning (UDL) where adaptive tools are seen as beneficial for a wide range of diverse learners. Because their methods and perceptions of student benefit are harmonized, the district has a unique opportunity to streamline professional development. Rather than creating separate training tracks, the district can host collaborative workshops that focus on bridging the gap in subject-area application, ensuring that AI becomes a seamless, district-wide bridge for inclusion rather than a tool used differently across various classrooms.

Table 12 shows the extent of utilization of AI tools in inclusive classroom instruction, in terms of Learner groups that benefit from the use of AI tools between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.75, which corresponds to the descriptive interpretation of "Always".

All indicators rated "Always" were: AI tools build the self-confidence of diverse learners, making them more active in peer interactions, (3.76); AI tools effectively remove physical and cognitive barriers for learners with disabilities, (3.75); AI technologies reduce the learning "gap" for students with diverse backgrounds and learning styles, (3.75); Real-time AI support (e.g., automated captions/translations) allows students to follow the lesson pace effectively, (3.75); and AI integration promotes equitable participation among all students, regardless of their learning abilities, (3.72).

The results indicate that both SPED and General Education teachers consistently perceive AI tools as highly beneficial for diverse learner groups, as reflected in the overall weighted mean of 3.75 interpreted as "Always." This suggests that respondents regularly observe positive impacts of AI integration in inclusive classrooms. Among the indicators, the highest mean (3.76) for AI tools building the self-confidence of diverse learners may be attributed to the immediate and personalized support that AI provides, allowing students to participate without fear of judgment. Such tools often give instant feedback and adaptive assistance, which can encourage learners especially those with disabilities or learning difficulties to engage more actively in peer interactions and classroom

Table 12
The extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of enhancing accessibility and participation

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. AI tools effectively remove physical and cognitive barriers for learners with disabilities.	3.74	A	4	3.76	A	1	3.75	A	3
2. AI integration promotes equitable participation among all students, regardless of their learning abilities.	3.70	A	5	3.74	A	2.5	3.72	A	5
3. AI technologies reduce the learning "gap" for students with diverse backgrounds and learning styles.	3.78	A	2	3.72	A	4.5	3.75	A	3
4. Real-time AI support (e.g., automated captions/translations) allows students to follow the lesson pace effectively.	3.76	A	3	3.74	A	2.5	3.75	A	3
5. AI tools build the self-confidence of diverse learners, making them more active in peer interactions.	3.80	A	1	3.72	A	4.5	3.76	A	1
Average	**3.76**	**A**		**3.74**	**A**		**3.75**	**A**	

activities.

On the other hand, the lowest mean (3.72), although still interpreted as "Always," was recorded for AI integration promoting equitable participation among all students. This slightly lower rating may indicate that while AI tools are generally effective, there are still practical limitations in ensuring full equity in participation. Factors such as unequal access to devices, varying levels of digital literacy among students, or differences in how teachers implement AI tools could affect the extent to which all learners benefit equally. Overall, the minimal variation among the indicators suggests a strong consensus between SPED and Gen. Ed teachers that AI tools play a significant and consistent role in supporting inclusive education, while also pointing to areas where implementation can still be improved to maximize equity.

Conferring to Toyokawa et al. (2023) show that AI enhances active reading by identifying students' learning strengths and challenges in real time, enabling educators to tailor content and strategies to individual needs. Meanwhile, Patiño-Toro et al. (2023) demonstrate that MOOCs designed for deaf students can eliminate communication barriers and expand equitable access to higher education.

Table 13 shows the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of Improving learning outcomes between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.77 which corresponds to the descriptive interpretation of "Always".

All indicators rated "Always" were: AI-assisted instruction clarifies complex concepts for students with different comprehension levels, (3.85); AI platforms empower students with diverse needs to work independently with minimal teacher supervision, (3.80); AI tools enable students to produce high-quality academic outputs with greater accuracy and efficiency, (3.76); The use of AI tools contributes to a measurable improvement in students' mastery of lesson objectives, (3.72); and Repetitive and interactive AI activities helps students retain critical information more effectively, (3.71).

The findings reveal that both SPED and General Education teachers consistently perceive AI tools as highly effective in improving learning outcomes in inclusive classrooms, as reflected in the overall weighted mean of 3.77 interpreted as "Always." This suggests that AI integration is not only regularly practiced but also seen as a reliable support in enhancing student performance across diverse learning needs.

The highest-rated indicator, "AI-assisted instruction clarifies complex concepts for students with different comprehension levels" (3.85), may be attributed to the adaptive and multimodal features of AI tools. These technologies can present content in simplified, visual, or interactive formats, making abstract or difficult lessons more accessible to learners with varying abilities. This is particularly valuable in inclusive settings where differentiation is essential.

Meanwhile, the lowest-rated indicator, "Repetitive and interactive AI activities help students retain critical information more effectively" (3.71), though still interpreted as "Always," may suggest that retention, while improved, is slightly less evident compared to immediate understanding and task

Table 13
The extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of improving learning outcomes

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. AI-assisted instruction clarifies complex concepts for students with different comprehension levels.	3.82	A	1	3.88	A	1	3.85	A	1
2. The use of AI tools contributes to a measurable improvement in students' mastery of lesson objectives.	3.70	A	4	3.74	A	4.5	3.72	A	4
3. AI platforms empower students with diverse needs to work independently with minimal teacher supervision.	3.78	A	2	3.82	A	2	3.80	A	2
4. Repetitive and interactive AI activities helps students retain critical information more effectively.	3.68	A	5	3.74	A	4.5	3.71	A	5
5. AI tools enable students to produce high-quality academic outputs with greater accuracy and efficiency.	3.74	A	3	3.78	A	3	3.76	A	3
Average	**3.74**	**A**		**3.79**	**A**		**3.77**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

Table 14
The extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of facilitating differentiated instruction

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. AI tools allow for the seamless modification of lesson content to suit each student's current proficiency level.	3.82	A	1.5	3.88	A	2	3.85	A	1
2. AI provides immediate, personalized feedback that helps students correct errors in real time.	3.70	A	5	3.92	A	1	3.81	A	2
3. AI analytics assist in the rapid identification of specific learning gaps within a diverse classroom setting.	3.78	A	4	3.82	A	3	3.80	A	3
4. AI enables the use of varied teaching modalities (visual, auditory, kinesthetic) to accommodate all learners.	3.82	A	1.5	3.76	A	5	3.79	A	4.5
5. AI helps in the efficient development of tiered materials for students with different reading and literacy levels.	3.80	A	3	3.78	A	4	3.79	A	4.5
Average	**3.78**	**A**		**3.83**	**A**		**3.81**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

performance. This could be due to the fact that retention depends on multiple factors beyond AI use, such as students' prior knowledge, consistency of practice, and the way activities are facilitated by the teacher. Additionally, some learners may benefit more from human interaction and contextual reinforcement rather than repetitive digital tasks alone. Overall, the narrow range of scores indicates strong agreement among respondents that AI tools significantly enhance learning outcomes, while also highlighting that long-term retention may require a balanced approach combining AI-supported activities with effective teaching strategies.

Research by Adeniran et al. (2024) indicates that AI-supported collaborative learning enhances critical thinking and problem-solving skills among secondary school students in Lagos State. Moreover, collaborative platforms powered by AI, such as Google Classroom and Microsoft Teams, have become vital in post-pandemic education.

Table 14 shows the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms, in terms of Facilitating differentiated instruction between SPED and Gen. Ed Teachers. The results show the weighted mean score of 3.81 which corresponds to the descriptive interpretation of "Always".

All indicators rated "Always" were: AI tools allow for the seamless modification of lesson content to suit each student's current proficiency level, (3.85); AI provides immediate, personalized feedback that helps students correct errors in real time, (3.81); AI analytics assist in the rapid identification of specific learning gaps within a diverse classroom setting, (3.80); AI enables the use of varied teaching modalities (visual, auditory, kinesthetic) to accommodate all learners, (3.79); and AI helps in the efficient development of tiered materials for students with different reading and literacy levels, (3.79).

The results indicate that both SPED and General Education teachers consistently perceive AI tools as highly effective in facilitating differentiated instruction in inclusive classrooms, as reflected in the overall weighted mean of 3.81 interpreted as "Always." This suggests that AI is regularly utilized to address the varied learning needs of students and is seen as a dependable support for instructional adaptation.

The highest-rated indicator, "AI tools allow for the seamless modification of lesson content to suit each student's current proficiency level" (3.85), highlights the strength of AI in providing adaptive learning experiences. This may be because many AI-powered platforms can automatically adjust the difficulty, pacing, and type of content based on individual student performance, making it easier for teachers to implement differentiation without excessive manual preparation.

On the other hand, the slightly lower ratings for "AI enables the use of varied teaching modalities" and "AI helps in the efficient development of tiered materials" (both 3.79), although still interpreted as "Always," may indicate minor practical challenges in maximizing these features. Teachers may require additional training, time, or resources to fully utilize AI for creating multimodal and tiered instructional materials. It is also possible that while AI offers these capabilities, their effectiveness depends on how well they are integrated into actual classroom practice. Overall, the minimal differences among the indicators show strong agreement between SPED and Gen. Ed teachers that AI tools play a crucial role in supporting differentiated instruction, while also suggesting opportunities to further enhance teachers' capacity to fully leverage AI for diverse instructional strategies.

A systematic review by Chen et al. (2020) found that AI has shown remarkable improvement in terms of the efficiency and effectiveness of administrative functions performed by instructors, such as reviewing and grading students' assignments. The study also highlighted that AI systems have been able to tailor and personalize curriculum and content according to students' needs, therefore improving learners' experience and the overall quality of learning.

Table 15 shows the summary of the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms in Quezon Province's 4th District between SPED and Gen. Ed. Teachers. The results show the weighted mean score of 3.77, which corresponds to the descriptive interpretation of "Always".

All indicators rated "Always", were Facilitating differentiated instruction, (3.81); Improving learning outcomes, (3.77); and Enhancing accessibility and participation, (3.75).

The results in Table XV indicate that AI tools are perceived as highly effective in supporting students with diverse needs in inclusive classrooms, as reflected by the overall weighted mean of 3.77, interpreted as "Always." Among the indicators, facilitating differentiated instruction obtained the highest mean score of 3.81, suggesting that teachers find AI tools most useful

Table 15
The summary of the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms in Quezon province's 4th district between SPED and Gen. Ed. teachers

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Enhancing accessibility and participation	3.76	A	2	3.74	A	3	3.75	A	3
2. Improving learning outcomes	3.74	A	3	3.79	A	2	3.77	A	2
3. Facilitating differentiated instruction	3.78	A	1	3.83	A	1	3.81	A	1
Average	**3.76**	**A**		**3.79**	**A**		**3.77**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

in adapting lessons to meet varying learner needs. This may be attributed to the ability of AI technologies to quickly modify content, provide multiple levels of difficulty, and generate personalized learning materials, which are essential in inclusive settings where student diversity is prominent.

On the other hand, improving learning outcomes, with a mean of 3.77, although still rated "Always," is slightly lower because learning outcomes are influenced by multiple factors beyond AI use, such as student motivation, teaching strategies, and assessment practices. Meanwhile, enhancing accessibility and participation received the lowest mean score of 3.75, which may be due to existing challenges such as limited access to devices, unstable internet connectivity, and varying levels of digital literacy among students.

These factors can affect how effectively AI tools promote full participation, particularly among learners with more complex needs. Overall, while all indicators are rated highly, the slight variations suggest that AI tools are most effective in instructional adaptation and somewhat less influenced by external constraints when it comes to accessibility and measurable learning outcomes.

The Wilcoxon Mann-Whitney U-Test was used to determine whether there exists a significant difference on rank orders on the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms between SPED and GEN. ED teachers.

Table 16 shows the results of the significant difference on the rank orders significant difference on the rank orders on the on the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms between the two groups. The summation of the ranks of the SPED teachers along with; Enhancing accessibility and participation 22.5, Improving learning outcomes 33, and facilitating differentiated instruction 31.5, while the summation of the ranks of the Gen. Ed. teachers in and Gen. Ed teachers in Enhancing accessibility and participation 32, Improving learning outcomes 22, and facilitating differentiated instruction 23.5.

The computed z-values were Enhancing accessibility and participation -0.94 ($p>0.05$), Improving learning outcomes -1.04 ($p>0.05$), and facilitating differentiated instruction -0.42 ($p>0.05$).

Based on the results, the researcher decided to accept the null hypothesis in all the three indicators, enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction because the probability value is greater than 0.05. We can say that there is no significant difference on the rank orders on the extent of effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms between SPED and GEN. ED teachers.

The findings in Table XVI imply that both SPED and General Education teachers share a consistent and unified perception regarding the effectiveness of AI tools in inclusive classrooms. Since no significant differences were found across all three indicators enhancing accessibility and participation, improving learning outcomes, and facilitating differentiated instruction it suggests that AI tools are viewed similarly by both groups, regardless of their specialization. This consistency may indicate that AI technologies are broadly applicable and adaptable across different teaching contexts, supporting diverse learners in comparable ways.

Furthermore, the results imply that professional roles or training backgrounds (SPED vs. Gen. Ed.) do not significantly influence how teachers perceive the benefits of AI in addressing diverse student needs. This could mean that current AI tools are user-friendly and flexible enough to be effectively utilized by teachers with varying expertise in inclusive education. It also highlights the potential for unified training programs or policies on AI integration, as both groups appear to have aligned experiences and expectations.

Lastly, the absence of significant differences may suggest that schools are implementing AI tools in a relatively standardized manner, leading to similar outcomes across teacher groups. This reinforces the idea that AI can serve as a common support mechanism in inclusive classrooms,

Table 16
The significant difference on the rank orders on the extent of the effectiveness of AI tools in supporting students with diverse needs in inclusive classrooms between SPED and GEN. ED teachers

Indicators	Enhancing accessibility and participation	Improving learning outcomes	Facilitating differentiated instruction
Summation of the Ranks of SPED teachers	22.5	33	31.5
Summation of the Ranks of Gen. Ed teachers	32	22	23.5
Total Number of Cases	10	10	10
Computed z	-0.94	-1.04	-0.73
Probability Associated with the Z	0.1736	0.1492	0.2327
Decision on H0	Accepted	Accepted	Accepted
Significant Difference	Not Significant	Not Significant	Not Significant

Table 17
The various challenges encountered when integrating AI tools within an inclusive classroom setting between the SPED and GEN.ED teachers

Indicators	SPED Teachers			General Education Teachers			Average		
	Wx	I	R	Wx	I	R	Wx	I	R
1. Unstable internet connectivity and limited access to functioning hardware (e.g., laptops, tablets) hinder the consistent use of AI tools.	3.58	A	5	3.88	A	2	3.73	A	5
2. Current professional training and digital literacy levels appear insufficient for the advanced technical requirements of AI-based inclusive education.	3.64	A	4	3.92	A	1	3.78	A	1.5
3. The time required for the selection, setup, and troubleshooting of AI platforms adds to the existing academic and administrative workload.	3.70	A	3	3.82	A	3	3.76	A	3.5
4. Concerns regarding student data privacy, algorithm bias, and academic integrity limit the widespread adoption of certain AI technologies.	3.80	A	1	3.76	A	5	3.78	A	1.5
5. High costs associated with premium subscriptions and the maintenance of AI-ready devices pose a challenge for long-term implementation in the Public-School setting.	3.74	A	2	3.78	A	4	3.76	A	3.5
Average	**3.69**	**A**		**3.83**	**A**		**3.76**	**A**	

Legend — Scale: 3.50–4.00 Always (A); 2.50–3.49 Often (O); 1.50–2.49 Sometimes (S); 0.50–1.49 Never (N). Acronyms: Wx = Weighted Mean; I = Interpretation; R = Rank.

promoting equity in instructional delivery and student engagement.

Table 17 shows the various challenges encountered when integrating AI tools within an inclusive classroom setting between the SPED and GEN.ED teachers. The results show the weighted mean score of 3.76 which corresponds to the descriptive interpretation of "Always".

All indicators rated “Always” were: Current professional training and digital literacy levels appear insufficient for the advanced technical requirements of AI-based inclusive education, (3.78); Concerns regarding student data privacy, algorithm bias, and academic integrity limit the widespread adoption of certain AI technologies, (3.78); The time required for the selection, setup, and troubleshooting of AI platforms adds to the existing academic and administrative workload, (3.76); High costs associated with premium subscriptions and the maintenance of AI-ready devices pose a challenge for long-term implementation in the Public School setting, (3.76); and Unstable internet connectivity and limited access to functioning hardware (e.g., laptops, tablets) hinder the consistent use of AI tools, (3.73).

The results in Table 17 indicate that teachers consistently experience challenges when integrating AI tools in inclusive classrooms, as reflected by the overall weighted mean of 3.76 “Always”. This suggests that, despite recognizing the benefits of AI, both SPED and General Education teachers regularly encounter barriers that affect effective implementation.

The highest rated challenges insufficient professional training and digital literacy (3.78) and concerns about data privacy, algorithm bias, and academic integrity (3.78) highlight two critical issues. First, the high rating for training and digital literacy implies that teachers may not feel adequately prepared to handle the technical and pedagogical demands of AI tools. This is likely because AI integration requires not only basic ICT skills but also a deeper understanding of adaptive technologies and inclusive strategies. Second, the equally high concern for ethical issues suggests that teachers are increasingly aware of the risks associated with AI, such as misuse of student data or biased outputs. These concerns can create hesitation or cautious use, thereby becoming a major barrier to adoption.

The lowest rated challenge, though still interpreted as “Always,” is unstable internet connectivity and limited hardware access (3.73). While slightly lower than the others, this may indicate that some schools have already begun addressing infrastructure issues through government or institutional support. However, its continued presence still shows that technological limitations remain a persistent obstacle, especially in less-resourced areas.

Overall, the pattern of results suggests that human factors (skills, training, and ethical concerns) are perceived as slightly more pressing than technical and resource-related issues. This implies that improving teacher capacity and establishing clear policies on AI use may be more urgent priorities than infrastructure alone, although both remain essential for successful AI integration in inclusive education.

The Wilcoxon Mann-Whitney U-Test was used to determine whether there exists a significant difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between SPED and GEN. ED teachers.

Table 18 shows the results of the significant difference on the rank orders significant difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between the two groups.

TABLE 18
The significant difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between SPED and GEN. ED teachers

Indicators	Various challenges encountered when integrating AI tools within an inclusive classroom setting
Summation of the Ranks of SPED teachers	38
Summation of the Ranks of Gen. Ed teachers	17
Total Number of Cases	10
Computed z	-2.09
Probability Associated with the Z	0.0183
Decision on H0	Rejected
Significant Difference	0.05

The summation of the ranks of the SPED teachers along with Various challenges encountered when integrating AI tools within an inclusive classroom setting 38, while in Gen. Ed. teachers 17.

The computed z-values were -2.09 ($p<0.05$). Based on the results, the researcher decided to reject the null hypothesis because the probability value is less than 0.05. We can say that there is a significant difference on the rank orders on the various challenges encountered when integrating AI tools within an inclusive classroom setting between SPED and GEN. ED teachers.

The results in Table 18 imply that SPED and General Education teachers experience and perceive challenges in integrating AI tools in significantly different ways. Since the null hypothesis was rejected, this indicates that the variation in their rank orders is not due to chance, but reflects real differences in their experiences within inclusive classrooms.

One key implication is that SPED teachers appear to encounter greater or more complex challenges compared to their Gen. Ed. counterparts, as reflected by their higher sum of ranks (38 vs. 17). This may be because SPED teachers work more intensively with learners who have diverse and specialized needs, requiring more precise, adaptive, and reliable AI tools. As a result, they may be more sensitive to limitations such as lack of customization, insufficient training, or ethical concerns in AI use.

Another implication is that a one-size-fits-all approach to AI integration may not be effective. Since the two groups differ significantly in their experiences, policies, training programs, and support systems should be differentiated. SPED teachers may require more advanced, specialized training and targeted resources, while Gen. Ed. teachers may need more general support focused on classroom-wide implementation.

Additionally, the findings suggest a need for context-specific interventions. School administrators and policymakers should consider the unique demands of inclusive education, particularly in SPED settings, when designing AI related initiatives. This includes providing adequate technical support, ensuring accessibility features are robust, and addressing ethical concerns more thoroughly.

Overall, the significant difference highlights that while AI tools are being used in inclusive classrooms, the challenges are not experienced equally, emphasizing the importance of tailored strategies to ensure that both SPED and Gen. Ed. teachers can effectively and confidently integrate AI in their teaching.

A. Policy Recommendations

1) Introduction and Rationale: Project AI-INSPECT

The landscape of basic education is undergoing a profound digital transformation, accelerated by the emergence of Artificial Intelligence (AI) as a foundational teaching tool. In inclusive education settings, where General Education (Gen Ed) and Special Education (SPED) teachers must seamlessly collaborate, technology is no longer a luxury—it is the modern infrastructure of equity. To operationalize the empirical findings of this study, this policy recommendation introduces PROJECT AI-INSPECT (AI Integration Support, Policy, & Equity in Inclusive Classrooms). Designed for implementation in the public schools of Quezon Province's 4th District for the Academic Year 2026–2027, this framework transitions research insights into sustainable administrative action. The initiative aims to bridge the operational divides between regular and specialized instruction, standardize data security protocols for vulnerable learners, and establish explicit administrative accountability measures. By anchoring technological adoption within localized policy, this framework ensures that AI remains an active catalyst for equitable classroom inclusion rather than an unguided administrative shortcut.

The institutional necessity of this formal, district-wide policy framework is driven by four critical dimensions identified in the statistical analysis of this study:

Bridging the Purpose-Usage Gap: The empirical data revealed a glaring dissonance between technological access and goal-driven implementation. While teachers frequently interact with AI applications (Frequency Mean: 3.68), their intentional pedagogical application lags behind (Purpose Mean: 3.35). This mismatch is confirmed by a statistically significant Wilcoxon Test result ($z = -2.51, p < 0.05$). Without structural frameworks like AI-Purpose Mapping Workshops, technology runs the risk of being relegated to mere administrative automation rather than serving as a targeted tool for inclusive learning.

Eliminating Subject-Area Disparities: Inclusive education demands uniform curricular access. However, the study uncovered significant variations in AI adoption across different academic disciplines ($z = -2.51, p < 0.05$). To ensure equitable learning outcomes, AI integration cannot remain isolated in tech-heavy subjects or rely solely on individual teacher initiative. Formalizing joint Professional Learning Communities (PLCs) and a Subject-Specific AI Integration Blueprint guarantees that both SPED and Gen Ed teachers deploy adaptive tools uniformly across the entire curriculum.

Mitigating Systemic Challenges and Safeguarding Data: Teachers are operating on an "Inclusive Frontline" under immense pressure, reporting that operational, technical, and workload obstacles are "Always" present (Obstacles Mean: 3.76). Crucially, the nature of these challenges differs significantly between Gen Ed and SPED cohorts ($z = -2.09, p < 0.05$). Furthermore, the integration of generative AI presents severe data privacy risks when handling sensitive student profiles and special needs diagnoses. A localized policy mandate is urgently required to allocate technical infrastructure equitably and establish strict ethical boundaries to protect student confidentiality.

Capitalizing on Proven Efficacy: Despite infrastructural bottlenecks, the study demonstrated a powerful, unified consensus among educators regarding AI's capacity to optimize student differentiation (Mean: 3.81), learning outcomes (Mean: 3.77), and overall accessibility (Mean: 3.75). Strikingly, the Wilcoxon test confirmed no significant variance between SPED and Gen Ed teachers regarding these success indicators. Because the pedagogical value of AI is universally validated by the frontline workforce, it is an ideal candidate for

Table 19
Strategic action plan matrix (A.Y. 2026–2027)
Project Title: PROJECT AI-INSPECT (AI INTEGRATION SUPPORT, POLICY, & EQUITY IN INCLUSIVE CLASSROOMS)

Key Finding / Statistical Basis	Strategic Objective	Action Steps & Key Activities	Key Personnel	Expected Output / Success Indicator
A. Gaps in Usage & Purpose 1. Usage Frequency: Mean 3.68 2. Purpose of Use: Mean 3.35 3. Wilcoxon Test: Significant difference in how often teachers use AI ($z=-2.51$, $p<0.05$).	To normalize usage frequency and help teachers shift from basic automation to meaningful, goal-driven AI adoption.	1. Launch "AI-Purpose Mapping Workshops" to help teachers move past basic administrative shortcuts and into intentional, inclusive teaching. 2. Set up a practical coaching schedule where School Heads can actively observe and guide AI use in the classroom.	1. School Heads 2. Master Teachers 3. Instructional Supervisors	Standardized AI integration logs and localized lesson design guides built directly into everyday lesson planning.
B. Subject-Area Disparities 1. Subject Integration: Mean 3.67. 2. Wilcoxon Test: Significant difference in subject-specific AI adoption ($z=-2.51$, $p<0.05$).	To ensure AI tools are distributed evenly across all academic subjects for both SPED and General Education classrooms.	1. Build active SPED-Gen Ed Professional Learning Communities (PLCs) so teachers can co-create inclusive materials together. 2. Design an AI Subject Integration Map that connects specific platforms (like Gradescope or Khan Academy) directly to target DepEd competencies.	1. Curriculum Planners 2. SPED Teachers 3. Gen Ed Teachers	A district-wide Subject-Specific AI Integration Blueprint tailored for inclusive settings.
C. Heavy Day-to-Day Challenges 1. Encountered Obstacles: Mean 3.76 ("Always"). 2. Wilcoxon Test: Significant difference in the specific challenges faced by each group ($z=-2.09$, $p<0.05$).	To systematically reduce infrastructure gaps, technical issues, ethical concerns, and the heavy workload weighing down both teacher groups.	1. Run a District Infrastructure Audit to make sure inclusive classrooms get priority access to stable internet and hardware. 2. Host practical Digital Literacy & Ethical AI Bootcamps focused on protecting the data privacy of diverse learners.	1. DepEd ICT Division 2. School Heads 3. School ICT Coordinators	District-level Ethical AI Guidelines, a streamlined tech-support system, and better resource distribution.
D. Strong Proven Effectiveness 1. Differentiation: Mean 3.81 2. Learning Outcomes: Mean 3.77 3. Accessibility: Mean 3.75 4. Wilcoxon Test: No significant variation between groups.	To lock in, expand, and sustain the successful strategies that are already improving outcomes for diverse learners.	1. Establish a quarterly Continuous Professional Development (CPD) track centered on AI-driven differentiated instruction. 2. Set up an informal peer-mentoring "buddy system" pairing tech-savvy teachers with colleagues who want to build their confidence.	1. DepEd Division Office 2. School Heads 3. Invited AI-Ed Experts	Completed CPD training modules and a shared resource bank of vetted, high-performing AI inclusion tools.

institutionalization through Continuous Professional Development (CPD) and standard performance metrics (RPMS/IPCRF).

Ultimately, PROJECT AI-INSPECT acknowledges that while AI is an exceptionally powerful tool for educational inclusion (Lee & Koh, 2020), it requires systemic governance to achieve its full, equitable potential. The following matrices outline the strategic action plans and institutional policy mandates designed to transform these data-driven insights into sustainable district realities.

2) Introduction and Rationale: Institutional Policy Recommendation Matrix

The successful deployment of educational technology requires moving past individual teacher initiative and moving toward institutional systemic governance. While individual software choices happen at the classroom level, sustainability requires structured policies from school leadership. To formalize this approach, the Institutional Policy Recommendation Matrix outlines a three-pronged regulatory framework covering Curriculum & Instruction, Governance & Equity, and Administrative Leadership. By embedding technological guidelines directly into existing Department of Education (DepEd) systems—such as Weekly Lesson Logs (WLL), Classroom Observation Tools (COT), and performance evaluations (RPMS/IPCRF)—this matrix transforms raw data into mandatory, enforceable standards. These policies establish clear lines of institutional accountability, ensuring that technology serves as a reliable asset for equity across all public schools in Quezon Province's 4th District.

The institutional necessity of these specific mandates is driven by three critical dimensions identified in the study's statistical analysis:

The Mandate for Structured Collaboration (Policy 1): The study revealed significant disparities in how technology is integrated across different academic subjects ($z = -2.51$, $p < 0.05$). This variance proves that leaving General Education and Special Education teachers to collaborate voluntarily results in uneven integration. To eliminate these subject-area gaps, cooperation must be institutionalized. Formally mandating a minimum of two hours of co-planning per month ensures that cross-disciplinary expertise is systematically shared, creating a unified, district-wide approach to inclusive lesson design.

The Mandate for Data Privacy and Ethical Security (Policy

Table 20
Institutional policy recommendation matrix

Policy Title & Scope	Statistical / Real-World Rationale	Core Policy Mandate	Monitoring & Accountability
Policy 1: The Unified SPED-Gen Ed Collaboration Protocol *(Curriculum & Instruction)*	Data proves clear gaps in how AI is integrated across different subjects (z=−2.51). We cannot leave teacher collaboration to chance or voluntary efforts.	1. Mandate a minimum of two (2) hours of structured co-planning per month for paired SPED and Gen Ed teachers. 2. This time must be used to co-develop AI-supported lessons and share inclusion tactics.	Checked and signed off by Master Teachers or School Heads during the routine review of Weekly Lesson Logs (WLL).
Policy 2: DepEd District Ethical AI & Data Privacy Guidelines *(Governance & Equity)*	Teachers "Always" run into steep challenges (3.76) regarding workload and ethics while handling sensitive student information.	1. Establish a clear, localized "Acceptable AI Use Policy." 2. This rule explicitly bans entering identifiable student diagnoses into public generative AI tools and standardizes the use of verified, secure accessibility platforms.	Annual IT and data privacy compliance reviews managed by the School ICT Coordinator and the Division Data Privacy Officer.
Policy 3: AI-M&E (Monitoring & Evaluation) Integration Framework *(Administrative Leadership)*	While overall AI use is high (3.76), there are visible gaps in how often and why it is used. Administrative tracking needs to catch up.	1. Embed AI-effectiveness indicators straight into standard performance evaluations (like RPMS/IPCRF). 2. Supervisors must evaluate how purposefully AI is used to open up student access (3.75), rather than simply checking if the technology was turned on.	Built directly into the standard Classroom Observation Tool (COT) rubrics used by School Heads.

2): Frontline teachers reported that technical, operational, and workload obstacles are "Always" present (Mean: 3.76), with the specific nature of these challenges differing significantly between Gen Ed and SPED cohorts ($z = -2.09, p < 0.05$). When handling sensitive student diagnostic profiles and accommodation needs, navigating these platforms without centralized guidance creates severe data liability risks. A localized Acceptable AI Use Policy is urgently required to establish strict boundaries against data exposure, protecting student confidentiality while providing clear technical support pathways to reduce teacher burnout.

The Mandate for Goal-Driven Accountability (Policy 3): The data uncovered a major gap between technological access and purposeful application. While teachers frequently use these tools (Frequency Mean: 3.68), their goal-driven pedagogical execution lags behind (Purpose Mean: 3.35), a mismatch confirmed by the Wilcoxon Test ($z = -2.51, p < 0.05$). Traditional administrative monitoring that simply tracks if technology is being used is no longer sufficient. By updating standard observation rubrics (COT) and performance evaluations to prioritize purposeful student accessibility (Mean: 3.75), school leadership can ensure that digital tools are used to actively close student learning gaps rather than serve as mere operational shortcuts.

5. Summary of Findings, Conclusions and Recommendations

This section presents a summary of the findings, issues and implications, and reflections of the study. The recommendations are also provided in this section.

A. Summary of Findings

When we look at how public-school teachers in the 4th District of Quezon Province are actually using AI in their classrooms, a few things become incredibly clear. It is not a question of if they are using it, but rather how it is reshaping their daily work and where the system is pushing back.

1. AI is part of the daily routine, but deep integration takes work. Teachers in these districts—including Tagkawayan, Guinayangan, Lopez, and Calauag—have genuinely embraced AI. On a broad level, tools like ChatGPT, text-to-speech software, and content adaptors are a constant presence in their daily routines, earning an overall rating of "Always" used.

However, there is a slight catch: when it comes to deeply embedding these tools into highly specific subject lessons or complex activities, that frequency dips slightly to "Often." This tells us that while teachers are comfortable using AI for general tasks, they still face a learning curve when trying to weave it directly into specialized parts of the curriculum.

2. SPED and General Education teachers are having very different experiences. One of the most striking parts of the data comes from the Wilcoxon Mann-Whitney U-test, which highlights a major divide between Special Education (SPED) and General Education (Gen Ed) teachers. They aren't using AI the same way, they aren't integrating it into their subjects at the same frequency, and they are running into completely different roadblocks.

That said, they do agree on two massive points: AI genuinely works: Both groups strongly feel that AI is highly effective at breaking down barriers for diverse learners, helping scale differentiated instruction, and tailoring lessons to students with specific physical or cognitive needs.

Humans come first: When a student is heavily struggling with a complex learning gap, both SPED and Gen Ed teachers draw a hard line. They firmly believe that machine automation cannot replace the "Human Intervention" threshold—real, one-on-one human connection and teacher-led remediation always take priority.

3. Systemic hurdles are holding the technology back. Despite the optimism and regular use, teachers are constantly swimming upstream against structural challenges. These pain points are felt universally and were ranked as "Always" present.

The reality of teaching in rural areas means facing a mix of severe barriers: a distinct lack of formal technical training and professional development, alarming data privacy vulnerabilities, heavy administrative workloads, and basic infrastructure failures like outdated hardware and highly unstable internet connections. Without addressing these root issues, the true potential of AI to support inclusive education will remain bottlenecked.

B. Conclusions

Based on the findings, the following conclusions are drawn:

1. The data shows a striking contradiction: public school teachers in Quezon's 4th District have completely open minds when it comes to technology, but they are working in a system that isn't ready to back them up. While educators are "Always" using general AI tools to ease their burdens, their integration dips to "Often" when it comes to deep, subject-specific inclusive lessons. This reveals a critical truth: teachers are currently using AI as a survival tool to manage heavy workloads and basic tasks, rather than as a precision tool for pedagogical transformation. The willingness to innovate is there, but until the digital divide is bridged with stable internet and modern hardware, the true power of AI to serve diverse learners will remain locked.

2. The significant statistical differences highlighted by the Wilcoxon Mann-Whitney U-test prove that we cannot treat all educators as a monolith. General Education and Special Education (SPED) teachers are navigating entirely different classroom realities, dealing with different student profiles, and running into unique operational roadblocks. Therefore, any broad, top-down policy that treats AI integration as a uniform checklist is bound to fail. For AI to truly foster inclusivity, future training, software provisioning, and division-level support must be distinctively tailored to the unique battlefields of both the mainstream and the specialized classroom.

3. Perhaps the most defining finding of this study is the unyielding commitment to the "Human Intervention" threshold. Both teacher cohorts drew a sharp, non-negotiable line: when a child with diverse needs experiences a severe learning bottleneck, technology must step aside. This leads to the profound conclusion that AI in an inclusive classroom is an accelerator, not a replacement. It can scale resources, translate text, and adjust reading levels in seconds, but it possesses no data point for patience, intuition, or love. The soul of the inclusive classroom remains entirely human; software is merely the scaffolding.

4. Finally, the universal persistence of systemic bottlenecks—from glaring data privacy vulnerabilities to a total lack of structured training—signals that teacher are currently innovating at their own risk. Leaving AI integration to the ad-hoc creativity of individual well-meaning teachers is unsustainable and dangerous. The study ultimately concludes that innovation without institutional protection is a liability. If the Department of Education wishes to realize the mandates of the Philippine Inclusive Education Act (RA 11650), it must move from a state of passive observation to active governance by providing the financial safety nets, ethical guardrails, and formalized professional development modules teachers urgently need.

C. Recommendations

Based on the findings and conclusions of this study, the following recommendations are presented as actionable statements to guide safe, equitable, and effective AI integration in inclusive classrooms:

1. For the Department of Education (DepEd)- Design Tiered Professional Development Tracks: The Department of Education should replace uniform ICT mandates with distinct training pathways under the TPACK framework, equipping General Education teachers with content-scaling tools like Diffit while providing SPED teachers with specialized training in assistive technology configurations.

Prioritize Offline-Capable Hardware Procurement: DepEd should realign the Computerization Program (DCP) budget to focus on procuring offline-compatible assistive hardware and low-bandwidth digital utilities rather than deploying cloud-dependent software to remote or isolated barangay schools.

Establish a Vetted Directory of Safe AI Applications: The division should publish an official registry of pre-cleared, secure AI platforms and clear ethical data privacy guidelines to protect sensitive student diagnostic metrics from being exposed on unvetted public servers.

2. For School Heads and Instructional Supervisors- Protect the Human Dimension of Remediation: School administrators should actively validate and reward teachers who intentionally prioritize high-touch, face-to-face tutoring over automated software cycles when an inclusive learner hits a severe cognitive roadblock.

Transform LAC Sessions into Collaborative Workshops: Learning Action Cell (LAC) sessions should be restructured into practical, cross-department workspaces where General Education and SPED teachers co-author localized prompt playbooks, social scripts, and lesson exemplars.

3. For Teachers- Cultivate Co-Teaching Alliances Across Tracks: Mainstream educators should routinely collaborate with their SPED peers to audit AI-generated materials for cognitive accessibility, while SPED teachers should leverage General Education resources to quickly adapt subject-matter depth.

Enforce Anonymized Prompting Practices: Teachers must strictly avoid entering full names, medical diagnoses, or tracking identifiers into commercial AI engines, opting instead for generalized learner profiles such as "a 9-year-old student reading at a Grade 1 level with dyslexia."

4. For Local Government Units (LGUs) and Community Partners- Subsidize Critical Connectivity and Power Infrastructure: Municipal leaders in Tagkawayan, Guinayangan, Lopez, and Calauag should align local Special Education Funds (SEF) to cover school internet overhead and purchase backup power units to prevent rolling blackouts from disrupting classroom learning.

Deploy Localized Tech Support Internships: LGUs should partner with nearby state universities to place IT and computer science interns in rural public schools, absorbing the technical

troubleshooting burden so educators can focus purely on teaching.

5. For Future Researchers- Initiate Longitudinal Impact Frameworks: Future investigators should track a specific cohort of neurodivergent learners over a two- to three-year timeline to assess whether targeted AI integration yields lasting improvements in academic retention and achievement.

Quantify Teacher Burnout Relief Metrics: Subsequent studies should isolate and measure the exact amount of administrative time saved when public school teachers automate routine tasks like lesson formulation and assessment grading.

Conduct Comparative Rural-Urban Analyses: Researchers should investigate the operational effects of the digital divide by contrasting the resource-constrained environments of 4th District schools with well-funded, urban inclusive classrooms.

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