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Table of Contents

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Exploring Pre-Service Teachers' Algebraic Thinking Levels: A Mixed Method Research

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Abstract

The study was to assess the algebraic thinking levels of prospective basic education teachers using SOLO taxonomy. Sequential explanatory mixed methods design was used for the study. 250 Pre-service mathematics teachers from four selected colleges of education in the Eastern region of Ghana were purposely sampled for the study. The data were collected with the aid of super item test and unstructured interviews as instruments. Descriptive statistics (means and standard deviations) and analysis of variance were used to analyse the quantitative data whereas thematic analysis was employed to analyse the qualitative data. The study revealed that the pre-service teachers showed good algebraic thinking at uni-structural and multi-structural levels of the SOLO taxonomy, but performed abysmally at relational and extended abstract levels. The study recommended that Mathematics tutors at the Colleges of Education in Ghana should use the SOLO model for teaching and evaluation of their students. This would help improve pre-service teacher algebraic thinking levels early enough for preservice teachers' overall progress in teaching mathematics after school.

Keywords: Algebraic thinking levels, Pre-service mathematics teacher, SOLO taxonomy.

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Introduction

Algebra is one of the key curriculum categories offered to help students acquire mathematical knowledge and skills. Research shows that success in algebra is a factor in many other important student outcomes (Knuth et al., 2016). Algebra is deemed tough by Egodawatte and Stoilescu (2015) because it is one of the most abstract threads in mathematics. The use of symbolic language is the hardest aspect of learning algebra for students. Emerging research suggests that students who start an algebra curriculum in the early grades take to the subject better in secondary school (Knuth et al., 2016). As per Ntsohi (2013), algebraic thinking entails employing mathematical symbols and instruments to express information mathematically through various means like verbal descriptions, diagrams, tables, graphs, and equations. It involves the examination of various scenarios, including determining the placement of unknown values, assessing proofs, and seeking evidence.

In a study conducted by Maharaj and Wagh (2016), it was revealed that students should become accustomed to and practice higher-order thinking skills questions among students so that mathematics thinking patterns are no longer something new but must be used to be done in the learning process in the classroom. The goal is to make mathematical thinking patterns a familiar and integral part of the learning process within the classroom. Additionally, it mentions that test instruments, often referred to as questions, are used as measurement tools to assess students' algebraic thinking processes.

Many individuals approach mathematical problem-solving, particularly those involving higher-order thinking skills, by utilizing algebra as a fundamental tool. Algebra holds a central role in the realm of mathematics (Malihatuddarojah & Prahmana, 2019; Ojose, 2011; Star et al., 2015). Algebra is introduced in early education and continues to be a pivotal subject through various educational levels, including analytic geometry, calculus, statistics, trigonometry, and topology (Jupri et al, 2014).

Furthermore, it is highlighted that nearly all activities carried out by humans on a daily basis involve some form of cognitive thought process. This thought process encompasses activities such as conceptualization, problem-solving, decision-making, and the generation of creative ideas (Jupri, Drijvers, & van den Heuvel-Panhuizen, 2014). Given the inseparable connection between mathematics and thinking, a prevalent form of thinking when students engage with mathematics is algebraic thinking (Cahyaningtyas, Novita, & Toto, 2018). Algebraic thinking is a critical tool in learning mathematics, particularly in comprehending algebraic concepts and fostering the process of generalizing mathematical ideas based on examples. This process typically involves expressing these generalizations through written or verbal communication (argumentation) that corresponds to the students' age and developmental level (Blanton & Kaput, 2011; Kamol & Har, 2010).

In Ghana, one of the main objectives of mathematics education is to promote higher-order thinking abilities. As a result, evaluating algebraic thinking must go beyond a paper and pencil test that relies solely on recollection and traditional methods and student grades (Owusu-Ansah, Apawu & Akayuure, 2018). There must be a different way altogether of assessing students in Ghanaian classroom in the way they solve mathematics related problems. Curriculum developers need to set some standards in assessing students learning process other than paper and

pencil test which we have been doing in our classrooms, Ghana. Biggs and Collis (1982) proposed a cognitive response to problem-solving progresses through different stages, evolving from simple to abstract generally referred to as Structure of the Observed Learning Outcome (SOLO) theory.

Theoretical Framework

Biggs and Collis designed SOLO taxonomy in 1982 as an evidence-based model after researching into samples of learners' thinking in many different areas (Biggs & Collis, 1982). The research found out that learners thinking follow a sequence of increasing structural measure of refinement in many different subjects and across different levels (Hook, 2015). The model was created based on Piaget's stages of cognitive development for the cognitive development of the learners in school learning context.

The SOLO taxonomy model describes new learning outcomes of learners that ranges from simple and robust form into a deep understanding of subjects. The model makes it possible to identify the level or stages at which a learner is currently operating at, and what needs to be done in order to progress in the cause of teaching, learning and assessing a topic.

According to Lim, Wun, and Idris (2010), the SOLO taxonomy was meticulously created to study student responses to assessment of problems in specific areas of mathematics, such as algebra, probability, statistics, geometry, fault, and problem-solving (Biggs & Collis, 1982). In addition to mathematics, the SOLO taxonomy has been approved for use in a number of other fields of study, including poetry, history, geography, science, economics, and evaluating attitudes about teen pregnancies (Collis & Davis, 1986; Biggs & Collis, 1982), as cited in Hatties & Brown (2004). The SOLO taxonomy as an assessment tool assesses learners' knowledge and skills in answering questions under five primary levels: the pre-structural level, uni-structural level, multi-structural level, relational level, and extended abstract level.

Pre-structural Level

This is a level of incompetence where the learner has no knowledge of the task or the subject. The pupil merely receives disconnected information at this point that is neither organized or made sense. The learner is still unable to comprehend the material; hence he fails to show understanding. This kind of response shows a lack of ability to meaningfully respond to the question. Such a response can entail focusing on some unrelated information that has nothing to do with the concept being assessed. Reaching this level in a student assessment denotes incompetence.

Uni-structural Level

This stage refers to a learner's initial level of understanding where they have limited knowledge about a particular task or subject. At this stage, the student has a basic grasp of the fundamental concept but lacks a deeper understanding of its broader implications. They can make simple and straightforward connections, but they are

not yet aware of the broader context or significance of the information. In their response, students demonstrate a clear understanding of the task, but their focus is primarily on one specific aspect of it.

Multi-structural Level

At this stage, the student possesses a diverse array of individual data pieces, but they are not integrated into a cohesive whole. The learner has accumulated a broad range of relevant, standalone knowledge. While the learners may recognize connections between various elements, they still struggle to fully comprehend how these components fit together to form a coherent picture. Concepts and ideas related to a particular topic remain disjointed and unconnected. Although the students can identify some connections, they are unable to grasp the significance of the overall context. Responses from the students are evaluated independently, even though they may draw upon relevant factors.

Relational Level

At this level, learners can integrate ideas or facts into a whole, recognize relationships and connect ideas to each other. They understand relationships between theory and practice, purposes and significance of ideas. Learners' answers to questions provide explanations that relate relevant details, which often bring concrete facts together. Verbs such as explain causes, compare and contrast, analyze, relate, distinguish, etc. Children utilizing an algorithm at this level would be able to look for mistakes and inconsistencies as well as recreate missing algorithmic components, according to a UNICEF (United Nations Children's Fund) report (UNICEF, 2007).

Extended Abstract

At this stage of learning, students have the capacity to synthesize information by combining various ideas or facts into a cohesive whole. They possess the ability to identify relationships between concepts and establish connections among different ideas. They also grasp the connections between theoretical knowledge and its practical application, comprehending the purposes and significance of various concepts. When answering questions, learners at this level offer comprehensive explanations that incorporate pertinent details, often consolidating concrete facts. They employ action verbs such as "explain causes," "compare and contrast," "analyze," "relate," and "distinguish" to demonstrate their higher-order thinking skills.

The Current Study

The worldwide learning catastrophe is actually a teaching catastrophe (Oketch, Rolleston & Rossiter, 2021). This suggests that the quality of teachers play a pivotal role in enhancing students' learning outcomes. This assertion is supported by the persistent underperformance of students in Basic Education in Ghana, which has raised concerns about the effectiveness of instruction within Ghanaian classrooms, as noted by Buabeng, Ntow, and Otami (2020). In essence, the statement underscores the critical link between teacher quality and student performance in education, particularly in the context of Ghana (Buabeng, Ntow & Otami, 2020). Furthermore,

Owusu-Ansah et al (2018) argue that students' algebraic thinking processes, which are essential for their long-term use of mathematics in decision-making and problem-solving, have been neglected or receives insufficient attention. Prior to 2018, teachers in Colleges of Education in Ghana used to teach and assess Mathematics Content and Methodology as separate entities. However, with the introduction of the Transforming Teacher Education and Learning (T-TEL) program, tutors are mandated to teach Mathematics Content and Methodology together. Additionally, the curriculum emphasis on both conceptual and procedural knowledge in the teaching and learning of mathematics (Salifu, 2021). For students to effectively grasp algebra, it's crucial that their teachers possess a profound understanding of the subject. Teacher training programs should offer the necessary content knowledge to help future educators comprehend algebra to make it easier for prospective teachers to teach the subject upon graduation (Brown & Bergman, 2013). The study seeks to assessed the algebraic thinking levels of pre-service teachers in CoE using SOLO taxonomy.

According to Lian, Yew, and Idris (2010), as thinking levels progress, especially from lower to intermediate relational and upper relational to extended abstract, the problem with students' thinking abilities becomes more pronounced. In a similar study conducted by İncikabi and Biber (2016) concerning the challenges prospective elementary mathematics teachers face in understanding the concept of functions, it was revealed that their understanding of functions in mathematics can improve with effective teaching methods. Additionally, most of their knowledge levels were categorized as pre-structural, multi-structural, and relational, with only a few reaching the extended abstract level (İncikabi & Biber, 2016). In this present study, among the four main categories of the SOLO taxonomy, Pre-service teachers for basic schools are mainly at the uni-structural and multi-structural levels.

Method

The study employed sequential explanatory mixed methods design. The method was convenient in the study because it offset the weakness of both quantitative and qualitative research methods. This is due to the fact that, in a situation where the quantitative method cannot be used to interpret context in which people behave, the qualitative method was used. The quantitative method makes it easy to generalize findings to the large group. From the accessible population, a sample size was selected. From this accessible population, a sample size of 250 was also selected to represent the population. The sample size was selected from 4 main colleges of education in the region including College 1, 2, 3 and 4. This sample is deemed large enough to represent the population and be used to generalize on the study population. It is also selected based on the researchers' ability to collect data on these participants within the stipulated time period and financial constraints available to them.

The study employed simple random sampling to select the four Colleges of Education in Eastern region and used purposive sampling to select the individuals within the four Colleges to respond to the super-item test question with respect to SOLO taxonomy, prospective mathematics teachers in basic education were selected. In undertaking the simple random sampling, the researchers' assigned unique identified by giving each of the colleges a unique identifier; that is the colleges were named "college 1, college 2, college 3, etc." Using a randomization method, the researcher selected four colleges from the population whilst ensuring that each school has an equal chance of being selected. The availability and willingness of the selected schools to participate in the

study were verified before administering the instrument towards the data collection.

Data Collection Instruments

The study used cognitive test also known as Super Item test and an unstructured interview as instruments for the data collection. The test consisted of two (2) questions designed based on SOLO taxonomy super-item test format. The unstructured interview guide consisted of items which demanded prospective basic education teachers to explain their working process during the Super Item test.

Results

The results of the study were in two folds. The first part deals with the algebraic thinking levels of prospective mathematics teachers which were assessed using descriptive statistics through quantitative data analysis method. The second part uses qualitative approach to explore the perceptions of students about the reasons behind their inabilities to attain the requisite algebraic levels based on the SOLO taxonomy.

Quantitative Findings

The algebraic thinking levels were aligned with the SOLO taxonomy. As a result, there is at least a question assessing each of the various levels of the SOLO taxonomy except that the information contained at the pre-structural level is not used in extensive decision making since it is assumed that the participants already possess that knowledge even before their enrolment into the school. Details on the SOLO taxonomy and the algebraic thinking levels of participants is shown in Figure 1.

The Figure 1 presents the number of correct and wrong responses, as well as the frequencies and percentages for each level and method/answer combination. It provides insights into the distribution of understanding across different cognitive levels and highlights the performance of specific methods or answers.

It is observed from Figure 1 that in the pre-structural level, uni-structural level and the multi-structural levels only the answers to the questions were needed for the study since these levels are not so much concerned with the processes an individual goes through in arriving at the answer. This is the reason for the absence on the methods in those levels as shown in Figure 1. However, the processes or methods employed in arriving at the answers are crucial in the relational and extended abstract level.

As shown in Figure 1 the SOLO taxonomy is divided into five levels of algebraic thinking: Pre-structural, Uni-structural, Multi-structural, Relational, and Extended abstract. Each level corresponds to a different stage of cognitive development and indicates the depth of understanding and problem-solving ability.

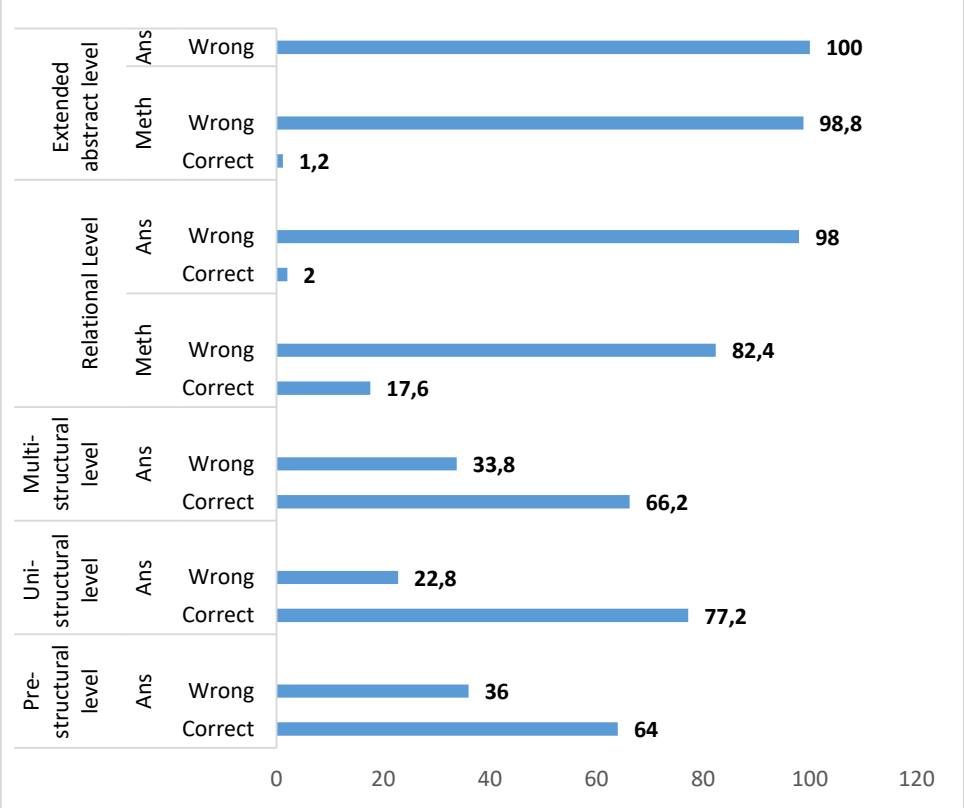

Figure 1. Algebraic Thinking Levels of Preservice Basic School Teachers.

Source: Survey Data (2023)

Qualitative Findings

In an interview with some of the students to ascertain the student's perceptions about the reasons behind their inabilities to attain the requisite algebraic levels based on the SOLO taxonomy, the following are some of the responses;

Researchers: Why do you think you got Question 2A wrong?
Student A: Since the first arrangement has 2 match boxes at the base and the 2nd arrangement also has 3 match boxes at the base, I decided to count the res based on that pattern I saw from the match boxes. I can see that in each arrangement, the base increases by one. But I don't know how come I could not do it well and I had the answers wrong.
It could be deduced from this student A's response that s/he understood the question, was able to identify a pattern but could not algebraically deduced any rule to arrive at subsequent arrangements
Students B: I saw a pattern but was doubting the answer. I did not get 6 match boxes. I was actually thinking that what I was doing were wrong because I was afraid of deviating. I was nervous so I can't tell what exactly I was doing there. I knew I was going to get it wrong.
Student B was able to correctly identify that there was a pattern but could not relax and follow the pattern to arrive at any answer. S/he was probably engulfed by fear and anxiety.

Researchers: How did you get the answers correct?

Student C: Sir, this question is more or less like sequence and series, so I quickly remembered. The 1st arrangement of the match boxes is 3 with 2 boxes at the base, the 2nd arrangement is 6, the base boxes were increased by 1 to make 3 and then the 3 boxes from the 1st arrangement was added to it making 6. I then realized that the 3rd arrangement is 10 with the 4 boxes at the base and 4 plus 6 which was the total for the 2nd arrangement making 10. this gave me the clue and so, I got 21 because it's observed that the base is increased by one as it is moving to the next arrangement of match boxes in shelf and the total number in the previous arrangement is added to it. But sir I could not generate a formula for it.

Discussion

The study intense to explore pre-service teachers algebraic thinking levels which employed sequential explanatory mixed methods design. The study used cognitive test also known as Super Item test and an unstructured interview as instruments for the data collection. The test items were designed based on SOLO taxonomy super-item test format. The unstructured interview guide consisted of items which demanded prospective basic education teachers to explain their working process during the Super Item test.

The Pre-structural level represents the lowest level of understanding. At this level, only 36% had their answers wrong which means that 64% of the participants had their pre-structural level responses correct. Those who failed to answer the algebra questions correctly at this level tend to have issues of comprehension indicating that though they were able to read the questions correctly, they were unable to understand the requirement of the question and process it accordingly. This is an indication that some of the participants (36%) cannot calculate the exact duration for each of the period they were asked at this level. There are several other factors that could prompt students' inability to perform well at the pre-structural level. For instance, during the interaction with the students after marking the test, some of the students stated that lack of fundamental knowledge in algebra, misconceptions about the topic, difficulty with application, limited vocabulary, confusion and sometimes frustration might be some of the causes of students' inability to perform basic operation in solving algebra questions. Similarly, in Kenya, Mbugua et al. (2012) identify similar factors contributing to low mathematics achievement. In the Philippines, Peteros et al. (2020) discovered that a majority of students (53.01%) scored below the average in mathematics in 2020, indicating that many teachers encounter difficulties in making the subject enjoyable for their students.

At the uni-structural level, participants were expected to observe a match box and produce a pattern from it. Students' responses showed that preservice teachers show some understanding of algebraic concepts. Most of the students performed well by scoring 77.2% of the question at this level correctly whilst 22.8% wrongly answered the questions indicating that most of the participants were able to develop the expected pattern. Although students understanding was better as compared to the pre-structural level, preservice teachers were primarily focusing on solving individual aspects of algebraic problems.

Participants were expected to use the same principle of developing a pattern from the arrangement of the match box to solve higher order arrangements. This was used to assess the multi-structural level of the SOLO taxonomy. At this level, the prospective teachers demonstrated more comprehensive understanding of algebraic thinking.

Most of the preservice teachers performed well at this level by obtaining 66.2% of the answers correct. This result indicates that the students were able to use the knowledge on the uni-structural level and extend it to solve higher related patterns. Participants at this stage were expected to integrate multiple concepts and apply them to solve algebraic problems. In a similar study conducted by Ozdemir & Goktepe Yildiz (2015), they discovered that pre-service elementary mathematics achievement test pertaining to spatial orientation skills were typically on a multi-structural level based on SOLO taxonomy. It means that pre-service mathematics teachers were able to extend their understanding to the next level based on SOLO taxonomy.

The relational level shows a deeper understanding of the relationships and connections between different algebraic concepts. Here, participants were asked to write a mathematical rule for the shop keeper to use when arranging the match box. Participants response showed that 17.6% of the prospective teachers used the correct method but only 2% of those had their answers correct. This means that 82.4% of the prospective teachers used wrong methodological approach in solving relational level question. Generally, 98% of the preservice teachers had wrong solution to relational level question. These scores suggest that the prospective teachers struggle to write the mathematical rule from the given task, apply relational thinking and have difficulties in explaining the connections between different algebraic ideas.

The extended abstract level represents the highest level of understanding and indicates the ability to think critically, generalize, and transfer knowledge to new contexts. At this level, participants were asked to develop a mathematical equation to generalize the arrangement. The solutions presented by the preservice teachers showed that almost all the prospective teachers could not solve the question under the extended abstract level of algebraic thinking. The results revealed that only 1.2% of the prospective teachers had their methods correct with 98.8% having wrong methods to solve the questions. Interestingly, even the 1.2% who had their methods correct could not get their answers right. This means that no individual was able to produce the expected equation at this level. These scores suggested lack of ability on the part of preservice teachers to think at an extended abstract level and apply algebraic thinking to complex and abstract situations. The results of this study were in line with the findings of Lian Yew, and Idris (2011), who observed that a majority of pre-service secondary mathematics teachers performed at the lower relational level (focused on algebraic thinking), while a minority performed at higher levels. According to Lian et al. (2011), as thinking levels progress, especially from lower to intermediate relational and upper relational to extended abstract, the problem with students' thinking abilities becomes more pronounced.

In general, the result showed that the prospective mathematics teachers have varying levels of understanding and proficiency in algebraic thinking. Nonetheless, the participants were unable to extend their understanding levels to solve complex and critical situations. Prospective mathematics teachers therefore lack the deep understanding and creativity needed to progress through all the levels of the SOLO taxonomy. The finding suggests that participants have a solid understanding of the basic concepts and can make connections between various aspects of algebraic thinking. However, the preservice mathematics teachers struggle when it comes to applying their knowledge to new and complex situations or generalizing their understanding. In other words, they have a good grasp of the foundational knowledge and can work with the information in a structured manner, but face challenges in transferring that knowledge to novel or real-life contexts. Therefore, participants learning is limited to specific

instances and lack the ability to go beyond the immediate scope.

This implies that prospective mathematics teachers understanding of algebraic concepts is limited to basic knowledge and procedural skills. At the pre-structural level, the students may have difficulty grasping the fundamental concepts of algebraic thinking, resulting in unrelated or incorrect answers. However, as they progress to the uni-structural level, they demonstrated understanding of one aspect or component of algebraic thinking. This means they were able to perform basic calculations and identify patterns in simple algebraic expressions. At the multi-structural level, the students also demonstrated understanding of multiple related aspects or components of algebraic thinking and they were able to solve simple equations, recognize patterns in different contexts, and perform calculations. However, their understanding was still fragmented, and they struggled to integrate their knowledge and apply their knowledge to more complex problems.

Further, it was realised that in terms of the relational and extended abstract levels, the students algebraic thinking was poor. At the relational level, it was expected that preservice mathematics teachers could make connections and understand the relationships between various concepts and procedures in algebra. They were also expected to solve more complex equations, analyze and manipulate algebraic expressions, and apply algebraic thinking in a variety of contexts. However, the preservice teachers struggled to solve the questions which required abstract thinking, and make connections between different algebraic concepts. This was reflected in the extended abstract level as they could not exhibit a high level of thinking and abstraction. The preservice teachers were expected to be able to transfer their knowledge and apply it creatively to new and unfamiliar situations. But they struggled to generalize their understanding and apply algebraic thinking beyond familiar contexts.

The results of this study align with the findings of Lian et al. (2011), who observed that a majority of pre-service secondary mathematics teachers performed at the lower relational level (focused on algebraic thinking), while a minority performed at higher levels. According to Lian et al. (2011), as thinking levels progress, especially from lower to intermediate relational and upper relational to extended abstract, the problem with students' thinking abilities becomes more pronounced.

In a similar study conducted by İncikabi and Biber (2016) concerning the challenges prospective elementary mathematics teachers face in understanding the concept of functions, it was revealed that their understanding of functions in mathematics can improve with effective teaching methods. Additionally, most of their knowledge levels were categorized as pre-structural, multi-structural, and relational, with only a few reaching the extended abstract level (İncikabi & Biber, 2016). Meanwhile, Putri, Mardiyana, and Saputro (2017) suggest that students with moderate self-efficacy can progress through the thinking levels of the SOLO taxonomy, starting from uni-structural and multi-structural stages, whereas those with low self-efficacy tend to remain at the pre-structural and uni-structural levels.

Conclusion

The study found that, among the four main categories of the SOLO taxonomy, Pre-service teachers for basic

schools are mainly at the uni-structural and multi-structural levels. The study therefore, concluded that the Prospective mathematics teachers have better understanding and application of algebraic concepts at the pre-structural, uni-structural and multi-structural levels whereas their algebraic thinking ability at the relational and the extended abstract levels were low.

Recommendations

The study recommended that educators in the Colleges of Education who teach mathematics should incorporate the SOLO model teaching as well as an alternative assessment tool to gain valuable insights into their students' early problem-solving abilities, allowing them to monitor the overall growth of their students' problem-solving skills. To identify and address students' challenges effectively, math tutors should also be attentive to their students' cognitive levels. The utilization of the SOLO taxonomy can assist educators in staying mindful of their students' cognitive abilities in algebra.

Limitation of the Study

In this present study, it is important to note that only the eastern region out of Ghana's sixteen regions was chosen as the study's location. Additionally, out of the 46 public colleges of education in Ghana, only four were included in the study. While the strategic selection of these colleges aimed to attract students from various parts of the country, it hindered the ability to generalize the findings to the entire nation. Moreover, the study had time constraints, which restricted the range of activities or tasks that prospective mathematics teachers could be assessed on. To address these limitations, future investigations with larger participant groups and a broader array of activities and assessment tools may produce different outcomes.

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Author(s)’ Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

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Exploring the Relationship between Authentic Assessment and Teaching Professional Competence Acquisition among Undergraduate Science Student-Teachers in Higher Education Institutions in Tanzania

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Abstract

Authentic assessment has garnered significant interest among scholars in Higher Education Institutions (HEIs) globally. This study investigated the relationship between authentic assessment and the acquisition of teaching professional competencies among undergraduate science student-teachers in HEIs in Tanzania. Utilizing a quantitative research approach with a descriptive survey research design, we sampled 231 third-year students enrolled in the Bachelor of Science with Education (BSC. ED) Programme. Data were collected through questionnaires and documentary review, and analyzed by using inferential statistics, specifically through multiple linear regressions. The findings indicate a positive relationship between authentic assessment and teaching professional competencies. Furthermore, the results demonstrate a positive relationship between authentic assessment tools such as portfolios, projects, teaching practice, and practical work, and specific competencies including content, pedagogical, and generic knowledge, albeit with variations depending on the tools employed. This study argues that the implementation of authentic assessment positively correlates with the acquisition of teaching professional competencies among undergraduate science student-teachers in HEIs. To ensure students attain teaching professional competence essential for navigating the labor market economy, course instructors must prioritize the utilization of authentic assessment tools.

Keywords: Authentic assessment, Content competence, Pedagogical competence, Professional competence, Undergraduate Science student-teachers

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Introduction

Authentic assessment has emerged as a focal point of interest among scholars within Higher Education Institutions (HEIs), driven by its perceived capacity to augment students' acquisition of essential competencies (Juanda, 2022; Karunanayaka & Naidu, 2021; Nicol et al., 2019; Tyas, 2020; Villarroel et al., 2018). This interest stems from the aspiration to witness graduates proficiently apply their acquired knowledge and skills in real-world scenarios post-graduation (Ghosh, 2018; Sewagegn & Diale, 2020; Vu & Dall'Alba, 2014). Authentic assessment has been acknowledged to foster the active students' engagement and cultivates a sense of responsibility for learning, through which one can find a crucial link between HEIs and the skill demands of the employment sector (Juanda, 2022; Quansah et al., 2019). The spectrum of competencies targeted by authentic assessment encompasses critical thinking, divergent thinking, problem-solving, creativity, communication, commitment, teamwork, social and civic competence. In addition, other competencies include Information and Computer Technology (ICT) proficiency, accountability, interpersonal skills, entrepreneurship, recognition and appreciation of diversity, leadership, cultural awareness, expressive abilities, and physical well-being (Davis & Gardner, 2012; Kivunja, 2015; Kong, 2015). The imperative for HEIs to equip graduates with such multifaceted competencies underscores the pivotal role of authentic assessment in curriculum planning and teaching methodologies (Rennert-Ariev, 2005).

Despite the widespread acknowledgment of authentic assessment's pivotal role in students' learning worldwide, the existing literature predominantly focuses on its utility for assessing learning outcomes or promoting 21st century employability competencies (Asamoah et al., 2022; Hobbins et al., 2021; Tyas, 2020; Wayan Suastra & Ristiati, 2019; Zakiah & Fajriadi, 2020; Fiore, 2020; Pereira et al., 2021; Villarroel et al., 2020). However, the link between authentic assessment and the acquisition of teaching professional competencies, encompassing content knowledge, pedagogical skills, and generic knowledge, remains relatively unexplored. In light of the evolving demands of the teaching profession and the importance to align HEI curricula with industry needs, understanding the role of authentic assessment in nurturing teaching professional competencies becomes increasingly crucial. Our study investigated the contribution of authentic assessment to the development of teaching professional competencies among undergraduate science student-teachers in Tanzanian HEIs. The key research question was: How does authentic assessment enhance teaching professional competencies among undergraduate science student-teachers?

What is Authentic Assessment?

Authentic assessment is conceptualized differently by various scholars, reflecting diverse perceptions. Gulikers et al. (2004, p. 69) define authentic assessment as requiring students to utilize competencies - knowledge, skills, and attitudes similar to those needed in professional settings. Mueller (2005, p. 2) characterizes it as a form of assessment where students perform real-world tasks demonstrating meaningful application of knowledge and skills. Swaffield (2011, p. 2) describes authentic assessment as evaluating learning through tasks situated in real-world contexts. Anderson (2003, p. 72) defines it as assessments featuring tasks connected to real-life situations or practical problems. In this study, authentic assessment refers to tasks that necessitate students to think critically

and take responsibility to acquire and demonstrate competencies and capabilities relevant to their professional domain.

The Meaning of Professional Competence

Similar to authentic assessment, professional competence is understood diversely in literature. Joanna et al. (2018) define it as competence associated with mastering knowledge. Greefrath et al. (2022) define professional competence as encompassing activities and tasks required to meet professional demands, including knowledge, skills, and attitudes. In this study, professional competence denotes the ability of prospective Science teachers to apply acquired knowledge and skills in real-world teaching contexts, distinguishing them from other professionals.

Types of Assessment

Assessment typically falls into two main categories: formative and summative assessments. Formative assessment entails tasks or activities providing feedback to students on their learning progress (Irons, 2008). It does not involve assigning grades for summative judgment, focusing instead on providing feedback to shape and develop teaching and learning activities (Black & Wiliam, 2009). Formative assessment, as explained by Bloxham and Boyd (Bloxham & Boyd, 2007) and Huang et al. (2023), aims to improve learning processes and identify areas of weakness. It fosters critical reflection and self-assessment skills among students, motivating them to engage in learning and develop competencies associated with the tasks. Summative assessment occurs at the end of a learning unit or program to certify students' learning achievements. It focuses on judging students' performance based on results after marking or grading their work (Irons, 2008). Summative assessment is termed as 'assessment of learning' (Bloxham & Boyd, 2007; Irons, 2008), determining students' competences for decision-making by teachers, policymakers, and employers (Hilden et al., 2022).

Rationales of Authentic Assessment in HEIs

The use of authentic assessment in Higher Education Institutions (HEIs) offers several benefits, including enhancing employability skills, minimizing cheating, and addressing criticisms against HEI graduates. Authentic assessment fosters the acquisition and application of employability skills, including communication, decision-making, and collaboration (Thambusamy et al., 2014). It prepares graduates for real-life experiences by equipping them with competencies required in the workforce (Kaider et al., 2017; Tay, 2018). Authentic assessment, through Learner-Centered Approach (LCA) pedagogies, actively engages learners in learning and promotes the development of employability skills (Tynjälä et al., 2016). Authentic assessment promotes deep learning and understanding by actively engaging students in tasks and promoting reflection (Karunanayaka & Naidu, 2021). It enhances learning by allowing students to carry out tasks collaboratively, resulting in competence acquisition (Mahasneh & Alwan, 2018). Authentic assessment discourages cheating by engaging learners in tasks and designing rubrics for task accomplishment (Wong & Zhang, 2020). Tasks reflecting real-life experiences, coupled with clear rubrics, reduce the likelihood of cheating among students. Authentic assessment addresses criticisms

regarding graduates' competencies by actively engaging them in tasks that facilitate skill acquisition (Pezer, 2015).

Education Assessment in Tanzania

The use of authentic assessment in Tanzanian HEIs is encouraged by the Tanzania Commission for Universities (TCU) under the University Qualification Framework (UQF) (TCU, 2012). HEIs are urged to adopt a learner-centered approach in teaching and assessment to enhance competence acquisition among graduates and prepare them for the job market. However, the extent to which instructors in Tanzanian HEIs utilize authentic assessment for competency acquisition remains an important area for further study.

Method

Research Approach and Design

In this study, a quantitative research approach was employed, utilizing a descriptive survey research design. The quantitative approach facilitated the collection of extensive data within a short timeframe (Lodico et al., 2010). The descriptive survey research design aimed to elucidate the relationship between authentic assessment tools, including portfolios, projects, practical work, and teaching practices, and learners' competencies. While the quantitative approach primarily focuses on numerical data, which may overlook individual nuances, it was imperative to provide comprehensive details to ensure clarity of communication.

Area of the Study and Sampling of the Participants

The study was conducted in two selected Higher Education Institutions (HEIs) in Tanzania. These institutions were selected based on their enrollment capacity compared to other institutions offering similar programs in Tanzania (TCU, 2021). The study sample comprised third-year students enrolled in the Bachelor of Science with Education Degree programs. Third-year undergraduate Science student teachers were chosen as participants due to their proximity to the completion of their studies and anticipated to have exposure to various assessment tasks throughout their academic journey. The selection of Science students was motivated by the field's significance in Tanzania's Vision 2025 and its contribution to socio-economic and political development (URT, 2000). Despite its importance, the number of students pursuing Science degrees remains relatively low compared to other fields (Drymiotou et al., 2021). Participants were selected through proportional stratified random sampling to ensure representation across genders. A total of 231 respondents were included in the sample, distributed across both institutions as indicated in Table 1.

Table 1. Demographic Characteristics of the Students (n= 231)

Institution	Gender	Frequency
A	Males	60
	Females	60
	Males	56
B	Females	55
	Total	231

Steps of the Study

The study commenced with a comprehensive literature review to identify existing knowledge gaps. Subsequently, a proposal and data collection instrument were developed and presented for feedback at the departmental and College of Education levels. Inputs from reviewers and panelists were incorporated into the study design. The subsequent phase involved fieldwork visits to the selected universities, where questionnaires were personally administered to the participants. Following data collection, analysis commenced concurrently with report writing, with continuous refinement of the literature review and methodology sections based on fieldwork experiences. The final stage involved thorough review and refinement to ensure clarity and alignment with the research objectives.

Data Collection

Questionnaires

To gather insights from undergraduate prospective Science teacher students, we utilized questionnaires. Closed-ended questions, employing a Likert scale, were carefully crafted to extract information regarding the utilization of authentic assessment by course instructors and its impact on competency acquisition. The use of closed-ended questions allows for quantitative analysis, enabling us to quantify participants' responses and discern patterns across the sampled population. By utilizing the Likert scale, we could gauge the intensity of agreement or disagreement, thereby providing nuanced insights into participants' perceptions. Questionnaires, however, face the weakness of low response rates especially when they are mailed or posted through mails. To address such potential limitations, we opted for personal administration. This approach not only enhances the high response rate but also facilitates the clarifications and ensures the completeness of responses, and thus, bolstering the reliability and validity of our data.

Documentary Review

Complementing the insights garnered from questionnaires, documentary review served as another crucial data collection method in our research. This approach enabled us to delve deeper into authentic assessment practices by scrutinizing various documents, including curricula, course outlines, journal articles, and books. The process of documentary review involved systematically identifying relevant databases and conducting thorough searches using keywords pertinent to authentic assessment. By screening materials to ensure credibility, we maintained the integrity of the data collection process. The reviewed documents provided valuable contextual information and insights into authentic assessment, complementing the data collected through questionnaires. See Table 2 for the reviewed documents.

Data Analysis and Ethical Issues Considerations

The quantitative data collected through questionnaires were analyzed using inferential statistics, specifically employing a multiple linear regression model to investigate the relationship between authentic assessment tools

and teaching professional competencies. IBM SPSS Statistics version 23 and STATA were utilized as tools for data analysis to facilitate this process. Multiple regression analysis models were employed to examine the relationship between authentic assessment tools (independent variables) and teaching professional competencies (dependent variable). Ethical considerations were paramount throughout the study, with participants providing informed consent prior to questionnaire administration. Confidentiality of provided data was ensured, and precautions against plagiarism were observed, with proper citation of sources used in the study.

Table 2. Documents Reviewed

SN	Documents	Type of information
1.	Course outlines and Curriculum	Information on uses and tools of authentic assessment.
2.	Journal articles	The meaning, rationales and tools of authentic assessment, and relationship between tools of authentic assessment and competencies, and background information on authentic assessment
3.	Books	The meaning and tools of authentic assessment and research methods

Results

Relationship between Authentic Assessment and Content Competence

By using multiple linear regression analysis the results indicated that there was a positive relationship between authentic assessment tools and students' competencies in content, pedagogical, and generic knowledge and skills (Table 3). These tools were; portfolios, projects, practical work, teaching, and practice (TP). The relationship between authentic assessment tools and competencies was = R-squared 0.541. The explanatory variables in the model had also a significant influence on the content competence of students ($F = 28.879$, $P < 0.001$). The predictor variables (portfolio and project scores), however, did not significantly influence the content competence of the students, while the practical and teaching scores significantly influenced content competence.

Table 3. Authentic Assessment and Content Competence of Students

Content competence score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Portfolio score	0.135	0.240	0.56	0.530	0.014	1.256	
Project score	0.254	0.402	0.63	0.642	0.028	0.157	
Practical score	0.083	-0.020	4.15	0.000	0.017	0.185	***
Teaching score	0.345	0.026	13.26	0.000	0.102	2.430	***
Constant	42.584	4.778	8.91	0.000	33.168	51.999	***
Mean dependent var		22.053	SD dependent var			5.817	
R-squared		0.541	Number of obs			228.000	
F-test		28.879	Prob > F			0.000	
Akaike crit. (AIC)		1363.792	Bayesian crit. (BIC)			1380.939	

*** $p<.01$, ** $p<.05$, * $p<.1$

The study also revealed that about 54.1 percent of content competence indicated variations in the explanatory variables. Practical score ($P< 0.001$) also significantly influenced the content competence of students. Since it had

a coefficient of 0.083, it implies that as the practical score increased by one unit, then the content competence would also increase by 0.083 scores. In other words, whenever the practical work was applied, the content competence tended to increase since it had a directly proportional relationship to each other. It was also revealed that the teaching practice score was significant at P< 0.001, and the coefficient was 0.345, meaning that as the teaching score increased by one score, then the content competence also increased by 0.345 scores. These results imply that teaching practice and content competence have a positive relationship because as the teaching practice was highly applied, the content competence among students tended to increase.

Authentic Assessment and Pedagogical Competence of Students

The study aimed to examine the relationship between authentic assessment and pedagogical competence among students. By using the multiple linear regressions the results indicated that independent variables were good predictors of the pedagogical competence of students with R-squared of 0.662. Results also indicated that explanatory variables had a significant influence on the pedagogical competence of students [F = 31.552, P < 0.001] o.oo1] (Table 4). It was, however, found that practical works and project scores did not significantly influence the pedagogical competence of students, while portfolio and teaching practice scores significantly influenced the pedagogical competence of students.

The results indicated further that about 66 percent of the pedagogical competence indicated variations in the explanatory variables. Teaching practice scores significantly (P< 0.001) influenced the pedagogical competence of students. It had a coefficient of 0.041, implying that as the teaching practice scores increased by one unit then the pedagogical competence would increase by 0.041 scores. In other words, whenever the teaching practice was applied, the pedagogical competence tended to increase since it had a directly proportional relationship to each other. In addition, the results indicated that the portfolio score was significant at P< 0.001, and the coefficient was 0.221, implying that as the portfolio score increased by one unit, then pedagogical competence to students would increase by 0.221 scores. The results indicated that portfolio and pedagogical competence had a positive relationship, as the portfolios were highly applied the pedagogical competence of students tended to increase.

Table 4. Authentic Assessment and Pedagogical Competence to Students

Pedagogical competence Score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Portfolio score	0.221	0.042	5.28	0.000	0.004	1.139	***
Project score	0.027	0.055	0.50	0.620	-0.081	0.135	
Practical score	0.012	0.095	0.13	0.899	-0.174	0.198	
Teaching score	0.401	0.047	8.60	0.000	0.093	2.310	***
Constant	43.579	5.001	8.71	0.000	33.723	53.436	***
Mean dependent var		20.533	SD dependent var			6.190	
R-squared		0.662	Number of obs			227.000	
F-test		31.552	Prob > F			0.000	
Akaike crit. (AIC)		1378.607	Bayesian crit. (BIC)			1395.732	

*** *p<.01*, ** *p<.05*, * *p<.1*

Authentic Assessment and Generic Competence

Multiple linear regressions were employed to examine the relationship between tools of authentic assessment, and the generic competence of students. Results indicated that independent variables were good predictors of generic competence to students with R-squared of 0.503. Results also indicated that explanatory variables had a significant influence on the generic competence of students [F = 24.073, P < 0.001] (Table 5). However, practical work did not significantly influence the generic competence of students, while portfolio, project, and teaching scores significantly influenced such competence in students.

Table 5. Authentic Assessment and Generic Competence

Generic competence Score	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Portfolio score	0.190	0.049	3.90	0.000	0.086	2.094	***
Project score	0.113	0.024	4.70	0.000	0.013	1.238	***
Practical score	0.030	0.012	2.50	0.034	-0.186	0.247	**
Teaching score	0.441	0.054	8.17	0.000	0.048	2.334	***
Constant	40.804	5.836	6.99	0.000	29.303	52.304	***
Mean dependent var		21.145	SD dependent var			6.876	
R-squared		0.503	Number of obs			227.000	
F-test		24.073	Prob > F			0.000	
Akaike crit. (AIC)		1446.761	Bayesian crit. (BIC)			1463.886	

*** *p<.01*, ** *p<.05*, * *p<.1*

It was revealed in this study that about 50.3 percent of generic competence indicated variations in the explanatory variables. Teaching practice scores significantly (P< 0.001) influenced the generic competence of the students. It had a coefficient of 0.441, implying that as the teaching practice scores increased by one unit, and then the generic competence would increase by 0.441 scores. The results also indicated that the portfolio score was significant at P< 0.001, and the coefficient was 0.190, implying that as the teaching score increased by one score, then generic competence to the students would increase by 0.190 scores (Table 5). Similarly, the results revealed that the project score was significant at P< 0.001 and the coefficient at 0.113, implying that as the project score increased by one score then generic competence to the students would also increase by 0.113 scores. In other words, project and generic competence had a positive relationship, as the project was highly applied the generic competence of students tended to increase. The implication is that portfolio and generic competence had a positive relationship because as the teaching practice was highly applied, the generic competence of students tended to increase.

Discussion

The results of this study reveal several significant associations between various educational factors and students' competence levels. Firstly, the results demonstrate a clear impact of practical scores on students' content competence. This indicates that engaging in practical activities correlates positively with the enhanced understanding of the subject matter. As students actively participate in practical tasks, their grasp of content improves, highlighting the beneficial relationship between practical work and content mastery. Similarly, teaching practice scores emerged as influential, suggesting that effective teaching methods contribute to students' content competence. When instructors implement practical approaches, students become more actively involved, thereby

facilitating their acquisition of content knowledge.

These results align with previous research, including studies by Anoh (2021), Arlianty et al. (2017), Chapoo et al. (2018), which have also identified a strong connection between authentic assessment methods and competency development. For instance, Arlianty et al. (2017) noted the positive impact of authentic assessment on Chemistry competence among students in Indonesia. Likewise, Meier (2021) and Njiku et al. (2021) emphasized the role of authentic assessment in enhancing both teacher and student competencies. Constantinou and Abrahams (2019) further underscored the importance of practical work in supporting learning and fostering content competence.

Secondly, the study found a significant relationship between pedagogical competence and teaching practice scores. This suggests that engaging in teaching activities correlates positively with the development of pedagogical skills among students. The utilization of portfolios also demonstrated a positive association with pedagogical competence, indicating that portfolio-based assessments contribute to skill enhancement. These findings resonate with research by Faizah and Sutopo (2021), Hagos et al. (2020), and others, who have highlighted the positive impact of authentic assessment on pedagogical competencies. Additionally, studies by Lin and Tsai (2021) and Kramer et al. (2021) emphasized the importance of student engagement in learning processes for the acquisition of pedagogical skills.

Moreover, the results reveal a relationship between authentic assessment tools, teaching practice, and generic competence among students. Engaging with authentic assessment methods was found to enhance students' generic competencies, including critical thinking, collaboration, communication, decision-making, and creativity. While some previous studies have also reported similar findings, it is important to note the nuanced relationship between practical work and generic competencies. While practical work inherently offers opportunities for developing these skills, the manner in which it is implemented by instructors can impact its effectiveness. Studies by Banu (2011) and Erduran et al. (2020) highlight the need for a formative approach to practical work to facilitate generic competence acquisition among students. Indeed, research by Constantinou and Fotou (2020) and others emphasizes the importance of utilizing practical work formatively to maximize its benefits.

The results underscore the significance of employing practical approaches and authentic assessment methods in education. By actively engaging students in practical tasks and adopting formative assessment practices, educators can effectively enhance both content and generic competencies among learners. These insights highlight the importance of creating engaging learning environments that prioritize active participation and skill development, ultimately fostering holistic student growth and success.

Conclusion

In this study we investigated the relationship between authentic assessment and the development of teaching professional competencies among undergraduate science student teachers in HEIs. The results underscore a significant association between authentic assessment tools and the enhancement of teaching professional competencies. Notably, the utilization of authentic assessment methods such as portfolios, practical work,

teaching practice, and projects demonstrated a positive impact on the improvement of teaching professional competencies encompassing content knowledge, pedagogical skills, generic knowledge and skills, and specific professional competencies among students.

This implies that there is a need to equip students in HEIs with the requisite knowledge and skills for them to survive in the competitive and dynamically evolving landscape of science and technology in the 21st century. It also implies that educators must integrate authentic assessment in the teaching and learning practices so that to have this kind of graduates. Moreover, active engagement of students in diverse activities conducive to the acquisition of desired competencies in the teaching profession is essential. To realize this vision, it necessitates concerted efforts such as a proportional increase in the government's budget allocation for education. For HEIs to establish and maintain laboratories and procure necessary apparatus to facilitate effective practical work among students they need an adequate funding system. The practice may not only help the nurturing and preparation of a generation of proficient and competent educators, but also meet the demands of the contemporary educational landscape of the 21st century.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

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Language-Related Barriers and Insights to Overcome the Challenges of English Medium Instructed Learning Environment for Undergraduates

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Abstract

The practice of English Medium Instruction in the tertiary phase of education in the non-Anglophone circle is a significant but perplexing argument. The void of academic exploration of the students' authentic perspectives and the challenges they face due to the quick transfer of the academic language from L1 to L2 without any smooth procedure is a critical ground that needs investigation. Thus, the current study aimed to explore the language-caused challenges and the strategies utilized by the students to overcome the challenges of the EMI learning environment in the tertiary phase of education. The study utilized the purposive sampling method and data was collected through a questionnaire survey and semi-structured interviews. Qualitative thematic analysis was utilized to analyze the collected data. The findings highlight that the significant language gap between secondary and tertiary education is the primary reason for students' language difficulties. However, students have developed strategies to tackle these language-related challenges. The study concludes by proposing potential solutions to facilitate a smoother transition from an L1-based learning environment to an L2-based learning environment.

Keywords: Challenges, English medium instructions, Strategies, L1 and L2, Tertiary education, Undergraduates.

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Introduction

Background and Significance of the Study

The profile of English Medium Instruction (EMI) within the arena of education is a context-bound sensation. Context-wise perspective on EMI is a debatable topic within non-Anglophone countries, which has a linkage with the colonial past. Accordingly, the context-wise belonging of the concern directly represents the category of Outer Circle (Kirkpatrick, 2014) of Kachru's World Englishes categorization (Y. Liu, 2022). In particular, the outer circle represents the countries which owe a historical relationship with British colonization, and these countries place the English language within their domain as the Second Language (L2). A clearer version of the contextual boundary is presented in the shaded area of Figure 1. Bestowing to the contextual boundary, the study clearly focused on the issues encountered in the EMI learning environment within the English as a Second Language (ESL) context.

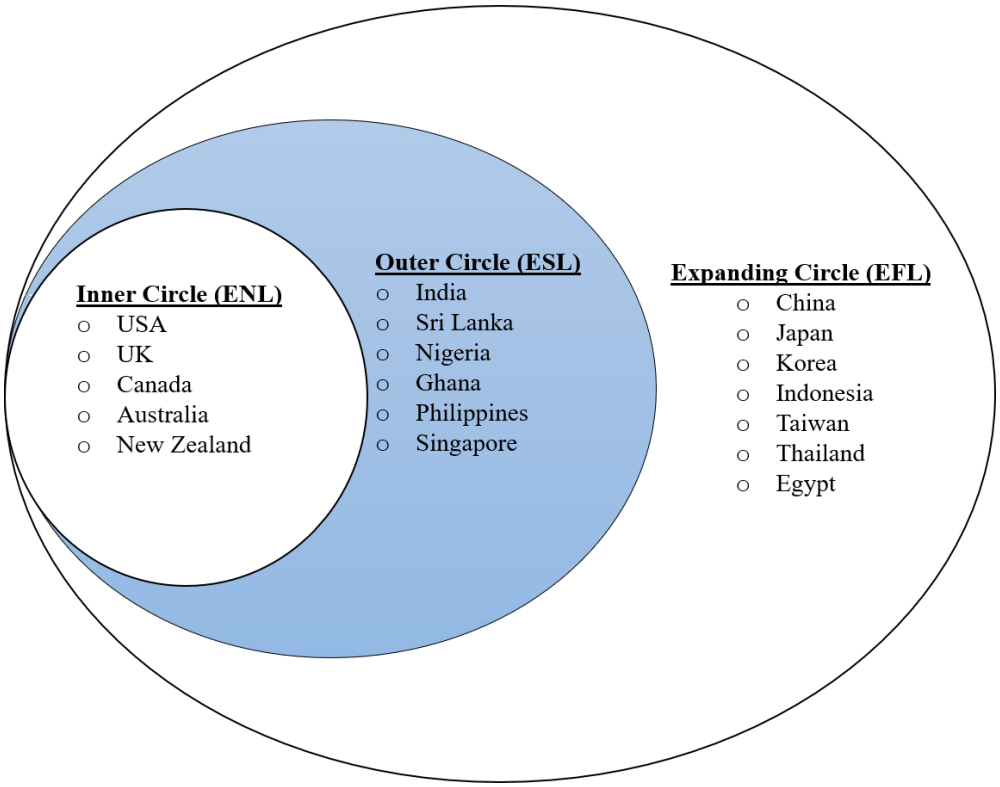

Figure 1. Kachru's Concentric Circles

In the aforementioned sphere, English plays a pivotal role in its language policy and anticipated demands of the future, aligning with the realities of globalization and economic trends (Schmidt-Unterberger, 2018). The majority of these outer circle countries had no exposure to the English language from the external environment they are in, and the majority remained in the attitude of promoting their Mother Tongue (MT/L1). In the former British colonies (e.g., India, Malysia, Hong Kong, Singapore) EMI mushroomed widely with the concern of internationalization of education and welcoming the economic benefits of new innovations (Jayathilake et al., 2021). Thus, in order to capture the competitive professional avenues in the international and local grounds, it is

vital to equip the Sri Lankan graduate professionals with required sharpness. EMI is one prominent catalyst for better survival on international professional grounds.

Contextual Importance of the Study through Existing Literature

According to the previous discussion, it was identified that other languages that were previously used in education, particularly in the tertiary phase of the Sri Lankan education system, were not suitable for science, technology disciplines, and global connectivity (Vaish, 2010). The impact of the notion, the first word decides where the resources of the developing world will head, led to an uplift in the quality of Sri Lankan tertiary education, with the introduction of first-world-launched projects such as IRQUE (Improving Relevance and Quality of Undergraduate Education) (Vaish, 2010). This led to a noticeable improvement in tertiary education as a response to the management of global capital. Therefore, the current context of university education remains on the solid belief that English is the only language that will enable people to participate in modernity and development.

Yet, the tertiary education system of the country had lapses and criticisms over the ability to provide students with skills needed to function in modern organizations and to prepare them for the professional demands and challenges of globalized business in a pluralistic world (Simões, 2020). Though the system has invented the concept of EMI within the university system with the intention of providing equity and quality (Vaish, 2010), due to various reasons, the system was unable to reach the optimal outcome. The study on the education system of Sri Lanka unveiled challenges faced by the Sri Lankan education system with poor quality, mismatch of the curriculum with existing labor market demands, lack of training of school teachers, inefficient administration, limited government expenditure on education, lack of clear national/state educational policy, un-planned policy changes, the politicization of recruiting procedures of school teachers and administrative staff, lack of proper teacher training (Liyanage, 2014). Further, it demonstrated the lapses of English language skills in the English language learning situation of Sri Lanka. Only 10% of students achieved a targeted level of mastery in English language skills, while English writing skills are recorded as 1% in the tested skill levels in the aforementioned study. According to the tested criteria, urban areas recorded that 23% of students master the English language, whereas only 7% of rural students achieve the same level of proficiency (Liyanage, 2014) which hinders the differences remain between contexts.

However, when narrowing down the case into the arena of tertiary education the extreme requirement of widening the avenues in education is mandatory. Specially, medium of instruction in English has a valid rationale in conquering the knowledge without any demarcation. The reasons are: (i) gaining increased attraction of the international students, (ii) reach higher university ranking and (iii) institutional expectations. Thus, the internationalization of higher education is the sole reason behind the process of implementing EMI in the phase of higher education and it has been defined as the process of integrating an international, intercultural or global dimension into the purpose, functions (primarily teaching/learning, research, service) or delivery of higher education (de Wit, 2020).

By 2009 the government's national policy framework for the development of higher education highlighted one

key aspect: improve the economic relevance of higher education by promoting skills in demand in the labor market, such as English, information and communication technology, and soft skills as well as expanding job-oriented higher education programs in the alternative higher education sector (Schultheiss et al., 2023). Yet, these aims were not fully accomplished due to prevailing lapses within the system. One significant cause for the situation in Sri Lanka is unevenness between L1 (Sinhala/Tamil) based secondary education and L2 (English) based tertiary education.

While Sri Lankan school education system in the EMI learning environment has been investigated by prominent Sri Lankan scholars (Punchi, 2001) with reference to authoritative and administrative layers, it has proven the downfall of language proficiency as neither teachers nor students are comfortable with the learning component in English. As a result graduates are deficient in key professional skills such as oral communication, critical thinking, negotiation, analytical thinking etc. (Ariyawansa, 2013; Pushpakumara, 2021). Further, it is noteworthy to state that the contextual empirical evidence related to EMI in tertiary education remains with a considerable lacuna as the findings are inconsistent (Jayathilake et al., 2021). Due to this scantiness in the context, EMI in tertiary education system needs more research. According to the remaining requirement of the current research lacuna, it is vital to explore the challenges and coping mechanisms utilized by the undergraduates in tackling the medium of instruction-caused challenges.

Therefore, the current study aims to explore (i) the challenges faced by undergraduates during this uneven transition of language, (ii) the coping mechanisms utilized by the undergraduates while they were getting accustomed to the EMI learning environment. Thus, the outcomes of the current study will enable the policy makers, curriculum designers and respective authorities to smoothen the language gap that remains between each phase of education. Further, the findings of the study will be effective for the universities when designing their orientation programs more effective by focusing the most challenging areas to be covered in their orientation programs.

Method

Study Context

The study context of the research is a state university of Sri Lanka which was established as a university in 1991 in which currently practicing EMI is present in all the faculties. The current study has narrowed down its research sample to one faculty of the aforementioned university. The context employs English as the primary medium of instruction. Within its academic framework, the university provides courses and workshops tailored to undergraduate students, encompassing English for general purposes, academic purposes and professional purposes (Prasanna, 2023). One reason was that the faculty consisted of a unique combination of multicultural, multiethnic, and multinational communities. Further, the context consisted of international students from Bhutan, Nepal, Nigeria, and the Maldives. Thus, the context can be interpreted as a melting pocket.

Participants

The total population considered for the sample was 250 surveying sciences undergraduates. They were divided into two groups based on the research instruments. Thus, 130 participants were selected using the purposive sampling method for the questionnaire survey, and five participants from the same cluster were selected for the semi-structured interviews using the purposive sampling method. Table 1 below clearly displays the demography of the sample.

Table 1. Demography of the Sample

Gender	Male		63
	Female		67
Age range			20 - 23
Study year and semester	YISI		65
	YISII		65
Department	SUGEO		130
	RSGIS		
Nationality	Sri Lankan	Sinhalese	60
		Tamils	63
	Chinese		1
	Maldives		4
	Filipinos		1
	Moroccans		1

Research Tools

The study utilized two basic research tools: (i) Questionnaire survey, and (ii) semi-structured interview series. Primary data were collected using a self-administered questionnaire through an online questionnaire survey which was designed as a Google form. The questionnaire is comprised of two sections. Section I included open-ended questions to capture the demographic information of the undergraduate: gender, age, school, and employment status of their parents. Section II of the questionnaire comprised of items taken from the research objectives and research questions. Open-ended questions were given at the end to capture other opinions and suggestions of the respondents, as it is beneficial to derive themes. For the feasibility check, both questionnaire and the interview questions were distributed among five random undergraduates to check whether the language needs to be changed and to check feasibility.

The interview questions were given two days before the scheduled time for the interview. Apart from that, the study referred to existing scholarly articles and other relevant documents, reports, and theories to collect secondary data. Collected data from the semi-structured interviews were analyzed by using qualitative thematic analysis.

The procedure of the study is visualized in Figure 2.

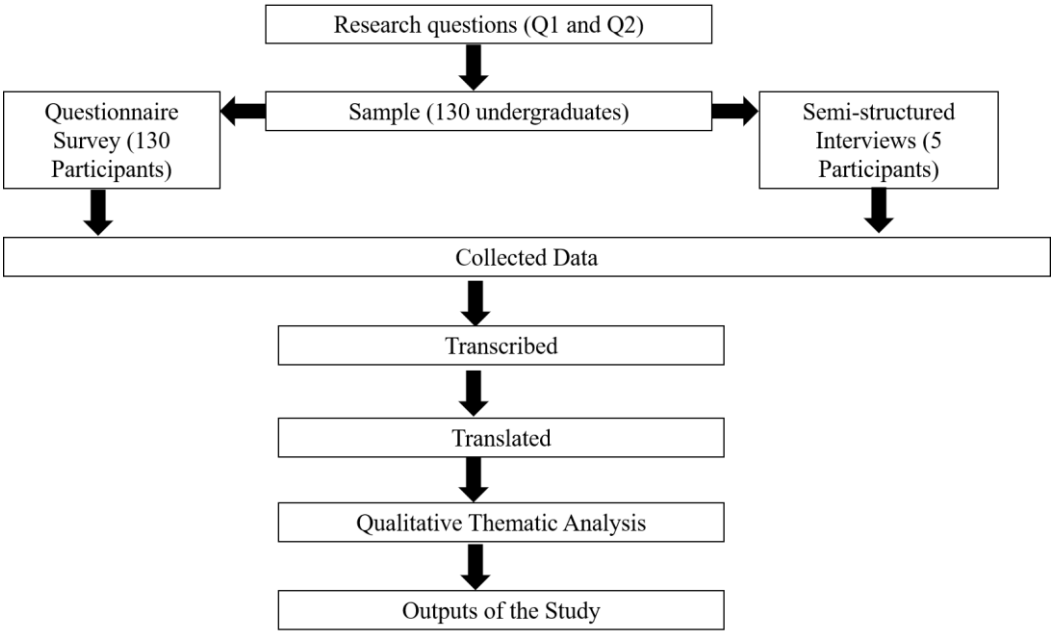

Figure 2. Procedure of the Study

Results and Discussion

The findings of the study are primarily divided into two: (i) language-related challenges of EMI learning environment in the tertiary phase of education, and (ii) coping mechanisms utilized by the students to overcome the emerged challenges. The identified challenges are visualized in Figure 3. Then the study moved its focus to explore possible solutions to overcome the discovered issues. In this section, the study discussed the coping mechanisms invented by the students themselves and the possible suggestions from the existing empirical evidence.

Limitations of the Study

Due to the COVID-19 pandemic, the university was functioning via online platforms. Thus, the researcher had to use online platforms to conduct the interviews. However, the researcher guaranteed that confidentiality was protected in the collected data. The study only addressed the profile of EMI via undergraduates' perspective due to the consideration of time and the type of the data analysis. Despite these limitations, the study reveals the authentic replica of the EMI situation of the research site, and the findings are applicable and can be generalized into the wider context as well.

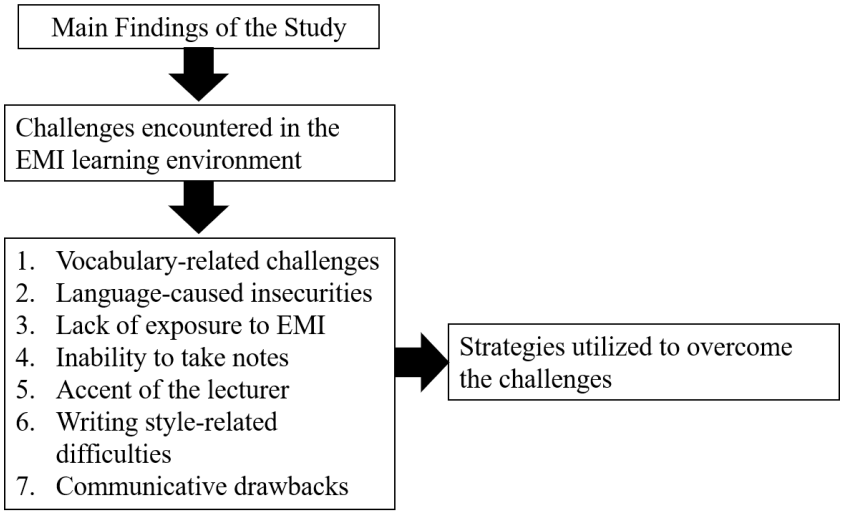

Figure 1. Flowchart of the Research Findings

Challenges in the EMI Learning Environment

In the EMI learning environment, students face a vast variety of language-related challenges. Responses of the considered sample of the study are visualized in Figure 4. The most dominant challenges are writing style-related issues (78%), language-caused insecurities (74%), and communicative issues (70%). A minimum number was recorded for an accent of the lecturer (40%) and vocabulary-related challenges (49%).

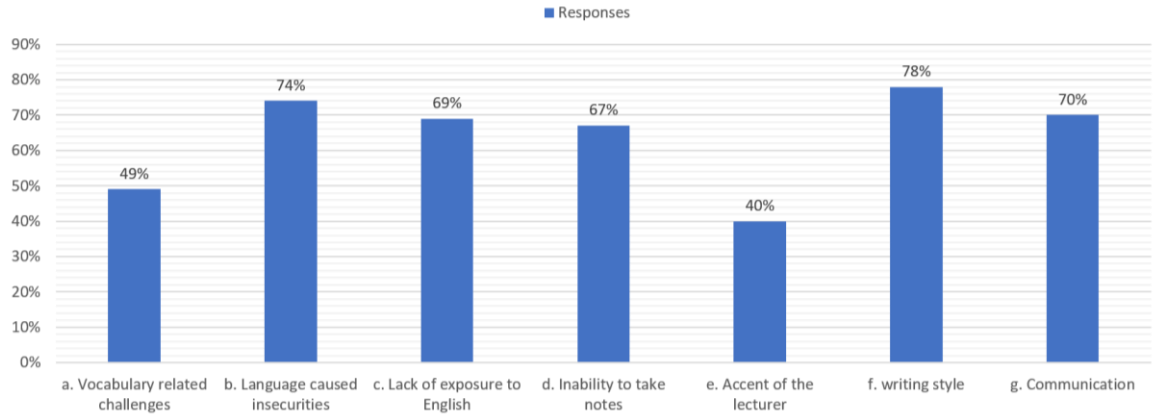

Figure 4. Number of Responses on Each Challenge

Vocabulary-related Difficulties

Students face diverse issues related to vocabulary. According to the tested sample, 49% of students struggle with subject-related technical terms. Almost all the students of the sample have followed their primary and secondary education in their mother tongue (Sinhala/ Tamil). Hence, these students have met the basics of mathematics and physics subject contents in Sinhala or Tamil medium. When it appears in an unhomely language it becomes hostile sphere to enter in a comfortable manner. Most of the sample revealed that the equations and calculations are

manageable. As evidence, only 1% of students consider the equations and calculations to be challenging factor. But the theories and concepts are very troublesome due to unfamiliar terms they encounter in English language. According to the collected data for 32% of the sample, understanding theories and concepts written in English is a challenging factor. The challenge related to vocabulary and technical terms is common among the international context (Hatch & Brown, 2000; Heath, 1992; Hiebert & Kamil, 2005; Richards & Renandya, 2002; Snow et al., 2005). Bestowing to the semi-structured interviews, this vocabulary issue was frequent among undergraduates. Though students have many things to say they struggle with finding words. If we define it through their own words, it is "words don't come". More evidence is displayed in Table 2.

Table 2. Evidence from the Semi-Structured Interviews (Interviewee A and B)

Respondent	Quote from the interview
A	"Maths contents and equations are manageable… but the theories and concepts are very hard to understand. But when we have kuppi programmes, the way our friends taught us is clearer because he is doing it in Sinhala… so we can understand the concept in a simple manner."
B	"Even when we write academic answers, we don't know how to find the most suitable word. Some friends write in a very nice way. But personally speaking, I struggle with finding words. Even when we speak, I take a long time to think and find a word that at least gives the slightest meaning I want to convey… but when I speak in Tamil, it does not go like this… Tamil words come naturally, but not English words…"

Word choice when writing academic answers is a challenging factor for 19% of the sample, while understanding words while reading academic documents is a considerable challenge for 25% of the sample. The subcategories considered under vocabulary related challenges are clearly displayed in Figure 5 below.

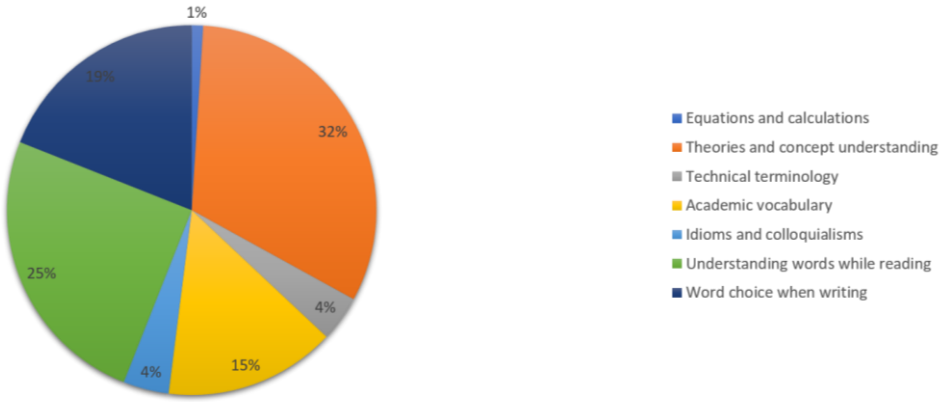

Figure 5. Sub-Categories of Vocabulary-Related Challenges

Language Caused Insecurities

Language-caused insecurities are detectable through behavioral changes of each student in different learning environments (Asad et al., 2023). Most of the time, the students remain very silent in the lecture and do not cooperate with the lecturer to build up academic rapport. The main reason behind this behaviour is that language

caused anxiety (Pichette, 2009). The study launched eight areas to test the language which caused anxiety. According to the collected data, as displayed in Figure 6, 12% of the sample gets nervous when the lecturer asks a question. The most dominant proportion of the sample, which is 27%, revealed that they are reluctant to converse with the lecturer due to English language difficulties. On the other hand, 20% of the sample revealed that they do worry over their grammatical and vocabulary related doubts. It is not because the student is weak for a subject. But due to the heavy nervousness of the student, unconsciously the student locks himself and his thought process clogs withing himself due to the strong inability to acculturate the L2 proceedings as evidence is depicted in Table 3.

Table 3. Highlights from the Semi-Structured Interviews (Interviewee A and E)

Respondent	Quote from the interview
A	"Most of the times, I don't involve in conversations with the lecturer XXX, YYY and PPP because they are very strict and only conduct the lecture in English. But in CCC lectures, I try to talk and share my thoughts. Because that madam gave me the feeling that my thoughts were important and that she made corrections in a really nice and interesting tone."
E	"I don't want to talk with lecturers. I usually try to omit eye contact with them because I'm afraid of their way of looking at us. Basically, I don't know whether I understand what they say. In one day, I only realized that I had given a wrong answer a few minutes later. Only when one of my friends told me what she asked. So I don't like to speak with them in English. I don't understand… I'm afraid the others might judge my errors."

Causes tested to identify the language-caused insecurities are visualized in the Figure 6. The most affected cause for the issue is shyness and lack the confidence to speak out (Ahsan et al., 2020). This situation gets worst when they are aware of that the other students are more competent. In such instances, they worry whether others might identify their insecurities (Ojongnkpot & Laurent, 2018). By considering the facts identified under the language caused insecurities, the context tends to have imposter conditions within students. A country like Sri Lanka has no procedure to identify those.

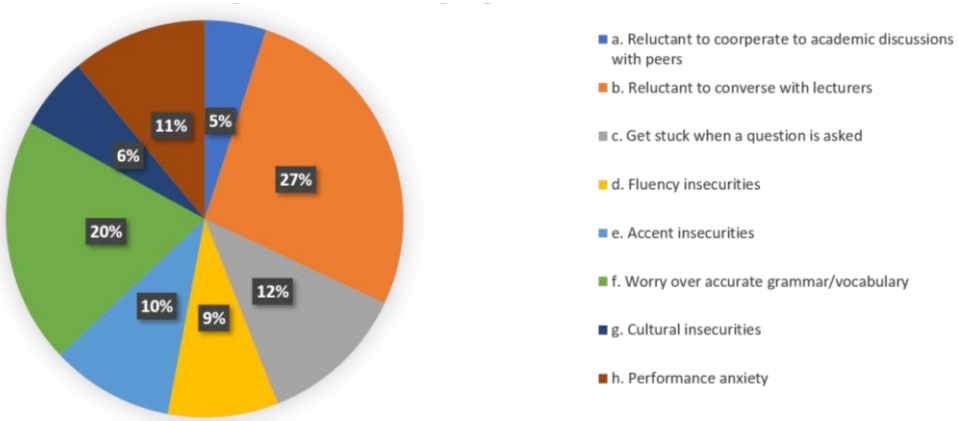

Figure 6. Tested Sub-Categories under Language-Caused Insecurities

Lack of Exposure to the EMI

In the Sri Lankan education system, primary and secondary education primarily uses the mother tongue (Sinhala/Tamil). However, tertiary education, especially in math streams, is conducted in English to ensure quality education and unrestricted access to knowledge (Vaish, 2010). The lack of an effective transitional period for students between secondary and tertiary education in Sri Lanka leads to struggles in understanding subject content in English. This situation aligns with Vygotsky's Zone of Proximal Development, which emphasizes the significance of culture, language, and community roles in the learning process (Mahn & John-Steiner, 2012). In the Sri Lankan context, there is a strong connection between culture, the roots of culture, and the community with Sinhala or Tamil languages. English is seen as a separate space beyond MT but is not easily accessible in early learning stages, contributing to a widening gap between L1 and L2 as children mature. Moreover, the minimal exposure to English language input from the outer society, results in a lack of interaction with authentic English exposure. (Al Zoubi, 2018). However, majority of the Sri Lankan context is filled with MT (Sinhala or Tamil). Being a grown up amidst MT based context, Sri Lankan students must continue their tertiary studies in an EMI environment. Further, the student's immediate background or families are also not that refined to speak English at home. Thus, the English language input that they should receive from the outer environment is zero in the studied context as evidence displayed in Table 4.

Table 4. Highlights from the Interview (Interviewee B)

Respondent	Quote from the interview
B	"My parents speak in Sinhala, they don't know English at all. They are farmers in Kahatagasdigiliya. They are happy to hear that I am studying at the university, but I am 100% sure they don't know what I am doing here… I have heard that they tell the others, 'My son is going to be a surveyor'". "[…] In my school days, we did not have a teacher to English, our science teacher did some English lessons, but the students were escaping from the class when it is English period. We never even thought of doing studies in English" "Actually, these university lectures are truly hard to understand… at the very beginning of my university life, I felt like going away from the lecture because I did not understand anything. But during my school days, I was one who scored highest marks. But here at the university, it was totally different. I always wanted to leave this place because I didn't understand anything."

However, the study tested eight subcategories under the theme of language exposure. Thus, the causes that were dominant in the tested category were (i) low socio-economic status (28%), (ii) minimal interaction with English speakers (24%), (iii) gap between MT based secondary phase and EMI based tertiary phase (27%) as displayed in Figure 7. The impact of the digital divide in Sri Lanka is minimal, accounting for only 2% of the overall impact in the tested sample. While Sri Lanka has access to internet facilities and media, certain knowledge sources are restricted due to high dollar rates when converted to LKR, contributing to a digital divide in third-world countries

despite low awareness in tested clusters.

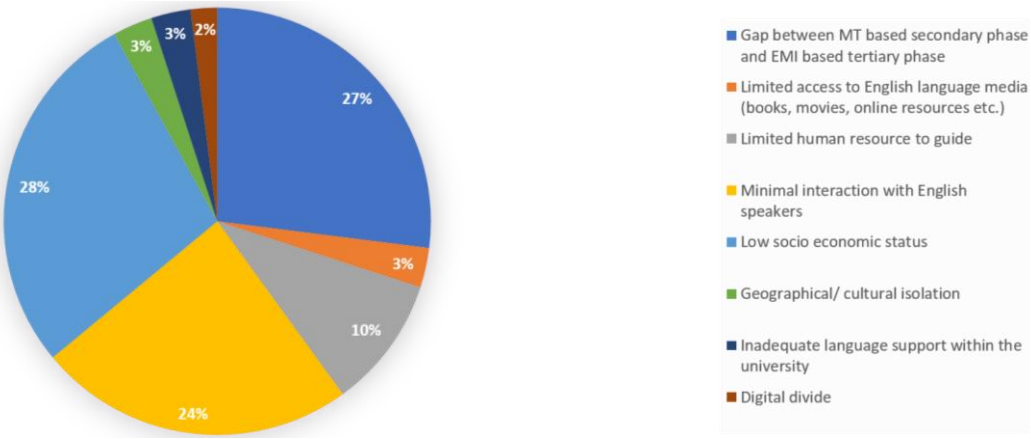

Figure 7. Sub-Categories Tested under Lack of English Language Exposure

Inability to Take Notes

Note taking poses a notable challenge for undergraduate students, as indicated by Figure 4 where 67% of the participants identified it as a significant difficulty. The primary reason for this challenge stems from the transition in learning mediums and the substantial differences between note-taking practices at the school level versus those at the university level. This difficulty is particularly pronounced during the initial year of university education. The adverse effects of this transition include struggles with subject-specific terminology, a heightened aversion to the English language, and a generally negative attitude towards English, as evidenced in Table 5, which provides substantial validity to the claim. The study conducted by Tang (2012) brings out a valid point that the students were unable to produce sufficient content in English because they have a linguistic problem in understanding the basic concepts. Further, the study focuses on the structural changes between L1 and L2, which also affect the inability to compose content in the related subject.

Table 3. Capture from the Semi-Structured Interviews (Interviewee B)

Respondent	Quote from the interview
B	"First thing is I did not understand what the lecturer was saying… and thought the lecturer would give notes like what we did in our school and A/L tuition classes." "University's situation was totally different from what I was used to. Sometimes we felt that it was necessary to explore more knowledge through academic documents and other books. Still, since everything was in English, I gave up doing that… actually, I had no idea how to understand those big books in English. I didn't understand a single paragraph in English. Sometimes, I felt this was not the right choice to continue my education at university… I still am in that doubt."

The primary challenges in note-taking stem from the differences between secondary and tertiary education

practices, with 28% of students citing this as the most impactful factor. In Sri Lankan schools, students are accustomed to receiving notes from teachers, unlike the independent notetaking required at universities. Additionally, 20% of students struggle due to a lack of English proficiency. Other significant factors include technological distractions (14%), issues with attention span and focus (11%), lack of practice in note-taking strategies (10%), and feelings of anxiety and stress (7%) as displayed in Figure 8. Although the students have represented these factors in comparatively low amounts, it certainly has a significant impact upon the students' academic performances (Luby & Southern, 2022).

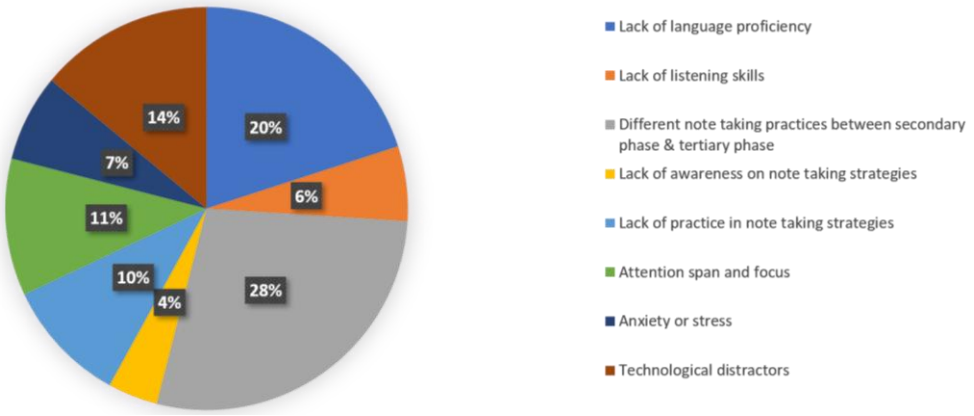

Figure 2. Sub-Categories Tested under Difficulties Related to Note-Taking

Accent of the Lecturer

With the globalized education system, gaining resources from international grounds is a vital concern in the tertiary phase of education(Huang & Xiong, 2023). Depending on the various language accents of the globe, each person has accent deviations. In such instances, students struggle to gain access to the subject content (Lillyman & Bennett, 2014; Wilkinson, 2020). According to the prevailing literature, language ability is highly intertwined with the teaching-learning process (Başıbek et al., 2014; Werther et al., 2014). With the unreachable accent of the lecturer, students are unable to accommodate the subject contents (Vinke et al., 1998). Claims for the statement are displayed in Table 6.

Table 4. Highlights of the Interview (Interviewee A)

Respondent	Quote from the interview
A	"…even I can't understand the language… top of that, when the lecturer uses a different accent, obviously it is hard to grab." "… even I only focus on what he is saying, I could not understand… so I don't think there will be any effective way to understand the lecture." "I only hear some set of sounds, and that is it… actually, I did not understand anything, especially in guest lectures."

According to collected data, variations in pronunciation has the highest impact (29%). Further, speech rate and

rhythm and weaknesses in listening skills have recorded 23% impact as displayed in Figure 9. According to the studied causes, the first four causes are beyond the control of students. The students can focus of developing weaknesses in their listening skills as it is the only possible way remain in their control (Field, 1998).

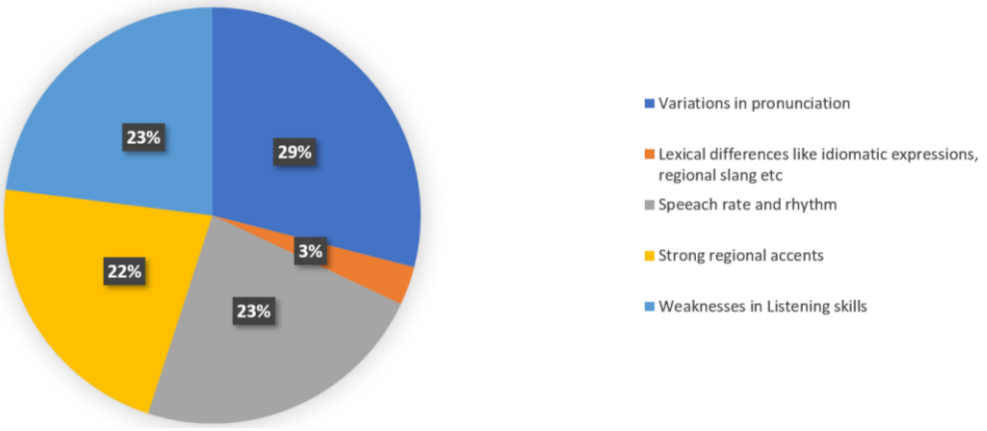

Figure 3. Sub-Categories Tested under Difficulties in Lecturer's Accent

Writing Style

Undergraduate students in outer circle countries encounter significant challenges when tasked with writing assignments and reports, struggling to effectively blend language and subject content. The transition from school to university exacerbates these challenges, highlighting the need for targeted support initiatives like writing-across-the-curriculum programs and language competency development tools to enhance academic writing skills among these students(W. Liu, 2023). The major reason for the emergence of this issue is the uneven transfer from the L1-based senior secondary phase to the L2-based tertiary phase. The lack of a refined and effective mode to sharpen their writing style is a significant drawback of the education system (Faruquzzaman Akan et al., 2019). As a result of this, when they tried to organize a sentence or any essay-type answer, they were unable to manage it at the expected level of language competency as the pre-installed language rules of L1 interfered with the new language rules (Derakhshan & Karimi, 2015). The most important findings are displayed in Table 7.

Table 5. Highlights from the Interviews (Interviewee B and D)

Respondent	Quote from the interview
B	"I should tell that I have no idea about how to construct a grammatically correct simple sentence in English…" "I used to think in Sinhala and then directly say it in English, but I also didn't know whether the sentence was correct or wrong." "Obviously, I had zero knowledge about the structure of an academic answer. Actually, I have never thought about writing a paragraph in a proper organization until I randomly sat for an English lecture in the second year first semester."
D	"I had no idea about academic answers…um… I just wrote what came to my mind. Sometimes, I just wrote the key terms that came to mind after reading the question."

	"No, I never even thought about academic language …umm…, tone or anything…" "I can remember that we had a few lectures about academic writing, note taking… umm… in our intensive English programme, but actually, I never thought those things were practically applicable until I got a few C passes for my first-semester exam."

According to collected data displayed in Figure 10, grammar and academic vocabulary choice is the highest recorded challenging factor, that is 23% of the sample. On the other hand, academic tone and style (22%), lack of individual attention and feedback from lecturers (17%), and inability to integrate language and subject content (15%) has a significant impact on writing style of the undergraduates. Thus, it is vital to address these writing issues to enhance the students' academic performances in the EMI learning environment.

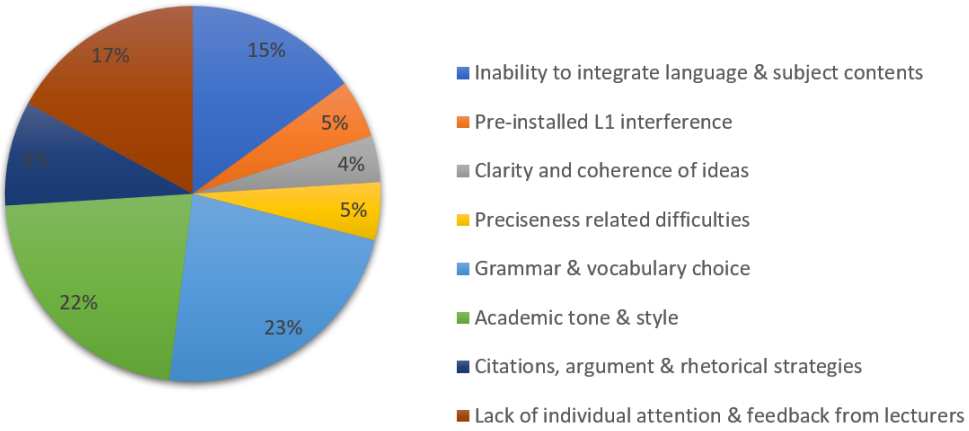

Figure 10. Sub-Categories Tested for Challenges in Writing Style

Communication

Communication is a mandatory purpose within an academic context. To support the point Kaur (2020) stated that in addition to being the language of lecturing, the need to use English often extends to other elements of an EMI course including the spoken interaction in lectures, tutorials, and study groups (Kaur et al., 2020). By applying the same lens to view the research context, it is mandatory to use English language to communicative purposes as the context is multicultural. Jensen and Thogersen (2011) stated that creating and sustaining an interactive teaching and learning environment in English presents significant linguistic challenges compared to traditional lecturing. This is because both teachers and students are required to possess advanced language skills that enable them to actively engage in academic discussions focusing on the course content. (Kaur et al., 2020). Further, the existing literature has evidence to prove that the students face greater difficulty in participating in various teaching-learning activities that involve the oral skills that go beyond delivering and understanding a lecture (Kaur et al., 2020). In support of the same argument Andrew (2017) stated that English language proficiency skills can be developed by using EMI in a university context.

According to the primary data as displayed in the Figure 11, the highest impact-caused factors are lack of confidence (27%), errors in sentence structure (18%), hesitation to speak (19%), difficulty in finding words with

smooth flow (21%) which clearly hinders that the lack of language exposure and confidence are the dominant factors to the communicative drawbacks.

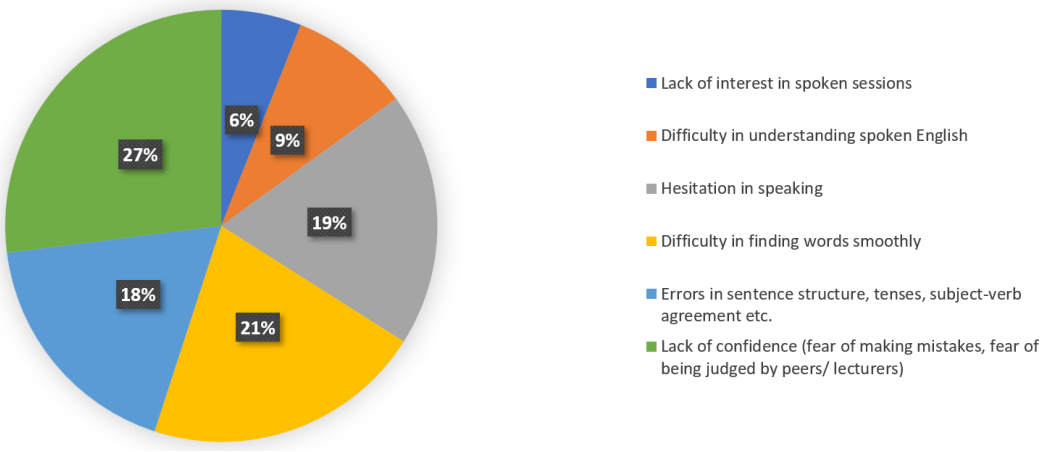

Figure 4. Sub-Categories Tested under Communication-Related Challenges

Afore-mentioned insights are highly effective when a non-Anglophone individual shifts into an EMI learning situation. Thereby the curricula that is designed for English course units should focus on sharpening the skills like note-taking, giving presentations, taking part in discussions, reading, and writing academic papers (Hyland & Shaw, 2015). Conversely, this entails support amongst language experts and the relevant subject departments to design EAP course curricula which supports learners in acclimatizing their 'academic discourse' (Schmidt-Unterberger, 2018).

Mechanisms Used by the Students to Overcome the Language-related Challenges

Vocabulary Development

Most students focus on improving their vocabulary, believing that the problem stems from poor vocabulary. To address this, they use traditional methods such as reading newspapers, research articles, and collecting unfamiliar words (Derakhshan & Karimi, 2015). Further, the scholars assigns three key spheres that caused an impact on oral communication effectiveness: (i) social knowledge, (ii)self-knowledge, and (iii) content knowledge (McGeer, 2001). According to the argument, these three components should be integrated. In most cases the fluctuations occur in the component self-knowledge (McGeer, 2001). Due to the lack self-knowledge related to English, they were unable to grab the content knowledge within the EMI setting. One example is that a student who is good at managing the language has shared that he continuously watched English movies and due to that positive impact, which is visible in his language usage, the other students started following the same strategy. Evidence is displayed in Table 8.

Table 6. Highlights of the Interview (Interviewee C)

Respondent	Quote from the interview
C	"one of my closest friends is really good at English… he is fluent, and words come like water. But I'm not like that… I talk and find words with much difficulty. I also tried the method invented by my fluent friend. He said that as a habit, he has continuously watched English movies since childhood. I also tried the same, but I have still not made any progress. Maybe it needs time." "Sometimes, unintentionally… when I talk with my Tamil friends, some good conversations happen… but still, I am not good at selecting the most suitable words in conversations and writing."

The study explores how students utilize newer technological tools like Google Translate to address subject-related terminology challenges. It suggests that engaging in stress-free activities such as watching movies, reading novels, and listening to music inadvertently provides significant benefits to students. These activities offer practical and unintentional advantages, potentially aiding in stress reduction and enhancing overall well-being. According to the collected data as displayed in Figure 12, The positive impact of stress-free activities on vocabulary development is evident, with 26% of the sample acknowledging its effectiveness in providing practical exposure. Traditional methods like reading and simply adding new words to a book are perceived as less effective compared to engaging in stress-free activities. Students have rated conventional mechanisms lower in effectiveness, emphasizing that merely collecting words without continuous usage is not as impactful. In contrast, when students immerse themselves in meaningful modes of entertainment in English, the benefits are more substantial and fruitful for vocabulary development (Huo, 2022). According to the process of vocabulary enhancement invented by Grauberg (1997) involves four stages: (i) discrimination, (ii)undertaking meaning (iii) remembering and (iv) consolidation and extension of meaning. For an instance absorbing words is a slow process that happens over time, it permanently absorbs when the learners use it within their personal stock of words. Thus, the importance of continuous exposure is mandatory in vocabulary development.

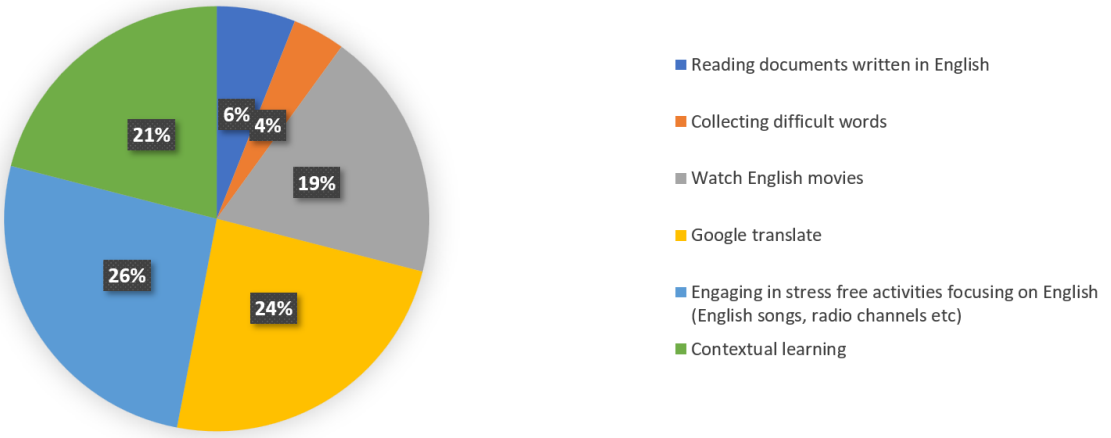

Figure 12. Mechanisms Utilized by the Students to Overcome Vocabulary-Related Challenges

Mechanisms Utilized to Overcome Language Anxiety-related Issues

Language anxiety is a significant concern within the study context as 74% of the sample has stated it is a

challenging factor in the Figure 4, they have experienced in the EMI learning environment. Most of the tested sample rated remaining silent manner during learning hours as the strategy they utilized to overcome language anxiety (42%). Further, 27% of the sample has stated that they are utilizing English core subjects to minimize their language related insecurities as evidence is displayed in Table 9.

Table 7. Highlights of the Interview Series (Interviewee E)

Respondent	Quote from the interview
E	"…always I just listen to the lecture, but I am afraid of entering into a conversation in English when I am in a lecture. Because sometimes lecturers and other students judge me based on that. I don't want to show them that I am not confident in handling English."

Further, 17% of the tested sample has revealed that they try to build conversations with other communities whose MT is different. Additionally, 14% of the sample has rated that they try to engage in in-class academic conversations in English as displayed in Figure 13. The main reason for that is the friendly and stress-free learning environment created within the ELTU. As a result of this, many students make use of the time to talk and enhance their language skills as evidence in Table 6.

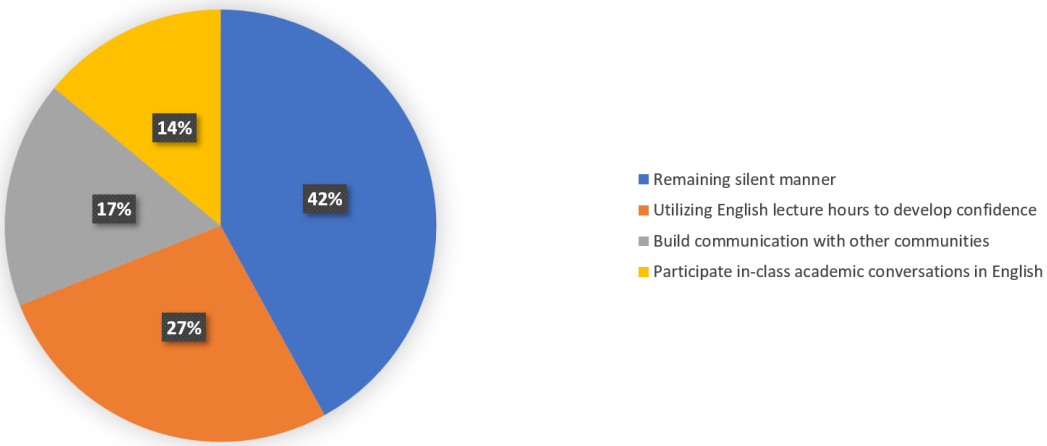

Figure 13. Mechanisms Utilized to Overcome Language Anxiety

Mechanisms Used to Gain more Exposure to the EMI Environment

Among the most frequent Mechanisms utilized to gain exposure, the study identified coping mechanisms like watching the lecture recording repeatedly (37%), contextual learning (21%), technological exposure (28%), searching about the topics on the internet (6%), watching documentaries, referring to online tutorials, watching foreign lecturers, and watching YouTube videos related to their subject areas (8%) as evidence is displayed in Table 10.

Table 8. Highlights of the Interview Series (Interviewee D)

Respondent	Quote from the interview
D	"I think during our field practical sessions, we learn a lot while working with group members from other language communities and other international representatives." "At the beginning, I tried to listen to the recorded versions of the lectures, but I gave up it as it consumes time."

Each strategy and the frequency of the usage is clearly visualized in Figure 14. According to Fellini's explanation, language is not a genetic gift, it is a social gift. Learning a new language is becoming a member of the club, the community of speakers of that language (Bano & Zaman, 2016). Bestowing to this definition, for a language to get flourish social contact and interaction is a mandatory requirement (Jóhannsdóttir, 2018). Scholars have revealed that out-side the learning environment has a dominant impact upon the student's language exposure (Ghelichli et al., 2023). According to the findings of Kucukler et al. (2021) English language exposure can be gained through television and films to develop their contextual learning. More dominantly, digital technology plays a vital role in language exposure in the current environment. Thus, most importantly technological exposure helps to increase exposure to the language.

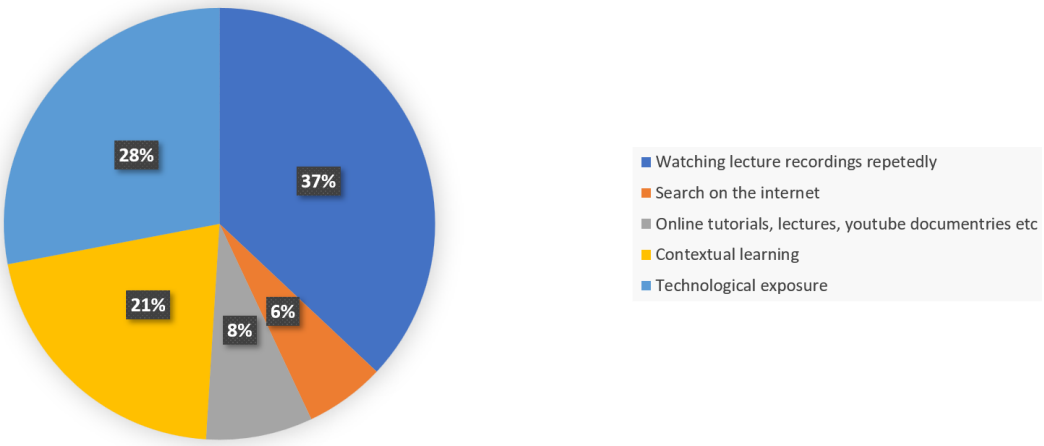

Figure 14. Coping Mechanisms Utilized to Gain More Exposure to the EMI Contents

Inability to Take Notes

A majority of the students had issues in taking notes when they are in the EMI environment due to several reasons as discussed in 3.1.4 section. The sample had their own ways to overcome these issues. Those mechanisms are clearly displayed in Figure 15 and Table 11. The primary strategy favored by the sample is requesting complete notes from a proficient student, accounting for 38% of participants. The term 'bright student' was defined as one adept in managing the English language. Watching lecture recordings multiple times was the second most popular strategy, chosen by 34% of the sample. Additionally, 28% of participants utilized PowerPoint slides for reference.

Notably, no students opted for in-sessional academic English courses, as this strategy is not currently implemented in the Sri Lankan university system.

Table 9. Capture from Interview (Interviewee A)

Respondent	Quote from the interview
A	"I have tried to do it, but I gave up as it only consumes time to refer to dictionaries and compose the notes. So, the most effective way is to have a photocopy of a bright student note or a note from a senior student." "No… there was no difference between the notes and the slides shared without senior batches. Most of the time it is the same note or the lecture slide."

Prevailing literature provides possible suggestions to sort this issue (Cancino et al., 2011). Students' English levels should be checked regularly through the program, to allow them to benefit from language support and employ effective learning methods in EMI (Cancino et al., 2011). Thompson et al. in 2019 highlighted a subsidiary benefit of in-sessional academic English courses (e.g. ESP and EAP) in developing not only students' academic English but also their confidence (i.e self-efficacy) towards success in learning through English (Aizawa & McKinley, 2020).

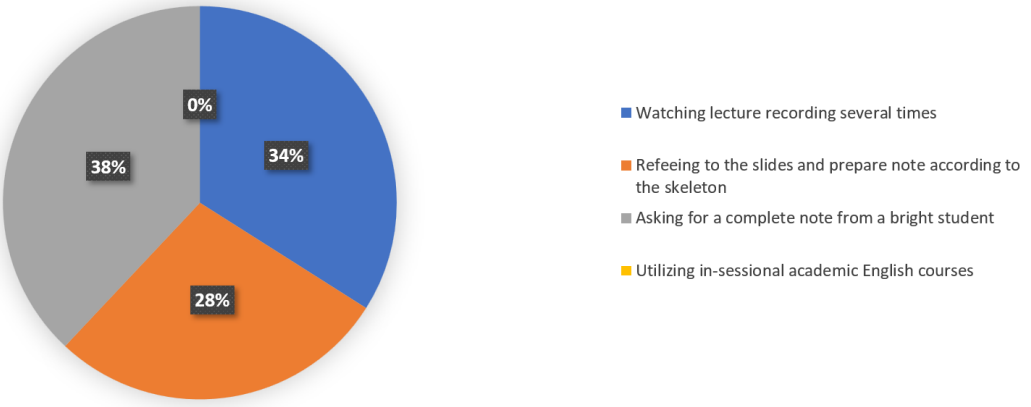

Figure 15. Mechanisms Utilized to Overcome Note-Taking Related Difficulties

Mechanisms Used to Tackle the Accent of the Lecturer

Most of the sample recorded collective discussions as the most popular method to sort the issue related to hard accents of the lecturers. According to Figure 16, 56% of the sample has utilized collective discussions to overcome this challenge. Further, in the university sub culture of Sri Lanka, the term 'kuppi' is utilized by the students to this type of academic discussions taken by the student groups(Kommalage & Thabrew, 2011) as evidence is displayed in Table 2. Thus, it is clear evidence to prove that these types of coping mechanisms are common among young undergraduates in Sri Lanka as they owe their own way of sorting out the academic issues. In these 'kuppi'

sessions the main resources utilized by the students are the lecture recordings, the main keywords of the lecture and the slides the lecturer shared with students. Then they searched the internet for tutorials and research articles about the subject contents (Lin & Morrison, 2010). Further, this is more closely related to self-learning by referring to other resources related to the subject area (Broadbent & Poon, 2015; Chand, 2014; Elliott & Higgins, 2012; Richards & Renandya, 2002). Thus, this is a process that they used to overcome the heavy accent of the foreign lecturers. This process is very effective for them to build up the lesson according to the skeleton they have. Thus, collective peer discussions are the dominant and most effective strategy utilized by the students. Figure 16 clearly displays how students have rated on each component tested.

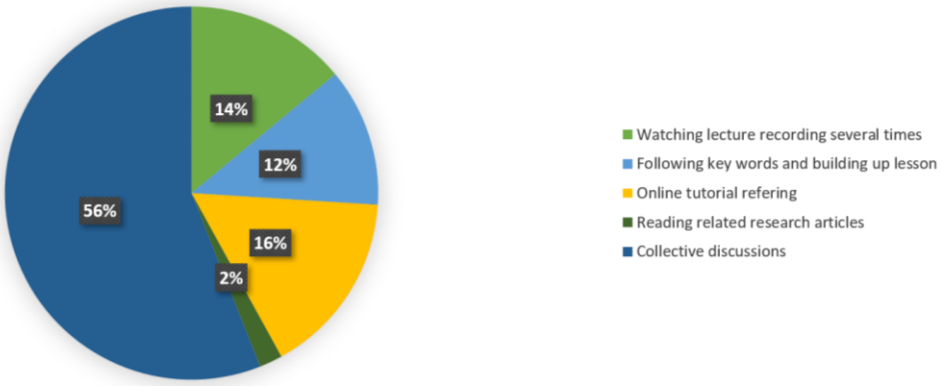

Figure 16. Mechanisms Utilized to Overcome Challenges Related to the Accent of the Lecturer

Coping Mechanisms to Develop their Writing Style

According to the collected data as displayed in Figure 17, the sample utilized four major coping mechanisms: seeking support from the ELTU, referring to teaching materials on core subject content, practicing with corrections and feedback, and engaging in extensive reading. Seeking guidance from the ELTU was the most popular strategy, chosen by 48% of participants. English lecturers based their study materials on students' subject content (32%), focusing on topics like mapping, GIS-related research articles, and news articles. Additionally, students requested corrections from English lecturers upon completing field reports (14%) as evidence is displayed in Table 12.

Table 10. Captured Evidence from Interview (Interviewee D)

Respondent	Quote from the interview
D	"I usually ask someone to read and correct my reports and other assignments." "Our English madams are really helpful in developing our writing skills because if we request them to give feedback on our work, definitely they do it with pleasure. The friendly attitude in them makes it easier"

The study conducted by Zhao and Dixon (2017) suggested possible ways to improve these issues by providing students with more natural opportunities to improve overall competence in English, enabling students to improve oral English, to acquire more specialized knowledge and information through extensive reading (Park, 2016).

Through continuous reading one can easily get familiar with a writing style and identify sentence structures and order. The tested sample reveals that only 6% of the sample is utilizing extensive reading to improve their writing style as depicted in Figure 17.

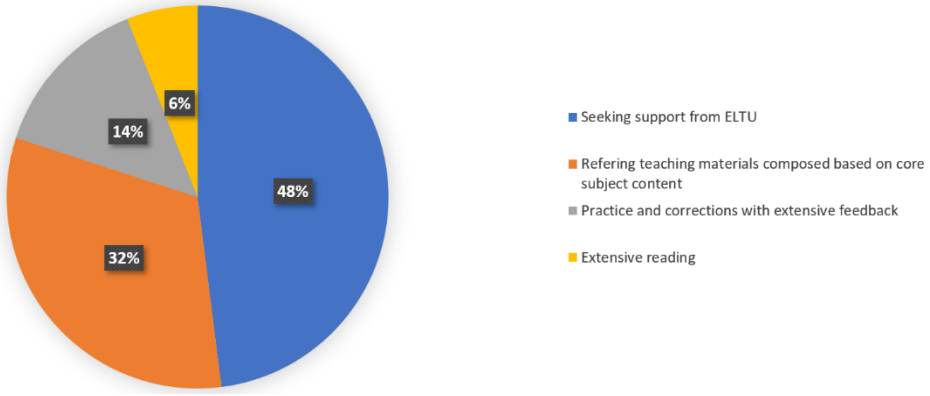

Figure 17. Strategies Utilized to Overcome Issues Related to Writing Style

Mechanisms to Develop Communicative Drawbacks

According to the secondary data referred for the study, Pascarella and Terenzini (1991) promoted the idea of communicating in both informal and formal settings that help and share the students' problems and other issues with their peers. In the tested sample 24% of the students have utilized this strategy as displayed in Figure 18. According to the collected data 12% of the sample is practically utilizing active listening practices. Long-term practice and exposure have significantly enhanced students' academic performance. In addressing communicative challenges like viva examinations and academic presentations, students need to effectively organize answers within time constraints. Approximately 33% of the sample expressed a desire for speaking opportunities to improve their oral communication skills. When responding to questions from lecturers, students must demonstrate skills such as retrieving relevant knowledge, interpreting information, comparing elements, and summarizing key points. As it is mandatory to communicate and interact with the lecturer in an effective way to develop rich scholarly dialogue it is an urgent requirement to develop more logical ways to enhance the student's language performances in the tertiary phase of education (Khoudri & Khoudri, 2023).

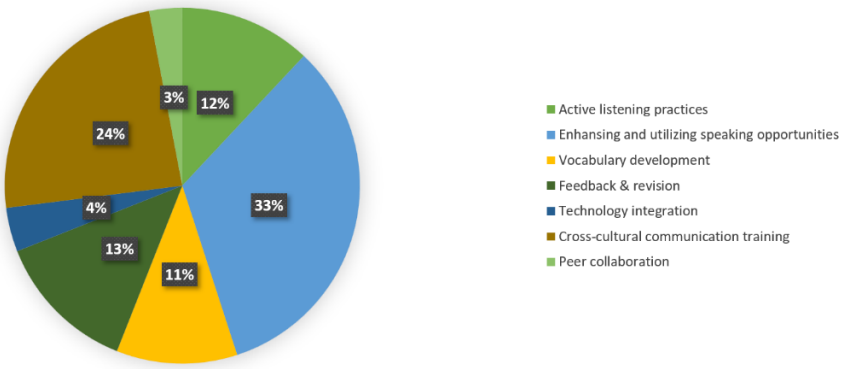

Figure 18. Mechanisms Utilized to Minimize Communicative Challenges

Conclusion

This study has reported the findings of a study which aimed to determine the challenging factors, causes and coping mechanisms utilized to overcome the challenges in the EMI learning environment of Sri Lankan tertiary phase of education. The case of study reveals a lack of confidence in their English abilities. Furthermore, the highest challenging factors lie in writing skills (78%), language caused insecurities (74%), and communicative drawbacks (70%). In addition, the lowest challenging factors for the tested sample are vocabulary-related issues (49%) and the accent of the lecturer (40%). Further, the study has identified causes for the afore-mentioned challenges. Among those, the most significant factor discovered was that psychological lapses related to English language skills developed since school education has a significant impact on the performances of the students in the tertiary phase. Psychological concerns are apparent behind almost all the causes discovered. Another vital factor identified is that most of the tested sample has revealed symptoms related to imposter syndrome. This psychological condition needs to be addressed in Sri Lanka through a more confidential and logical way with the intention of uplifting the performances of the most valuable fruitage of the Sri Lanka's free education system.

Moreover, the coping mechanisms utilized by the students to overcome the challenges encountered in the EMI learning environment have two distinct parallaxes. Some mechanisms the students have identified consisted of rationale that it has a solid impact on language improvements. For instance, language development through extensive reading, stress-free engagement with the English language, contextual learning, peer-assisted academic discussions, seeking professional advice and feedback continuously etc., owe a logical foundation towards the positive acquisition of language. On the contrary, coping mechanisms like remaining silent manner, avoiding in-class academic discussions, avoiding more interactive lectures, and asking for a completed note from another student lacks a language development. Those irrational mechanisms only provide a temporary space to avoid the real problem, which leads towards a vital concern that is psychologically harmful repercussions in the learning environment.

Recommendations

Thus, the study would recommend that policymakers and curricula designers in the education field pay more attention to these areas. As the students are struggling with language caused difficulties, it is mandatory to bridge the fluctuated transit between the two educational phases which will be beneficial for the coming generations. Apart from that, through effective collaboration between the content lecturers and language teaching educators, the language component in EMI can be dealt in a more fruitful manner. Further, the study recommends that the learning environment should be stress-free. Despite the challenges encountered by the students, EMI is truly important as Sri Lankan academics are more mobile within the contemporary globalized world. It is hard to expect them to become a solid part of the international academia without proper command of English.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered

in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

***Statement of Interest*:** We have no conflict of interest to declare.

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A Literature Review: The Impact of Experiential Learning on Developing Students' Critical Thinking Skills in Indonesia

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Abstract

The use of the experiential learning model within learning often remains underutilized despite its proven effectiveness in enhancing students' abilities across various domains. There is a need for a review of existing studies applying this pedagogical approach. This research aims to disseminate the impact of research that has been carried out on the development of knowledge science. These findings affirm the effectiveness of experiential learning in cultivating critical aspects of students' thinking, aligning with the demands of modern education that emphasize deep and critical thinking skills. This model consistently contributes positively to students' abilities in analysis, evaluation of arguments, and making rational conclusions based on evidence. Students engaged in experiential learning show increased cognitive activity, more comprehensive participation, and high motivation to develop critical thinking skills. The stages of implementing this model, from concrete experience to active experimentation, blend real-world experiences with the development of students' critical thinking skills. This process involves direct experience, reflection, conceptualization, and implementation, reflecting a student-centred, experientially-based learning approach. This research provides a strong basis for considering the adoption of experiential learning to enhance the quality of learning and the development of critical thinking skills in future educational endeavours.

Keywords: Critical Thinking, Experiential Learning, Learning, Teaching.

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Introduction

The discussion of critical thinking ability as the primary focus of classroom learning objectives is essential to holistic and progressive education. Critical thinking is identified as one of the high-level thinking skills required for developing 21st-century skills (Redhana, 2019; Kurniawati et al., 2019; Mardhiyah et al., 2021; Rahardhian, 2022; Pare & Sihotang, 2023). Developing critical thinking, problem-solving, communication and teamwork skills, as well as fostering creativity and invention, are essential components of learning and are crucial for the advancement of society in the 21st century (Kurniawati et al., 2019).

In this context, critical thinking ability is defined as students' capacity to deeply analyze information, evaluate arguments, and construct rational and logically reasoned thoughts (Ahmatika, 2017; Saputri et al., 2019; Firdaus et al., 2019). Learning objectives focusing on developing critical thinking skills acknowledge the importance of preparing students to think independently and critically about the myriad of information they encounter in daily life. An individual's critical thinking ability is crucial for life, work, and effective functioning in all other aspects of life (Fristadi & Bharata, 2015).

Critical thinking abilities are essential in classroom learning as they develop individuals who can excel and adapt in complex and constantly evolving cultures. Through critical thinking, students can develop problem-solving abilities. Problem-solving skills require children to possess critical thinking abilities to solve a problem or explore various problem-solving alternatives and decision-making, evaluate potential, problem-solve, and synthesize information to make decisions (Fristadi & Bharata, 2015; Novita et al., 2020). Emphasizing critical thinking skills in learning also enables students to develop deep analytical abilities towards social, scientific, and cultural issues they encounter, thus fostering intellectual growth and enhanced understanding.

Furthermore, critical thinking-oriented learning contributes to shaping individuals who are critical of various narratives and perspectives. By encouraging students to question, evaluate, and construct arguments critically, such learning creates an environment where tolerance for diversity of opinions is promoted and the ability to engage in evidence-based discussions is enhanced. Therefore, critical thinking-focused learning not only pursues academic achievement but also aims to shape active, critical, and competitive citizens in a complex global era.
Achieving critical thinking skills as a learning outcome requires the application of appropriate and effective learning models. Learning models emphasizing the development of critical thinking skills typically involve active interaction between students and their learning materials and mentors. A model that provides room for students to develop their abilities is necessary (Novita et al., 2020).

In this context, the existence of learning models becomes a primary focus to support effective and efficient learning processes. Learning models are conceptual frameworks that guide the teaching and learning process, considering various aspects from teaching methods to interaction patterns between teachers and students (Mertayasa, 2023). Joyce & Well describe a learning model as a plan or pattern that can be used to design long-term learning plans, design learning materials in the learning process, and guide the learning process in class (Albina et al., 2022). The right learning model can play a crucial role in developing students' critical thinking

skills. By selecting a learning model that aligns with students' characteristics and learning objectives, teachers can create a motivating and challenging learning environment that enables students to achieve their maximum potential.

In practice, the presence of suitable learning models can optimize the learning process by increasing student engagement, enhancing conceptual understanding, and facilitating knowledge transfer to different situations. Teachers who understand various learning models have the flexibility to adapt their approaches according to students' needs and characteristics. Therefore, the presence of learning models can be considered a key element in achieving optimal learning outcomes in an educational context.

The discussion on the underutilization of the experiential learning model by teachers, despite its high effectiveness in improving student learning outcomes, reflects a paradox in the education world. Experiential learning was introduced in 1984 by David Kolb in his book titled "Experiential Learning: Experience as the Source of Learning and Development." Experiential learning is defined as "the process by which knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Idris, 2018).

The experiential learning model not only provides insights into conceptual knowledge but also builds skills through real assignments, feedback, and evaluation between the application outcomes and what should be done (Zuhryzal & Fatimah, 2019). This model emphasizes that experience plays a central role in the learning process (Barida, 2018). In the experiential learning model, learning occurs naturally in the form of participants working and experiencing rather than the transfer of knowledge from educators to learners (Aryuni et al., 2017).
This method offers a real context for students to apply the knowledge they gain in real-life situations, which can deepen their understanding. The experiential learning model stimulates original thinking and develops various thinking strategies and perceptual skills not acquired from books or lectures (Efstratia, 2014). Involving students directly in the process of discovering and formulating concepts enables pupils to develop their ideas and thoughts (Novita et al., 2020).

However, the main challenge that may make teachers reluctant to adopt this model is the challenges in planning and implementation, which require considerable time and resources. One reason why the experiential learning model is underutilized is the lack of understanding and training among teachers on how to effectively implement it in the classroom context. This approach requires teachers who can integrate elements of active learning, reflection, and practical experience into their curriculum and teaching designs. Unfortunately, the lack of support and resources for teachers to develop these skills often becomes a major barrier to adopting the experiential learning model (Periyanti et al., 2019).

Furthermore, some teachers may be hesitant to use the experiential learning model due to concerns about reduced control and orderliness in the classroom. In this approach, students play a more active role in their learning process, which can change the traditional dynamics in the classroom. This can cause discomfort or concerns for some teachers who are more accustomed to structured approaches. Therefore, to increase the use of the experiential

learning model, it is important for educational institutions and curriculum developers to provide adequate training for teachers and facilitate an environment that supports experimentation and innovation in teaching methods. In the information age, critical thinking ability is a much-needed skill. Experiential learning helps students develop these abilities by exposing them to real-life situations that require analysis, evaluation, and problem solving. Investigating and implementing experiential learning can be one strategy to get around problems in conventional educational systems and raise educational standards all around.

Method

The employed approach is a systematic literature review (SLR), which is a methodical and organized research technique used to locate, assess, and amalgamate all pertinent information from preexisting literature pertaining to a particular subject (Rahayu & Hosizah, 2021). This method involves the following steps: (1). Develop research questions. Research questions are formulated based on the needs of the selected topic. The research questions for this study are: RQ1: What is the impact of the experiential learning model on students' critical thinking abilities? RQ2: How is the experiential learning model applied to enhance students' critical thinking abilities?; (2). Selection Criteria. The selection criteria for this research are as follows: a. Inclusion Criteria: 1). Relevant journal articles or scientific works related to the sought topic or research questions (impact of the experiential learning model on students' critical thinking abilities). 2). Publication year (2013 to 2023). 3). Indonesian national journal articles. 4). Accredited SINTA journal articles or scientific works. b. Exclusion Criteria: 1). Irrelevant journal articles, scientific works, or out of the search topic. 2). It was published more than 5 years ago. 3). Non-accredited journal articles or scientific works; (3). Developing the search strategy The search process is conducted using a search engine (Google Chrome) with the website addresses https://garuda.kemdikbud.go.id and https://scholar.google.com/ using the keywords "experiential learning critical thinking students"; (4). The methodology for selecting participants in the study Journal articles or scientific publications that have been identified are subject to the selection criteria for selection process. Sometimes referred to as screening to ensure the research meets the selection criteria or not. The selection process is conducted in two stages, where the title and abstract of the research are initially reviewed to determine relevance to the sought-after topic. (5). Appraising the quality of studies.

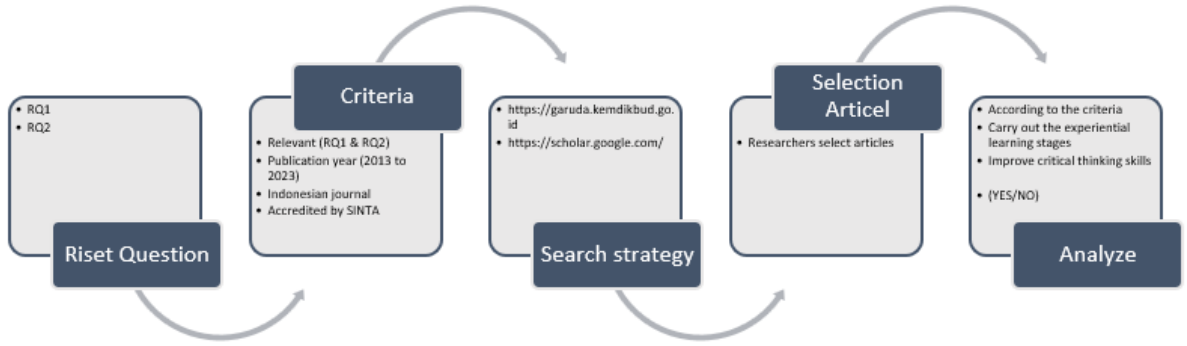

Figure 1. Methodological Steps

The found data will be evaluated based on quality assessment questions as follows: QA1: Was the journal paper published between 2013 to 2023? QA2: Is the journal article published in a SINTA-accredited journal? QA3: Does the journal paper describe the stages of applying the experiential learning model? QA4: Does the journal paper describe the improvement of students' critical thinking abilities? For each journal article or scientific work, answers will be provided below for each of the questions above: a. Y (yes) b. T (no).

Results

From the search results, 11 articles were obtained and will undergo selection. One article is a duplicate of an existing article, resulting in a total of 10 articles available for selection. Out of these 10 articles, four fall into the acceptance category.

For question QA1, all accepted journal articles were published between the years 2013 to 2023. Regarding question QA2, all accepted journals are indexed in SINTA 3. In response to question QA3, all journal articles describe the stages of implementing the experiential learning model. Finally, for question QA4, all journal articles discuss the improvement of students' critical thinking abilities. Further details are illustrated in the following table:

Table 1. Selected Articles

No.	Authors	Title	Publisher
1	Ayu Amalia, Eko Hariyono	Penerapan Experiential Learning pada Materi Perubahan Iklim untuk Melatihkan Keterampilan Berpikir Kritis Siswa	BRILIANT: Jurnal Riset dan Konseptual, Vol. 7 (1), 2022
2	Winda GarinaIis, Nurasiah,Dyah Lyesmaya	Penerapan Pendekatan Experiential Learning Dalam Pembelajaran IPA Untuk Meningkatkan Berpikir Kritis Pada Siswa Sekolah Dasar	Attadib Journal Of Elementary Education, Vol. 2 (1), 2018
3	Ni Wayan Rina Lestari, I Wayan Sadia, Ketut Suma	Pengaruh Model Experiential Learning Terhadap Keterampilan Berpikir Kritis Dan Motivasi Berprestasi Siswa	e-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi IPA, Vol. 4, 2014)
4	Reni Periyanti, Lia Yuliati, Ahmad Taufiq	Eksplorasi Kemampuan Berpikir Kritis Siswa melalui Strategi Experiential Learning pada Materi Fluida Statis	Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan, Vol. 4 (7), 2019

Source: Processed from https://garuda.kemdikbud.go.id/

Discussion

1. RQ1: What is the influence of experiential learning on students' critical thinking abilities?

From the analysis conducted, there were differences in critical thinking skills between two groups of students who underwent different learning methods: experiential learning and conventional learning. In this context, critical thinking skills were measured as students' ability to analyze information, evaluate arguments, and draw rational conclusions based on available evidence.

The data analysis results indicated a significant difference in critical thinking skills between the two groups of students. The experimental group, which learned through the experiential learning approach, demonstrated a greater improvement in critical thinking skills compared to the control group that underwent conventional learning. This was evident from the significant scores achieved by students in identifying assumptions, constructing sound arguments, and critically evaluating information (Lestari et al., 2014; Amalia & Hariyono, 2022). Experiential learning positively influences participants' activities in the learning context. Students engaged in experiential learning tend to be more cognitively active, participate more comprehensively in the learning process, and exhibit higher motivation to develop critical thinking skills.

The experiential learning approach can enhance students' critical thinking abilities. Based on the observed changes in students' thinking, it is evident that this strategy effectively stimulates reflection and deep evaluation of the learning material. The observed improvement in students' critical thinking skills can be attributed to the characteristics of experiential learning, which emphasize direct experience and reflection. By involving students in activities that require active analysis, synthesis, and evaluation, this learning model encourages the development of critical thinking skills (Garinalis et al., 2018; Periyanti et al., 2019).

This provides concrete evidence that the application of experiential learning influences how students process information and develop thinking skills. In the context of modern curricula that emphasize cognitive development, this experience-based learning strategy has the potential to provide significant benefits in preparing students to face intellectual challenges. Moreover, this research provides a strong scientific basis for recommending the integration of experiential learning into the curriculum. By providing students with direct experience in the learning process, educational institutions can effectively enhance their critical thinking abilities, preparing them to solve complex problems and adapt to future changes. The significant differences observed in critical thinking skills between students learning through experiential learning and conventional learning provide additional impetus for educators and policymakers to consider the use of more innovative, experience-based learning strategies.

2. RQ2: How does the implementation of experiential learning enhance students' critical thinking abilities?

a. Concrete Experience.

In the concrete experience phase, students are provided with real-life experiences or real-world problems related to the discussed material. Students actively engage in the learning process (Hakima & Hidayati, 2020). In this phase, the interpretation dimension of critical thinking skills is developed. Students are given stimuli or motivation

that can encourage them to engage in activities based on their experiences (Lestari et al., 2014; Garinalis et al., 2018; Periyanti et al., 2019; Amalia & Hariyono, 2022).

The concrete experience phase involves engaging students in the learning process, which plays a role in developing students' learning abilities during the learning process because the media used is not only books and teachers but also involves students' experiences (Arifah, 2023). Previous experiences are utilized by providing stimulation and direction so that students can think critically (Sundari et al., 2014). Experiences can serve as student learning sources, thus forming understanding (Hajjah et al., 2022).

Through the capacity of humans to reconstruct experiences and then interpret them (Ariani, 2018), learners can more easily construct knowledge independently (Mariyam et al., 2014). Students are invited to directly engage with real-life experiences or relevant real-world problems related to the learning material. The goal is to encourage students to develop the interpretation dimension of critical thinking. Additionally, it invites students to critically view everyday events and conduct simple research to determine what actually happened, followed by drawing conclusions together (Nurhasanah et al., 2017).

Real experiences and relevant real-world problems related to the learning material are key to achieving experiential learning goals. By using relevant experiences and problems, students can understand concepts and theories more deeply, be motivated to learn, develop critical thinking skills, improve knowledge transferability, and prepare for real-life situations. The best learning process occurs when facilitated by conflicts between direct experiences and students' real experiences (Ariani, 2018).

In the concrete experience stage, the teacher plays a role in providing appropriate stimuli and motivation to students. Stimuli can be in the form of questions, pictures, videos, or real objects related to the experiences or problems provided. Motivation can be provided by explaining the benefits of studying the material and how the material can be applied in real life. Educators are responsible for overseeing the organization of learning activities based on previous experiences and linking them to new experiences (Ariani, 2018). Students are encouraged to engage in activities related to the experiences or problems provided. These activities can include observation, experiments, discussions, problem-solving, or projects. These activities should be designed in a way that encourages students to think critically, analyze information, and draw conclusions.

The interpretation dimension of critical thinking is the ability to understand the meaning and implications of acquired information. Therefore, students are trained to interpret the experiences or problems they face. Students are encouraged to view various perspectives, analyze the involved factors, and draw logical and reasoned conclusions.

b. Reflective Observation

In the reflective observation phase, students are encouraged to observe phenomena presented earlier. Students are expected to describe and communicate their experiences so that the analytical dimension of critical thinking skills can be developed. In this phase, teachers play a role in inviting participants to explain their experiences. The

activities produced in this stage serve as a basic guide for students to understand a concept from their existing experiences in daily life (Lestari et al., 2014; Garinalis et al., 2018; Periyanti et al., 2019; Amalia & Hariyono, 2022).

Reflective observation aims to develop students' critical thinking skills. Reflection is a new action in knowledge development (Nugraha et al., 2020) and is an important vehicle to meet the breadth and depth of knowledge (Rahman, 2014). In the reflective stage, students are encouraged to observe phenomena they have experienced or learned about previously. Students observe the results of their experiences from various reflective or direct perspectives (Hakima & Hidayati, 2020).

Reflective learning can assist students in creating solutions to the issues they encounter. The absence of reflection exercises in the learning process can lead to misconceptions and make it more difficult for pupils to understand what they are learning (Dewi & Erman, 2021). At this point, students watch as exercises involving the five senses are experienced. In addition, students consider their experiences, and they derive lessons from the conclusions of this thinking. In this instance, the teacher's ability to inspire students to retell their experiences, recommunicate, and draw lessons from them will facilitate the reflection process (Hariri & Yayuk, 2018)

c. Abstract Conceptualization.

In the abstract conceptualization phase, students are expected to explain concepts related to observed phenomena and integrate new experiences with previous experiences to develop their evaluation and explanation abilities. In this phase, teachers assist students in optimizing the application of acquired knowledge with previous experiences (Lestari et al., 2014; Garinalis et al., 2018; Periyanti et al., 2019; Amalia & Hariyono, 2022).

Abstract conceptualization aims to develop students' critical thinking skills. In this phase, students are encouraged to move beyond observation and analysis of experiences and begin developing abstract and conceptual understandings of the phenomena they have learned. Students conceptualize by integrating or combining the results of their observations and previous reflections into a logical and easily understandable conceptual theory (Hakima & Hidayati, 2020).

Throughout the abstract conceptualization stage, students engage in a number of tasks, such as assessing the alternatives' utility, before selecting one through the process and using it to carry out the active experiment, which is the next activity (Sudarman et al., 2023). Every student examined the outcomes of their initial experiments again. Students who have not been successful in their initial experiments think about ways to increase their chances of success, such as examining possible reasons for their failures and conversing with peers who have completed initial experiments successfully, until they come across new ideas or concepts that they can comprehend. Pupils who completed the first experiment successfully share their methods with others in order to maximize their outcomes (Hakima & Hidayati, 2020). The abstract conceptualization phase is intended to encourage students to move beyond observation and analysis of experiences and begin developing abstract and conceptual understandings of the phenomena they have learned. Teachers play a role in facilitating these activities and helping students apply their acquired knowledge in new situations. The abstract conceptualization phase has

many benefits for students, such as improving abstract thinking, problem-solving, self-directed learning, and communication.

d. Active Experimentation

In the active experimentation phase, students implement the knowledge gained in different situations and draw conclusions to develop their inference skills. Therefore, the experiential learning model can accommodate the development of all indicators of students' critical thinking skills. Students plan or try an experiment related to one of the problems. Participants conduct observations and test the truth of theories drawn in the previous phase as the basis for decision-making in solving problems (Lestari et al., 2014; Garinalis et al., 2018; Periyanti et al., 2019; Amalia & Hariyono, 2022). Consequently, students will use the concepts they have to overcome problems in daily life.

The active experimentation phase aims to develop students' critical thinking skills. In this phase, students are encouraged to implement the knowledge they have gained in different situations and draw conclusions, thereby developing their inference skills. Students conduct experiments to test the theories they have previously generated to be used in making decisions in problem-solving (Hakima & Hidayati, 2020). When making judgments and solving problems, students employ ideas (Dewi & Erman, 2021).

The active experimentation phase is an important stage in developing students' critical thinking skills. In this phase, students are encouraged to implement the knowledge they have gained in different situations and draw conclusions, thereby developing their inference skills. Teachers play a crucial role in facilitating these activities and helping students apply their learning in different situations. The active experimentation phase has many benefits for students, such as improving critical thinking skills, problem-solving abilities, independent learning, and collaboration with others.

Conclusion

The analysis conducted on four articles revealed that the implementation of experiential learning models has a positive and significant impact on enhancing students' critical thinking abilities. Based on the data analysis from the selected articles, it can be concluded that the experiential learning model consistently contributes positively to the development of students' critical thinking skills compared to conventional learning methods. Participants engaged in experiential learning demonstrated significant improvement in their ability to analyze information, evaluate arguments, and formulate rational conclusions based on available evidence. These findings also indicate that students learning through experiential learning are more cognitively active, participate comprehensively in the learning process, and exhibit higher motivation to develop critical thinking skills. These results provide strong empirical support for the effectiveness of the experiential learning model in enhancing critical aspects of students' thinking, highlighting the importance of this approach in the context of modern education, which emphasizes the development of deep and critical thinking skills.

The stages of implementing the experiential learning model integrate students' real-life experiences with the development of critical thinking skills. The concrete experience stage allows students to actively engage in

learning through direct experiences, which form a crucial basis for developing critical thinking abilities. Subsequently, the reflective observation stage encourages students to conduct reflective observations of their experiences, facilitating the development of analytical dimensions in critical thinking. The abstract conceptualization stage prompts students to develop abstract and conceptual understanding by integrating new experiences with previous ones. Lastly, the active experimentation stage provides students with opportunities to implement knowledge in different contexts, effectively developing students' inference abilities and the application of critical thinking skills. These holistic stages build students' critical thinking skills through direct experience, reflection, conceptualization, and implementation, reflecting a student-centered, experiential-based learning approach.

Recommendations

Based on the literature review conducted in four research journals, it is recommended to use the experiential learning model in education ranging from elementary school to higher education. A limitation of this study is that the analysis was conducted on only four selected articles within the last 10 years; thus, it is suggested that researchers explore a broader range of articles and establish more general boundaries.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

***Statement of Interest*:** We have no conflict of interest to declare.

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The Role of ChatGPT in English as a Foreign Language (EFL) Learning and Teaching: A Systematic Review

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Abstract

The potential role of ChatGPT in English as a foreign language (EFL) learning and teaching has not yet been fully elucidated. Therefore, a systematic review was conducted using Web of Science to identify the effectiveness of ChatGPT in promoting EFL learning and teaching. The database was searched until May 2024. The review summarizes findings from twenty-one studies extracted from the Web of Science database to get a better insight into the advantages and drawbacks of using ChatGPT in the field of EFL education. The review results showed that ChatGPT significantly improved students' EFL learning experiences and teachers' teaching practices. The main advantages of ChatGPT in EFL education are that it can improve learners' language proficiency and basic language skills of speaking, listening, reading, grammar, vocabulary and especially the writing skill in addition to its ability to increase motivation and engagement, enhance learner autonomy, and provide individualized learning opportunities. Despite these beneficial effects, students and teachers approach ChatGPT with caution mostly because of its limitations and ethical issues. This systematic review research contributes to the understanding the key benefits and drawbacks of ChatGPT in the specific area of EFL teaching and learning.

Keywords: ChatGPT, English as a foreign language, Language learning and teaching, Systematic review.

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Introduction

Technology not only has an impact on our lives and work, but also on the educational experiences (Culp et al., 2005; Dahiya, 2022). After the invention of printing press in the fifteenth century, technology has continued to play a significant role in education, with the use of radio and television in the twentieth century and having access to computers and the internet in the 21st century (Kikalishvili, 2023). Many studies in the literature have showed and discussed the positive effects of using information and communication technologies (ICTs) in teaching and learning processes (Allah Rakha, 2023; Culp et al., 2005; Dahiya, 2022; Kikalishvili, 2023; Lakhan & Laxman, 2018; Punie et al., 2006). Similarly, by analyzing many studies, Schacter (1999) reported that uses of technology in learning and instruction had affected student achievement positively. It other words, as asserted by Dahiya (2022), ICT has a positive effect on everything regarding education, from curriculum studies to educational assessment. The benefits of new ICT developments in education is accepted and adopting active use of innovative pedagogies and materials is recommended for high quality learning environments by European Commission (2015). Furthermore, OECD (2010) points to the importance of technology-related competencies, which are part of the 21st century competencies.

However, there is a substantial body of research available showing that technology use does not always improve learning performance and ensure desirable outcomes for all students in a language classroom. For instance, a study by Li et al. (2019) reported a negative role of technology use in promoting communicative language learning environment and only a minimal impact of technology on teacher feedback patterns in primary EFL classrooms; therefore, put an emphasis on the importance of EFL teachers' pedagogical awareness and competence in using technology in language classes. Kikalishvili (2023) suggested approaching with caution to technology use in educational settings in that overuse use of it can cause detrimental effects such as insufficient critical thinking skills, academic dishonesty, cyberbullying and social isolation. In addition, along with the positive effects of technology use on student achievement, Schacter (1999) found evidence that educational technologies could be ineffective unless learning objectives and the focus of using any kind of technology is specifically identified. Moreover, debates in the literature continue as to the benefits of ICT and researchers point to the limited data and elusive evidence as to the benefits and impact of ICT in education and the problems about its successful implementation (Eurydice, 2011; Livingstone, 2012; Pandolfini, 2016; UNESCO, 2009).

As in the educational settings described above, the benefits and opportunities of technology use in English as a foreign language (EFL) teaching and learning environments has been accepted (Al-Munawwarah, 2014; Azmi, 2017; Çakıcı, 2016; Hashemi, 2016; Mahmud et al., 2022; Sabiri, 2020). For instance, in a review study by Azmi (2017) it was revealed that use of ICT in an appropriate way in EFL classrooms can enhance motivation and engagement, promote learners' autonomy, boost interaction and communication, enhance authenticity and improve student performance. Hashemi (2016) has found that ICT can enhance the language learning experience and can be used as an effective tool for both teaching and learning. Chen (2022) revealed that technology-enhanced language learning reduced EFL learners' public speaking anxiety. In a meta-analysis, Hao et al. (2021) found that technology-assisted second language (L2) vocabulary learning helped language learners more than teaching without the use of technology. and the use of technology improved long-term vocabulary retention.

However, some challenges and concerns about the use of ICT have been recognized in the EFL arena as well. Blake (2008) clarifies that technologically enhanced activities do not ensure success for students in language classes, but instead the way technology is used with a strong pedagogical planning produces satisfactory results. In another study, Azmi (2017) points out that appropriate implementation of ICT in English language teaching requires careful planning and well-defined objectives. Çakıcı (2016) mentions some certain disadvantages of using ICT in EFL classrooms like inexperienced teachers about ICT use, problems in classroom management, challenges in choosing the most suitable tool with the content, the cost. In a study by Irgatoğlu (2021), it was revealed that the opportunity of ICT to provide authentic materials is the most motivating factor for EFL instructors, while the problems of technical support and nonavailability of ICT facilities are the most preventing. Moreover, Papadima-Sophocleous et al. (2014) found that despite policymakers' interest, language teachers have some hesitations in using ICT in their classes and more studies are needed to elucidate the impact of technology use in language classrooms.

As with the use of other technologies in education, the relatively new technology of artificial Intelligence (AI) is a subject of debate among educators as it offers both some benefits and drawbacks in the teaching learning processes. A study by Kikalishvili (2023) demonstrated that the AI technology is helpful in terms of creating an interactive learning environment which encourage student engagement with the content material and hereby supports learning process; however, along with AI's potential to enhance educational experiences, it was noted that it can cause academic misconduct and plagiarism. Chukwuere (2024) found that the use of ChatGPT can provide both some advantages like providing individualized instruction, encouraging feedback and student interaction, easy access to learning, and the disadvantages like inability to comprehend emotions, the lack of social interaction, technological limitations, and depending too much on ChatGPT. In a recent review study, Gökçearslan et al. (2024) reported both advantages and disadvantages of AI chatbots for both students and educators. In the study, increased motivation, language skill development, and increased performance were reported as the advantages for learners while limited interaction, misleading answers, and limited individualized feedback were the most common disadvantages. Regarding the educators, cost-effectiveness, reducing workload, and providing educational resources were reported as the advantages while the disadvantages include the originality and plagiarism, the inability to determine the level of readiness and the difficulty in the development of AI-based applications.

The benefits of Al technology in enhancing second or foreign language learning experiences in many aspects are widely recognized in the literature. Studies (Sumakul et al., 2022; Vera, 2023) show that EFL teachers are of the opinion that the AI technology could help both teaching and learning processes in the EFL classes. A study by Chen (2022) revealed that the instructional feedback generated by AI decreased EFL learners' public speaking anxiety. Alharthi (2024) reported that Siri, Apple's mobile intelligent assistant, improved EFL learners' pronunciation skills more than in-class instruction. In Tai and Chen's (2020) study, it was demonstrated that Google Assistant fostered EFL learners' willingness to communicate, enhanced communicative confidence, and decreased speaking anxiety. Dizon (2020) found that the use of intelligent personal assistant, Alexa, promoted L2 speaking skills. In another study, Amazon Echo was found to be helpful in assisting L2 learners' pronunciation practice (Moussalli & Cardoso, 2016). Marzuki et al. (2023) underscore the potential benefits of AI writing tools

in improving the quality of EFL student writing. A meta-analysis by Seyyedrezaei et al. (2022) revealed that the applications of educational technology produce a major positive effect on EFL/ESL learners' writing performance. Despite the considerable amount of research results on the benefits of AI technology in EFL education, there exists studies discussing the cons of AI. In their studies, Eliott (2024) and Mohamed (2024) bring the concerns about the use of AI in EFL settings into focus due to its inhibiting effects on research and critical thinking skills. In another study, Rukiati et al. (2023) assert that the position of human as teachers, bias in AI algorithms, privacy, and the quality of the AI-based applications are the concerns that should be addressed to make the most of AI technology. Vera (2023) addresses the importance of creating a responsible and ethical use of these technologies in the EFL classroom.

Developed by the American AI research lab OpenAI, ChatGPT is an artificial intelligence (AI) chatbot and was launched in November 2022 (Xames & Shefa, 2023). It "uses a pre-trained generative language model to understand user questions, consider context, and generate accurate and relevant conversational responses" (p. 4) and the most well-known versions are GPT-1, GPT-2, GPT-3, and GPT-4 (Sarrion, 2023). The potential opportunities of ChatGPT for both teaching and learning processes in general educational setting (Kasneci et al., 2023; Sullivan et al., 2023; Xames & Shefa, 2023) and in advancing EFL learners' English proficiency (Baskara, 2023; Eliott, 2024; Karataş et al., 2024; Koraishi, 2023; Mohamed, 2024; Tseng & Lin, 2024) have been reflected in the literature. However, some limitations and biases concerning the adoption of ChatGPT in the education context have been reflected. In their study, Kasneci et al. (2023) emphasize the privacy, security, environmental, regulatory and ethical requirements that should be met in the integration of ChatGPT into education. Xames & Shefa (2023) address the challenges and concerns such as AI authorship, nonexistent references, unintentional plagiarism, biases, and copyright and ethical issues.

As discussed above, the use of technology in varying forms has been subject to considerable debate in the educational research area, highlighting both advantages and concerns. Similarly, researchers continue to hold intense discussions on the use of ChatGPT, a state-of-the-art natural language generation model developed by OpenAI, and its impact in both learning and teaching processes. Furthermore, the need for further research to reveal the effects of ChatGPT in EFL learning (Abdelhalim, 2024; Mohamed, 2024) as well as in general educational setting (Kasneci et al., 2023; Sullivan et al., 2023) was indicated. Therefore, the aim of this study was to carry out a systematic review of the studies to explore the impact of ChatGPT in EFL learning and teaching, an area which needs further investigation. In line with this aim, the relevant studies published in Web of Science (WoS) database from 2022 to 2024 and in the category of education were reviewed. The study is thought to be useful for both researchers in the field of EFL education and EFL educators who want to integrate AI technologies into their practice. Following research questions were addressed:

1. What are the advantages of using ChatGPT in EFL teaching and learning processes?

2. What are the drawbacks of using ChatGPT in EFL teaching ang learning processes?

Method

Research Design

This study focused on the impact of ChatGPT on EFL learning and teaching, to gain a comprehensive understanding of its advantages and drawbacks in the EFL field. Therefore, the present study is designed as a systematic review. Bruce and Mollison (2004) state that "A systematic review is a critical synthesis of research evidence, which involves analysis of all available and relevant evidence in a systematic, objective and robust manner" (p. 13). The authors further clarify that it is a formal, meticulous methodological process with overcomes the subjectivity of traditional narrative reviews. The key stages of a systematic review include "the clarification of the research question, comprehensive identification of relevant literature, explicit inclusion criteria, critical assessment of included studies, summarizing data in an informative manner and interpretation of findings" (p. 16).

The Manuscript Selection Process

A search was performed in the Web of Science database for available literature on the use of ChatGPT in the EFL teaching and learning. The Web of Science database was chosen as it is known as the most extensive and reliable academic information resource library in the world (Ferhatoglu et al., 2020; Lv et al., 2021). The keywords used for the search were "ChatGPT", "English language learning" and "foreign language learning". Article date was not identified as a criterion in the manuscript selection process as ChatGPT was launched in November 2022 and all the relevant studies started since then. Therefore, all the relevant literature from 2022 to 2024 were included. The keywords were searched in the "All Fields" filter in the WoS database. Article and early access were chosen as the document type while review articles and proceeding papers were excluded. Education educational research, Computer science cybernetics, Computer science interdisciplinary applications, Language linguistics, Linguistics, Multidisciplinary sciences, Computer science theory methods were chosen as Web of Science search areas. The last search was conducted on 12 May 2024. Inclusion and exclusion criteria were given in Table 1 below. Article selection process was presented in Figure 1 below.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Article topic	Discuss ChatGPT into EFL teaching and learning	Discuss ChatGPT into another field of study
Document type	Article, early access	Review article, proceeding paper
Web of science category	Education educational research, Computer science cybernetics, Computer science interdisciplinary applications, Language linguistics, Linguistics, Multidisciplinary sciences, Computer science theory methods	Other categories
Article availability	Full text articles	Non-full-text articles
Article language	English	Non-English

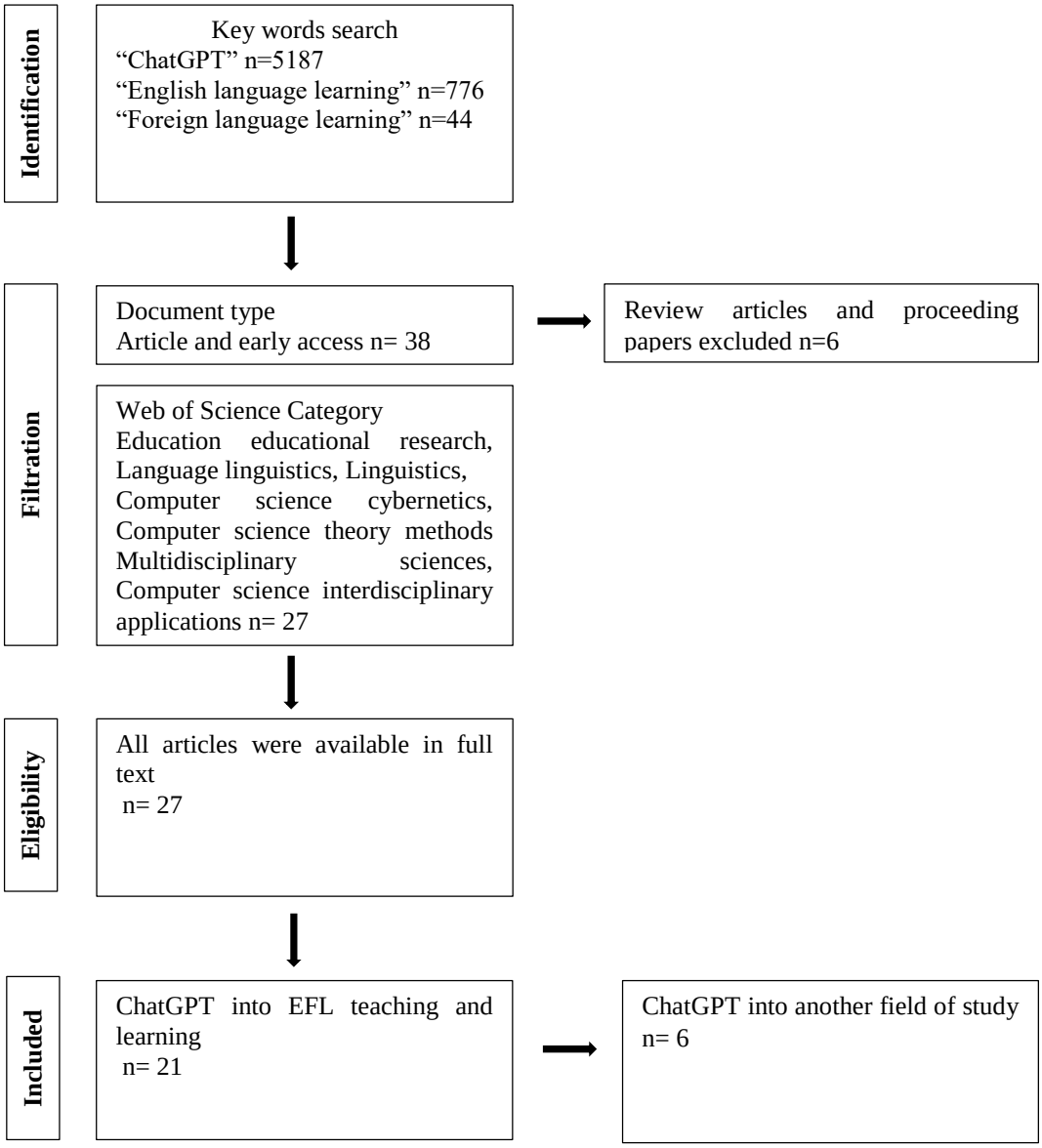

Figure 1. Article Selection Process

Results

The aim of this study was to carry out a systematic review of the studies to explore the impact of ChatGPT in EFL education by focusing on its advantages and drawbacks. Through an analysis of the existing studies published in the WoS database, the advantages and drawbacks of using ChatGPT in EFL teaching ang learning processes were identified. The relevant studies included in this review were categorized according to their research design and their main findings were summarized in the tables. Table 2 presents the main results of the three experimental studies, Table 3 presents the main results of the five mixed-method studies, Table 4 presents the main results of the ten qualitative studies, and lastly Table 5 presents the main results of the three quantitative studies.

Table 2. The Main Results of the Experimental Studies

AUTHOR(S) AND YEAR OF PUBLICATION	RESEARCH AIM AND LANGUAGE SKILLS OR ASPECTS	PARTICIPANTS (if available)	MAIN RESULTS
Boudouaia et al. (2024)	The use and acceptance of ChatGPT-4 in students' EFL writing	76 undergraduate students participating in an EFL program	ChatGPT-4 had a beneficial effect on students' EFL writing skills, which ultimately led the students to accept the tool. The main reason for its acceptance was its potential usefulness in putting students' previous knowledge of EFL writing into practice. Experimental group's views were reported to be improved which could be attributed to the use of ChatGPT.
Özçelik and Ekşi (2024)	The impact of ChatGPT on the acquisition of register knowledge in a variety of writing tasks	11 undergraduate students	The students found ChatGPT useful for the acquisition of formal register knowledge but did not find it necessary for informal writing.
Young and Shishido (2023)	ChatGPT's potential for creating reference dialogues to help EFL learners improve English.	-	ChatGPT generated reference dialogues are mostly suitable for elementary level students. The dialogues are easy to understand, allowing students at this level to understand most of the vocabulary used. In addition, a significant proportion of the dialogues generated for intermediate level students provide sufficient stimulation to learn new words.

Table 3. The Main Results of the Mixed-Method Studies

AUTHOR(S) AND YEAR OF PUBLICATION	RESEARCH AIM AND LANGUAGE SKILLS OR ASPECTS	PARTICIPANTS (if available)	MAIN RESULTS
Alenizi et al. (2023)	Teachers' views on integrating ChatGPT into special education EFL instruction	Questionnaire-199 EFL special education teachers Interviews-5 EFL special education teachers	ChatGPT was perceived as moderately effective with moderate obstacles. Female teachers were more likely to use it.
Abdelhalim (2024)	The impact of EFL students' level of metacognitive awareness on their views, use and satisfaction with ChatGPT in developing research competence.	Questionnaire-27 undergraduate students enrolled in an English Language and Literature program Interviews-14 undergraduates	Metacognitive awareness level significantly predicted students' views and practices of ChatGPT.
Liu et al. (2024)	Chinese EFL learners' recognition and acceptance of GPT technologies in informal digital English learning	Questionnaire-867 Chinese EFL learners Interviews-20 Chinese EFL learners	A theoretically grounded model has been developed. This model explains EFL learners' adoption of new GPT technologies. The interview results provide examples of EFL learners' acceptance and use of GPT

			technologies for informal digital English learning purposes.
Gao et al. (2024)	EFL university teachers' views about the integration of Large Language Models in language education	95 EFL teachers from Chinese universities	Neglect of traditional learning resources, academic integrity, over-reliance were the main concerns regarding the integration of Large Language Models (LLMs).
Yan (2024)	EFL learners' feedback seeking skills in the writing classroom using ChatGPT as an automated provider of written corrective feedback and their perceptions	3 EFL learners with different language proficiencies and technological competences at a Chinese university	The key factors that determine students' development of feedback seeking skills were identified.

Table 4. The Main Results of the Qualitative Studies

AUTHOR(S) AND YEAR OF PUBLICATION	**RESEARCH AIM AND LANGUAGE SKILLS OR ASPECTS**	**PARTICIPANTS (if available)**	**MAIN RESULTS**
Karataş et al. (2024)	The effect of ChatGPT on students' language learning experience and its advantages and disadvantages in EFL teaching	13 preparatory class students studying English at the School of Foreign Languages at a university in Türkiye	ChatGPT can improve language proficiency while increasing learner motivation and engagement. Over-reliance on ChatGPT, connection problems, encouraging students to take the easy way out in learning processes, and limited effectiveness for practicing speaking were reported as drawbacks.
Xiao and Zhi (2023)	Students' experiences with ChatGPT and their perceptions of	5 undergraduate students from different disciplines at a Chinese university	ChatGPT can help students complete language tasks and provide instant feedback and personalized learning experiences.
Tseng and Lin (2024)	The integration of GPT-3.5 within a university-level EFL writing course	15 junior or senior non-native English speaking undergraduate students at a private university in Taiwan	GPT-3.5 speeds up the writing process by providing immediate feedback and creating content ideas. It also encourages critical thinking and help them develop a distinctive writing voice.
Yeh, (2024)	The integration of ChatGPT into EFL teacher learning	13 in-service teachers enrolled in an 18-week advanced graduate course titled English Teaching Methods	AI technologies enabled teachers to design interactive and adaptive learning materials. The adaptability of AI tools improved students' listening and speaking skills.
Mohamed (2024)	Faculty members' views on ChatGPT as a tool for learning EFL	10 EFL faculty members	ChatGPT enhanced students' English proficiency. Faculty members found ChatGPT's responses quick and accurate; however, its negative effects on students' critical thinking and research skills, and its possible support in bias or misinformation were reported as disadvantages.
Bao and Li (2023)	Graduate student instructors'	5 graduate student instructors enrolled	The capability of ChatGPT to generate ideas, texts, grammar and comprehension

	exploration and integration of ChatGPT into language teaching	in a graduate-level course	questions were reported as its opportunities, while unnatural answers and its limited ability about Chinese language were its disadvantages.
Derakhshan and Ghiasvand (2024)	EFL teachers' perceptions of ChatGPT's potentials and threats for L2 learning, teaching, assessment, and research	30 EFL teachers who were active in research and practice and teaching English in different state universities	ChatGPT can both benefit and harm L2 language education. Increasing learner autonomy, providing individualized learning, reducing teachers' workload were reported as some potentials while ChatGPT' negative effects on creativity and academic integrity, supporting cheating, spreading false and misinformation, and encouraging plagiarism were reported as threats.
Nugroho et al. (2024)	Students' experiences of using ChatGPT to provide scaffolding for essay writing. It also reveals students' views of ChatGPT.	12 EFL learners who used ChatGPT in academic writing classes	Some benefits of translation, accuracy and efficiency in writing, generating ideas, and practicality were reported as some advantages. Students had some criticisms regarding misinformation and academic dishonesty.
Yan (2023)	Students' views and behaviors of ChatGPT in writing classrooms	8 Chinese undergraduate EFL majors	The findings revealed the convenience of ChatGPT in writing classrooms. Some concerns related to ethical issues and equity were reported.
Zou and Huang (2023)	Doctoral students' perceptions of ChatGPT's impact on writing.	215 doctoral students at a public university	ChatGPT served as a self-learning tool for writing, supporting students at all stages of their writing process. In addition, concerns reported included learning loss, authorial voice, unintelligent writing, academic integrity, and social/safety risks.

Table 5. The Main Results of the Quantitative Studies

AUTHOR(S) AND YEAR OF PUBLICATION	**RESEARCH AIM AND LANGUAGE SKILLS OR ASPECTS**	**PARTICIPANTS (if available)**	**MAIN RESULTS**
Dehghani and Mashhadi (2024)	Factors influencing the adoption of ChatGPT for English language teaching	234 Iranian EFL teachers	Iranian EFL teachers had generally positive views towards ChatGPT. The ease of use of ChatGPT was positively related to the perception of its usefulness.
Xu and Thien (2024)	The factors that influence the intention of Chinese undergraduate EFL students to use ChatGPT for their English language learning.	432 first- and second-year undergraduate students at two Chinese universities	Intention to use ChatGPT for English learning was directly influenced by effort and performance expectancy, social influence and perceived enjoyment.
Guo and Wang (2024)	ChatGPT's role in teaching and learning writing.	Five Chinese EFL teachers	ChatGPT produced various and more feedback than teachers in a very short time.

Discussion

This research aimed to investigate the role of ChatGPT, a Large Language Model (LLM)-based chatbot, in the EFL teaching and learning practices. By reviewing a total of twenty-one relevant articles extracted from the prestigious database of WoS, it was attempted to get a better insight into the advantages and drawbacks of using ChatGPT in the field of EFL education. The findings of the reviewed studies provided insights into the potential advantages and drawbacks of ChatGPT that can enhance its efficient use for effective EFL teaching and learning. Regarding research question one, which concerns the advantages of using ChatGPT in EFL teaching ang learning processes, results show that ChatGPT has the potential to enhance students' learning experiences and teachers' instructional practices in the EFL context. Concerning overall EFL proficiency, studies (Boudouaia et al., 2024; Mohamed, 2024) point out that ChatGPT can help students improve their overall language proficiency. Similarly, regarding language skills, Karataş et al. (2024) reported positive effects of ChatGPT in students' learning experiences, especially in writing, grammar, and vocabulary as well as its potential to foster motivation and engagement; however, limited impact on speaking skills and no impact on listening skills were reported. Unlike Karataş et al. (2024), Yeh (2024) reported that the in-service teachers believed that AI tools enhanced students' listening and speaking skills. Xiao and Zhi (2023) highlight the potential of ChatGPT in EFL education as a helpful learning partner in completing language-related tasks. Young and Shishido (2023) report that the reference dialogues generated by ChatGPT might be helpful especially for elementary level EFL learners as they provide speaking, reading and listening practices simultaneously. In addition to its advantages in improving diverse language skills, ChatGPT was also reported to be helpful in terms of enhancing learner autonomy, providing individualized learning opportunities for students, relieving teachers' burden by developing rubrics that can be used in student assessment processes and summarizing academic papers which take up teachers' time and energy (Derakhshan & Ghiasvand, 2024), generating ideas for class activities, comprehension questions, texts, grammar exercises (Bao & Li, 2023); as well as contributing to students' academic achievement and language learning motivation to actively participate in language learning activities (Gao et al., 2024). In addition to these advantages, Mohamed (2024) suggests the advantages of immediate feedback, motivation enhancement, individualized instruction, broad base of knowledge, low cost, proper responses, and the advantage of practicing EFL skills out of the class for students. Liu et al. (2024) also emphasize that ChatGPT technologies are easy to adopt for students.

It is clear from the systematic literature review that studies mostly tend to focus on the writing skill (Boudouaia et al., 2024; Guo & Wang, 2024; Nugroho et al., 2024; Özçelik & Ekşi, 2024; Tseng & Lin, 2024; Yan, 2023; Yan, 2024; Zou & Huang, 2023) and acknowledge ChatGPT's positive effects on EFL writing. Some of these potential positive effects include improving the organization of students' written works (cohesion and coherence), supporting them in accurate grammar use during the writing process, increasing their vocabulary knowledge (Boudouaia et al., 2024); offering immediate feedback, creating content ideas, and accelerating the writing process (Tseng & Lin, 2024); translation and writing efficiency (Nugroho et al., 2024), producing a larger amount and different types of feedback in a very short time compared to teacher feedback (Guo & Wang, 2024), its speed in text creation, general quality and high standards of academic writing, that is, its convenience and applicability for writing skill (Yan, 2023); supporting students across all writing stages (pre-, while-, and post-) as a self-learning tool (Zou & Huang, 2023). However, it deserves mentioning that, in the study by Özçelik and Ekşi (2024),

although ChatGPT was reported to have a beneficial effect on acquiring formal register knowledge, the same beneficial effect was not applicable for informal writing. These positive effects of ChatGPT on EFL writing proficiency can be explained by its potential to provide individualized practice and explanations (Alenizi et al., 2023; Boudouaia et al., 2024), immediate feedback (Xiao & Zhi, 2023), and/or its ability to develop critical thinking (Tseng & Lin, 2024).

A substantial amount of the study results included in this review are based on EFL students and teachers' perceptions. The systematic analysis of these studies show that both students (Abdelhalim, 2024; Karataş et al., 2024; Nugroho et al., 2024; Xiao & Zhi, 2023; Zou & Huang, 2023) and teachers (Bao & Li, 2023; Dehghani & Mashhadi, 2024; Gao et al., 2024; Guo & Wang, 2024; Mohamed, 2024; Yeh, 2024) generally indicate positive perceptions regarding the use of ChatGPT in EFL learning. However, in the study by Alenizi et al. (2023), the EFL teachers found ChatGPT as moderately affective tool for EFL learning. Furthermore, metacognitive awareness level was reported to have a significant effect on EFL students' perceptions and practices of ChatGPT and prompt formulation, systematic thinking, self-regulation strategies, and trust in AI were reported as the key factors for using it in an efficient way (Abdelhalim, 2024). Perceived usefulness and perceived ease of use were reported as the factors affecting ChatGPT's acceptance by the EFL teachers (Dehghani & Mashhadi, 2024). Besides, effort and performance expectancy, social influence and perceived enjoyment were reported as the factors which have direct effects on intention to use ChatGPT for language learning (Xu & Thien, 2024). Teachers' knowledge of content and pedagogy were reported to affect their use of technology (Bao & Li, 2023). Furthermore, despite their limited number, experimental studies (Boudouaia et al., 2024; Özçelik & Ekşi, 2024; Young & Shishido, 2023) considerably confirm other study results indicating the potential of ChatGPT in enhancing EFL proficiency.

Regarding the second research question, which concerns the drawbacks of using ChatGPT in EFL teaching and learning processes, research results show that despite the positive perceptions mentioned by both EFL teachers and students, ChatGPT's limitations and some concerns regarding its use in EFL education have been emphasized. Main concerns and drawbacks expressed by students about ChatGPT's use in the EFL context include excessive dependence on it, some technical problems, encouraging students to take the easy way out in learning processes (Karataş et al., 2024), reliability issues, its inability to understand informal registers (Özçelik & Ekşi, 2024), ChatGPT's mono-modal interface, common sense deficiency, lack of the ability to learn from experiences (Liu et al., 2024); ethical issues like academic dishonesty and misinformation (Nugroho et al., 2024); learning loss and safety risks (Zou &Huang, 2023). Some drawbacks expressed by EFL teachers include lack of emotional support and nonverbal cues, limited opportunities to practice listening and speaking skills, time consumption (Alenizi et al., 2023); its negative effects on critical thinking and research skills, problems related to privacy and ethical issues (Mohamed, 2024); unnatural answers, its limited ability to process some languages (Bao & Li, 2023); negative effects on creativity and academic integrity, negative support in cheating (Derakhshan & Ghiasvand, 2024); disregarding traditional learning sources, extra time for planning, potential treats towards teachers' identity (Gao et al., 2024); too long, difficult and irrelevant feedbacks (Guo & Wang, 2024); academic dishonesty (plagiarism) and educational inequity (Yan, 2023).

It is clear from the above discussion that ChatGPT does indeed provide advantages as well as some limitations and drawbacks for both students and teachers in the EFL teaching and learning processes. As technology continue to advance at a rapid pace, we can expect more advanced AI tools and application that will revolutionize the future of EFL education. It really seems impossible to avoid technology in the EFL teaching and learning processes as it has been integrated in our lives. Furthermore, we cannot ignore its benefits for both students and teachers in the EFL context if used in an ethical way and integrated properly into EFL lessons. Therefore, as indicated in the literature, EFL teachers need to develop the necessary skills and knowledge via trainings to efficiently make use of the AI tools in their classrooms (Bao & Li, 2023; Mohamed, 2024), and teachers should model their students in terms of its ethical use (Boudouaia et al., 2024). In this respect, Dehghani & Mashhadi's (2024) suggestion as to the integration of ChatGPT's ethical practices into the teacher training programs sounds reasonable.

It should be noted that the number of the available experimental studies conducted on the use of ChatGPT in the EFL context is rather low, which prevents reaching definite conclusions regarding the values of ChatGPT in the EFL context. Therefore, there is clearly a need for further studies, especially experimental ones, to better understand the effectiveness and potential drawbacks of ChatGPT in the EFL arena. Moreover, as indicated by Abdelhalim (2024), the literature on the use of ChatGPT primarily focuses on the perspectives of scholars and teachers, it is of vital importance to conduct studies to get students' views regarding the integration of Chat GPT in EFL learning. Furthermore, this study has some limitations which could affect the generalizability of the findings. First and foremost, the studies included in this systematic review were extracted from the WoS databases. Future research can retrieve articles from other databases which could possibly include relevant high-impact articles. Secondly, future systematic reviews can focus on the articles in languages other than English. Lastly, the number of the experimental studies focusing on the role of ChatGPT in EFL context is rather low. Therefore, the role of ChatGPT in teaching and learning of other languages as a foreign language can be covered in future systematic reviews.

Conclusion

The purpose of this systematic review was to identify the impact of ChatGPT in the EFL education with a special focus on its benefits and disadvantages. After reviewing a total of twenty-one full-text articles from the WoS database, it can be concluded that ChatGPT is a promising tool that can support both EFL students' learning experiences and teachers' instructional activities both in and out of class. The main advantages of ChatGPT in the EFL context include enhancing general language proficiency and various language skills (such as grammar, vocabulary, syntax, writing, listening, speaking, reading) and promoting language learning motivation, enhancing learner autonomy, providing personalized learning opportunities, reducing teachers' burden, immediate feedback, broad base of knowledge, low cost, opportunity to practice EFL skills out of the class for students. However, along with its benefits, potential limitations and drawbacks were also addressed in these studies. The main limitations and drawbacks expressed by students are excessive dependence on ChatGPT, technical problems, reliability issues, its inability to understand informal registers, ChatGPT's mono-modal interface, common sense deficiency, ethical issues and safety risks. In addition, lack of emotional support and nonverbal cues, limited opportunities to practice some language skills, its negative effects on critical thinking and research skills, problems

related to privacy and ethical issues, its negative effects on creativity and academic integrity, potential treats towards teachers' role and identity, too long feedback and educational inequity are some main drawbacks expressed by EFL teachers.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** I hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. I take full responsibility for the content of the paper in case of dispute.

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The Role of Law in Ensuring Access to Special Education: The Views of Teachers

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Abstract

The primary goal of this research is to explore teachers' perspectives on the role of law in ensuring access to special education. Special education aims to provide equitable educational opportunities to students with diverse learning needs. This qualitative study involved in-depth interviews with twenty teachers from primary, high school, and university backgrounds. Thematic analysis of the data revealed various perspectives on how the law can ensure access to special education, including awareness of the legal framework, challenges in providing access, the role of teacher advocacy, student empowerment, and views on equity. The study examines the practical implications of legal mandates, policies, and procedures by analyzing teacher interviews. Findings highlight both appreciation for the protective measures provided by law and concerns about implementation challenges, resource constraints, and the balance between legal compliance and teacher autonomy. This research underscores the complex interplay of law, educational practices, and teachers' experiences ensuring access to special education. The findings will benefit the academic community and special education support services. By shedding light on teachers' perspectives, this study offers valuable insights for policymakers, educators, and stakeholders interested in advancing inclusive education practices and promoting equitable opportunities for all students.

Keywords: Education, Law, Special education, Students with disability, Teacher.

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Introduction

Globally, there has been a significant shift away from segregated educational methods and towards inclusion since the Salamanca Declaration (Ainscow et al., 2019). The principles of inclusive education, which guarantee a friendly atmosphere in schools free from the damaging effects of discrimination on the basis of gender, culture, ethnicity, disability, religion, or socioeconomic status, are becoming more and more widely acknowledged (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1994). Nonetheless, there is still a long way to go before educators everywhere can assert that inclusiveness has been methodically and consistently ingrained throughout the wide range of education. Research indicates that educators, in particular, lack the self-assurance and drive to incorporate students with disabilities into their lessons and pedagogical delivery (Forlin et al., 2009). We still need to fully understand and implement the value and efficacy of child-centered, customised teaching-learning approaches. Children with disabilities have historically been one of the most marginalised groups of children in Bangladesh. Their growth potential is severely hampered and their educational development is frequently severely impacted. According to a recent study, only 4% of the estimated 1.6 million primary school-aged disabled children receive an education. Only 18% of people in areas with disability-related interventions had this access. 48 percent of the group was enrolled in formal education, 23 percent in integrated schools operated by private companies, 15 percent in special education, 5 percent in inclusive education initiatives, and 9 percent in other educational programs. Significant dropout rates were indicated by the fact that the percentage of students with disabilities in schools declined with age, from 44% among children aged 6 to 10 to just 15% among adolescents aged 16 to 18 (Centre for Services and Information on Disability [CSID], 2002).

This study advances existing knowledge of the dynamics at work in the educational system by shedding light on how teachers perceive the role that laws play in determining their access to special education. In the end, it seeks to provide information for policy debates and programs that support inclusive, equitable learning environments for all students, regardless of their abilities or disabilities.

Literature Review

Special education is defined by the Individuals with Disabilities Education Act as instruction created specially to meet the learning needs of a person with a disability, regardless of the setting a classroom, a home, or a hospital (Francisco et al., 2020). The law also stressed that the child's parents should not have to pay for this extra instruction. The reason special education is "special" is that it plays a unique role in the education of diverse students, including those who are at risk, as well as people with disabilities. The term "special education" refers to a variety of instructional strategies that are specifically created to meet the needs of students with disabilities who have unique learning needs (Cook & Schirmer, 2003). These strategies are carried out by qualified special education teachers and are not typically observed or employed by unskilled teachers in a regular classroom (Cook & Schirmer, 2003).

Some argued that, in contrast to the past, when treating people with disabilities was seen as oppressive, inhumane, and unfair, modern practice is better as we move towards inclusion and are guided by social justice and equity

(Winzer, 2009). On the other hand, history could be interpreted as contextual and filtered through the prism of the powerful. As a result, a conventional view of history may unintentionally cause injustice and marginalization of the disabled population (Lanear & Frattura, 2007). The history of special education has frequently been disregarded, altered, and taken out of context over time in order to support ideas and procedures (Cook & Schirmer, 2003). According to Mostert and Crockett, stakeholders were better equipped to manage and instruct people with disabilities than those who knew nothing at all about the history of special education, particularly with regard to successful interventions. It is impossible to dispute how history has ultimately shaped and impacted the modern ideologies and methods used by special education teachers today (Lanear & Frattura, 2007). Present-day special education policies and practices are still influenced by many of the early viewpoints and practices (Winzer, 2009).

The laws governing special education have changed over time, moving from merely stating that people with disabilities have equal rights to becoming more detailed about the educational requirements of these students. Over time, Congress amends and reauthorizes laws based on stakeholder reports, recommendations from various studies, and findings to ensure the laws remain relevant and improve over time (Huefner, 2000). Here, we go over these special education laws in brief. The Rehabilitation Act, Public Law No. 93-112, 87 Stat. 357 of 1973, is the first law pertaining to special education and people with disabilities. The Rehabilitation Act's section 504 forbade discrimination against people with disabilities, thereby establishing the foundation for their rights (Little & Little, 1999).

People with disabilities are entitled to the same opportunities and access as their peers without disabilities. Public Law No. 94-142, 89 Stat 773, the Education for All Handicapped Children Act (EAHCA), was the second law passed in 1975. The Public Law No. 99-457, 100 Stat. 1145, which amended this law, was passed in 1986. All children between the ages of three and twenty-one have the legal right to FAPE in the LRE. Until their disabilities are so severe that learning in a general education classroom is not beneficial, individuals with disabilities should, by default, receive their education in a general education classroom. This decision is made after a thorough assessment by a multidisciplinary team. An interdisciplinary team conducts assessments and develops individualized education programmes (IEPs) for each disabled person. Preschoolers with disabilities were also granted the right to a FAPE in an LRE through another amendment (Public Law 99-457). A multidisciplinary team assesses and implements an individualised family service plan (IFSP) for each child in place of an individualised education programme (Baglieri et al., 2011).

In 1990, the Individuals with Disabilities Education Act (IDEA) was renamed from the amended EAHCA. One of the most significant changes was the phrasing of the statute, which now refers to "disability" rather than "handicapped"(Farrell, 2009). Access to assistive technology and other special services deemed appropriate for learning is granted to individuals with disabilities under this law. New categories of recognised disabilities (such as autism and traumatic brain injury) were added as additional provisions of IDEA (Farrell, 2009). Public Law 105-17) underwent several amendments in 1997, including requiring a statement of measurable annual goals in the IEP and a report on the student's progress towards the goals set. Additionally, parents were required to participate more in the eligibility and placement decisions of their children, and state-offered mediation was made

clearer when resolving disputes. Since there's always room for improvement, the Individuals with Disabilities Education Improvement Act (IDEIA), Public Law No. 108-446, was created to reauthorize the IDEA in 2004. Among the changes are the mandates for teachers to hold a state license and complete certification in special education and the core subject they were teaching. Additionally, there were modifications to the makeup of multidisciplinary teams, with parents playing a larger role in the decision-making process (Farrell, 2009).

The Elementary and Secondary Education Act (ESEA) was reauthorized in 2001 with the passage of Public Law No. 107-110, 115 Stat. 1425 (2001), which is known as the No Child Left Behind Act (NCLB). It offered assistance and supplemental education services in the areas of literacy development and intervention to all students, including those with disabilities. Advocates for inclusion and advocacy organisations like The Association for the Severely Handicapped (TASH) and the National Down Syndrome Congress applauded this law (Francisco et al., 2020). The watering down of the regular curriculum and instruction that placed an excessive emphasis on noncognitive skills that are very different from those in general education (such as life skills) has long been a problem in special education. By guaranteeing access to appropriate assessment and testing against grade-level standards and placing accountability for students' performance on the schools, the NCLB brought about a shift in how society views people with disabilities (Elementary-and-Secondary-Education-Act-Summary-2001-2014.). Though this law was created with the best of intentions, there have been complaints that it has made the gap between "normal" students and marginalised groups, such as people with disabilities, wider. By placing unjustifiable requirements on students from underprivileged backgrounds and those with disabilities, the ESEA did more harm than good by widening the gap (Hursh, 2007). Neoliberal education policies, which are based on the idea that an individual's success is mostly determined by their own choices and decisions, became prevalent with the introduction of the NCLB (Hursh, 2007). This viewpoint makes the assumption that all children are born with equal opportunities, but in reality, children have differing degrees of privilege depending on their race, ethnicity, and socioeconomic status. Due to the increased emphasis on academics in schools and the adoption of standardised testing as a measure of learning quality, this law had an even greater impact on special education (Hursh, 2007).

The NCLB's prescriptive requirements were impractical for the majority of schools and teachers, so in 2015, the ESEA was revised and reauthorized as Every Student Succeeds Act (ESSA, 2015), replacing the NCLB in response to the demands of educators and families. Compared to the NCLB, ESSA was more flexible and did not use standardised test results as the only indicator of academic success in schools. Since decision-making and resource management are influenced by current education policies and resource availability, special education is a product of classroom practice and policy. Because teachers, special service providers, parents, and school administrators are the ones in the front lines of implementing and evaluating the child's learning needs, it is imperative that they are all aware of the current special education policy. Regretfully, it is a fact that many educators, particularly those in general education, are not well-versed in IDEA or Section 504 provisions (O'Connor et al., 2016).

A significant portion of children with disabilities are still not receiving mainstream education, according to a 2011 report by the prominent education player Campaign for Advancement of Mass & Popular Education (CAMPE),

which sheds light on the country's larger exclusionary context. These kids have extremely low enrollment rates to begin with, which are further hampered by their inability to adjust to the school environment, their lack of access to personal help, its limited availability, its inaccessible surroundings and infrastructure, and the unfavourable attitudes of their families, teachers, and community (Khan & Ānisujjāmāna, 2011). The majority of the initially enrolled children with disabilities do not finish their primary education for a variety of reasons, including inadequate or nonexistent public transportation, inaccessible transportation, a lack of qualified teachers, a lack of accessible restrooms in schools, an inaccessible school environment, unfavourable attitudes from parents and teachers, bullying by classmates, and little to no implementation of the current policy regarding the education of children with disab Additionally, studies reveal that teachers and educators who receive specialised training in teaching students with learning disabilities may feel more competent and effective when working with students who have disabilities (Kosko & Wilkins, 2009).

However, Munir and Islam, (2005), found that the pre-service teacher training curriculum for primary level students in Bangladesh lacked materials related to inclusive education. Furthermore, Ahuja and Ibrahim's 2006 evaluation of Bangladesh's inclusive education system revealed that the pre-service teacher training programme did not provide enough support to enable primary school teachers to feel competent and confidentin their ability to teach inclusive classes (UNESCO, 1994). According to Save the Children, inclusive education is "one dimension of a rights-based quality education which emphasises equity in access and participation, and responds positively to the individual learning needs and competencies of all children." Teachers are the key players in classroom practice, so their success in an inclusive education intervention is primarily dependent on them (Jerlinder et al., 2010). According to a number of studies, educators who work with students who have disabilities may also grow to dislike them and be less receptive to changes in their pedagogical approaches (Barnyak & Paquette, 2010).

All Bangladeshi children's rights to an education are protected by the Compulsory Education Act (1990). Bangladesh ratified the EFA in 1990 and then passed this Act. In 1992, this Act was formally put into effect. The Compulsory Education Act, which does not address inclusive education, mandates free and compulsory primary education for all children in Bangladesh. After that, the Disabilities Welfare Act (2001) was passed by the government of Bangladesh in 2001. Children with special needs now have the right to participate in the regular education system thanks to this Act. In addition, the Welfare Act's part-D stated that teacher preparation programmes must be set up in order to instruct students with disabilities. The first official measures to protect children with special needs' right to an education were represented by this Act. For kids with special needs, this Act recommended separate learning environments within the mainstream school system.

This was done by integrating underprivileged students into the regular education system. According to the National Education Policy (2010), in order for children with special needs to participate in society, they must attend regular schools (Ministry of Education, 2010). Since the National Education Policy (2010) is being followed by the current educational system, inclusive education has been made required for all GPS students.
As of right now, the number of special needs students enrolled in DPE-managed schools has risen faster than the Primary Education Development Programme II targets for students overall, but particularly for students with

vision problems and physical disabilities, which were established by the Bangladeshi government. There was a startling 50% increase in the number of children with special needs between 2005 and 2011. The enrollment trend steadily declined starting in 2012 and peaked at 76,522 in 2014. According to DPE Report, A plausible rationale could be that, before 2012, educators might not have acquired the essential instruction to recognize pupils with exceptionalities. However, it's not clear how much of this trend was due to better identification of students with disabilities or increased enrollment. In order to make a compelling case for the proper distribution of funding for inclusive education, it is critical to enhance the methods used for routine data collection in order to include children with disabilities. Despite significant progress in making primary education more accessible, 4 million school-age children in Bangladesh, including those with disabilities, are still not enrolled in school). This implies that the Bangladeshi educational system still has a long way to go before it can ensure that every child has access to an education.

Method

Study Design

In order to successfully accomplish the research goals and fill in the gaps found; this study used a qualitative research technique to fully explore the views of teachers regarding the role of law in ensuring access to special education. The goal here, according to Creswell, (2015), is to make visible the depth, richness, and complexity inherent in human experiences and perceptions. The researcher conducted in-depth interviews in order to broaden the scope of data collection. One-on-one interviews were chosen on purpose to give a platform for unique perspectives and ideas as well as to give a comprehensive understanding of the range of their experiences.

Table.1 Demographic Data about Participants

Teacher ID	Institution Type	Gender	Years of Experience	Qualification
T01	University	Male	10	M.Ed. & B. Ed.
T02	University	Male	7	M.Ed. & B. Ed
T03	High School	Female	12	B. Ed
T04	College	Male	15	B. Ed
T05	College	Female	8	B.Ed.
T06	Primary School	Female	9	M.Ed.
T07	High School	Male	11	M.Ed.
T08	Primary School	Male	6	B.Ed.
T09	High School	Female	14	B. Ed
T10	High School	Female	5	B. Ed
T11	High School	Female	13	M.Ed. & B. Ed
T12	High School	Female	8	B. Ed
T13	Primary School	Female	9	B. Ed
T14	High School	Male	9	B. Ed
T15	Primary School	Male	7	B. Ed
T16	Primary School	Female	9	B. Ed
T17	High School	Male	6	B. Ed
T18	High School	Female	5	M.Ed.
T19	Primary School	Male	14	M.Ed. & B. Ed
T20	High School	Male	10	B. Ed

Sample

The method of purposive sampling was utilised in order to pick participants. A non-probability selection technique called purposive sampling is especially well-suited for qualitative research because it enables the researcher to deliberately choose participants with particular traits or life experiences that are relevant to the study's goals (Palinkas et al., 2013). Twenty teachers with varying backgrounds were chosen. This approach makes it possible to gather data in a targeted and intentional manner, which frequently results in a deeper understanding of the subject being studied (Creswell & Creswell, 2014).

Data Collection Tools

In-depth interviews with specific educators served as the primary means of data collection in this study. In general, interviews are a good way to collect data because they let you use the conversation as a teaching tool (Leavy, 2022). The in-depth interviews in this study were semi-structured, allowing for some conversational freedom even with a predetermined framework. There were prepared questions, but they weren't followed exactly, which made for a more natural and open dialogue with the participants.

Ethical Considerations

In the process of developing this research design and gathering data, the researcher considers ethical considerations the highest priority. The protection of the rights of research participants, the enhancement of research validity, and the preservation of scientific or academic integrity are all goals served by ethical considerations, which ensure validity and reliability in qualitative research.

Data Analysis

This study's methodology applies the thematic analysis approach, which consists of six steps: familiarising oneself with the data, allocating codes, formulating themes, evaluating themes, characterising and labelling themes, and recording the results. By employing this particular methodology, the researchers have successfully reduced the likelihood of confirmation bias in the analysis.

Results

Law can ensure the Access of Special Education

According to teachers Law is a key component in advancing inclusive education and guaranteeing that every student, regardless of ability or disability, has the chance to succeed academically and socially by outlining rights, obligations, and procedural protections. In this introduction, we examine how important it is for the law to ensure that students have access to special education and how this affects the creation of inclusive learning environments. A teacher said “We have limited law and act regarding access to special education. As law imposing only can ensure the access. So, government should pass such law for special education so student with disability can access

education more easily.” (Male, T02).

Another teacher added “Since enforcing existing laws alone cannot guarantee access. Therefore, the government ought to enact special education legislation. So that student with disability can have the opportunity to access smooth education system.” (Female, T11).

Another teacher also added "Since enforcing existing laws alone cannot guarantee access. As such, legislation pertaining to special education should be passed by the government. in order for students with disabilities to benefit from a unified educational experience.” (Female, T05).

Legal Framework Awareness

In order for disabled students to receive equal special education, it is necessary to be aware of the legal framework. Rules and laws safeguard the rights of individuals with disabilities and specify how educational institutions should cater to their various needs. This introduction will go over how teachers who are aware of the legal framework can better navigate the policies and procedures related to special education. In order to shed light on the difficulties and opportunities associated with maintaining compliance and promoting the educational rights of students with disabilities, this study investigates teachers' familiarity with pertinent laws and regulations.

One Teacher said, "As a teacher, I am aware of special education laws. I've taken part in numerous professional development seminars on special education law over the years. In order to guarantee classroom compliance, I also keep up with legal updates. In order to support disabled students and make sure they receive the necessary services and accommodations; it is imperative that you are aware of these legal requirements."(Male, T01).

A teacher said "My knowledge of special education laws is lacking. Although I am aware of the legal framework, I haven't received any official training or professional development related to this area of teaching. When navigating special education requirements, I frequently rely on the policies and procedures of the school or my colleagues. But I'm excited to find out more and am actively looking for resources to help me comprehend the legal responsibilities associated with offering special education." (Female, T13).

Other remarked from a teacher "I've been exposed to special education law, but my training has been limited. I've since gone to a few legal compliance-focused professional development seminars, but they were more generic than in-depth. Although I think I could navigate the legal system with more training, I do have a basic understanding." (Male, T17).

Compliance vs. Implementation

The gap between legal requirements and classroom implementation is highlighted by a major conflict in special education: compliance and implementation. Even though special education services are mandated by laws and regulations, putting them into practice can be difficult and lead to noncompliance. The challenges faced by

educators in translating legal requirements into worthwhile actions and results for students with disabilities will be discussed in this introduction. In order to identify opportunities for equitable access to special education and barriers within the educational system, this research looks at the discrepancy between compliance and implementation.

A teacher shared "I have to be honest; I don't have much experience with special education services or legal training. Throughout my teacher preparation programme, I hardly touched on special education law. I haven't had many opportunities for professional development on this subject since then. I primarily study on my own, but I do occasionally ask administrators or coworkers about legal requirements. I think more thorough and approachable training is required." (Female, T03).

Another Teacher added "The complexity and ambiguity of legal mandates make it difficult for me to implement them in my classroom. Though there is limited law regarding special education. This ambiguity could lead to inconsistent and uncertain implementation of my legal mandate. Additionally, it can be challenging to comply with the law when I try to strike a balance between the needs of my students and those requirements." (Female, T09).

Challenges in Access Provision

Providing equal access to education for students with disabilities requires addressing access provision issues. Teachers frequently encounter obstacles that keep them from offering effective special education services, even in the face of legislative requirements and inclusion initiatives. The systemic, practical, and attitude barriers that prevent students with disabilities from receiving an education will be covered in this introduction. In order to comprehend teachers' challenges and their effects on the academic and socioemotional development of disabled students, this study looks at the complexities of access provision.

A teacher added " It can be challenging to interpret special education eligibility criteria and determine the appropriate degree of accommodations for students with special needs. This ambiguity could make the way my legal mandate is implemented unclear and inconsistent. I also have trouble striking a balance between the needs of my students and the requirements of the law, which can lead to conflict and complicate compliance." (Male, T02).

Another teacher said "It is difficult for me to assist students with disabilities because of barriers. Students' disability evaluations and services may be delayed or denied due to low stakeholder knowledge and comprehension. This may hinder their ability to get the right interventions and accommodations, which could have an impact on their wellbeing and academic performance." (Female, T12).

Teacher Advocacy Role

In the complicated world of special education, teachers must speak up for the needs and rights of their students.

As frontline practitioners, teachers promote fair educational opportunities, accommodations, and support services for students with disabilities. The various ways that teachers support students' rights and educational inclusivity will be covered in this introduction. In order to demonstrate the significance of teachers in guaranteeing special education access and successful outcomes for students with disabilities, this study looks at the difficulties, achievements, and moral dilemmas surrounding teacher advocacy.

One teacher said "It is my responsibility as a teacher to fight for my students' rights to special education, and I have seen many situations were doing so was essential to guarantee fair treatment. My support of a student with autism who experienced difficulty transferring classes and had sensory issues stands out. The student's needs were not being met in spite of his challanges, which led to anxiety and disturbances in the classroom." (Female, T16).

Another teacher stated "I firmly believe that students should have access to special education. One time, I collaborated with the parents of a student to make sure their child got the accommodations specified in their Individualised Education Programme. The significance of standing up for students' rights and collaborating with partners to implement special education laws was underscored by this encounter." (Male, T19).

Student Empowerment

In special education, student empowerment is essential because it provides students with the information, abilities, and self-assurance to speak up for themselves in the classroom. This introduction addresses the concept of student empowerment and how it can help special education students develop their sense of agency, self-determination, and autonomy. By assisting students in understanding their rights, communicating their needs, and taking part in decision-making, educators can help students take ownership of and control over their education. Through the lens of student empowerment, this study investigates the methods, difficulties, and results of teaching disabled student's self-advocacy within the framework of special education law.

A teacher shared "I increase the awareness of rights among special education students by integrating discussions about rights and advocacy into my classroom. I also urge students to discuss their preferences and objectives. My goal is for special education students to become self-advocates and feel empowered by understanding their rights." (Male, T01).

Another teacher added "In order to promote legal advocacy, I help students become more self-aware and confident. In my classroom, students feel free to voice their needs and preferences because they are supported and feel safe doing so. My goal is to equip students with the knowledge and self-assurance necessary to excel in school and beyond by enabling them to legally advocate for themselves." (Male, T08).

Teacher Perspectives on Equity

Teacher Views on Equity investigates the opinions of educators regarding fairness in access to special education. As frontline educators, teachers fight for fair opportunities and services to support students with disabilities. This

study looks at equity from the viewpoint of the teacher in order to pinpoint obstacles, chances, and best practices for advancing inclusivity and justice in education.

One teacher said "I think that providing equal opportunities for all students to succeed and thrive in school, regardless of ability or background, is what I mean by equity in special education access. In order to achieve equity, inclusive practices and settings that respect diversity and highlight students' abilities are also necessary." (Female, T11).

A remarked from teacher “In my opinion, valuing and acknowledging each student's worth and dignity—regardless of ability or difference—is essential to ensuring equity in special education access. It's about identifying the needs, strengths, and learning preferences of each student and providing them with the resources they require to succeed. In order to achieve equity, systemic injustices and obstacles that might keep impaired students from participating fully in the educational process must be removed." (Female, T18).

Another teacher added "In my view, equitable access to special education entails just and fair distribution of educational opportunities and resources among students with disabilities." The objective is to identify and resolve systemic injustices that disproportionately impact minority and low-income students." (Male, T20).

Discussion

According to the teacher, Legal Framework Awareness is essential for disabled students to receive equal special education. Laws and regulations protect disabled people's rights and outline educational institutions' duties to meet their diverse needs. A study explored that inclusive education requires a multifaceted approach, focusing on social justice and individual instructional needs, and placing students with disabilities in general education only when it is the most effective learning environment for their futures (Kauffman et al., 2016). By addressing gaps in special education research and practice, Disability Studies in Education fosters deeper understandings of disabilities and provides opportunities for continued discussion and investigation (Baglieri et al., 2011).

Current study explores that compliance and implementation are a major conflict in special education, highlighting the gap between legal requirements and classroom implementation. While laws and regulations require special education services, implementation often presents many obstacles that can prevent full compliance. According to Mueller Over the past ten years, there has been a decline in special education litigation as parent and school-focused conflict prevention and resolution strategies have emerged as viable solutions (Mueller, 2015). All three conflict dimensions had a strong correlation with teacher empowerment and compliance. The evaluation and preservice and in service training of school principals were found to have implications (Johnson & Short, 1998).

According to the teacher, the current study found that access Provision challenges are crucial to ensuring educational equity for disabled students. Despite legal mandates and inclusion initiatives, teachers often face barriers that prevent them from providing meaningful special education services. Terzi (2007), found the egalitarian principle—which holds that social and institutional arrangements should be created with equal

consideration for all—forms the fundamental basis of the ideal of educational equality. Beyond this general requirement, it is more challenging to pinpoint the exact nature of the ideal of educational equality (Terzi, 2007). As Inclusion can be positively impacted by shifting the politics of disability, access, and belonging in education, but long-term success depends on addressing power and social structures (Greenstein, 2014).

The current study evaluated that teacher must advocate for students' rights and needs in special education's complex environment. Teachers advocate for equitable educational opportunities, accommodations, and support services for students with disabilities as frontline practitioners. Study found People with disabilities, their parents, and educators are among the increasing numbers of concerned people around the globe who are pushing for the inclusion of disabled students in regular classrooms and schools. Disability rights activists, on the other hand, contend that for individuals with disabilities to have a fully formed sense of self as adults, they must have had the chance to interact during their school years with children and adults who share their interests and traits (Stainback et al., 1994). This study looks at the problem and offers one possible solution from our point of view.

The study founds Student empowerment is crucial in special education, giving students the knowledge, skills, and confidence to advocate for themselves in the educational system. This introduction discusses student empowerment and its role in promoting autonomy, self-determination, and agency in special education students. As Student voice programs in special education settings can improve behavior management techniques by encouraging communication, consistency, and healthy relationships (Sellman, 2009). Postschool outcomes are poor for students with behavioral disorders (BD) and cognitive limitations combined; their lives are characterized by a lack of empowerment and independence. Creating effective models to encourage students' personal independence and empowerment is one of special education's main objectives. During the planning meeting for an individualized education program (IEP), students can acquire vital skills related to goal-setting, self-advocacy, self-management, and decision-making (Snyder, 2002). Equitable teacher power use, strong teacher-student relationships, and a feeling of community in the classroom are indicators of student empowerment, which raises aspirations for education and results in better grades, fewer behavioral incidents, and increased extracurricular involvement (Kirk et al., 2016).

The study found that teacher perspectives on equity examines educators' views on equity in special education access. Teachers advocate for equitable opportunities and support services for disabled students as frontline educators. Another study found Since the beginning, TATE articles have focused on equity and social justice in teaching and teacher education, with an emphasis on helping educators understand educational disparities and equipping them to make meaningful changes that will lead to a more just society and education (Kaur, 2012).

Conclusion

This study examined the complex relationship between special education access and the law, with a particular emphasis on the views of educators. Several significant conclusions were drawn from a thorough literature review and empirical investigation, which helped to clarify the complex nature of this important problem. First, it became clear that legal frameworks are essential for ensuring that all students have equal access to special education

services. In order to guarantee that students with disabilities receive the assistance they require to succeed academically and socially, laws like the Individuals with Disabilities Education Act (IDEA) in the United States serve as essential cornerstones. Furthermore, the viewpoints of educators offered priceless insights into how these legal requirements would actually be implemented in practice. Their experiences demonstrated the difficulties and achievements in providing access to special education, highlighting the significance of continued professional development and assistance.

Additionally, this study emphasised the value of cooperation between different stakeholders, such as parents, advocacy organisations, educators, and legislators. Building inclusive learning environments and navigating the complicated terrain of special education law require strong partnerships. The results underscored the necessity of ongoing evaluation and enhancement of current legal structures. Laws must adapt to meet the changing needs of students with disabilities as educational environments and public perceptions of disability rights change. This study made clear how important teacher advocacy is in influencing policy discussions and bringing about constructive change in the field of special education. Instructors are first responders, standing up for the rights of their pupils and promoting fair distribution of resources and assistance.

In conclusion, by examining the subject from the viewpoint of teachers, this research advances our knowledge of how the law ensures that students have access to special education. Through recognition of the subtleties and complexity present in this field, interested parties can cooperate to create inclusive learning environments where each student can succeed. Building on the knowledge gained from this study is crucial going forward in order to advance laws and procedures that protect the rights and dignity of students with disabilities. By working together and remaining steadfast in our commitment to inclusion and equity, we can work towards creating an educational system that is more fair and just for everyone.

Recommendations

This study is important because it offers a thorough understanding of the role of law in special education from the educators' perspective, ultimately fostering a more equitable educational environment for students with special needs. It addresses significant gaps in policy implementation, promotes inclusive education, and supports teacher development. To strengthen support systems, schools should establish strong networks, such as specialized special education coordinators or legal counsel, to help educators navigate legal requirements and manage implementation and compliance issues. Additionally, increasing collaboration and communication among educators, administrators, attorneys, and legislators is crucial. Regular forums or workshops should be set up to discuss legal updates, share best practices, and address any concerns about special education regulations. Ensuring adequate funding and resources for special education programs is also essential. This includes providing the necessary tools, resources, and personnel to meet legal obligations and deliver high-quality education to students with special needs. Moreover, it is recommended to regularly review and update special education legislation and policies, incorporating feedback from educators, evolving needs, and current educational practices. This keeps the legislative framework supporting access to special education current and effective. Finally, advocating for inclusive policies that actively support the inclusion of children with special needs in regular classroom settings

is vital. This goes beyond mere legal compliance by fostering an inclusive school climate and ensuring that every student has an equal opportunity to succeed.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

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