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Beyond research output: The importance of research ethics for educational innovation and scholarly progress

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Abstract

This editorial begins with the concern that, in the interest of increasing research output, the issue of research ethics might have been placed on the back burner. Unless Ethiopian higher education institutions recognize unethical research practices by their faculty members and students as a threat to their reputation and credibility, they will gradually lose the trust and acceptance of both the scientific community and the wider public they are meant to serve. As a result, they will find it difficult to establish themselves as centers of innovation and progress. This editorial identifies some of the causes of unethical research practices and suggests possible solutions. It also outlines the focus and major findings of each article published in this issue. The articles featured in Volume 26, Issue 2, address some of the most persistent concerns in modern education: instructional leadership, curriculum implementation, pedagogical competence, assessment practices, technology-enhanced learning, educational aid, teacher knowledge, and the availability of instructional resources. Although the studies are located in different educational contexts across Africa, particularly Ethiopia, Tanzania, and Nigeria, they converge on a common theme—the need to strengthen educational quality through effective leadership, innovative pedagogy, informed assessment practices, and institutional support.

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Research ethics, research output, educational innovation

Introduction

Research output has steadily increased in Africa during the twenty-first century (Heleta & Jithoo, 2023), driven in part by efforts to promote educational innovation and scholarly progress. This growth may have been facilitated by online publishing, which has increased the number of scholarly journals and improved access for researchers on the African continent (Jantakun et al., 2025). This trend has been particularly notable in countries such as South Africa (Shareefa et al., 2026), and similar trends have also been observed in Ethiopia (Aga, 2025).

It seems that as institutions of higher learning have focused on increasing research output to remain competitive locally and worldwide, they have neglected the importance of conducting research ethically (Liu et al., 2026). Recognizing the serious consequences of unethical research practices, many higher education institutions have developed policies and strategies aimed at promoting research integrity and preventing research misconduct (Resnik et al., 2015; Steneck, 2006). However, unethical practices in doing research have persisted (Plevris, 2025; Zhang & Wang, 2025), possibly due to weak oversight mechanisms, insufficient

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mentorship, misuse of technology, socio-cultural acceptance of unethical behavior, and inadequate national research policies (Sozon & Parnthe, 2026). Unless higher education institutions in Africa address the problem of unethical research practices head-on, it would be difficult for them to establish themselves as centers of innovation and progress.

According to the website of Committee on Publication Ethics, research ethics is "making sure research is conducted honestly, accurately, safely and without making up or altering data or images" (COPE, 2023). The same source identifies practices such as data fabrication, falsification and plagiarism as unethical research practices. Unethical research practices may also have been exacerbated by the advent of artificial intelligence, which can make unethical practices more difficult to detect and control (Günes & Kaban, 2025).

Sozon and Parnthe (2026) recommend that prioritizing research quality, establishing independent research integrity offices, integrating ethics education into academic programs, and promoting collaboration among governments, universities, and publishers as ways of controlling unethical research practices. Bahir Dar University, the publisher of *Bahir Dar Journal of Education* has, for the first time in its history, acquired plagiarism detection software as part of its efforts to reduce potential unethical research practices among faculty members and students. The software will definitely have a significant impact on reducing the incidence of unethical research practices; however, the use of the software alone may not be sufficient to overcome unethical research and publication practices.

One of the challenges in research and publication arises when faculty members or students are found to have violated ethical research norms. BDU has demonstrated a firm stance against violations of ethical norms and standards in conducting research. Some faculty members and graduate students at BDU were penalized in the past for unethical research practices. In addition to reprimanding or penalizing faculty members and students who violate ethical research and publication norms, higher education institutions in Ethiopia should also support faculty members and students in conducting research ethically. Unless we ensure that the research conducted by faculty members and students is ethical, the reputation and credibility of higher education institutions will be at stake.

It is time to shift our focus from merely increasing research output to ensuring that research is conducted ethically. Issues related to research and publication ethics should be incorporated into advanced research courses offered to postgraduate students at BDU. Moreover, enhancing faculty members' awareness and understanding of the importance of conducting and publishing research ethically should become a regular focus of seminars organized for that purpose. In addition, periodicals addressing research and publication ethics could be prepared and distributed to faculty members and graduate students. Faculty members should also be familiar with the tell-tale signs of a research report that might have been done unethically and be trained on what to do when they encounter such reports. Moreover, editors of academic journals published by higher education institutions in Ethiopia should spearhead efforts to ensure that the manuscripts they publish adhere to research ethics standards, and these editors should also be supported in their efforts to uphold research ethics.

The editorial team of *Bahir Dar Journal of Education* has embarked on the long journey of ensuring that the articles published by the journal demonstrate high standards of research ethics. The team has done everything possible to ensure that the articles published in Volume

26, Issue 2, were conducted ethically. This effort will continue until we ensure that conducting research ethically becomes a norm among faculty members and students.

The articles featured in Volume 26, Issue 2, collectively address some of the most pressing concerns in contemporary education: instructional leadership, curriculum implementation, pedagogical competence, assessment practices, technology-enhanced learning, educational aid, teacher knowledge, and the availability of instructional resources. Although the studies are situated in different educational contexts across Africa, particularly Ethiopia, Tanzania, and Nigeria, they converge around a common theme—the need to strengthen educational quality through effective leadership, innovative pedagogy, informed assessment practices, and institutional support.

In the opening article, Joyce Exusper Nemes examines instructional leadership practices among heads of public schools in Tanzania through a narrative review of studies published between 2014 and 2025. Nemes identifies five central dimensions of instructional leadership, including goal setting, instructional supervision, curriculum coordination, professional development, and the optimization of learning environments. The review reveals that while some school leaders demonstrate alignment with established instructional leadership frameworks, many continue to struggle with administrative overload, limited professional capacity, and inadequate resources. The study highlights the continuing importance of strengthening leadership preparation and institutional support systems to improve school effectiveness.

Questions of educational quality are also central in the study by David Adeyemi Aladesuyi, Florence Omosholape Abidoye, Zubairu Bio Salihu, and Adekunle Omotayo Abidoye, who evaluate the implementation of the senior secondary mathematics curriculum in Niger State, Nigeria, using the CIPP model. Their findings indicate that although curriculum objectives and content coverage were generally satisfactory and most teachers possessed appropriate qualifications, implementation remained hindered by insufficient use of student-centered teaching approaches, inconsistent use of instructional materials, and limited practical assessment practices. The study demonstrates that effective curriculum implementation depends not only on curriculum design but also on the pedagogical processes and classroom practices through which the curriculum is enacted.

The importance of assessment practices in supporting mathematical understanding is further explored by Girma Tessema, Kassa Michael, and Solomon Areaya. Focusing on geometry learning at Robe College of Teacher Education, the authors investigate how assessment-for-learning practices contribute to pre-service teachers' mathematization. Their findings suggest that although assessment-for-learning strategies were commonly used, they often failed to capture the depth of learners' mathematical reasoning and conceptual understanding. However, the incorporation of dialogue, argumentation, and varied formative assessment strategies created opportunities for deeper reasoning and abstraction. The study contributes to ongoing discussions about the role of assessment in fostering higher-order mathematical thinking.

Teacher competence and pedagogical content knowledge are examined in the study by Wendiyfraw Wanna and Abate Anjulo, who investigate English language teachers' proficiency and pedagogical content knowledge. Their findings reveal moderate levels of language proficiency and pedagogical competence among teachers, alongside important deficiencies in

fluency, vocabulary, grammar, and communicative classroom practices. The study raises critical concerns regarding teacher preparedness and emphasizes the need for continuous professional development, improved working conditions, and institutional support for teachers.

Innovative instructional approaches receive significant attention in this issue. Alemayehu Anbess Gebremeskel, Mulugeta Atinafu Ayele, and Adem Mohammed Ahmed examine the effects of the VHGGDIA on students' motivation to learn plane geometry. Their quasi-experimental study demonstrates that the intervention significantly improved students' motivation and engagement. The authors further show that successful implementation requires supportive conditions such as manageable class sizes, adequate time, sufficient learning space, and access to instructional resources. Similarly, Mersha Minwuyelet Kassa, Mulugeta Kibret Azen, Solomon Melese Mengstie and Melaku Wale Ferede investigate the impact of interactive multimedia and differentiated instruction on students' biology multimedia attitudes. The study reveals that multimedia-supported differentiated instruction significantly enhanced students' attitudes toward learning biology and created more active and engaging learning environments. Importantly, the findings also indicate that the instructional strategy was free from gender bias, reinforcing its broader pedagogical value.

Broader systemic and policy concerns are addressed in the article by Jerusalem Yibeltal Yizengaw and Asnake Tarekgn Nigussie, who explore the effectiveness and challenges of international educational aid delivered by UNESCO-Ethiopia. Using the Theory of Change and the principles of the Paris Declaration as analytical frameworks, the study reveals important tensions between policy intentions and implementation realities. The authors identify challenges related to responsiveness, coordination, and the inclusion of vulnerable populations, while also drawing attention to the relatively limited focus on tertiary education. Their recommendations for greater stakeholder engagement and coordinated educational support provide important insights for educational development initiatives.

Teacher knowledge and pedagogical understanding are further explored by Workineh Birhanu Aynalem, Tiruwork Tamiru Tolla, and Amare Sahle Abebe, whose narrative review maps the development of pedagogical knowledge research in Ethiopia from 1986 to 2024. The review demonstrates that Ethiopian scholarship has focused predominantly on pedagogical content knowledge, while general pedagogical knowledge has received comparatively limited attention despite its significance in addressing challenges such as large class sizes and learner diversity. The study provides an important foundation for future research on teacher education and professional knowledge in Ethiopia.

Assessment orientation among teacher educators is critically examined by Tiruneh Ewunetu, Amare Sahile, and Tiruwork Tamiru. Their mixed-methods study conducted in colleges of teacher education in the Amhara region reveals misconceptions and inadequate implementation of assessment practices, particularly formative assessment before and during instruction. Structural challenges such as heavy workloads, large classes, and traditional assessment mindsets further constrained effective assessment practices. The findings underscore the urgent need for institutional reforms and professional development initiatives aimed at strengthening formative assessment culture in teacher education institutions.

Resource limitations and learning environments are also highlighted in the study by Abate Mengistu Gessese and Alebachew Kemisso Haybano, who investigate the implementation of performing and visual arts education in Ethiopian primary schools. Their

findings reveal that shortages of art materials and dedicated instructional spaces significantly hinder the implementation of performing and visual arts curricula. The study reminds us that creativity and artistic learning require not only curriculum inclusion but also material and spatial support.

Finally, Basha Bekele, Solomon Lema, and Asfaw Gnefato examine middle school citizenship teachers' pedagogical perspectives in Sidama Regional State. Their findings reveal an important contradiction between teachers' stated preference for constructivist pedagogies and their continued reliance on traditional classroom practices. The study illustrates the persistent gap between pedagogical ideals and classroom realities and points to the contextual constraints that shape instructional practice.

Taken together, the contributions in this issue provide a rich and multifaceted examination of educational practice and policy in African contexts. The studies collectively reveal that meaningful educational improvement depends not only on curriculum reform or policy development, but also on effective leadership, teacher competence, assessment literacy, instructional innovation, resource availability, and institutional support. They further demonstrate the interconnectedness of these dimensions and the importance of addressing educational challenges holistically.

We hope that the insights gleaned from this issue will kindle further scholarly discussion, inform educational policy and practice, and contribute to ongoing efforts to enhance teaching, learning, and educational leadership across diverse educational settings.

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Exploring the instructional leadership practices of heads of public schools in Tanzania: A narrative literature review

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Abstract

This narrative review aimed to examine how heads of public schools in Tanzania performed their instructional leadership roles in alignment with established theoretical frameworks, while also identifying the factors that guided their performance. In this narrative review, an online search was conducted across Google Scholar, Scopus and DOAJ databases using Boolean operators. Therefore, articles published between 2014 and 2025 were screened using predefined inclusion and exclusion criteria. After thorough screening, 29 studies met the inclusion criteria for thematic analysis of which five major themes emerged from the analysis: goal setting and communication practices, instructional supervision and monitoring activities, curriculum leadership and coordination, professional development leadership and learning environment optimization. Moreover, the findings revealed partial conformity with established instructional leadership tenets as some heads of schools demonstrated effective practices. On the contrary, other heads of schools struggled due to capacity constraints, administrative overload and resource limitations. Although some heads of public schools effectively carried out their instructional leadership roles, significant gaps still existed in systematic implementation of their roles. Thus, the study recommends targeted capacity building programs for heads of schools, reduction of administrative burdens and regular provision of adequate resources in order to enable effective instructional leadership practices in public schools in Tanzania.

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Educational leadership, instructional leadership, school heads, Tanzania, narrative review

Introduction

The role of heads of schools as instructional leaders has become critical in ensuring an effective teaching and learning process in educational institutions globally (Hallinger et al., 2020; Harris et al., 2017, 2020; Heck & Hallinger, 2014; Kaai, 2016; Naz & Rashid, 2021). However, a fundamental question remains: are heads of schools actually discharging authentic instructional leadership responsibilities or are they merely performing administrative tasks with insignificant instructional components? This question is mainly pertinent given that instructional leadership efficacy directly correlates with student academic achievement through curriculum implementation, teacher professional development and systematic classroom instructional supervision (Bellibaş et al., 2021; Kilag & Sasan, 2023; Naz & Rashid, 2021).

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Basically, the available literature suggests that the way in which heads of public schools execute their instructional leadership role serves as a decisive determinant of the efficacy of the teaching and learning process in schools (Bellibaş et al., 2021; Gading, 2024). In Tanzania, this relationship assumes critical importance as depicted by mixed educational performance indicators. While Basic Education Statistics 2014-2017 indicates positive trends in Standard Seven Leaving Examination performance (URT, 2018), and the recent Education Training Policy (2023) reported that approcimately 76.6 % pupils who sat for the National Standard Seven Examination joined secondary education **(**URT, 2014). Concurrent studies have revealed persistent challenges in basic education performance, with leadership styles of heads of schools identified as major determinants of good outcomes, including academic performance (Njuu et al., 2023).

Significantly, the term instructional leadership represents a school leadership paradigm that prioritizes continuous improvement of teaching and learning processes, thus positioning student's learning outcomes as the primary focus of educational management (Campbell et al., 2019; Gunawan & Adha, 2021; Shaked, 2023; Sharif, 2020; Shava et al., 2021). In essence, this leadership approach is anchored in three fundamental dimensions which are defining and developing the school mission, managing curriculum and instructional programs and promoting positive school learning climates coupled with school culture (Gawlik, 2018; Hallinger, 2003; Shava et al., 2021). Nevertheless, authentic instructional leadership requires distinct conformity to the established theoretical tenets rather than superficial engagement with instructional activities.

It is worth noting that the concept of instructional leadership has significantly shifted beyond a narrow focus on school administration to encompass curriculum development, professional development, data-driven decisions and active engagement with the wider community (Akomodi, 2025; Davis, 2025; Ezzani, 2020). Thus, contemporary understanding of the phenomenon sees heads of schools as being learning-focused leaders who actively participate in and guide instructional processes rather than merely overseeing managerial functions (Abonyi & Sofo, 2021; Gümüş et al., 2021; Mbangula, 2021; Ngole & Mkulu, 2021). This evolution raises critical questions about whether current practices align with theoretical foundations.

In the African context, a large body of research has examined the instructional leadership practices of school heads, as evidenced by studies conducted in this area (Bada et al., 2024; Musandu, 2018; Sibomana, 2019; Yasser & Amal, 2015; Zvandasara, 2016). However, a recurring concern emerges from studies revealing that, apparently, considerable time is allocated in administrative duties rather than in instructional supervision and leadership (Chabalala & Naidoo, 2021; Noor & Nawab, 2022). This administrative focus as practiced potentially compromises authentic instructional leadership, subsequently creating a gap between theoretical expectations and practical implementation.

Conversely, the existing research landscape on instructional leadership in Tanzania presents uneven findings across diverse geographical locations and contexts, subsequently generating variations in how heads of public schools actually perform their instructional leadership roles. Isolated studies conducted in specific locations in Tanzania such as in Karatu (Kaai, 2016), Biharamulo (Logation et al., 2021), Bukoba (Khamis, 2023), Lindi (Chiwamba & Kigobe, 2022) and Nyamagana in Mwanza (William & Ligembe, 2022) evidently lack

coherent synthesis necessary for broad nationwide perspective and theoretical conformity assessment in relation to the issue under study. Thus, a clear empirical gap persists, calling for a more integrated, context-specific study of instructional leadership in Tanzania.

Methodologically, the majority of studies on instructional leadership in Tanzania employed mixed approaches as evidenced by Chiwamba and Kigobe (2022), Kaai (2016), Khamis (2023) Logation et al. (2021) and William and Ligembe (2022). Moreover, with regard to focus, some studies have centered on the challenges encountered in Nyamagana, Mwanza (William & Ligembe, 2022); perceptions in Karatu (Kaai, 2016; Logation et al., 2021); student academic performance (Mtei, 2022) and teacher performance (Chiwamba et al., 2022). Furthermore, a study by Chiwamba and Sumbizi (2024) was conducted to investigate the extent to which heads of schools discharge instructional supervision roles in order to enhance teacher performance in their daily activities. However, the study did not adopt a narrative review, thereby compelling the present researcher to undertake a narrative review.

Despite the fact that there is abundant global literature on school principals' instructional leadership including comprehensive review articles in Asian contexts (Ikram et al., 2021), meta-analytic reviews (Boyce & Bowers, 2018) and qualitative meta-syntheses in Turkey (Gümüş et al., 2021) and Indonesia (Sunaryo, 2020), none of them systematically examined the Tanzanian context through narrative literature review with a specific focus on theoretical conformity. This fragmentation has resulted in critical variance specifically on incomplete understanding of the full spectrum of instructional leadership activities, unclear theoretical foundations guiding practice and the limited comprehension of contextual factors influencing successful implementation.

Most critically, the paucity of narrative reviews exploring conformity between actual practices and established instructional leadership tenets creates uncertainty about whether heads of public schools are genuinely discharging instructional leadership responsibilities or are merely engaging in peripheral instructional activities without a substantive leadership impact. Apparently, this gap undermines evidence-based policy development and professional development program designs. Therefore, this study has addressed these critical gaps by conducting a comprehensive narrative literature review so as to explore whether heads of public schools in Tanzania effectively perform their instructional leadership roles in alignment with established theoretical frameworks

Principally, this review is guided by focused research questions designed to assess theoretical conformity which are: How do the instructional leadership practices of heads of public schools in Tanzania align with the established theoretical dimension of instructional leadership? What factors contribute to conformity or non-conformity with regard to fundamental instructional leadership dimensions among heads of public schools in Tanzania? Thus, by synthesizing fragmented findings and systematically identifying both strengths and gaps in the current practices against theoretical benchmarks, this review tries to establish a foundation for developing contextually and theoretically sound instructional leadership models suited to the Tanzanian educational landscape.

Notably, this review contributes to the deeper understanding of how heads of public schools fulfill their roles as authentic instructional leaders, ultimately informing evidence-based policy and practice improvements for education quality enhancement in Tanzania. Predominantly, its significance extends beyond documentation as it provides crucial insights

for educational policymakers seeking empirically-grounded strategies to improve the efficacy of school leadership. Moreover, it offers targeted guidance for professional development programs and identifies priority areas requiring research attention. For countries with similar socio-economic and educational contexts, this review offers valuable comparative insights that inform considerable educational leadership development initiatives.

Conceptual Framework: Instructional Leadership Theory (ILT)

This study is anchored in Hallinger and Murphy's (1985) Instructional Leadership Framework, which is the most comprehensive and proven model in understanding school-based instructional leadership. This framework is appropriate for this study as it delineates specific behavioral indicators that serve as benchmarks for evaluating instructional leadership performance. Besides, the theory employs perspectives from research into effective schools in the early 1980s (Hallinger, 2003), which provides a robust framework for understanding how school leaders can significantly influence teaching and learning outcomes. This theory is therefore pertinent in examining the performance of heads of public schools in Tanzania.

Hallinger et al.'s (1983) three-dimensional model serves as the analytical framework for this study. Initially, the first dimension is to define the school mission and examine how heads of public schools in Tanzania communicate and sustain clear educational visions. The second dimension is about managing the instructional program and investigating how these leaders plan, coordinate and evaluate curricular processes to ensure quality education. The third dimension focuses on promoting a positive school learning climate and examining how leaders create and sustain environments that are conducive to effective teaching and learning processes.

This theoretical lens aligns directly with the research questions, thus enabling the identification of well-implemented aspects of instructional leadership as well as neglected ones. Likewise, by comparing actual practices against the aforementioned theoretical standards, the study reveals critical gaps in their implementation and implications for educational outcomes. Furthermore, the context-specific application of the theory makes it suitable for analyzing instructional leadership within the unique socio-cultural environment in Tanzania. This alignment not only enriches the analysis but also enhances the relevance of the findings to actual practice in Tanzanian public schools, finally contributing to improved educational leadership and students' success.

Methods

Narrative Review Approach

This study employed a narrative literature review methodology in order to investigate the roles of heads of schools as instructional leaders in public schools in Tanzania. Notably, the selection of the studies was guided by rigorous criteria so as to ensure both relevance and quality, apparently focusing specifically on how school leaders navigate their practices, behaviors, challenges and outcomes. Moreover, the priority was given to studies that relate to Hallinger and Murphy's (1985) instructional leadership framework, thereby ensuring the literature directly addresses the context of Tanzanian public education.

Selection Criteria

Timeframe, Rationale and Database Selection

Related studies meeting the established criteria were retrieved from three academic databases namely Google Scholar, Scopus and the Directory of Open Access Journals (DOAJ). These databases were selected for their strengths in capturing both mainstream and region-specific educational research. Basically, Scopus provides broad coverage of peer-reviewed literature with robust indexing and citation tracking capabilities, ensuring access to high-quality international journals. Besides, Google Scholar was included for its extensive reach into grey literature, institutional repositories, theses and dissertations, which proved valuable for accessing locally published research from Tanzanian universities and research institutions that may not appear in commercial databases.

Moreover, DOAJ ensured the inclusion of open-access journals, which are important in accessing research from the Global South, including East Africa and Tanzania in particular. Conversely, the publication period ranging from 2014 to 2025 coincides with significant educational reforms in Tanzania, namely the implementation of the Tanzania Education and Training Policy of 2014, the 2023 Edition along with the transition to a competency-based curriculum. This timeframe allowed the examination of how the reforms have shaped existing instructional leadership practices, roles and challenges faced by school heads. Furthermore, this period reflects a notable increase in research output in the field of educational leadership in Tanzania, ensuring that the findings remain relevant to current practices, thereby changing the nature of instructional leadership in public schools.

Quality Assessment

Predominantly, the quality assessment included studies rigorously assessed for methodological quality and relevance to the research focus. Basically, each study directly addressed the central themes under investigation, thereby providing valuable insights pertinent to the study objectives. Moreover, this comprehensive evaluation ensured the credibility, consistency and integrity of the study findings presented. Moreover, it strengthened the analytical foundation of the study by minimizing bias and enhancing the reliability of synthesized evidence. Thus, the systematic appraisal enhanced confidence in the conclusions drawn and supported their applicability to the broader research context.

Search Strategy and Screening Process

The search strategy employed a combination of keywords and Boolean operators to ensure complete retrieval of relevant literature while maintaining specificity to the research focus. Distinctly, core keywords included "instructional leadership," "educational leadership," "heads of public schools," "school principals," "head teachers" and "Tanzania." Inversely, Boolean operators were systematically applied as follows: AND was used to combine different concepts for instance, "heads of public schools" AND "instructional leadership" AND "Tanzania." Besides OR was used to include synonyms or related terms for instance, "instructional leadership" OR "educational leadership" OR "pedagogical leadership" and NOT was used to exclude unwanted terms for instance, "Tanzania" NOT "private schools."

Moreover, representative search strings included "heads of public schools" AND "instructional leadership" AND "Tanzania"; "instructional leadership" OR "educational

leadership" AND "Tanzania"; "school management" AND "teacher performance" AND "Tanzania" and "curriculum implementation" AND "school leadership" AND "Tanzania." Notably, the reviewed documents included peer-reviewed journal articles, dissertations and theses from Tanzanian and international institutions. Generally, after thorough screening and quality assessment, 29 studies were selected for the final review which directly addressed instructional leadership practices, challenges or outcomes in Tanzanian public schools.

Data Analysis and Synthesis

Recognizing the flexibility and the non-structured nature of narrative reviews, the screening process ensured no strict guidelines regarding the number of studies to be included (Ferrari, 2015; Juntunen & Lehenkari, 2021; Sukhera, 2022). Although some scholars such as Pae (2015) and Cipriani and Geddes (2003) critique narrative reviews for their potential bias and subjectivity, the present study explicitly sought to address these concerns. For example, McCann and Brown (2017) clearly employed a narrative review to analyze quantitative studies on discrimination, resilience and the needs of transgender individuals. Thus, this precedent supports the inclusion of both quantitative and qualitative data in the review indicating that the broad approach can enhance understanding.

To mitigate potential biases, the study adhered to several key stages as outlined by Pautasso (2019). Initially, the selection of the relevant topic was done, followed by the development of a broad search strategy which utilized various keywords and databases. This approach led to the inclusion of 29 studies that met the established criteria, hence ensuring a robust and diverse dataset for analysis. Moreover, data analysis as per Pautasso's (2019) recommendations was conducted using thematic analysis in accordance with Braun and Clarke's (2006) framework. The analysis involves six steps including becoming familiar with the data, systematically coding the extracts, grouping these codes into potential themes, reviewing themes, defining and naming themes and the final step which was producing the final report.

Essentially, each theme was carefully refined and validated so as to ensure its clarity and relevance, thus leading to a coherent narrative synthesis of the findings. Besides, the emerging themes were clearly examined in relation to Hallinger and Murphy's framework in order to assess their alignment with the established theoretical principles. Finally, following Pautasso's (2019) recommendations, the draft was revised for coherence whilst peer feedback was solicited prior to dissemination. Generally, this rigorous methodological approach not only mitigated bias but also facilitated the integration of both qualitative and quantitative studies on instructional leadership in Tanzania.

Findings and Discussion

The analysis of 29 publications revealed intricate patterns of instructional leadership amongst heads of public schools in Tanzania. Largely, by utilizing the Hallinger and Murphy's (1985) three-dimensional framework, the findings of the study are organized into five key themes which are Mission Definition and Goal Communication, Instructional Supervision and Monitoring, Curriculum Leadership and Coordination along with Professional Development Leadership and Learning Environment Optimization. Notably, each theme was examined in

alignment with the instructional leadership expectations, followed by a critical interpretation of the observed patterns and their implications for effective leadership practices.

Goal Setting and Communication Practices

Setting goals and Communicating to Teachers

The studies reviewed indicate that heads of schools actively plan school goals and effectively communicate them to teachers. In essence, the school management fosters shared vision, instructional coherence and improved teaching practices. This is clearly shown in a study by Mtei (2022, p. 23) in Morogoro Municipality who highlighted the critical role of school leaders. Notably, the head of a school asserted, "As a school leader, I develop school goals and present them to my School Management Team (SMT) members for input. Basically, these goals are discussed during staff meetings and parents' meetings and indirectly through daily directives".

Similarly, Logation et al. (2021, p. 167) found that heads of schools in Biharamulo district utilize staff meetings as essential opportunities to convey instructional leadership roles. Staff meetings primarily strengthen collaborative planning, shared understanding of pedagogical goals and coordinated implementation of teaching and learning practices across schools as one head of school stated, "I always consider every staff meeting as a golden chance to inform staff members with regard to what should be done, specifically the implementation of the competence-based curriculum. Moreover, I inculcate teacher cooperation in planning the annual budget before being presented to the school board."

Furthermore, a regional comparison further underscores these findings as Bakokonyane (2022) in Botswana recorded that rural primary schools' management successfully engage staff and other stakeholders in developing their vision and strategic plans which enhances performance. In contrast, low-performing schools often give the illusion of involvement without genuine engagement. Moreover, in Rwanda, Sibomana (2022) observed that principals who exercise strong instructional leadership actively define and communicate a shared vision in fostering collaboration and effective school leadership. Collectively, these regional insights highlight the centrality of authentic instructional leadership and participatory vision-building in enhancing school effectiveness across contexts.

However, challenges persist as there is evidence of non-conformity as Kaai (2016) reported from Karatu that many teachers struggled to articulate their school vision and mission. Shockingly, Urio and Manase (2024) found in Arusha district that, although the school vision existed, there was a significant lack of communication and actionable plans for its implementation. These findings highlight the need for alignment with the instructional leadership theory, indicating that effective goal setting and communication are critical in fostering a productive educational ambience.

Instructional Supervision and Monitoring

Effective instructional leaders enhance educational quality by observing classroom instruction, providing feedback, and monitoring curriculum implementation (Hallinger & Murphy, 1985). The reviewed studies revealed mixed patterns amongst heads of schools as Msuya and Mwila (2023) noted, "Our head of school usually teaches his lessons. Although he sometimes misses a few lessons due to administrative duties, he is always available to serve

our students" (p. 36). Similarly, Mwesiga and Okendo (2018) reported that heads of schools are supervising teachers, checking lesson plans and providing constructive feedback.

Further evidence from Yasini and Goldman (2025) in Geita district confirms that heads of schools actively engage in supervising instructional activities, including schemes of work, lesson plans, lesson notes, logbook reviews along with classroom observations. This adherence to visibility and presence underscores the role of heads of schools in participating actively in the teaching and learning process in public schools in Tanzania. Evidently, this in turn brings about the best outcomes intended particularly in both students' academic performance and moral development.

However, significant departures from this dimension were recorded in various studies. For example, Chiwamba and Kigobe (2022, p. 5) quoted one head of school as stating, "It is difficult for me to have time to visit every teacher in his or her classroom given that teachers perceive supervision negatively, thinking that it is an evaluation process." This statement highlights a vital misunderstanding of instructional supervision as a supportive endeavor rather than a punitive evaluation. This indicates lack of conformity with the collaborative supervision tenet. Besides, Kaai (2016) further suggested that heads of schools should receive training to effectively balance instructional and administrative responsibilities.

Remarkably, regional comparisons reinforce the findings reported by Chiira et al. (2023) in Kenya that secondary school principals normally engaged in supervision through meetings, observing lessons and providing feedback to teachers. Moreover, Hallinger et al. (2017) emphasized, "…instructional leadership makes a difference for the quality of teaching and learning process, thus being taken on a serious note by heads of schools" (p. 222). For that reason, the findings underscore the critical need for principals to embrace a constructive approach to instructional supervision that aligns with the tenets of ILT (1985)

Generally, the findings of the study suggest fragmented implementation of instructional supervision. While some heads of schools understand the importance of classroom instructional supervision and monitoring, many lack the systematic approach and supportive framework essential for effective instructional supervision as evidenced by the number of studies reviewed. The negative perception of supervision by the teaching staff as evaluation rather than professional support indicates conceptual gaps in understanding instructional leadership principles.

Curriculum Leadership and Coordination

It is worth noting that instructional leaders are tasked with coordinating curriculum implementation. Basically, they are supposed to ensure that there is an alignment between instructional objectives and the monitoring of academic progress in school settings (Nader et al., 2019; Parveen et al., 2023). In Tanzania, there is evidence of systematic curriculum coordination among heads of schools as studies by Mbezi (2016), Mwesiga and Okendo (2018) as well as Urio (2018) highlight efforts in lesson plan supervision and resource mobilization.

For instance, Urio (2018, pp. 96-97) noted that the mobilization of resources such as chalk, lesson plan books and other teaching materials is commendably done, with each department preparing a list of its needs to submit to the academic office. In addition, William and Ligembe (2022) found that heads of departments in Nyamagana district regularly review lesson preparation documents while heads of schools convened meetings with teachers in order

to address instructional matters. This demonstrates procedural conformity in resource coordination, aligning with the principles of effective curriculum leadership.

These findings are in parallel with the study carried out by Ikram et al. (2021), who observed that principals in Asian countries prioritize instructional programs and student achievement over mere curriculum management. Similarly, Walker and Qian (2022) reported that Chinese principals actively engage in teaching and learning processes, revealing a thorough understanding of classroom practices as vital aspect in ensuring best student outcomes both academically and morally. Conversely, instances of inadequate curriculum coordination persist as Chiwamba et al. (2022) revealed that, in Lindi, heads of schools often fail to regularly check teachers' lesson plans, with oversight occurring only annually or through school inspectors.

Besides, Ngole and Mkulu (2021) reported that many heads of schools in Ilemela district neglected their responsibility to review lesson plans, mistakenly viewing this task as outside their purview. Emiru (2020) similarly noted that heads of schools in Iringa district did not conduct classroom observations or review curriculum materials whilst in Kenya, Mutua (2024) linked inadequate curriculum supervision and lack of teachers' motivation plans with poor student performance. This reflects a critical gap in understanding essential instructional leadership responsibilities.

These findings highlight a pattern of the role confusion and capacity deficits in curriculum leadership. Thus, many heads of schools do not fully grasp their responsibilities as they treat curriculum coordination as optional rather than essential. In that regard, this indicates a significant non-conformity with instructional leadership theory. Along the same wavelength, the findings illustrate a disconnection between procedural adherence and conceptual understanding in curriculum leadership in the sense that while heads of schools may follow administrative procedures in performing their duties, they often lack a comprehensive understanding of effective curriculum leadership principles.

Furthermore, with regard to regional comparison, these patterns resonate with the study by Okey (2020) in Nigeria, who found a significant link between principals' leadership practices and students' academic performance. The study emphasized the importance of selecting principals based on their knowledge and experience in classroom teaching and supervision, thus reinforcing the need for training in curriculum leadership. This underscores the necessity for heads of schools to not only adhere to procedures but rather to grasp the foundational principles that foster a productive educational environment.

Professional Development Leadership

Largely, instructional leaders are expected to foster continuous professional growth, provide mentorship and learning opportunities to junior staff members (Brown & Militello, 2016). Apparently, Chaula et al. (2024) in Southern Highlands found that teachers strongly agreed that their heads of schools' appraisal of lesson plans improved their professional competencies in organizing content, engaging students and setting objectives. This aligns with the findings from regional studies by Ahmad et al. (2021), Li (2014), Kilag and Sasan (2023), Bellibaş et al. (2021) who asserted that effective instructional leadership practices positively impact student's learning outcomes. Inversely, Tahir and Fatima (2023) in a cross-sectional

study conducted in Punjab, Pakistan and Lahore reported that principals' instructional leadership practices enhanced teachers' professional development.

Furthermore, Kim and Lee (2020) noted that in Japan, Singapore and South Korea principals' leadership influences teachers' participation in professional development such as mentorship, peer observation and coaching. Similarly, Nguyen et al. (2025) found teachers in Vietnam being satisfied with their principal's instructional leadership, which positively impacts their professional learning. Besides, in Malaysia, Wahab et al. (2020) recorded strong instructional leadership which promotes professional development, enhances teachers' performance, regardless of the demographic factors. Moreover, Dorukbaşi and Cansoy (2024) in Türkiye echoed that the increased principal authority and professional development opportunities positively impacted instruction and students' learning outcomes.

In contrast, Makia (2016) reported that in the Singida region the academic qualifications of most head teachers were below standard. Similarly, Ngole and Mkulu (2021, p. 69) found in Ilemela District that most heads of schools lack knowledge about supervision since they do not understand their roles in school supervision. Besides, Chiwamba et al. (2022) reported that in the Lindi region most teachers disagreed that their heads of schools regularly hold regular meetings in order to discuss teaching-related issues, with a significant percentage expressing disagreement about organizing in-house training to address instructional challenges. Moreover, Marandu et al. (2022) found that inadequate regular training opportunities limit heads of schools' coaching roles, subsequently hindering teachers' professional development.

Predominantly, the data reveals a pattern of capacity-constrained non-conformity, whereas heads of schools recognize the importance of professional development but lack the requisite knowledge and skills to fulfill this role effectively. This is indicated by a study in Mpanda district council by Kalyalya (2017), who recommended capacity building for heads of schools so as to enhance their effectiveness in teaching and learning processes. Similarly, Pendo (2017) in Kigoma Ujiji called for the improved quality of leadership training for both in-service and newly appointed head teachers. Moreover, Rutemelwa et al. (2023) emphasized the necessity for head teachers to enhance their management skills through various professional development programs.

Distinctly, the literature indicates a fragmented pattern of conformity that, while some heads of schools grasp the need for instructional supervision and monitoring practices, they often lack a systematic approach and supportive frameworks necessary for effective instructional supervision. To address these gaps, the literature strongly recommends that training for heads of schools is indispensable given that they would equip them with the skills required for effective instructional supervision (Ngole & Mkulu, 2021). Besides, training will enable them to better fulfill their duties and ultimately improve the overall quality of education. Generally, the reviewed studies highlight the urgent need for effective and efficient execution of the instructional leadership role to foster a milieu conducive to learning.

Learning Environment Optimization

Instructional leaders are primarily tasked with creating conditions that support effective teaching and learning process, which includes resource provision and stakeholder engagement (Hallinger & Murphy, 1985). Despite facing various constraints, heads of schools have indicated efforts to align with this dimension. Apparently, this is maintained by Logation et al.

(2021), who asserted that one of the fundamental responsibilities of heads of schools is to ensure the availability of necessary teaching and learning resources for the delivery of quality instruction. Likewise, in Njombe district, heads of public schools were found to effectively manage teachers by instructing them to prepare proper lesson plans and supervising their implementation (Gosori, 2023).

Furthermore, research highlights the importance of head teachers in maintaining strong relationships with parents and the wider community so as to encourage student participation in their studies (Kija & Mosha, 2024). Basically, such collaboration promotes the shared responsibility for learners' academic progress and school development. Quite a large number of studies confirm that parental involvement positively influences children's learning outcomes (Mwania et al., 2019; Nyakundi, 2020; Panaoura, 2021). These study findings underscore that strong school-community relations are essential in fostering student engagement and optimizing the learning process.

However, systemic barriers often hinder full conformity as pointed out in the study by Logation et al. (2021), who noted that a monthly Capitation Grant disbursed from the central government was too small to purchase textbooks, reference books and other necessary teaching and learning aids. This limitation significantly affects the quality of instruction and the overall learning experience for students. In addition, this is further proven in a study carried out in Ilemela district by Ngole and Mkulu (2021), who quoted one Ward Executive Officer (WEO) as asserting, "In most of our schools, the teaching and learning materials are insufficient, which hinders the supervision process among heads of schools."

The findings of the study reveal a pattern of non-conformity driven by systemic barriers that, while heads of schools recognize their fundamental responsibilities, they are often constrained by external factors such as inadequate funding and insufficient resources. In addition, many heads of schools lack the necessary knowledge of their roles as instructional leaders and supervisors (Ngole & Mkulu, 2021). In that regard, this gap can negatively impact the quality of teaching and learning process as well as the academic performance in schools. Addressing these challenges through targeted training and increased resource allocation is essential in fostering a more conducive educational ambiance.

Factors Contributing to Conformity and Non-Conformity

Facilitating Factors for Conformity

Individual Commitment and Understanding. The existing literature reveals that personal dedication can significantly overcome systemic barriers to effect instructional leadership as Urio (2018, p. 95) noted heads of schools ensured that teachers prepare schemes of work and lesson plans before the term begins and prior to classroom instruction. This commitment to structured planning underscores the vital role of leadership in fostering a productive learning environment. Furthermore, Urio (2023) reported that heads of schools in high-performing institutions revealed a strong commitment in articulating school goals and setting high expectations for both teachers and students, thereby enhancing the overall school performance.

Supportive Institutional Culture. Although instances of supportive institutional culture were limited in the reviewed literature, the studies depicted that schools were characterized by collaborative environments and showed better alignment with instructional leadership

principles. This is shown by a study by Nyaibuli and Mwila (2024), who noted that 70% of teachers reported that their supervisors offered support and collaboration to achieve the shared objectives. Thus, collaborative leadership in Ilala District, Dar es Salaam, positively impacted teachers' performance and their involvement in the decision-making process. In light of this, collaboration culture provides teachers with opportunities to share their views, ensuring their voices are heard and making them feel integral to the school's decision-making process.

Similarly, Njuu et al. (2023, p. 255), quoted the school principal as narrating, "as a school principal, inviting contributions from subordinates before making any decision, fosters consensus and makes them feel valued, which in turn improves their morale and leads to enhanced students' academic performance." Likewise, in Rombo District, Mwakajitu et al. (2022) found that an effective instructional supervision not only enhanced teachers' skills in employing diverse teaching methods but also improved their ability to prepare their instructional materials. Collectively, the findings stress the value of participatory leadership and effective instructional supervision in strengthening teaching practices and improving student academic outcomes.

Barriers to Conformity

Conceptual Misunderstanding. The fundamental misunderstanding of instructional leadership roles is a recurring theme in the literature as pointed out by Emiru (2020), who observed that heads of public schools, school administrative managers, teachers and students were not familiar with the concept of instructional leadership. Thus, the lack of clarity led to negative attitudes amongst teachers, as noted by Kilimhana (2020) in Dodoma who suggested that, school leaders should clarify the purpose of instructional supervision so as to alleviate intimidation and foster a more supportive environment. The study recommended that heads of schools should have regular training in order to enhance their understanding and efficacy in supervision.

Administrative Overload. Apparently, regarding excessive administrative overload poses a significant barrier to maintaining an instructional focus. Ngole and Mkulu (2021, p. 68) quoted one head of school as stating, "We have burdens of tasks, such as attending meetings, preparing reports and conducting seminars with teachers, thus making it difficult for us to perform the instructional tasks at the same time maintain the supervision role". Moreover, Mwesiga and Okendo (2018) echoed the excessive number of meetings and tasks that detract their ability to focus on instructional leadership. Similarly, Nyaibuli and Mwila (2024) reported that in Ilala Municipality heads of schools faced manifold challenges in managing the teaching and learning process due to overcrowded classrooms and a limited number of teachers.

Capacity Deficits. Studies consistently identify knowledge and skill gaps among heads of schools as barriers to effective instructional leadership as Ngole and Mkulu (2021) found that, most heads of schools lack knowledge on supervision, thus they do not understand their fundamental roles in school supervision in relation to instructional practices. Hence, the lack of understanding basically hampers efforts to improve the quality of the teaching and learning process.

Notably, Urio and Manase (2024) reported that heads of schools lacked adequate skills for supervising classroom instruction whilst Kaai (2016) urged that heads of schools should receive regular training to balance their dual roles as instructional leaders and administrators. Moreover, Nyambo (2017) noted the challenges of conducting instructional supervision due to

scarce knowledge and skills, while Nzali (2024) noted that the dearth of trained heads of schools negatively affects the management of curriculum implementation. Conversely, Bush and Anania (2023) stressed that in sub-Saharan Africa countries including Tanzania often depict a focus on administration with instructional leadership overlooked.

Thus, regular training for heads of schools in public schools is essential. For example, Ipando (2019) affirmed that trained head teachers in Meatu District significantly improved students' academic performance compared to untrained counterparts. This leads to the inference that continuous professional development equips school leaders with pedagogical and managerial competencies necessary for effective instructional supervision. Consequently, institutionalizing regular leadership training can strengthen teaching practices and sustainably enhance learning outcomes in public schools.

Resource Constraints. It is worth noting that systemic underfunding severely limits the ability of heads of schools to fulfill their tasks. As Mwita (2022) noted financial limit has been a major challenge for heads of schools in Kahama district. Similarly, Urio and Manase (2024) found that heads of schools in community schools lacked sufficient funds to carry out school activities effectively, thus undermining the efforts to promote quality education. In addition, Mbezi (2016) reported similar challenges in Mkinga District, where budget shortages hindered supervisory activities amongst heads of schools in public schools.

Likewise, Msuya and Mwila (2023) noted that the government allocates funds to schools each month as Capitation Grants; however, the amount is often insufficient to cover the basic needs in schools, subsequently leading to debt and inability to meet essential services such as photocopying examinations or paying teachers for extra duties. On the same note, inadequate facilities such as classrooms and ICT resources exacerbate these challenges as Chiwamba et al. (2022) reported public schools often lack sufficient textbooks and libraries thus, limiting access to both students and teachers.

Besides, the findings indicate that inadequate provision of resources, overcrowded classrooms and lack of qualified teachers basically hinder heads of schools from effectively carrying out their instructional leadership roles. This has been indicated in a study by Chacha (2022), who recommended additional financial resources in order to enable heads of schools to implement their roles effectively. Furthermore, other studies suggest that adequate facilities and funding are crucial in improving the teaching and learning environment in public schools (Suleiman & Otieno, 2022).

Notably, these findings align with studies from other regions as Geleta (2019) in Ethiopia highlighted inadequate instructional materials whilst Adams and Muthiah (2020) also found inadequate facilities and resources which are significant challenges for school principals in the 21st century. In order to address barriers such as conceptual misunderstandings, administrative overload, capacity deficits and resource constraints, it is critical for educational stakeholders to enhance the efficacy of instructional leadership in schools. Therefore, without targeted interventions and support, these barriers will continue to impede the improvement of educational quality in Tanzania and in countries with similar educational settings.

The analysis of 29 publications, guided by Hallinger and Murphy's (1985) framework has revealed a dichotomy in Tanzanian public schools. While heads of schools demonstrate some adherence to instructional leadership dimension as evidenced by Mtei (2022), systemic issues and conceptual gaps have been severely undermining their efficacy. Besides, goal setting

and communication, though present, often lack clarity, subsequently hindering teachers' ability to align with school visions (Urio & Manase, 2024). Moreover, instructional supervision has been misunderstood, with teaching staff perceiving it as punitive rather than supportive, thereby contributing to uneven and ineffective system (Chiwamba & Kigobe 2022).

Basically, curriculum leadership suffers from role confusion and capacity deficits, with leaders often failing to grasp their responsibilities as noted by Ngole and Mkulu (2021). On the other hand, the professional development initiatives are hampered by leaders' own skill gaps, thus perpetuating a cycle of inadequate support. Finally, systemic barriers like resource constraints and administrative overload, in essence cripple efforts to optimize the learning environment as noted in the study by Mwita (2022) that financial limitations restrict the ability to provide essential teaching and learning materials, while overcrowded classrooms further complicate management efforts in schools.

Generally, the findings of the study revealed a complex landscape of instructional leadership in Tanzanian public schools, characterized by both adherence to and deviations from effective practices. Therefore, addressing these barriers through targeted training and resource allocation is of paramount importance in enhancing the overall quality of education in the society and the country at large. Notably, the insights acquired underscore the importance of aligning practice with instructional leadership theory which advocates for the clear communication, collaborative supervision and a commitment to continuous professional development as foundational elements of effective school leadership.

Conclusions

This narrative review guided by established frameworks aimed at providing an accurate assessment on how heads of schools in public schools in Tanzania perform their instructional leadership roles. Apparently, the findings revealed a spectrum of conformity to instructional leadership tenets that, while some heads exhibited effective practices, others faced challenges due to capacity constraints, administrative overload and limited resources. Specifically, few studies demonstrated systematic alignment with theoretical expectations, whereas quite a good number of studies showed selective conformity or minimal adherence. Thus, these variations highlighted the need for targeted professional development and policy support to strengthen instructional leadership practice.

Although heads of schools engage in procedural activities, they frequently lack systematic, evidence-based approaches, resulting in notable gaps in instructional observation, data-driven curriculum coordination and sustained professional development. Inherently, the analysis featured a critical disconnect between theory and practice in relation to instructional leadership. Intrinsically, although Hallinger and Murphy's framework (1985) outlines essential leadership behaviors, contextual factors significantly shape their implementation in Tanzanian public schools. This indicates the need for interventions that address systemic barriers such as resource limitations and administrative burdens. Basically, bridging this gap requires context-responsive leadership models that align theoretical prescriptions with the practical realities of Tanzanian public schools.

Furthermore, professional development initiatives should focus on fostering deep conceptual understanding rather than mere procedural compliance, hence promoting a more

effective instructional leadership culture. This approach would finally strengthen teaching practices and improve student learning outcomes. Remarkably, the implications of these findings are profound for policymakers in establishing comprehensive training programs focused on instructional leadership competencies. Conversely, streamlining administrative responsibilities and increasing funding for instructional materials will also enhance leadership effectiveness. Thus, educational administrators should actively facilitate collaborative networks among heads of schools, consequently fostering shared learning and mutual support.

In addition, implementing mentoring programs can provide ongoing guidance, further enhancing leadership capabilities. It is worth mentioning that this study is novel as it represents one of the few narrative reviews that comprehensively examine how heads of schools in Tanzania fulfill their instructional leadership roles in public schools. Distinctly, the review is a detailed exploration of leadership practices, supported by extensive evidence from diverse scholarly sources, thus providing a rich and nuanced understanding of the phenomenon. However, the geographical focus on Tanzanian public schools limits its generalizability, and its temporal scope may not also capture long-term trends.

Future research, therefore, should be expanded to include comparative studies across various contexts and explore how heads of schools communicate their vision and goals to different stakeholders. In addition, policymakers should develop robust regular training programs, streamline administrative tasks and allocate more funding for instructional materials. Generally, researchers should investigate the scientific implementation of leadership practices and explore culturally responsive frameworks that maximize leadership effectiveness within resource-constrained settings. To conclude, addressing these challenges is essential for promoting effective teaching and learning processes in Tanzanian public schools, ultimately leading to improved educational outcomes.

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Evaluation of the implementation of the senior secondary mathematics curriculum in Niger state using the context, input, process, and product evaluation model

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Abstract

This study evaluated the implementation of the senior secondary mathematics curriculum in Niger State using the CIPP model. A descriptive survey design was employed, targeting 421 mathematics teachers and 10,211 Senior Secondary Two (SS2) students. Using a multi-stage sampling technique, 706 participants (120 teachers and 586 students) were selected across the three senatorial zones. Data were gathered through validated structured questionnaires guided by the CIPP evaluation model, with a reliability index of 0.87 (Cronbach's alpha), and analyzed with descriptive statistics. The findings revealed that curriculum objectives were mostly achieved, and content coverage was generally adequate. Most teachers held relevant qualifications, but implementation was limited by low adoption of student-centered methods, inconsistent use of instructional resources, and underuse of practical assessments. While the mathematics curriculum provided a solid foundation for learning, its effectiveness was undermined by process-related challenges. The study recommends targeted interventions to enhance innovative instructional practices and effective resource utilization.

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Introduction

Educational reforms in Nigeria, including the Universal Primary Education (UPE) of 1976 and the 6-3-3-4 system of 1985, have shaped curriculum planning to promote national development, with mathematics positioned as a core subject due to its role in scientific reasoning, technological advancement, and innovation (Okoye & Nnamani, 2021; Adewale & Bako, 2023; Federal Republic of Nigeria [FRN], 2013).

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The Senior Secondary School Mathematics curriculum, developed by the National Educational Research and Development Council (NERDC, 2012), comprises six thematic areas; Number and Numeration, Algebra, Geometry and Trigonometry, Mensuration, Statistics, and Introductory Calculus and specifies objectives, content, instructional strategies, materials, evaluation procedures, and teacher qualifications. Effective implementation depends on qualified teachers, pedagogical competence, adequate instructional resources, and systematic evaluation, as teacher preparation, subject mastery, and personal attributes significantly influence student achievement (Ania & Olanipekun, 2015; Oludipe & Oludipe, 2021; Owusu-Agyeman & Moroeroe, 2022). Instructional materials, including visual, audio, and digital tools, enhance conceptual understanding and engagement (Akanbi & Imogie, 2018; Adesola et al., 2022; Achimugu, 2017), while learner-centred methods such as inquiry-based learning and problem-solving promote meaningful attainment of curriculum objectives (Rwegasha & Hassan, 2024; Hoque, 2016).

Evaluation frameworks, including Tyler's Objective-Centered Model (1949) and Stufflebeam's CIPP Model (1971), provide structured approaches for assessing curriculum relevance and outcomes (Stufflebeam, 2003; Agustina & Mukhtaruddin, 2019). This study examines the implementation of the Senior Secondary School Mathematics curriculum in Niger State.

Despite educational reforms and a structured Senior Secondary School Mathematics curriculum in Nigeria, student performance remains low, suggesting issues with curriculum implementation rather than design (Punch, 2023a, 2023b; NERDC, 2012). Poor implementation is linked to inadequate teacher qualifications, uneven content coverage, limited use of instructional strategies, insufficient materials, and weak evaluation practices (Aliyu, 2020; Gogo et al., 2020; Onwusa & Ugwuanyi, 2019).

Studies using CIPP and Tyler's models highlight gaps between curriculum objectives and classroom realities (Ojengwa et al., 2024; Busari, 2024; Amuche et al., 2023). Most research is context-specific and examines isolated aspects of implementation without integrating teacher qualifications, content, methods, materials, and evaluation (Agugoesi et al., 2022; Akubue et al., 2024). The present study, therefore, sought to answer the following research questions:

(1) To what extent are the objectives of mathematics curriculum achieved?
(2) How well are the contents of mathematics being covered?
(3) How adequate are the qualifications possessed by mathematics teachers?
(4) What is teachers' level of compliance with appropriate teaching methods for mathematics?
(5) How adequate are teachers' use of instructional materials for teaching and learning of mathematics?
(6) How adequate are teachers' use of various evaluation techniques in the implementation of mathematics curriculum?

Theoretical Framework

This study is grounded in the Context, Input, Process, and Product (CIPP) Evaluation Model developed by Stufflebeam in 1986. The CIPP model provides a decision-oriented and

systematic framework for evaluating educational programmes and curricula by integrating planning, implementation, and outcomes.

The model comprises four interrelated components. Context evaluation examines educational needs, policy demands, and environmental conditions to ensure curriculum objectives remain relevant. Input evaluation assesses the adequacy of resources, strategies, teacher preparedness, instructional materials, and infrastructure required for effective implementation (Stufflebeam, 2003). Process evaluation focuses on curriculum delivery, instructional practices, and assessment methods, providing formative feedback for continuous improvement (Rodgers, 1979). Product evaluation evaluates curriculum outcomes by examining student performance, skill development, and overall programme impact, thereby informing decisions on curriculum improvement or modification (Stufflebeam & Zhang, 2017).

Overall, the CIPP model offers a holistic framework for curriculum evaluation by linking educational goals, resources, instructional practices, and learning outcomes. Its emphasis on accountability and continuous improvement makes it particularly relevant for studies that seek to examine curriculum effectiveness and inform evidence-based curriculum innovation.

Methods

Research Design

This study investigated the implementation of the Senior Secondary School Mathematics curriculum in Niger State, focusing on teachers' qualifications, curriculum content coverage, compliance with recommended instructional strategies, utilisation of instructional materials, and application of evaluation techniques. A descriptive survey design was adopted to allow for the systematic collection of quantitative data describing the current state of curriculum implementation without manipulating variables.

In response to the need for deeper explanatory insight, the study was strengthened with complementary qualitative inputs through brief open-ended items embedded within the teacher questionnaire. This minor qualitative component enhanced the interpretation of quantitative trends, thereby providing a more nuanced understanding of implementation challenges across schools. The design also aligned with the CIPP (Context, Input, Process, and Product) evaluation model, enabling a holistic assessment of curriculum implementation processes and outcomes.

Participants and Sampling Technique

The population of the study comprised all Mathematics teachers and Senior Secondary School Two (SS2) students in Niger State during the 2024/2025 academic session. According to data obtained from the Niger State Ministry of Education, there were approximately 421 Mathematics teachers and 10,211 SS2 students across public senior secondary schools in the state. A multi-stage sampling technique was employed to ensure representativeness across the three senatorial zones of the state; Niger North, Niger South, and Niger East. In the first stage, the state was stratified into the three zones. In the second stage, schools were randomly selected from each zone to include a fair representation of

urban and rural locations. In the third stage, purposive sampling was used to select SS2 students and their Mathematics teachers because these students have been exposed to a significant portion of the curriculum and are not yet preoccupied with external examinations. In total, 706 respondents were selected, consisting of 120 Mathematics teachers and 586 SS2students, ensuring proportional representation.

Data Collection Instruments

Data were collected using two structured questionnaires adapted from Akubue et al. (2024) to suit the context of the study. The first instrument, titled Teachers' Questionnaire on Implementation of Senior Secondary School Mathematics Curriculum (TQISSSMC), was divided into five sections that focused on teachers' qualifications, content coverage, instructional methods, utilisation of instructional materials, and evaluation techniques. It consisted of 32 closed-ended items designed on a 4-point Likert scale. The second instrument, titled Students' Questionnaire on Implementation of Senior Secondary School Mathematics Curriculum (SQISSSMC), contained 20 items that assessed students' perceptions of curriculum content coverage and the use of teaching and learning resources, also structured on a 4-point Likert scale. A decision mean of 2.50 was used to determine acceptable implementation levels for both instruments. A trial testing was conducted using a sample of 24 Mathematics teachers and 48 SS2 students from schools not included in the main study. The internal consistency of the instruments was determined using Cronbach's alpha, and reliability coefficients of 0.80 for the teachers' instrument and 0.90 for the students' instrument were obtained, indicating that both instruments were reliable for the main study.

Procedure

A formal letter of introduction obtained from the Department of Science Education, University of Ilorin, was presented to school principals to seek official approval for data collection. Upon approval, the researcher, assisted by six trained research assistants (two in each senatorial zone), administered the questionnaires to the respondents.

Data Analysis Methods

Quantitative data were coded and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics; frequencies, percentages, means, and standard deviations were used to summarise respondents' demographic information and determine the extent of curriculum implementation across the five focus areas. To enrich the analytical depth, inferential statistics of ANOVA and chi-square were employed to test hypotheses at 0.05 level of significance.

Ethical Consideration

Ethical protocols were strictly observed throughout the study to protect the rights and privacy of all participants. Verbal informed consent was obtained from students and teachers after they were assured of the voluntary nature of their participation and their right to withdraw at any point without any penalty. To facilitate matching questionnaire responses with official school records where necessary, minimal identifying information was initially

collected. However, once data entry was completed, all identifiers were removed to anonymise the dataset. Strict confidentiality was maintained throughout, and all data were used solely for academic and research purposes in line with institutional ethical guidelines.

Results

This section presents the results of data analysis from 706 respondents; 120 Mathematics teachers and 586 SS2students. In this study, the minimum expected frequency was 28.16, indicating that the assumptions for the chi-square test were also satisfied. The decision mean for the rating scale was 2.50, obtained by dividing the sum of the numerical value by the number of scaling items

Objectives of Mathematics Curriculum Being Achieved

Table 1

Mean and Standard Deviation of Students' Responses on the Achievement of Curriculum Objectives

Zone / Item Type	Niger North Mean (SD)	Niger South Mean (SD)	Niger East Mean (SD)	Grand Mean	Extent of Achievement
Highest-rated objective	3.42 (0.72)	3.47 (0.70)	3.44 (0.74)	3.44	Very High Extent (VHE)
Lowest-rated objective	2.70 (0.99)	2.66 (1.02)	2.68 (1.01)	2.68	High Extent (HE)
Overall mean across all objectives	3.12	3.12	3.12	3.12	High Extent (HE)

Table 1 presents the mean and standard deviation of students' responses regarding the achievement of mathematics curriculum objectives across the three senatorial zones of Niger State. The grand mean of 3.12 indicates that students perceive the objectives of the senior secondary school mathematics curriculum to be achieved to a high extent. Most items scored above the decision point of 2.50, reflecting a general agreement among students that the curriculum is relevant, effective, and practically applicable. Notably, the highest-rated item, "Teacher uses mathematics for real-life problems" (grand mean = 3.44), suggests that students strongly recognise the practical application of mathematics in daily life. On the other hand, the item "Use technology to learn mathematics" received the lowest mean score (2.68), indicating that technological tools are not yet optimally integrated into teaching and learning. Other areas, such as understanding algebraic symbols, equations, trigonometric functions, and collaborative learning, also received high scores, confirming that students generally feel the curriculum is comprehensive and beneficial to their mathematical development.

The mean scores across Niger North, Niger South, and Niger East were remarkably similar for all items, with differences generally less than 0.05. This uniformity demonstrates that students' perceptions of curriculum achievement are consistent across the three senatorial zones, suggesting that geographical location does not significantly influence how students experience the curriculum.

Table 2

ANOVA of Students' Perceptions of Curriculum Objectives across Senatorial Zones

Source	SS	Df	MS	F	p
Between groups	0.90	2	0.450	0.68	0.508
Within groups	402.10	610	0.659		
Total	403.00	612			

Table 2 presents the results of an ANOVA conducted to determine whether differences exist in students' perceptions of the achievement of mathematics curriculum objectives across the three senatorial zones. The between-groups sum of squares (SS = 0.90) and mean square (MS = 0.450) were minimal compared to the within-groups variability (SS = 402.10, MS = 0.659), indicating that differences between zones were negligible. A one-way analysis of variance (ANOVA) revealed that there was no statistically significant difference in students' perceptions across the zones, $F(2, 610) = 0.68$, $p = .508$. Consequently, the null hypothesis (H01) is retained, confirming that students from Niger North, South, and East perceive the achievement of mathematics curriculum objectives similarly.

Content of Mathematics Being Covered

Table 3

Mean and Standard Deviation of Teachers' Responses on Content Coverage

Zone / Content Area	Niger North Mean (SD)	Niger South Mean (SD)	Niger East Mean (SD)	Grand Mean	Extent of Coverage
Highest-rated topic	3.48 (0.61) – Quadratic equations	3.52 (0.62) – Quadratic equations	3.50 (0.61) – Quadratic equations	3.50	Very Satisfactory Coverage
Lowest-rated topic	2.83 (1.01) – Rules of logarithms	2.87 (1.02) – Rules of logarithms	2.85 (1.03) – Rules of logarithms	2.85	Satisfactory Coverage
Overall mean across all content areas	3.18	3.25	3.17	3.20	Satisfactory Coverage

Table 3 presents the mean and standard deviation of teachers' responses regarding the coverage of mathematics content across the three senatorial zones of Niger State. The grand mean scores for the zones; Niger North (3.18), Niger South (3.25), and Niger East (3.17) indicate that teachers generally perceive the coverage of the mathematics curriculum content to be sufficient (SC), with certain topics covered to a very sufficient extent (VSC). Specifically, topics such as approximation (grand mean = 3.40), arithmetic progression (3.35), and quadratic equations (3.50) are considered to be very sufficiently covered, reflecting strong adherence to the curriculum in these areas. Other content areas, including calculations using logarithms, geometric progression, linear inequalities, circle theorem, probability, rules of logarithms, practical problem-solving, and statistics, were rated as sufficiently covered, suggesting that while these areas are taught effectively, there is room for further enhancement to achieve very sufficient coverage.

At the zone level, the mean scores for individual content areas are remarkably similar, with only minor variations. For instance, the coverage of quadratic equations in Niger South (3.52) is slightly higher than in Niger North (3.48) and Niger East (3.50), but these

differences are minimal. This uniformity indicates that curriculum content is implemented consistently across all three senatorial zones.

Table 4
ANOVA of Teachers' Responses on Content Coverage across Senatorial Zones

Source	SS	df	MS	F	P
Between groups	0.22	2	0.110	0.18	0.835
Within groups	71.50	117	0.611		
Total	71.72	119			

Table 4 presents the ANOVA results for teachers' responses on content coverage across the three zones. The between-groups sum of squares (SS = 0.22) and mean square (MS = 0.110) are very small relative to the within-groups variability (SS = 71.50, MS = 0.611), indicating minimal differences among zones. The analysis indicated no statistically significant difference, $F(2, 117) = 0.18$, $p = .835$, suggesting that teachers' perceptions of content coverage are consistent across Niger North, Niger South, and Niger East. Consequently, the null hypothesis (H02), which states that there is no significant difference in teachers' coverage of the mathematics curriculum across the three senatorial zones, is retained.

Qualifications Possessed by Mathematics Teachers

Table 5
Distribution of Mathematics Teachers by Qualification

Qualification	Niger North	Niger South	Niger East	Total
M.Ed	6	4	5	15
M.Sc+PGDE	7	6	7	20
B.Sc(Ed)	16	15	17	48
B.Sc+PGDE	7	7	8	22
NCE	3	4	3	10
Others	1	2	2	5
Total	40	38	42	120

Table 5 presents the distribution of mathematics teachers' academic qualifications across the three senatorial zones of Niger State. The data show that the majority of teachers hold a B.Sc. (Ed) in Mathematics, totaling 48 teachers (40% of the sample). This is followed by teachers with a B.Sc. + PGDE (22 teachers, 18.3%), M.Sc. + PGDE (20 teachers, 16.7%), and M.Ed. in Mathematics (15 teachers, 12.5%). Only 10 teachers (8.3%) possess the NCE qualification, while a small number (5 teachers, 4.2%) have other qualifications.

The distribution across the zones is relatively balanced, with each zone having comparable numbers of teachers in each qualification category. For example, the numbers of B.Sc. (Ed) teachers are 16, 15, and 17 for Niger North, South, and East, respectively, while M.Sc + PGDE teachers range from 6 to 7 across zones. This suggests a fairly equitable spread of teacher qualifications across the state.

Table 6

Chi-square Test of Mathematics Teachers' Qualifications across Senatorial Zones

Qualification	Niger North (O)	Niger North (E)	$(O-E)^2/E$	Niger South (O)	Niger South (E)	$(O-E)^2/E$	Niger East (O)	Niger East (E)	$(O-E)^2/E$
M.Ed	6	5.0	0.20	4	4.75	0.06	5	5.25	0.01
M.Sc+PGDE	7	6.67	0.016	6	6.33	0.017	7	6.99	0.0001
B.Sc(Ed)	16	16.0	0.00	15	15.2	0.002	17	16.8	0.002
B.Sc+PGDE	7	7.33	0.015	7	6.95	0.0003	8	7.72	0.010
NCE	3	3.33	0.033	4	3.16	0.17	3	3.50	0.071
Others	1	1.67	0.27	2	1.58	0.11	2	1.75	0.036
Total χ^2			0.805			0.367			0.126

Table 6 indicated no statistically significant difference in teachers' qualifications across the zones, $\chi^2(10, N = 120) = 1.301$, $p = .998$. This suggests that mathematics teachers' qualifications are evenly distributed across Niger North, Niger South, and Niger East.

Teachers' Level of Compliance with Appropriate Teaching Methods for Mathematics

Table 7

Mean and Standard Deviation of Teachers' Compliance with Teaching Methods

Teaching Method	Niger North Mean (SD)	Niger South Mean (SD)	Niger East Mean (SD)	Grand Mean	Decision
Lecture	3.72 (0.52)	3.68 (0.51)	3.70 (0.53)	3.70	OU
Project	2.82 (0.90)	2.78 (0.92)	2.80 (0.91)	2.80	SU
Concept mapping	2.68 (0.95)	2.63 (0.96)	2.65 (0.97)	2.65	SU
Simulation/games	2.32 (1.01)	2.38 (1.02)	2.35 (1.03)	2.35	NU
Scaffolding	2.75 (0.88)	2.74 (0.90)	2.76 (0.89)	2.75	SU
Illustration	3.05 (0.78)	3.05 (0.77)	3.05 (0.79)	3.05	OU
Grand Mean	2.90	2.95	2.80	2.88	SU

Table 7 presents the mean and standard deviation of teachers' responses regarding their compliance with recommended instructional strategies for teaching mathematics across the three senatorial zones of Niger State. The grand mean scores; Niger North (2.90), Niger South (2.95), and Niger East (2.80) indicate that teachers' overall use of varied teaching methods is sometimes used (SU), suggesting moderate compliance with the recommended instructional strategies. The lecture method (grand mean = 3.70) and illustration method (3.05) were the most frequently used strategies, reflecting a preference for teacher-centred approaches. In contrast, student-centred strategies such as project method (2.80), concept mapping (2.65), scaffolding (2.75), and simulation/games (2.35) were less frequently employed, indicating limited adoption of interactive and experiential learning approaches in classrooms.

Across the zones, the mean scores for individual teaching methods are quite similar, with negligible differences. For example, lecture usage ranges from 3.68 in Niger South to 3.72 in Niger North, while simulation/games range from 2.32 in Niger North to 2.38 in Niger South. This consistency suggests that teachers' instructional practices are relatively uniform across the three senatorial zones.

Table 8

ANOVA of Teachers' Responses on Compliance with Teaching Methods across Senatorial Zones

Source	SS	df	MS	F	P
Between groups	0.68	2	0.340	0.66	0.518
Within groups	60.30	117	0.516		
Total	60.98	119			

Table 8 shows the ANOVA results for teachers' compliance with teaching methods across the zones. The between-groups sum of squares (SS = 0.68) and mean square (MS = 0.340) are minimal compared to within-groups variability (SS = 60.30, MS = 0.516), indicating very little difference among zones. A one-way analysis of variance (ANOVA) revealed that there was no statistically significant difference in teachers' compliance with recommended teaching methods across the three senatorial zones of Niger State, $F(2, 117) = 0.66$, $p = .518$. Consequently, the null hypothesis (H_{03}) was retained.

Adequacy of Teachers' Use of Instructional Materials

Table 9

Mean and Standard Deviation of Teachers' Use of Instructional Materials

Material	Niger North	Niger South	Niger East	Grand Mean	Decision
Model of shapes	3.18	3.22	3.20	3.20	OU
Flash cards	2.84	2.87	2.85	2.85	SU
Chart board	2.68	2.72	2.70	2.70	SU
Counters	2.63	2.67	2.65	2.65	SU
Sum cards	2.58	2.62	2.60	2.60	SU
Cylinder-shaped objects	2.42	2.47	2.45	2.45	NU
Grand Mean	2.75	2.82	2.65	2.74	SU

Table 9 presents the mean scores and standard deviations for teachers' use of instructional materials in teaching mathematics across the three senatorial zones of Niger State. The grand mean scores; Niger North (2.75), Niger South (2.82), and Niger East (2.65) indicate that, overall, teachers sometimes use (SU) instructional materials, reflecting moderate adequacy in the integration of teaching aids into lessons. Among the materials, models of shapes are the most frequently used (grand mean = 3.20, often used, OU), while flash cards, chart boards, counters, and sum cards are used occasionally (grand means between 2.60 and 2.85). Cylinder-shaped objects are the least used (grand mean = 2.45, never used, NU), indicating that certain hands-on materials are underutilized in classrooms.

Across the zones, the mean scores for each material show minimal variation, suggesting uniformity in the use of instructional resources. For example, the use of flash cards ranges narrowly from 2.84 in Niger North to 2.87 in Niger South, while counters range from 2.63 in Niger North to 2.67 in Niger South. This pattern suggests that teachers' reliance on teaching aids is consistent across Niger North, South, and East.

Table 10

ANOVA of Teachers' Responses on Teachers' Use of Instructional Materials across Senatorial Zones

Source	SS	Df	MS	F	p
Between groups	0.48	2	0.240	0.50	0.605
Within groups	55.90	117	0.478		
Total	56.38	119			

The ANOVA results for teachers' use of instructional materials across the three senatorial zones of Niger State are presented in Table 10. The between-groups sum of squares (SS = 0.54) and mean square (MS = 0.270) are relatively small compared to the within-groups variability (SS = 62.10, MS = 0.531), suggesting that differences in material use among the zones are minimal.The one-way analysis of variance (ANOVA) conducted to examine differences in teachers' use of instructional materials across the three senatorial zones of Niger State showed no statistically significant difference, $F(2, 117) = 0.50$, $p = .605$. This indicates that teachers' use of instructional materials does not differ significantly across Niger North, Niger South, and Niger East.

Adequacy of Teachers' Use of Various Evaluation Techniques

Table 11

Mean and Standard Deviation of Teachers' Use of Evaluation Techniques

Evaluation Method	Niger North	Niger South	Niger East	Grand Mean	Decision
Quizzes	3.23	3.27	3.25	3.25	AU
Oral questioning	3.38	3.42	3.40	3.40	AU
Essay writing	2.88	2.92	2.90	2.90	SU
Objective tests	3.33	3.37	3.35	3.35	AU
True/false	2.78	2.82	2.80	2.80	SU
Completion of blanks	2.68	2.72	2.70	2.70	SU
Take-home assignments	3.13	3.17	3.15	3.15	AU
Practical assessments	2.83	2.87	2.85	2.85	SU
Grand Mean	3.02	3.10	3.03	3.05	AU

Table 11 presents the mean scores and standard deviations of teachers' use of various evaluation techniques for assessing Mathematics across the three senatorial zones of Niger State. The grand mean scores; Niger North (3.02), Niger South (3.10), and Niger East (3.03) indicate that teachers generally always use (AU) some evaluation methods, reflecting a relatively high level of assessment integration in teaching. Specifically, quizzes (grand mean = 3.25), oral questioning (3.40), objective tests (3.35), and take-home assignments (3.15) are frequently employed, while essay writing (2.90), true/false questions (2.80), completion of blanks (2.70), and practical assessments (2.85) are used occasionally (SU). This shows that while teachers apply a range of assessment strategies, there is a preference for traditional and oral forms of evaluation over practical or alternative methods.

The data also show minimal differences across zones. For example, oral questioning has mean scores of 3.38 in Niger North, 3.42 in Niger South, and 3.40 in Niger East, indicating consistent use across the state. Overall, the findings suggest that teachers are fairly diligent in using evaluation techniques, though some methods are underutilized.

Table 12
ANOVA of Teachers' Responses on Use of Evaluation Techniques

Source	SS	Df	MS	F	p
Between groups	0.24	2	0.120	0.23	0.794
Within groups	61.00	117	0.521		
Total	61.24	119			

Table 12 presents the ANOVA results testing for differences in teachers' use of evaluation techni ques across the three senatorial zones. The between-groups sum of squares (SS = 0.24) and mean square (MS = 0.120) are small compared to the within-groups variability (SS = 61.00, MS = 0.521). The one-way analysis of variance (ANOVA) conducted to determine differences in teachers' use of evaluation techniques across Niger North, Niger South, and Niger East showed no statistically significant difference, $F(2, 117) = 0.23$, $p = .794$.

Discussion

This study sought to address six research questions concerning the effective implementation of mathematics curriculum. Specifically, whether objectives of the mathematics curriculum are being achieved, how well the contents of the mathematics curriculum are being covered, adequacy of qualifications possessed by mathematics teachers in Niger State senior secondary schools, level of teachers' compliance with appropriate teaching methods for Mathematics, adequacy of teachers' use of instructional materials and facilities in the teaching and learning of mathematics, adequacy of teachers' use of various evaluation techniques in the implementation of the mathematics curriculum. The following discussion interprets the findings presented in the preceding section in relation to these research questions and compares them with insights from previous studies.

Findings from this study revealed that the objectives of the mathematics curriculum are achieved to a high extent. Students reported that their learning experiences generally align with the aims of the curriculum. This finding is consistent with Akubue et al. (2024), who found a high level of mathematics curriculum objective achievement in junior secondary schools in Enugu State. Similarly, Busari (2024) observed that performance objectives in the physics curriculum were adequately achieved in North-Central Nigeria, suggesting a positive trend in science curriculum implementation across the region. In contrast, Ojengwa et al. (2024) reported insufficient achievement of chemistry curriculum objectives in Enugu West Senatorial District.

The study also revealed that mathematics content in senior secondary schools in Niger State is sufficiently covered by teachers. This finding aligns with Akubue et al. (2024), who reported exhaustive coverage of mathematics curriculum content in Enugu State. Similarly, Amuche et al. (2023) observed that biology curriculum content was generally relevant and well addressed, indicating that science content delivery can be robust when conditions are conducive. In contrast, Athanatius (2020) reported only fair coverage of mathematics content in senior secondary schools.

The study found that most mathematics teachers in Niger State hold relevant academic and professional qualifications. This aligns with Nigeria's minimum qualification

requirements for teachers at the senior secondary level. Similarly, Akubue et al. (2024) reported that mathematics teachers in Enugu State possessed relevant qualifications and partially complied with curriculum expectations. Agugoesi et al. (2022) noted that teacher qualifications and experience significantly influence curriculum implementation, highlighting the role of teacher expertise in student learning.

The study showed a mixed pattern of teaching method use. Lecture and illustration methods were frequently used, while student-centered approaches such as simulation, project-based learning, scaffolding, and concept mapping were seldom applied. This indicates moderate compliance with recommended methods and an overreliance on traditional approaches. Similarly, Akubue et al. (2024) reported occasional compliance with recommended methods in Enugu State, and Amuche et al. (2023) found infrequent use of interactive methods in biology instruction in Taraba State. Busari (2024) also observed partial compliance among physics teachers in North-Central Nigeria.

Findings indicate that while some instructional materials are occasionally used, overall integration into teaching practice remains suboptimal. Teachers tend to use materials sporadically rather than regularly incorporating them into lessons. This aligns with Gogo et al. (2020) and Aliyu (2020), who reported that inadequate instructional resources hindered effective curriculum implementation. In contrast, Akubue et al. (2024) observed satisfactory use of teaching aids in junior secondary schools in Enugu State. The differences may reflect regional disparities in funding, infrastructure, teacher training, and access to instructional materials. This highlights the need for targeted interventions to promote equitable resource use.

The study found that teachers generally applied a range of assessment methods, including quizzes, oral questioning, and objective tests. However, practical assessments and completion exercises were less frequently used. These findings are consistent with Shaibu and Ameh (2024), who observed recommended evaluation practices in Kogi State, and Amuche et al. (2023), who found biology teachers employed diverse assessment methods.

Conclusions

This study assessed the implementation of the senior secondary school mathematics curriculum in Niger State, focusing on curriculum objectives, content coverage, teacher qualifications, instructional strategies, use of materials, and evaluation techniques. The findings show that curriculum objectives are largely achieved, most teachers adequately cover the prescribed content, and the majority hold the required qualifications, indicating a generally sound implementation framework.

However, gaps remain in instructional practice. Teaching is still dominated by lecture-based methods, with limited use of student-centred approaches, while instructional materials are inadequately utilised. Although evaluation practices are generally effective, practical and alternative assessment techniques are underused.

These findings highlight the need for improved instructional innovation and resource provision. Policymakers and school administrators should support continuous professional development to enhance teachers' pedagogical and assessment skills. The study contributes empirical evidence to curriculum implementation research and provides policy-relevant

insights for strengthening mathematics education through improved teaching practices and resource utilisation.

This study has certain limitations that should be acknowledged. First, as a survey-based investigation rather than an experimental study, it cannot establish cause-and-effect relationships between the implementation of the mathematics curriculum and the observed outcomes such as student achievement or instructional practices. Second, some of the data, particularly those related to the frequency and quality of instructional material usage, relied on teachers' self-reports, which may be subject to response bias or inaccuracies. Third, the study was limited to senior secondary schools in Niger State, which may affect the generalisability of the findings to other regions with different educational contexts, resources, or teacher profiles. Additionally, the sample size, while adequate for statistical analysis, may not fully capture the diversity of experiences across the state.

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Assessment for learning in teacher education: A case study on mathematization through formative strategies in learning triangles

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Abstract

Mathematization and understanding are essential for learning geometry. This study explored assessment practices and their influence on learners' mathematization. The study was conducted at Robe College of Teacher Education, Ethiopia and focused particularly on how the use of assessment for learning contributed to pre-service teachers' mathematization in learning triangles. The sample consisted of 27 pre-service teachers who were learning plane geometry and five mathematics teachers. The study employed a descriptive exploratory method with classroom observation as a data collection instrument, and emphasised the utilization of informal dialogue and argumentation as mechanisms of assessment for learning strategies. The findings revealed that teacher educators predominantly used assessment for learning methods which were found to be insufficient and ineffective in evaluating the mathematization process of pre-service teachers as they were limited to capturing the depth of mathematical thinking and understanding. However, incorporating a variety of assessment-for-learning strategies helped to create the necessary conditions for triangle congruence, fostered mathematization through justified reasoning, supported the learning of mathematical concepts that involved abstraction and advanced cognitive processing. The study concludes that adopting enhanced assessment practices, particularly with a focus on assessment for learning, can address the complexities inherent in some mathematical concepts.

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Introduction

Mathematics is an essential discipline in most educational systems around the world (Chand et al., 2021) that requires appropriate mathematization and concept construction meaningful to real situations. It encompasses analytical and critical competence, meaning making, and problem-solving. To this effect, Freudenthal (1968) noted that mathematics

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teachers should prioritize teaching the process of mathematization rather than simply presenting mathematical concepts. Conceptual understanding is important in learning mathematics which has a significant impact on learners' mathematics performance (Ncube & Luneta, 2025). Obunge and Omeodu (2024) noted that integrating real-world applications into mathematics education is essential for enhancing students' understanding, motivation, and ability to apply mathematical concepts in diverse contexts.

Mathematizing succeeds when it begins with contextual problems and connecting new information to previously learned concepts (Gravemeijer, 1994). For mathematization, learners are encouraged, under close guidance from their teachers, to reimagine and generate mathematical ideas from these contextual problems. Through guided reinvention and problem-solving in real-world scenarios, mathematization fosters the development of students' mathematical concepts and enhances their understanding of the relevance and application of mathematics in real-life contexts. In this regard, assessment serves as a critical tool through which learners can monitor their progress in mathematization (Ngunjiri, 2022), provide feedback to teachers on their lessons (Mahlambi et al., 2022), or evaluate students' overall performance in mathematics (Ozan & Kıncal, 2018). Assessment enables teachers to meet students' individual needs (Tlale, 2013), engages learners in developing conceptual understanding (Lai et al., 2019), and supports them to improve their problem-solving skills (Ukobizaba et al., 2021). However, its implementation varies significantly depending on real-world conditions, teacher competence, student needs, and the overall teaching-learning context. As no single type of assessment is adequate for evaluating all mathematical concepts and skills (Zhai & Nehm, 2023), various assessment formats are needed to evaluate students' abilities to solve problems, justify conclusions, and make mathematical connections and representations (Suurtamm et al., 2016). Other factors include the nature of mathematical knowledge, and the specific skills learners must develop and acquire (Bleiler et al., 2014). Scholars such as Kontorovich (2021) advocate interviews and mathematical discourse along with argumentation (Jonassen & Kim, 2010) as tools for assessing learners' problem-solving and critical thinking skills. The use of assessment for learning progressively builds learners' understanding of mathematics (Mahlambi et al., 2022) and links mathematization with appropriate contextual strategies (Pielsticker, 2022). These approaches positively influence learners' academic performance and confidence in triangle concepts (Gaylo & Masinading, 2022). Moreover, the opportunities these approaches provide for mathematizing contextual problems and developing learners' arguments indicate the paramount importance of dealing with these concepts. Numerous studies underscore the broad benefits of assessment for learning (Black & Wiliam, 1998).

Despite this, in Ethiopia, the predominant method of assessment largely remains traditional, relying primarily on paper-and-pencil tests or exams, which are summative in nature (Gebremariam & Gedamu, 2023; Melaku et al., 2023; Dawit, 2023). Research further indicates that mathematics teacher educators primarily use assessment for summative rather than formative purposes, limiting opportunities for improving student learning (Dagnachew & Sewagegn, 2020). The adoption of assessment for learning among teacher educators in Ethiopian colleges and universities is also notably minimal (Moges, 2018; Oli & Olkaba, 2020), hindering the promotion of mathematization skills. Despite the valuable nature of paper-pencil tests in effectively measuring knowledge and understanding, these

may not be sufficient in all contexts, especially for cultivating mathematization skills (McClelland, & Cuevas, 2020).

It is, therefore, vital to examine the interrelationship between assessment for learning conceptions and practices and mathematization. The lack of research on mathematization in the Ethiopian context further highlights the importance of this study. This study aimed to examine the assessment conceptions and practices employed by mathematics educators in a teacher education college to foster the mathematization process among pre-service mathematics teachers. Given the expansive nature of mathematics learning, this study will focus specifically on triangles as part of geometry learning, as this provides an effective framework for connecting mathematical concepts to real-world scenarios. Accordingly, the study sought to address the following research questions:

1. What assessment practices do teacher educators utilize to promote mathematization among pre-service mathematics teachers?
2. What assessment-for-learning strategies are used to assess the mathematization process of pre-service mathematics teachers, and how are these strategies appropriate?

Theoretical Framework

Geometry learning could be well captured when it is integrated with real contexts, and when students connect theoretical knowledge with practice. Hence, schoolteachers need to plan and employ hands-on approaches with the help of manipulatives and models in the teaching and learning of geometry to help their students better understand the concepts and develop problem-solving skills (Tessema et al., 2024). This indicates that geometry learning could best be entertained when it is integrated within the framework of Realistic Mathematics Education (RME), to help students actively engage to construct meaning. Kant and Sarikaya (2021) argue that the primary objective of mathematics in RME is to mathematize real-world situations. Such an approach not only helps pre-service teachers to relate theoretical knowledge of geometry to practice but also explain the real essence of mathematizing geometry concepts in their surroundings. Therefore, using an approach that relates triangle concepts with real life applications is important since such an approach gives an opportunity for teachers themselves to develop awareness, interest, skill, and understanding in using locally available materials from their surroundings.

In so doing, assessments which reflect different purposes are often organized around the notions of assessment as learning (AaL), assessment for learning (AfL), and assessment of learning (AoL) (Schellekens et al., 2021). While AaL and AfL are categorically formative in nature, AoL is summative. AoL is used basically for evaluation purposes and for ensuring accountability, which is conducted at the end of a unit or time span. Formative assessment has an ongoing nature, and it supports improvement of students' learning. It positions both teachers and students as key agents of educational change (Lysaght & O'Leary, 2013), functioning as a bridge between teaching and learning (Lysaght & O'Leary, 2013).

In establishing a guiding theoretical framework for the use of assessment, Zou et al. (2024) offer practical strategies for implementing assessment to enhance teaching and learning where AfL serves as a pedagogical framework for a systematic support for understanding learner progression. Abo and Gursha (2023) and Oli and Olkaba (2020) also

provide practical challenges and innovations in assessment modalities that help us ground AfL in real classroom contexts. With the premise of enhancing pre-service teachers' learning and understanding, assessment is expected to reveal their abilities in terms of understanding concepts, procedures, communication, reasoning, and problem-solving (Jaelani & Hasbi, 2022). Assessment strategies also play a crucial role in teaching and learning, and rational assessment strategies can provide a comprehensive understanding of students' abilities, facilitate instructional improvement, and contribute to the teaching and learning process and student development (Zou, 2024).

In learning geometry, one of the ideals is relating geometry concepts with daily life applications. Ethiopia in general and the study area in particular have rich workplace mathematics, and localities provide mathematical applications in action. Such an offer entails mathematizations that are explainable by the users. The baking of *injera*, a local staple food made of *teff* grains, involves pouring batter on an open oven starting from the outermost of the oven and moving to the center. One of the possible mathematizations is the issue of heat and heat transfer; when making pots, there is also mathematization of size and volume. When ploughing, farmers apply concepts of gradient, areas, angles, etc. These are some real-life examples which illustrate the contribution of the daily activities of the local community to mathematization. Teachers in schools are expected to apply geometry concepts in daily life applications or bring locally available mathematical concepts into class. Therefore, it is imperative to develop mathematization skills in pre-service teachers.

Mathematization has diverse conceptualizations. It is viewed as a theory for curriculum design (Isoda, 2018), the application of mathematics in previously unexplored domains and an epistemic phenomenon of historical and philosophical significance (Dijksterhuis, 2010), and a teaching approach that emphasizes the relevance of mathematics in everyday life by enabling students to apply mathematical tools to solve real-world problems (Mumcu, 2016). In addition, mathematization is considered a pedagogical tool (Wheeler, 2001) and a mechanism for expressing or modeling real-life phenomena mathematically (Ferreira & Silva, 2020).

Ferreira and Silvia (2020) provided the mathematization thesis and Widada et al. (2020) demonstrated how realistic mathematics education foster mathematization. In support of this, Isoda (2018) provided a framework for mathematization that connects theory and practice and shows how mathematization can best support contextualizing abstract concepts like triangles. To understand triangle concepts better, therefore, it is fundamental to link the concepts learned with local knowledge and practices of mathematization by pre-service teachers.

Enhancing mathematization skills demands the application of formative assessment strategies which is elaborated by Swan and Foster (2018), who provided practical formative assessment approaches in mathematics classrooms. Pielsticker (2022) also provided lessons on mathematical knowledge of triangle concepts in real contexts. Triangulating geometry teaching-learning, assessment for learning strategies, and enhancement of mathematization is of paramount importance for which Thompson and Kaur (2011) highlighted the importance by employing a multi-dimensional approach to assessing mathematical knowledge, that provides ways into how AfL and mathematization intersect in geometry, especially with triangle concepts.

Methods

Research Design

To explore situations where variables are unclear, Yin (1994) recommends an exploratory case study. This is particularly useful for understanding complex phenomena in real-life contexts. Yin (1994) further emphasized that case study research, including exploratory designs, is appropriate when a researcher has little control over events, and the focus is on contemporary issues within a real-world context. It is, therefore, useful to apply this in educational research like mathematization, where detailed observations and flexible data collection methods allow for a deeper understanding of how assessment for learning can influence the development of conceptual learning. Accordingly, this study employed a single case study design. Embedded were also units of investigation such as strategies teacher educators used in class, pre-service teachers' deliberations, and views on both assessment and mathematization.

Participants

The participants of this study comprised pre-service mathematics teachers and mathematics teacher educators from Robe College of Teacher Education. Comprehensive sampling strategy was used on a total of 27 pre-service teachers to participate in the study. Five mathematics teacher educators were also selected using an availability sampling technique to provide accessibility during the data collection phase and based on their willingness to participate in the study. However, one of these educators, who was teaching the plane geometry course, was purposively selected for an in-depth examination of classroom discourse.

Data Collection Instruments

Data were gathered through field notes and semi-structured interviews to capture data on the assessment for learning practices used by mathematics teacher educators. Observations were also employed to cross-check the educators' self-reported practices against their actual classroom behaviours, and how the reality-based mathematical applications were integrated with classroom instruction to influence mathematization.

Trustworthiness and Credibility

Trustworthiness was ensured by adhering to the key criteria of qualitative research: credibility, transferability, dependability, and confirmability. Credibility was achieved through data triangulation and transferability by providing sufficient context for other educators to determine whether the findings could be applied in different settings. However, given the reality-based mathematization and variations among contexts, the issue of transferability seeks critical scrutiny. Dependability was ensured through rigorous documentation, the creation of an audit trail, and the maturation of information. Confirmability was strengthened by cross-referencing the findings with existing literature, as

well as through peer review and feedback from the participants during debriefing sessions. Additionally, the emergent themes and interpretations were validated through rigorous comparison with the established literature, further enhancing the study's credibility and trustworthiness.

Data Analysis

This study employed thematic analysis to uncover issues that addressed the research questions and broader problem under investigation. The process went beyond data summarization where key thematic areas were identified and cross-referenced with emergent cases to re-conceptualize assessment for learning through mathematization. Data from interviews were transcribed verbatim. Observations and field notes served as reference of actions. Open coding was used to identify relevant codes, reviewed, and refined by the research team. Multiple readings and interpretations of the raw data, aligned with the research questions, formed the basis for the analysis. This led to the identification of assessment for learning strategies employed by teacher educators, the mathematization process of pre-service teachers, and the collaborative emergence of themes.

Ethical Considerations

The researchers adhered strictly to all ethical guidelines throughout the study. Ethical approval was granted by the Institutional Review Committee of the College of Education and Behavioral Studies at Addis Ababa University, and the core ethical principles of justice, autonomy, beneficence and non-maleficence were upheld at every stage of the research. We secured permission to conduct the study, and informed consent and voluntary participation. The participants were also informed about confidentiality and anonymity, and that they would not receive any direct benefit from participating in the study. Moreover, they were assured that no personally identifiable information would be used in the research report and that all data collected would be treated with strict confidentiality.

Results

Assessment Mechanisms Practiced in Teacher Education

The assessment mechanisms of the teacher educators under investigation revealed three central themes: conceptualization of assessment, assessment practices, and provision of feedback.

Conceptualization of Assessment

The results revealed that teacher educators have a basic understanding of assessment types and their purposes. One interviewee had the following to say:

> I conceptualize assessment as a means of gathering information about students' understanding. It helps us determine whether they have internalized a given concept. Formative assessment is used during the teaching-learning process, while summative

> assessment is conducted at the end of a program or a unit of study. (Interviewee, MTE1)

This indicates an established view of assessment and his mention of "gathering information" signals assessment not just about measuring outcomes but also understanding student learning. However, the true effectiveness depends on how they are implemented to inform instruction and support learners.

Another interviewee said:

> I assess my students to determine whether they have met the expected learning outcomes. If they do not meet these expectations, I revise the lesson plan accordingly. To achieve this, I use various assessment tools such as assignments, project work, and labs, although these methods are less commonly used in mathematics. (Interviewee, MTE2)

This view emphasizes predefined goals, ensuring assessments are purposeful and potential for opportunities for broader, exploratory learning and problem-solving in learning mathematics. The educator demonstrates flexibility by revising lesson plans which further underscores a commitment to addressing diverse student needs and fostering meaningful learning outcomes. This may allow them to address misconceptions or gaps before advancing to more complex topics. Employing a range of assessment tools also reflects an awareness of diverse assessment methods. These offer opportunities for deeper learning and promote mathematization, especially when aligned with learning objectives. Another interviewee also conceptualized assessment as a means of identifying learners' weaknesses and strengths in learning. He indicated that:

> Our current understanding of assessment is incomplete, as it is often shaped by the way we were previously taught. Instead of using assessment as a tool to improve instructional methods and enhance student learning, we primarily use it for grading purposes, with gaps in the knowledge on how to effectively assess students. (Interviewee, MTE3)

This educator indicates causes of conceptions and uses of assessment depicting assessments are not fully realized in practice. This understanding of assessment suggests that some educators may not be fully prepared to implement strategies covering all domains of learning, entailing the need for integrating all learning domains and aligning assessments with educational objectives. Prior experience shapes understanding of assessment with influence of using traditional assessment methods that are often summative, focusing on grading. Teacher education programs should promote reflective practice and encourage exploration of innovative formative assessment methods that support continuous improvement in student learning. Without adequate expertise in designing and implementing assessments, educators may struggle to create tools that accurately reflect student understanding or foster meaningful learning experiences.

The interviews highlight several challenges that include an incomplete understanding of assessment and the influence of traditional grading-focused practices. Addressing these challenges requires professional development emphasizing formative assessment. The

inclusion of mechanisms to assure the process, such as mathematization which builds knowledge restructuring is also worth noting. Therefore, there is the need to focus on equipping educators with the skills to create, implement, and interpret a variety of assessments, with particular emphasis on formative methods that support student learning.

Practices of Assessment

Teacher educators' assessment practices vary, with the dominance of traditional paper-and-pencil assessments, such as tests, mid-term exams, final exams, and assignments, primarily for grading purposes. One interviewee says:

> Most of the time, we do not incorporate diverse assessment techniques aimed at improving learning, such as peer assessment, self-assessment, or portfolios, apart from oral questioning and observation. Although we use oral questions and observations, we fail to analyze the results to enhance our instructional approach. The most common assessments we employ are mid-term and final exams, primarily for summative purposes. (Interviewee, MTE3)

Another interviewee noted:

> In teacher education colleges, assessment for learning is not widely practiced to enhance student learning or improve teachers' instructional strategies. However, it is uncommon to provide quizzes, observe student participation in group work, or identify students' strengths and weaknesses during the teaching and learning process. (Interviewee, MTE4)

This highlights a limited use of diverse and formative assessment techniques which are useful to promote deeper learning, critical thinking, and reflective practices. Another interviewee also remarked:

> Since the courses we teach are extensive and new to learners, my colleagues and I often lack the time to incorporate peer assessment, self-assessment, or portfolios as assessment tools to track students' learning progress. Instead, we focus on summative assessments for grading. (Interviewee, MTE1)

This also highlights critical issues related to assessment practices. When educators use summative assessment, students may not receive the necessary guidance to address gaps in understanding. This may also limit opportunities for students to engage in self-regulation and reflection. Incorporating diverse assessments, hence, fosters a more comprehensive understanding of students' abilities and promotes improved learning outcomes. Otherwise, limited use of assessment for learning could hinder both student learning and the improvement of teachers' instructional strategies. Addressing this is essential, as implementing AfL can create more dynamic, responsive teaching and learning environments where both teachers and students thrive. By fostering a culture of continuous assessment and feedback, educators can better prepare future teachers to incorporate these strategies in their own classrooms, ultimately improving education at all levels.

While summative assessments are essential for grading, formative assessments play a critical role in fostering students' learning and understanding. These require institutional

support, professional development, and creative approaches to balance the demands of teaching extensive courses with the need for continuous student feedback.

Feedback Provision

Feedback is useful when teachers use formative assessment as it gauges learner progress toward the intended learning outcomes. However, mathematics teacher educators revealed that providing feedback is not consistently practiced by teacher educators, despite variations among them. Some mentioned that feedback isn't frequently given, especially in content-heavy courses such as algebra or geometry, while others indicated its implementation during individual or group presentations and reflections, in courses like practicum and subject-area methodology. An interviewee educator stated:

> Feedback practices vary depending on the individual educator and the courses taught. It is commonly provided in subject area methodology courses and during teaching practice or practicum. However, in courses like calculus, algebra, and similar subjects, feedback is rarely given. This is because students are not often invited to engage in practical exercises in these courses, and the feedback process is uncommon. (Interviewee, MTE3)

Another educator noted:

> The provision of feedback to students is inconsistent—some educators deliver it effectively, while others do not. Feedback is usually given during presentations and tends to focus on misconceptions and weaknesses. It is common in certain subjects but less so in others. Nevertheless, some teachers occasionally provide feedback, both orally and in writing, for individual or group work. (Interviewee, MTE1)

These statements provide valuable insights into the assessment and feedback practices employed by mathematics teacher educators at teacher education colleges. Several key points emerge, reflecting both the diversity of and challenges in feedback provision across different teaching contexts.

The educator's distinction, in employing feedback, between subject-area method courses and content-based courses like calculus and algebra is alarming. The absence of feedback in content courses raises concerns about the quality of the learning experience. Although these courses focus heavily on the acquisition of mathematical knowledge, the lack of formative assessment opportunities may hinder deep learning. Effective feedback can help students reflect on their understanding, identify misconceptions, and strengthen their mathematization and mathematical reasoning skills. Addressing this gap requires a pedagogical shift toward more active learning strategies in content courses, where formative feedback can enhance students' learning experiences and outcomes. Similarly, attempts to primarily focus on completing the course rather than emphasizing understanding and student learning progress, is a pivotal challenge that seeks consideration.

The inconsistent provision of feedback may leave students feeling discouraged in learning some subjects. A more balanced form of feedback that highlights strengths alongside specific recommendations for improvement would likely be more effective. So, the

inconsistencies in feedback delivery indicate that the formative assessment process may not be fully realized, and students may struggle to gauge their progress and identify areas for improvement. Addressing these issues could enhance assessment practices and create a more supportive learning environment.

Assessing the Mathematization Process

Mathematization requires formative assessment and several strategies could enforce these; some of the strategies identified were informal dialogue, observation, probing during presentations, and argumentation.

Informal Dialogue

One mathematics teacher educator, who was responsible for teaching plane geometry was purposefully selected for further investigation and targeted implementation. Observations revealed that he implicitly used interviews, observations, and argumentation to assess the mathematization process of pre-service mathematics teachers. Below is a discourse between the teacher educator, who employed these methods, and the pre-service teachers who worked on determining the necessary and sufficient conditions for triangle congruency.

The instructor designed a game in which two groups participated. One group constructed a triangle secretly. The group provided one condition at a time for the second group to construct a corresponding triangle. At the end of the game, the students compared the triangles for congruency. The instructor guided, observed, and assessed the pre-service teachers' progress by interviewing them as they worked to establish congruency criteria.

One group proposed SSA (Side-Side-Angle) as a criterion for triangle congruency, believing that equality of two sides and a non-included angle suffice congruence. However, they didn’t achieve congruent triangles under this condition. This sparked a discussion, mediated by the teacher educator. Through this discourse, the students realized that while SSA might work in some cases, it is not a universally valid criterion for triangle congruency. The following discourse between the instructor and the pre-service teachers highlights this learning process:

Instructor: I noticed differences in the outcomes between the groups. Could you explain the issue?

PMT4: At the start of the activity, we were provided with the length of one side of the triangle, which was 2 cm. With this information, despite multiple attempts, we were unable to duplicate the triangle constructed by the other group.

Instructor: What observations did you make when comparing the triangle your group constructed with that of the other group?

PMT3: We realized that only one criterion or condition is insufficient to guarantee congruence of two triangles.

Instructor: What additional information did you receive during your second attempt?

PMT1: We were given the length of the second side, which was 3 cm. However, with the two sides, we were still unable to construct an exact replica of the opponent's triangle.

Instructor: Why did this occur and what inferences can you draw from these repeated attempts?

PMT2: Although two sides of a triangle may correspond with the sides of another triangle, this alone does not ensure congruence.

Instructor: What information did the other group provide in the final round?

PMT2: They provided us with the measure of a non-included angle, which was 40 degrees. We applied the Sine Law to determine the angle opposite the side measuring 3 cm.

Instructor: What were the results of your calculations?

PMT2: Our calculations gave us Sin(x) = 0.964, and we determined that x equals 74 degrees.

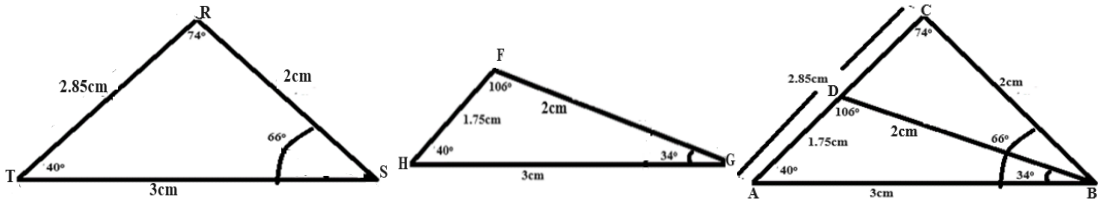
Instructor: Is 74 degrees the only possible value for angle x? Consider what would happen if the angle was 106 degrees. Do you recall the Sine value for the difference between two angles, particularly Sin (180° - x°)?

PMT4: If we let y = 180° - x°, then sin (180° - x°) = sin180°cosx° - cos180°sinx° = 0 - (-1). In our case, if x = 74 degrees, then sin 74° = sin (180° - 74°) = sin106°.

PMT3: We determined that one possible value for the angle was approximately 74 degrees. The third angle was calculated to be 66 degrees, and the third side measured around 2.85 cm. Despite this, we were unable to produce an exact match with the opponent's triangle. When we attempted to superimpose our ΔABD on their ΔABC, they did not coincide. (The first group constructed the triangle on the left, while the lead group initially constructed the middle triangle. The third figure illustrates the result obtained when the opposing group attempted to align their triangle with the original.)

Figure 1

Two Triangles Having Two Equal Sides and One Equal Angle but Different in the Remaining Side and Angles (constructed by pre-service teachers)



Instructor: What could cause this discrepancy?

PMT4: I suspect the discrepancy arises from the differences in the side lengths and angle measurements obtained by our group compared to those of the opposing group.

PMT2: Since sin(x) = 0.964, the angle x could either be 74 degrees or 106 degrees. These two possibilities affect the measurement of the third angle. If we use 74 degrees, the third angle becomes 66 degrees. However, if we use 106 degrees, the third angle would be 34 degrees. This could explain the difference.

Instructor: Can you state the interior angles of a triangle if one of the angles measures 106 degrees?

PMT2: The interior angles would be 40 degrees, 106 degrees, and 34 degrees. This is the triangle constructed by the opposing group earlier.

Instructor: What angles did your group obtain?

PMT3: We calculated 40 degrees, 74 degrees, and 66 degrees.

Instructor: What conclusion can you draw from this?

PMT1: We can conclude that the side-side-angle (SSA) criterion, when involving arbitrary angles, may not guarantee congruence of triangles.

The dialogue provided inquiry-based problem-solving, mathematical reasoning, and advancement of the concept of triangle congruency. From the conversation, it becomes clear that a significant lesson was learned regarding the insufficiency of one condition (SSA Ambiguity) for establishing triangle congruence.

PMT4's group struggled to construct a congruent triangle from just one given side. This opened an essential teaching moment, highlighting the limitations of using only one side to establish congruence of triangles. PMT3's realization that a single side cannot guarantee congruence reflects the group's growing awareness of how multiple conditions must interact to establish congruence. This marks their shift toward understanding more robust congruence conditions.

PMT1 notes that even after receiving the second condition (3 cm), the group couldn't establish congruence. This demonstrates that the pre-service teachers were beginning to recognize the necessity of understanding the relationships between sides and angles, rather than simply relying on isolated measurements. The group's recognition that the angle between two sides was a critical factor (PMT2's inference) shows their advancement in understanding congruence. They were starting to grasp the significance of angle-side relationships and why the SSA (Side-Side-Angle) condition did not guarantee congruence.

When PMT2 applies the Sine Law to calculate the angle opposite a given side, it illustrates their problem-solving skills and understanding of trigonometric principles. However, this also introduces ambiguity, as the Sine of an angle has two possible values (e.g., sin (74°) = sin (106°)). The instructor's question about whether 74° is the only possible angle prompts the group to reflect on the dual possibilities inherent in the sine function (i.e., sin (180° - x) = sin(x)). This discussion emphasizes the mathematical nuances of dealing with non-included angles.

PMT2 correctly identifies the ambiguity in their solution, noting that sin(x) = 0.964 could yield either 74° or 106°. This affected the remaining angles, leading to differing triangle configurations depending on which angle they chose. The group's inability to superimpose their triangle over the opponent's reveals a deeper understanding of how SSA ambiguity can result in two distinct, non-congruent triangles. This insight connects their theoretical understanding with practical construction challenges. The discussion culminates with PMT1 concluding that SSA does not guarantee triangle congruence. This marked a pivotal moment where the learners solidified their understanding that some configurations

(like SSA) were inconclusive for congruence, necessitating the use of more reliable conditions such as SAS or ASA.

The dialogue encouraged the PMTs to reflect on their process and infer principles rather than seeking direct answers. This is a hallmark of inquiry-based learning, where students discover concepts through exploration and reflection. The conversation among the PMTs also demonstrates active peer learning. They build upon each other's ideas, correct misconceptions (e.g., regarding the use of angles), and collaboratively construct understanding, which is critical in developing deep mathematical knowledge. The dialogue further exemplifies how instructor's questioning and the students' responses serve as formative assessment in action, helping both the instructor and the students gauge understanding throughout the process. The dialogue also illustrates how inquiry and problem-solving promote mathematization - students are not merely memorizing rules, but are actively constructing, testing, and refining mathematical concepts. The PMTs' difficulties in reconstructing the triangles fostered deeper mathematical reasoning, showing how formative assessment can create space for productive struggle, which is essential for meaningful learning in mathematics.

Observation

During his observation, the instructor encountered some unusual concepts while a group of pre-service mathematics teachers attempted to construct a triangle with sides measuring 5 cm and 7 cm, along with a non-included angle of 60 degrees. He engaged in a discussion with the group to address the issue, with some excerpts from the discourse presented below.

Instructor: To begin the exercise, you constructed a triangle with side lengths of 7 cm and 5 cm, along with a non-included angle of 60 degrees, opposite the 5 cm side. After constructing the triangle, you gave it to the opposing group for verification. In their attempt to construct a congruent triangle, they calculated the measure of the angle opposite the 7 cm side using the "Sine law." However, their result seemed unusual. Could you verify the calculation using the Sine law? What was your outcome?

PSMT1: No, sir, we can check it now. Let's denote the angle opposite the 7 cm side as *x*. We are given that the angle opposite the 5 cm side is 60 degrees: By applying "Sine law", $\frac{\sin x}{7\text{cm}} = \frac{\sin 60^o}{5\text{cm}}$, $\Longrightarrow \sin x = \frac{7\text{cm}\sin 60^o}{5\text{cm}} = 1.212 \Longrightarrow \sin x = 1.212.$

Instructor: You found a value of 1.212 for sin(x). Is it possible to have this value for the sine of an angle? What is the maximum possible value of the sine function? What does this result indicate? And what can you learn from this?

PSMT2: The sine of an angle is always between -1 and 1. This value suggests there was an issue, either with the side lengths or the angle measurement of the triangle. From this, we learned that when constructing a triangle, it is important to maintain the correct relationship between the side lengths and the internal angles.

Instructor: Suppose you are given two sides and a non-included angle. Under what conditions would the sine law yield a valid triangle? Why?

PSMT3: Let a and b be the sides of the given triangle and let A and B be the angles opposite sides a and b, respectively. In applying the Sine law, we will get the triangle if and only if $0 < \sin A = \frac{a\sin B}{b} \leq 1$, $0 < \sin B = \frac{b\sin A}{a} \leq 1$ and the degree measure of the two angles need not be 90 degrees simultaneously.

This conversation highlights several key insights into both mathematical content and the formative role of assessment in promoting deeper understanding among pre-service mathematics teachers (PSMTs). The dialogue underscores the critical thinking processes involved in exploring the congruence of triangles through the sine law, offering a valuable case study for examining how assessment for learning (AfL) strategies can facilitate the mathematization process.

The primary error identified by the PSMTs occurred during the application of the sine law. Their calculation yielded sin(x)=1.212, an impossible value. This error likely stemmed from either incorrect side lengths or a misinterpretation of the angle. The instructor adeptly used this opportunity to prompt students to reflect on the conceptual meaning of the sine function, steering the conversation towards a deeper understanding of the properties of triangles and trigonometric functions. This exemplifies effective formative assessment, where the instructor identifies a misunderstanding and uses it as a learning moment for the students.

As PSMT2 reflected on the error, the group shifted the discussion to how side lengths and angle measures interacted during triangle construction. This discussion reinforced an important geometric concept: the dependency of a triangle's shape on the specific combination of its side lengths and angles. The lesson learned here emphasizes the necessity of critical evaluation and reflection during problem-solving, which is essential for developing a strong mathematical foundation in prospective teachers.

In the final exchange, the instructor asked PSMT3 to generalize the conditions under which the sine law produces a valid triangle when given two sides and a non-included angle. The student provided a thoughtful response, correctly outlining the sine conditions that must be satisfied. This generalization, together with the previous reflection on the incorrect result, demonstrates a progression from specific error diagnosis to a broader conceptual understanding of when the sine law can and cannot be applied.

This dialogue illustrates how assessment can be woven into instruction to promote mathematization of concepts related to triangles—the process of making sense of the world through a mathematical lens while learning the geometry concept of triangles. The instructor's role is not only to correct mistakes but also to guide students in deriving general principles from specific cases. This fosters the mathematization process, as students engage in reflective thinking, reason abstractly about relationships between quantities, and apply their insights to solve broader classes of problems. Through this iterative process, the PSMTs moved from procedural knowledge (applying the sine law) to conceptual understanding (knowing the limitations and conditions for its use).

This case study highlights the importance of creating learning environments where errors are viewed as opportunities for deeper learning. By encouraging students to explore their misconceptions and arrive at correct conclusions, instructors can help develop a more

robust understanding of the material. This approach is particularly relevant in teacher education, where PSMTs must develop the ability to not only solve problems but also anticipate and address the types of misconceptions their future students might encounter. In conclusion, this dialogue serves as a powerful example of how effective AfL strategies can support the mathematization process in teacher education, particularly in the context of understanding triangle congruence through trigonometric principles.

Probing During Presentation

In another discussion, the instructor asked a group to present a scenario involving two and three given angles, focusing on the angle-angle (AA) or angle-angle-angle (AAA) criteria for triangle congruence. A pre-service mathematics teacher presented his group's (P) work, and the following dialogue was observed between the instructor and the presenting group.

Instructor: Is the Angle-Angle (AA) criterion sufficient for the congruence of two or more triangles?

PSMT7: No, we've attempted it several times, but we couldn't produce an exact replica of the triangle our opponents constructed. Another pre-service teacher, P1, pointed out that the congruence of two or three corresponding angles alone does not guarantee the congruence of triangles.

Instructor: Why does the AA criterion fail to guarantee congruence in triangles, and how does the AAA criterion compare?

PSMT8: The issue lies in the side lengths of the triangles. For example, consider an equilateral triangle with side lengths of 2 cm and another equilateral triangle with side lengths of 4 cm. Both triangles have identical interior angle measures of 60 degrees, but their side lengths differ, making the triangles non-congruent. This also applies to the AAA criterion.

Instructor: Based on this, what conclusion can we draw?

PSMT6: The congruence of two or three angles of one triangle with the corresponding angles of another triangle is neither a necessary nor sufficient condition for triangle congruence. However, if a corresponding side—either included or non-included—is also congruent, then the triangles will be congruent, provided that the angles are correspondingly congruent.

The conversation helped to explore the criteria for triangle congruence and provided key insights into pre-service mathematics teachers' (PSMTs) understanding of geometric principles. It reflects how future teachers should approach the critical reasoning required in geometry, particularly when assessing triangle congruence.

The instructor questioned and the responses from the PSMTs indicated a clear understanding that angles alone were insufficient for determining congruence. PSMT7 and PSMT6 expressed doubts about the AA criterion, correctly stating that congruent angles do not guarantee congruent triangles. This was reinforced by PSMT8's example. The inclusion of the equilateral triangle example provided a concrete illustration of why the AAA criterion also fell short in ensuring congruence. The exchange highlighted that the PSMTs recognized the limitations of angle-based congruence criteria and understood the side length's role. PSMT6 emphasizes the necessity of including side information, showing an understanding of more robust criteria like SAS (Side-Angle-Side) and ASA (Angle-Side-Angle). Their

responses reflect a shift from basic reasoning to a more nuanced comprehension of geometric properties, aligning with deeper mathematization processes.

This conversation also served as an assessment tool for the instructor. By engaging students in dialogue about their reasoning, the instructor effectively gauged their grasp of fundamental concepts while fostering a deeper understanding through discussion. These exchanges reflect formative assessment in action, where the instructor identifies gaps in knowledge and encourages PSMTs to refine their understanding.

In conclusion, the dialogue reinforces that congruence cannot be inferred from angles alone and offers valuable insights into how PSMTs process and articulate geometric concepts, with implications for both teaching and learning in the context of geometry.

Argumentation

Argumentation serves as a means of assessing the mathematization process of pre-service mathematics teachers. The researchers also observed the claim, data, and warrant the pre-service mathematics teachers provided while establishing the necessary and sufficient condition for the congruency of triangles. An example is provided below.

Figure 2

Toulmin's Model of Argumentation on Congruency Criteria of Triangles

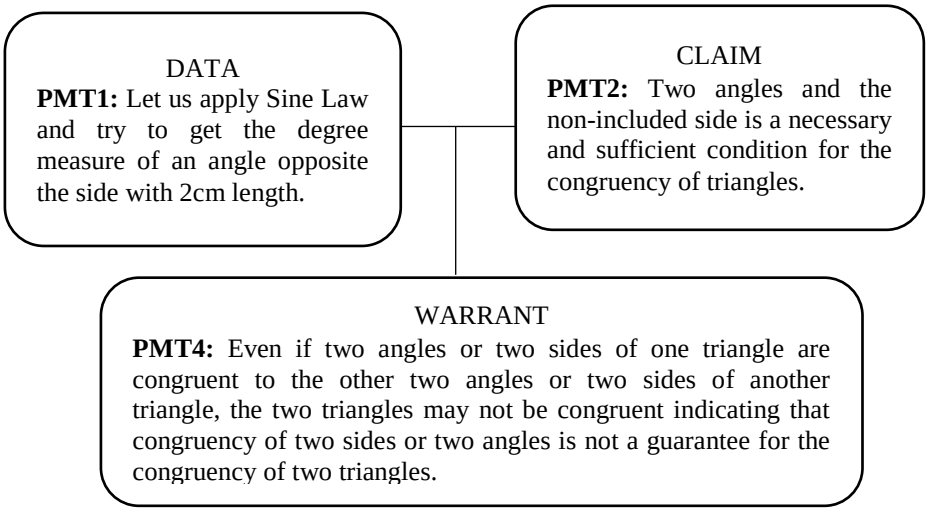
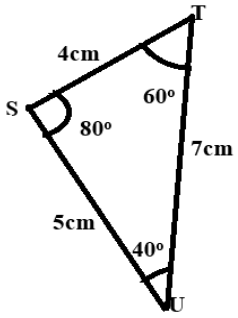


Figure 2 illustrates the claim, data, and warrant provided by the pre-service teachers while establishing the conditions for triangle congruence. The argumentation helped them formulate claims supported by relevant data and warrants that strengthened their justification. During the interview, the instructor explained that this approach allowed him to offer constructive feedback to the pre-service mathematics teachers. However, while establishing the congruence criteria, the pre-service teachers mistakenly constructed a triangle without considering the relationship between the side lengths and the interior angle measures. The instructor further mentioned that, upon applying the Cosine Law as demonstrated below, the pre-service teachers recognized their error in constructing the triangle.

Figure 3

A Triangle Constructed by Pre-Service Teachers Having Misalignment between the Length of Sides of a Triangle and the Degree Measure of Interior Angles



Application of the Cosine Law:

$$(7m)^2 = (4cm)^2 + (5cm)^2 - 2 \times 5cm \times 4cmcos80^{\circ}$$

$$\Rightarrow \quad 49cm^2 = 16cm^2 + 25cm^2 - 40cos80^{\circ}.$$

$$\Rightarrow \quad 49cm^2 = 41cm^2 - 40 \times .174cm^2.$$

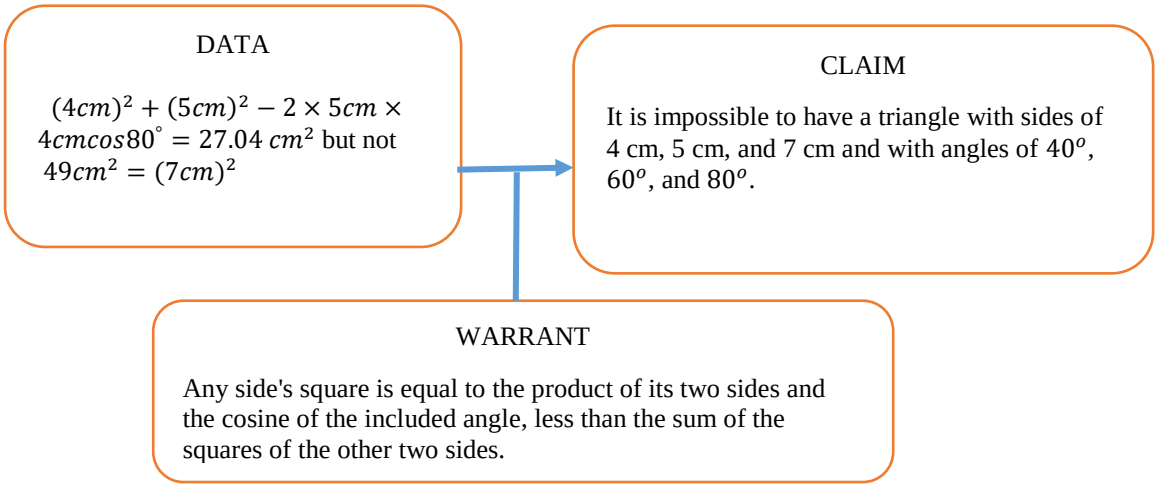
$$\Rightarrow \quad 49cm^2 = 41cm^2 - 6.96cm^2$$

$$\Rightarrow \quad 49cm^2 = 27.04\ cm^2 \ \Rightarrow \Leftarrow (Contradiction).$$

The pre-service mathematics teachers concluded that it is impossible to construct a triangle with side lengths of 4 cm, 5 cm, and 7 cm and with angle of degree measurements of 40, 60, and 80 degrees. They came to this generalization through argumentation, as depicted below.

Figure 4

Toulmin's Model of Argumentation on Constructing Triangle Congruence



Different Strategies in Assessing the Mathematization Process of Pre-Service Teachers

Regarding the types of assessment for learning utilized, the teacher educator explained:

> I utilized observation, interview, presentation, and argumentation as a means of assessment for learning. Interview, argumentation, and presentation had been better to

> assess the mathematization process of pre-service teachers as compared to observation since they are dialogic in nature. These provided an opportunity to assess the reasoning skills, justification, argumentative skills, thinking skills, and mathematical communication skills. Of course, classroom observation also helped me to use further probing questions to uncover the thinking processes of the pre-service mathematics teachers. (Interview with classroom instructor)

This excerpt emphasizes the use of diverse assessment approaches—specifically observation, interviews, presentations, and argumentation—to enhance learning process. These methods are inherently dialogic, fostering dynamic interaction between the teacher educator and the PMTs. This engagement allows for a deeper exploration of students' mathematical reasoning. Interviews, for example, facilitate personalized exchanges, enabling the educator to probe individual PMTs' thought processes, making it a tailored tool for understanding each student's unique mathematical journey. Argumentation, on the other hand, involves the articulation of mathematical concepts and solutions through logical reasoning. This not only fosters critical thinking but also encourages PMTs to construct, justify, and evaluate mathematical arguments, promoting higher-order thinking skills and mathematical communication. Presentations require PMTs to organize and publicly convey their mathematical understanding, assessing both content mastery and the ability to communicate complex ideas effectively.

The focus on dialogic methods reflects their potential to foster the mathematization process, where PMTs move beyond rote learning toward constructing and applying mathematical knowledge, and engage deeply with mathematical problems, justify their thinking, and develop conceptual understanding, along with the ability to apply mathematical principles to novel situations. These approaches also provide deeper insights into students' thinking processes and foster essential skills such as reasoning, justification, and communication. Although observation is less dialogic, it remains valuable for real-time assessment and can be enhanced with probing questions to better understand students' mathematical thinking.

In using a test or quiz to assess the mathematization process of pre-service teachers, the teacher educator stated that:

> I have been using tests, quizzes, and oral questions to assess the performance of my students. However, I was not certain that a single test could assess all mathematical concepts. We cannot fully understand the thinking process of our students regarding some mathematical concepts using tests or quizzes. Therefore, it is better to use two or more assessments for learning strategies like mathematical discourse in addition to a test or quiz to assess the thinking process of our students. What I understood from this is that mathematical discourse like argumentation and interviews do not only serve as teaching and learning strategies, but also as assessments for learning to better understand learners' levels of thoughts. (Interview with Classroom Instructor)

While acknowledging the widespread use of tests and quizzes, the teacher educator noted that these methods may not adequately support diagnosis of deeper levels of understanding, especially when dealing with complex mathematical concepts. This aligns with the view that mathematization involves more than procedural knowledge; it requires

conceptual understanding and the ability to engage in mathematical discourse. Mathematical discourse, argumentation, and interviews serve not only as teaching and learning techniques but also as effective "assessments for learning" (AfL) approaches. These reflections suggest that employing multiple assessment strategies, including discourse-based methods, enable a more holistic assessment of students' mathematical thinking and foster their mathematization. This deliberated approach is consistent with contemporary educational theory, which advocates for a variety of assessment tools to ensure comprehensive evaluation. The inclusion of argumentation and interviews as assessment strategies allows educators to observe the cognitive processes students undergo as they develop their mathematical thinking, making these strategies particularly effective in promoting and assessing mathematization.

In summary, the interview results underscore the value of integrating diverse assessment strategies, such as mathematical discourse, into the assessment of pre-service teachers' mathematization processes. By combining both traditional methods (tests, quizzes, etc.) with alternative approaches (discourse or argumentation), instructors can gain a more complete understanding of students' mathematical thinking and provide more targeted feedback to support their learning. This balanced approach ensures that assessments are not merely summative but also formative, fostering deeper engagement with the process of mathematization. Incorporating these reflections into assessment design can greatly enhance the effectiveness of teaching and learning in mathematics education.

Discussion

Teacher educators generally conceptualize assessment by categorizing it into formative and summative types, each serving distinct purposes. Formative assessment is perceived as a tool for monitoring students' progress and understanding, allowing educators to identify learning needs and adjust their instruction accordingly. On the other hand, summative assessment is viewed to measure students' achievement of predetermined standards, often used for grading or certification. Although the educators in this study displayed a solid understanding of these distinctions, some of them did not fully implement formative assessment, leaning more towards summative methods. The interview excerpts '*assessment for learning is not widely practiced by educators to enhance student learning or improve teachers' instructional strategies.' (Interviewee, MTE4),* and *'I have been using tests, quizzes, and oral questions to assess the performance of my students. However, I was not certain that a single test could assess all mathematical concepts'* (Interviewee classroom teacher), reveal the understanding on the usefulness of using flexible approaches to assessment while indicating gaps in fully employing formative assessment. This tendency reflects findings from previous studies (Hunduma et al., 2023; Oli & Olkaba, 2020; Sewagegn, 2019).

While summative assessments like final exams, mid-terms, tests, and assignments dominate, some educators did occasionally employ formative techniques such as oral questioning, microteaching, and presentations with integrated feedback, especially in practice-oriented courses like subject area methodology and practicum. However, in more theoretical subjects, such as Calculus, Algebra, and Geometry formative approaches like

presentations, microteaching, peer assessment, and self-assessment were conspicuously absent.

Several factors contributed to this limited use of formative assessment techniques, including the educators' own educational experiences and the content-heavy nature of some courses like Calculus, Algebra, and Geometry. Consequently, pre-service mathematics teachers struggled to develop essential skills such as conceptual understanding, problem-solving, critical thinking, and mathematization. These findings align with those of Rahman et al. (2021), emphasizing the ongoing challenges in shifting away from summative practices.

The overreliance on lecture-based teaching and summative assessments undermines the potential benefits of formative assessment, particularly in providing timely feedback. Without adequate feedback, students miss opportunities to reflect on their mathematical understanding, improve problem-solving abilities, and address misconceptions. This overemphasis on summative assessments promotes rote memorization rather than fostering deeper learning, limiting the mathematization process—a concern echoed by Swan and Foster (2018) that ultimately defies the potential of developing mathematization process skills and thought-provoking efforts.

The study further revealed that argumentation and mathematical discourse enabled pre-service mathematics teachers to gain a more profound understanding of geometric concepts, such as the criteria for triangle congruency. Through discussions, they were able to construct and justify why certain criteria, like AA or AAA, do not guarantee congruency, while others, such as SSA, require further examination. These dialogues helped pre-service teachers improve their reasoning, generalization, and communication skills, all of which are crucial for mathematization. These findings also underscore the value of argumentation and dialogue, not only as instructional strategies but also as effective assessment tools. By fostering discussions that encourage reasoning and justification, educators can better assess students' mathematical thinking and generalization abilities. This aligns with the work of Uygun and Akyüz (2019), who demonstrated that collective argumentation enhances pre-service teachers' reasoning and generalization skills in mathematics.

Similarly, Jonassen and Kim (2010) emphasized that argumentation serves as both a pedagogical tool and an alternative assessment strategy, particularly for evaluating problem-solving skills. Using interviews or informal dialogues to assess the mathematization process, rather than relying solely on traditional assessments, is consistent with other studies (Ardiyani et al., 2018; Araújo & de Lima, 2020; Deniz & Kabael, 2017; Upu et al., 2017; Widada et al., 2019). These researchers demonstrated the effectiveness of informal dialogues in assessing learners' mathematization processes.

Considering these insights, re-evaluating the role of argumentation, dialogue, and feedback in assessment practices could significantly enhance the mathematization process for pre-service mathematics teachers. By more consistently integrating formative assessment strategies, even in more theoretical subjects like algebra, educators can create opportunities for deeper engagement, more meaningful feedback, and an overall improvement in students' mathematical understanding.

A notable discrepancy exists in the feedback practices between subject area methodology/practicum courses and more theoretical subjects. Shifting toward more student-centred approaches, such as active learning, group work, or problem-based learning in

theoretical courses, could increase the demand for feedback. This shift would encourage both educators and students to view feedback as a critical tool for academic growth, even in content-heavy subjects like calculus and algebra.

Conclusions

Mathematization is essential for developing conceptual understanding and problem-solving skills, which pre-service teachers need to develop. The role of teacher educators in building mathematization is an area of emphasis as mathematization is indicated to be a process of translating real world situations into mathematical form. Assessment approaches need to build pre-service teachers mathematization, and this demands the use of all forms of assessment. This study has highlighted the over-reliance on traditional, summative assessment methods in teacher education particularly in geometry learning. The findings indicate that formative assessment methods, such as argumentation, mathematical discourse, and presentations hold significant potential for fostering deeper engagement with mathematical concepts. These strategies encourage reasoning, justification, and communication skills, which are crucial for promoting mathematization among pre-service teachers. However, the limited implementation of these approaches, especially in non-practicum and non-subject area teaching methods courses, impedes the development of essential skills in learners which will have a cascading effect on school-based teaching-learning.

To improve the effectiveness of assessment practices in teacher education, there is a need for a paradigm shift towards more formative and student-centred approaches. Teacher educators should integrate diverse assessment methods, including informal dialogue, peer assessment, self-assessment, and argumentation, into their pedagogical practices. This shift would enable a more comprehensive evaluation of students' mathematical thinking and provide more opportunities for timely feedback that promotes mathematization.

Moreover, enhancing teacher educators' knowledge and skills in formative assessment through professional development programs is crucial. These programs should emphasize the importance of diverse assessment strategies and their role in promoting higher-order thinking and mathematization in pre-service mathematics teachers. By adopting these practices, educators can better prepare future teachers to implement similar strategies in their classrooms, ultimately improving mathematics education in schools across Ethiopia.

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Professional competency of secondary school English language teachers in Southern Ethiopia Region: Pedagogical content knowledge and oral proficiency

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Abstract

Research findings suggest that English language teachers have difficulty using the language effectively in the classroom. Consequently, this study aimed to examine whether English teachers were proficient in delivering daily lessons and possessed adequate pedagogical content knowledge (PCK). Sixty-one English language teachers who were selected through convenience sampling completed a questionnaire. Of these, 18 were involved in classroom observation and interview. To collect data, a questionnaire, observation, and interview were used. Descriptive statistics, specifically frequencies, percentages, and mean scores, were used to determine English teachers' PCK and proficiency levels. Bloom's and Likert Scale cut-off points were used to delineate knowledge and proficiency levels. The classroom observation result showed that 53% had moderate proficiency, whereas the interview ratings indicated that only 47% had moderate proficiency. In addition, the overall PCK assessment showed that 59% had moderate PCK. Furthermore, qualitative data from ineterviews showed that the teachers participating in the study were less fluent and deficient in vocabulary and grammar. They never used body language, fillers, and simplifications. Therefore, universities should provide pedagogical training for teachers, the Ministry of Education should improve working conditions by providing resources and employing more teachers to reduce workload, and teachers should continually update their PCK through reading and Internet use.

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Introduction

Ethiopia has made remarkable progress in expanding schools and higher learning institutions across the country since 2002, when the EPRDF decreed the New Educational Policy. With the expansion of educational facilities, poor quality of education (Tuli & Fiorucci, 2012; Lemlem, 2010; Oulai et al., 2011; Tekeste, 2006; Assefa, 2006; Grenecheal,

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2019) and low student achievement (National Agency for Examinations [NAE], 2010) characterized the Ethiopian educational system. This was attributed to shortage of qualified teachers who possessed the required knowledge and skills to teach (Birhanu, 1999; Geberew et al., 2018). Consequently, teachers' professional competence is closely related to student academic achievement (Chetty, 2014; Akiri, 2013). Specifically, teachers' subject-specific knowledge and skills to teach has a direct bearing on effective teaching and student learning (Baumert et al., 2010; Hill et al., 2005; Sadler et al., 2013; Gitomer & Zisk, 2015; Grossman & McDonald, 2008; Munby et al., 2001; Hoy et al., 2006). Furthermore, Guskey (2009) argued that teachers' professional competence accounts for 40% of student achievement.

In this regard, researchers sought to explain the professional competencies of teachers. Snežana et al. (2013) specified a number of competencies as related to teachers' profession: organizational, didactic, pedagogical, cognitive-creative, psychological, evaluative, and advisory. Similarly, Whitty (1996) explained that teachers' professional competence comprises teachers' knowledge and understanding of students' learning, subject knowledge, the curriculum, the education system, and teachers' roles during classroom instruction. Stronge (2002) also identified the skills that effective teachers should possess as professionals: classroom management and organization skills, managing and implementing instruction, and monitoring student progress and potential.

In the same vein, other researchers tried to specify the competencies that English language teachers should possess. Richards (2010) described what English teachers should fulfill to become effective: comprehend texts, use the target language appropriately, have knowledge of lexis and grammatical structures, monitor their spoken and written outputs, and give corrective feedback. In addition, Araya et al. (2021) suggested that English teachers should be able to create an environment conducive to learning and motivate learners to learn collaboratively with their classmates. Current teachers' English language proficiency is undoubtedly linked to their language learning experience at primary and secondary schools and their teacher training or preparation at colleges. Therefore, teachers' language proficiency is intertwined with their performance during their studentship years.

Very few studies have examined the English language proficiency of Ethiopian teachers. Taddese (2014) conducted a qualitative study of EFL teachers and educators who attended language refreshment training. He asked the participants to rate their level of English language proficiency and they indicated that it was 'poor' or 'medium'. Eventually, he attributed Ethiopian English-language teachers' poor proficiency to poor living and working conditions. Similarly, Mijena (2013), in a literature review, concluded that English language teachers' language proficiency was so poor that they predominantly used the local language to teach English. Ali et al. (2019) conducted a study on 50 PGDT (Postgraduate Diploma in Teaching) students majoring in geography at two public universities. Their study aimed at identifying the relationship between language proficiency and academic performance. The correlation was computed between PGDT entrance examination results and undergraduate grade point achievement. The study found that the students or trainee teachers had average academic performance (46.13%) and average language proficiency (41.98%). Moreover, the relationship was not significant.

Hence, these studies did not efficiently show to what extent teachers proficiently used English to teach their lessons and did not provide much information on teachers' language

proficiency in communicative events outside the classroom. All these previous studies were cross-sectional, and they failed to show how teachers used English in the classroom. Therefore, this shows that there is a lack of empirical evidence regarding English language teachers' language proficiency in classroom settings. Since these studies lacked the rigor to reveal the actual classroom situation, the current study attempted to investigate teachers' oral skills during classroom instruction and interpersonal communication.

Regarding English language teachers' PCK, there were very few studies. Samuel and Damtew's (2024) study focused on English language teachers' perceptions and PCK to teach reading skills. Furthermore, Haymanot et al.'s (2025) study revealed how teachers' PCK could be developed through lesson study. These studies never showed the level of English language teachers' PCK. Hirpa et al. (2023) reported that teachers had inadequate knowledge by administering a test. However, it was not clear how the levels were determined. Hence, the current study tried to address the following questions:

1. How proficient are teachers in using English when delivering lessons in the classroom?
2. How proficient are teachers in using English for interpersonal communication beyond the classroom?
3. What is the level of English language teachers' pedagogical content knowledge?

Literature Review

Shulman (1986) was the pioneering researcher to introduce the concept of pedagogical content knowledge. He described PCK as containing two components: content knowledge and pedagogical knowledge. Later, Shulman (1987) further added more components to the list: general pedagogical knowledge, curricular knowledge, knowledge of students, knowledge of the educational context, and knowledge of educational philosophies, goals, and objectives. Furthermore, Grossman (1990) outlined what she thought constituted PCK. She argued that PCK was concerned with teachers' knowledge and beliefs about the purposes of teaching. Teachers should also have knowledge about students' perceptions and misconceptions of language learning. In addition, teachers should possess knowledge about the curriculum, instructional materials, and strategies of teaching.

Other researchers sought to explain the components of PCK in light of English language teaching. In this regard, Richards (2017) linked content knowledge to teachers' knowledge about theories of second language teaching and that of the language system (i.e., grammatical, lexical, and phonological aspects of the English language). At the same time, he attempted to relate pedagogical knowledge to the instructional strategies and methodologies that teachers use to make their lessons comprehensible to learners. Cochran et al. (1991), on their part, connected knowledge of the context to the English language program and curriculum, and knowledge of students' abilities, learning strategies, attitudes, and motivations. However, Shariatifar et al. (2017) proposed a much broader conceptualization of PCK, which consisted of the following elements: knowledge of teaching and assessing the components of the curriculum; knowledge of developing, planning, and managing language teaching; and knowledge of developing and evaluating instructional materials.

However, possessing pedagogical content knowledge by itself may not be sufficient unless teachers have the required oral proficiency in the English language (Anggreni et al.,

2020). As a result, all teachers are expected to be efficient in their oral proficiency in order to impart their knowledge to their respective students (Mammadzada, 2021). In this regard, teachers' oral proficiency is directly related to the development of their speaking skills in the English language.

Speaking is the primary skill that all human beings should learn to master. All people, irrespective of their cultural differences, are born to speak their native language in their childhood (Tarone, 2005). People learning a second or foreign language are often assessed on whether they are able to use their oral communicative skills to interact with people who speak the target language (Nunan, 1998). In the classroom context, teachers need to have the ability to structure their thoughts in a way that they are understandable to students. They should have the ability to give clear instructions, describe concepts, show their relationships, and use non-verbal cues to complement their information (Weller, 1985, as cited in Labarca & Bailey, 1985). Speaking is, thus, a complex process that involves sending and receiving of spoken inputs through the medium of verbal and non-verbal signals. In this regard, Canale and Swian (1980) proposed the competences that a language user needs to have: grammatical competence, sociolinguistic competence, and strategic competence. Hence, English teachers need to have an adequate size of vocabulary, knowledge of grammar, pronunciation, stress, intonation, and non-verbal symbols to communicate well in the target language (Nation, 2001; Canale & Swain, 1980; Celce-Murcia et al., 1996; Gregersen, 2007).

In this regard, oral proficiency embodies important constructs such as fluency, accuracy, pronunciation, stress, and intonation as they are interrelated. For example, fluency refers to the ease and smooth flow of speech in real time (De Jong & Van Ginkel, as mentioned in Verhoewen & DeJong, 1992). Fluency can be affected by the lack of vocabulary since the speaker may hesitate and pause while searching for appropriate vocabulary (Lam, 1994). Likewise, accuracy is related to the knowledge of vocabulary, grammar, and correct pronunciation (Canale, 1983). Furthermore, Omaggio (1986) relates accuracy to the correct use of grammatical structures, registers, vocabulary, and cohesive devices. Hence, knowledge of grammar and vocabulary affects oral proficiency to a greater extent (Iwashita, 2010). Apart from linguistic factors, cognitive and affective factors affect oral proficiency. Cognitive factors involve conceptualization, formation, and articulation, whereas affective factors concern anxiety and self-restriction (Derakhshan et al., 2016).

Methods

Research Design

The research design was a convergent mixed design as the research questions required quantitative and qualitative data. Specifically, the first research question was concerned with teachers' classroom oral proficiency, for which checklists and notes were taken. The second research question was about teachers' language use in communicative events outside the classroom, for which an interview and a checklist were used together. The last research question was concerned with examining teachers' PCK level, for which a questionnaire and an interview were used to collect data. As qualitative and quantitative data were collected, the convergent mixed-methods design was appropriate.

Participants and Sampling Methods

The population of the current study included all secondary school English teachers in the Southern Ethiopia Region. Because of the region's vastness, a manageable sample was necessary. Hence, the researchers planned to limit their scope to big cities in the region, as most secondary schools were located in big cities. Convenience sampling method was used to select three cities. These included: Arba Minch, Wolaita Sodo, and Sawla. The total number of secondary schools in these cities was 16, and the number of English teachers teaching in those schools was 105. Again, convenience sampling method was used to select 3 schools from each city. Hence, a total of 9 schools were selected for the study. Availability sampling method was used to select teachers in the schools. As a result, two teachers from each school were selected for classroom observation and interview. Hence, a total of 18 teachers were observed and interviewed. Eventually, all teachers in the nine schools were asked to complete the questionnaire, including teachers who were observed and interviewed. Thus, the total number of teachers who completed and returned the questionnaire was 61.

The study participants, despite living in different cities, had similar educational qualifications. In the three cities selected for the study, 66 had BA degrees while 39 held master's degrees. All the schools had similar infrastructure and governance. They all taught in large classes and carried heavy workloads.

Data Collection Instruments

Three data collection instruments were used: a questionnaire, observations, and interviews. Each tool was believed to generate the required data to answer the research questions. The questionnaire was adapted from Peng's (2013) modified Model of Pedagogical Content Knowledge. At the same time, observation was used to obtain data on teachers' oral competence, classroom management, and interactions with students. In this regard, the Classroom Evaluation Checklist was used to measure the constructs, which included accuracy, fluency, use of expressions or words, body language and miming, use of fillers, and meaning negotiation so as to determine teachers' classroom oral proficiency. Besides, notes were taken to collect data on teachers' classroom management and interactions with students. Accuracy was determined by counting the number of grammatical errors in utterances, whereas fluency was measured by frequency of pauses and interruptions and the time wasted during pauses. Regarding vocabulary size, the frequency of inappropriate words and of switching to L1 to replace English words was counted.

On the other hand, interview was designed to assess teachers' oral proficiency while engaged in interpersonal communications. The Oral Proficiency Evaluation Guide adapted from ACTFL's 2020 Oral Proficiency Interview Familiarization Guide and Wanna et al.'s (2016) criteria for oral proficiency test were used to measure teachers' oral competence. The interview sessions were audio-recorded and checklists were used to determine teachers' oral proficiency. Thus, both observation and interview protocols were used to determine teachers' proficiency level. Almost a similar scale was used for both tools to measure the participants' oral proficiency. The rating scale for Oral Proficiency Evaluation Guide ranged from 1-3 against each speaking sub-skill. Point 1 on the scale indicated the least performance of the sub-skill while 3 suggested the highest performance. In the same vein, the Classroom

Evaluation Checklist had a rating scale which ranged from 1-3. Point 3 indicated the highest score while 1 showed the least score in a particular sub-skill. Eventually, the questionnaire had a rating scale that ranged from 1-5. Points 1 and 2 on the scale showed disagreement, 3 neutral, but 4 and 5 indicated agreement at different levels. The questionnaire was designed to assess teachers' PCK on four issues: knowledge about the purpose of teaching English, English curriculum, instructional strategies, and students' needs and conceptions of learning English.

Data Analysis

Descriptive statistics, specifically frequencies, percentages, and mean scores, were used to determine participants' proficiency levels and their pedagogical content knowledge. SPSS was used to calculate the mean scores and percentages for each questionnaire item and observation checklist. The mean score for each item in the categories was interpreted using the Likert Interval Scale as follows: 1.00-1.80, strongly disagree; 1.81-2.60, disagree; 2.61-3.40, neutral; 3.41-4.20, agree; and 4.21-5.00, strongly agree. In order to fit Bloom's cut-offs, the mean scores had to be multiplied by 20. In this case, Bloom's cut-offs were used to determine participants' PCK knowledge: 80-100 indicated *high knowledge*; 60-79 showed *moderate knowledge*; and <60 suggested *low knowledge*. On the other hand, PreLas' Oral Language Components Cut-offs were used to determine participants' oral proficiency: 0-59 *low*; 60-79 *mid-level*; and 80-100 *high*, which were quite similar to that of Bloom. In order to use this, the rating scores for classroom observation and interview guide were totaled and converted to 100%. On the other hand, content analysis was used to examine the qualitative data obtained from notes taken during classroom observations and audio transcripts of the interviews.

Results

English Teachers' Pedagogical Content Knowledge

Table 1

English Teachers' Overall and Categorical Pedagogical Content Knowledge

		Overall PCK		Purpose of teaching English		English curriculum		Instructional strategies		Needs and preconceptions	
Range	Level of knowledge	N	%	N	%	N	%	N	%	N	%
80-100	high	24	39%	38	62%	11	18%	35	57%	41	67%
60-79	moderate	36	59%	21	34%	45	74%	23	38%	15	25%
<60	low	1	2%	2	3%	5	8%	3	5%	5	8%
	Grand mean	3.84		4		3.45		3.84		4.05	
	100%	77		80		69		77		81	
	level	moderate		high		moderate		moderate		high	

As shown in Table 1, the overall evaluation of the study participants' PCK suggested that 59% had moderate knowledge while 39% had high knowledge. On the other hand, a

more detailed analysis of the participants' pedagogical content knowledge across the different components showed that there was conformity between percentage counts and grand mean scores in three of the components. Specifically, 62% had high knowledge, while 34% had moderate knowledge, but only 3% had low knowledge concerning the purpose of teaching the English language. This was in conformity with the grand mean (4.00) whose percentage was 80% indicating high knowledge. Regarding their knowledge about the English curriculum, 74% had moderate knowledge, 18% attained high knowledge, but 8% had low knowledge. The grand mean (3.45) also showed that the majority of the participants had attained moderate knowledge, with 69%. However, there seemed to be a contradiction between frequency counts and the grand mean with regard to participants' knowledge of instructional strategies. Specifically, 57% had high knowledge, whereas 38% attained moderate knowledge, but only 5% had low knowledge. Nevertheless, the grand mean (3.84) showed that the participants had moderate knowledge with 77%. Concerning teachers' knowledge of students' needs and preconceptions, both frequency counts and the grand mean seemed to be in conformity. Specifically, 67% had high knowledge and 25% had moderate knowledge, but only 8% had low knowledge. Besides, the grand mean (4.05) indicated high knowledge with 81%.

English Teachers' Pedagogical Content Knowledge in Terms of Specific Issues

Knowledge about the Purpose of Teaching English

Table 2

English Teachers' Responses to Specific Items Showing the Purpose of Teaching English

Items	Scale	F	%	mean	response	%	knowledge
To integrate students with native speakers	strongly agree	14	23	3.77	Agree	75.4	moderate
	agree	32	52.5				
	neutral	4	6.6				
	disagree	9	14.8				
	strongly disagree	2	3.3				
To make students successful in academic studies	agree	22	36.1	4.64	Strongly agree	92.8	high
	strongly agree	39	63.9				
To reduce teacher's dissatisfaction with misspelling	strongly agree	12	19.7	3.34	Neutral	66.8	moderate
	agree	25	41				
	neutral	3	4.9				
	disagree	14	23				
	strongly disagree	7	11.5				
To help learners be autonomous	strongly disagree	1	1.6	4.33	Strongly agree	86.6	high
	neutral	2	3.3				
	agree	32	52.5				
	strongly agree	25	41				

The first part of the PCK questionnaire was constructed around issues about the purpose of teaching the English language to Ethiopian students. As shown in Table 2, the teachers seemed to have

moderate knowledge (75.4%) about the purpose of teaching English to their learners. The first item stated that the purpose of teaching English was to integrate with native speakers of English, to which the majority of the teachers (52.5%) agreed, and 23% strongly agreed. This was in agreement with the grand mean score (3.77), which suggested 'agree' according to the Likert Interval Scale. Thus, most teachers might have realized that the purpose of teaching English in Ethiopia was to enable students to communicate with foreign people. Regarding the second item, the majority of them (63.9%) strongly agreed, and the rest (36.1%) agreed that the purpose of teaching the language was academic. The grand mean (4.64) also suggested most of the teachers 'strongly agreed', indicating high knowledge (92.8%) about the proposition. Unlike the preceding items, the study participants appeared to be confused with the third item, which stated that the purpose of teaching was directly linked with teachers' emotional aspect.

The data showed the confusion as 41% agreed and 19.7% strongly agreed, while 23% disagreed, and 11.5% strongly disagreed. This result was in contradiction with the grand mean (3.34), which suggested 'neutral'. Thus, they appeared to have moderate knowledge (66.8%) of how misspelling causes teachers' dissatisfaction. Regarding the last item, the majority of the study participants (52.5%) agreed, and 41% strongly agreed with the proposition that the purpose of teaching English was to make learners autonomous. This result showed the frequency counts had little variation, as the grand mean (4.33) suggested 'strongly agree'. This implies that the teachers had strong knowledge of how to teach English to make learners autonomous.

Knowledge about the English Curriculum

Table 3

English Teachers' Responses to Specific Items Related to English Curriculum

Items	Scale	F	%	mean	response	%	knowledge
Organization of the English textbook	strongly disagree	3	5	3.73	Agree	74.6	moderate
	disagree	4	6.7				
	neutral	9	15				
	agree	34	**56.7**				
	strongly agree	10	16.7				
If the textbook contains pictures	strongly disagree	2	3.3	3.87	Agree	77.4	moderate
	disagree	9	14.8				
	neutral	2	3.3				
	agree	30	**49.2**				
	strongly agree	18	29.5				
The presentation of the macro-skills in the textbook	strongly agree	8	13.1	3.07	Neutral	61.4	moderate
	agree	22	**36.1**				
	neutral	7	11.5				
	disagree	14	23				
	strongly disagree	10	16.4				
Inclusion of study skills	strongly agree	8	13.3	3.23	Neutral	64.6	moderate
	agree	19	**31.7**				
	neutral	14	23.3				
	disagree	17	28.3				
	strongly disagree	2	3.3				

The second part of the PCK questionnaire was concerned with assessing teachers' knowledge about the English curriculum. Although the concept was vast, the items exclusively dealt with the

nature of the English textbook that the teachers used to teach their particular learners. As indicated in Table 3, the study participants seemed to have moderate knowledge about all of the items. However, they seemed to agree with the first two items while they had a neutral response to the last two items. With regard to the organizing principle followed by textbook writers, the majority of the participants (56.7%) agreed, and 16.7% strongly agreed that the textbook was organized around different topics. This finding was in conformity with the mean score (3.73), which suggested agreement. The second item was about the pictorial support that textbook writers provided to assist learners' understanding, to which many of the teachers (49.2%) agreed, and 29.5% strongly agreed. The mean score (3.87) also implied agreement and moderate knowledge. The third item was about the integration of the language skills, to which all of the participants seemed to have confusion or uncertainty, as 36.1% agreed and 23% disagreed. This was reflected in the mean score (3.07), which suggested that the participants had a neutral position based on the Likert Interval Scale. The last item was about the inclusion of study skills in the textbook, to which the participants equally showed confusion or uncertainty as their responses were varied: 31.7% agreed, but nearly a similar proportion, 28.3%, disagreed about the use of study skills in the textbook. This was also reflected in the mean score (3.23), which suggested a 'neutral' position. Hence, the study participants seemed to have moderate knowledge of the textbook they used daily to teach their students.

Knowledge about Instructional Strategies

Table 4

English Teachers' Responses to Specific Items Related to Instructional Strategies

Items	Scale	F	%	Mean	response	%	knowledge
Correcting students' errors	strongly disagree	10	16.4	3.08	Neutral	61.6	moderate
	disagree	15	24.6				
	neutral	2	3.3				
	agree	28	45.9				
	strongly agree	6	9.8				
Pre-reading activities	strongly disagree	1	1.6	4.39	strongly agree	87.8	high
	agree	33	54.1				
	strongly agree	27	44.3				
Post-reading stage	disagree	6	9.8	3.92	agree	78.4	moderate
	neutral	6	9.8				
	agree	36	59				
	strongly agree	13	21.3				
Process approach to writing	strongly agree	15	25	4.05	agree	81	high
	agree	37	61.7				
	neutral	4	6.7				
	disagree	4	6.7				

The third part of the PCK questionnaire assessed teachers' knowledge about the instructional strategies they used to teach the English language. As shown in Table 4, the first item assessed the effect of written error correction on students' motivation to learn. This item caused uncertainty and confusion among the participants as their responses were more varied. A sizeable proportion (45.9%) agreed while 24.6% disagreed with the proposition. This was reflected in the mean score (3.08),

which implied a 'neutral' position. Thus, they seemed to have moderate knowledge about error correction. The second item was about the importance of pre-reading activities, to which the majority of them (54.1%) agreed, and 44.3% strongly agreed. The mean score shows that they strongly agreed, and their knowledge about pre-reading activities was found to be high. The third item was whether writing could be part of a post-reading activity to which many of the participants (59%) agreed and 21.3% strongly agreed. This was reflected in the mean score (3.92) which indicated agreement, but it suggested that they had moderate knowledge about post-reading activities. The last item was about the nature of a process approach to writing to which the majority of the teachers (61.7%) agreed and 25% strongly agreed. The mean score (4.05) implied that they agreed and thus they had high knowledge about the process approach to teaching writing skills.

Knowledge about Students' Needs and Conceptions

Table 5

English Teachers' responses to specific items related to learners' needs and conceptions

Items	Scale	F	%	Mean	Response	%	knowledge
Students' vocabulary shortage	strongly disagree	1	1.6	4.25	strongly agree	85	high
	disagree	2	3.3				
	neutral	2	3.3				
	agree	32	52.5				
	strongly agree	24	39.3				
Students' learning preference	strongly disagree	2	3.3	4.03	agree	80.6	high
	disagree	1	1.6				
	neutral	8	13.1				
	agree	32	52.5				
	strongly agree	18	29.5				
Students' confusion with verb structures in passive and reported speech	strongly disagree	4	6.6	3.82	agree	76.4	moderate
	disagree	5	8.2				
	neutral	4	6.6				
	agree	33	54.1				
	strongly agree	15	24.6				
Students' confidence to speak in English	strongly disagree	2	3.3	4.08	agree	81.6	high
	disagree	6	9.8				
	neutral	2	3.3				
	agree	26	42.6				
	strongly agree	25	41				

The last part of the PCK questionnaire dealt with teachers' knowledge about students' needs and conceptions of learning English. As depicted in Table 5, the first item dealt with the cause of students' vocabulary deficiency to which many teachers (52.5%) agreed and 39.3% strongly agreed. The mean score (4.25) suggested that the teachers strongly agreed and had high knowledge about students' vocabulary deficiency. The second item was about students showing more preference to grammar than other language skills to which the majority of the participants (52.5%) agreed and 29.5% strongly agreed. This was reflected in the mean score (4.03) which suggested that they agreed with the proposition and that they had high knowledge about students' preference for grammar over other language skills. The third

item was concerned with students' confusion with verb structures in passive constructions and reported speech. In this regard, many of the participants (54.1%) agreed and 24.6% strongly agreed that the problem was evident. The mean score (3.82) showed that they agreed with the proposition, but they had moderate knowledge about this problem of students. The last item was about students lacking confidence to speak in English, to which many of the participants (42.6%) readily agreed and 41% strongly agreed. The mean score (4.08) showed that the teachers agreed with the proposition, and they had high knowledge about the issue.

Observed Oral Proficiency in Lesson Delivery

A total of 18 observations were made, and at least two teachers were observed from each secondary school. A checklist constructed around six variables was used to collect data about teachers' oral proficiency during classroom instruction.

Table 6

English Teachers' Classroom Performance in Terms of Oral Proficiency Variables

Variables	Performance	f	%
Use of accurate oral language	Less accurate	18	82%
	More accurate	4	18%
Uninterrupted speech	somewhat constrained	15	68%
	continuous and free	7	32%
Word power	having deficiency	16	73%
	rich in words	6	27%
Use of body language	Never uses body language	10	46%
	Occasionally using body language	11	50%
	Often uses body language	1	5%
Use of fillers	Fillers rarely used	18	82%
	Fillers occasionally used	4	18%
Ability to make meaning clear	Experiencing much difficulty to make meaning clear.	1	5%
	Experiencing some difficulty to make meaning clear	18	82%
	Experiencing no difficulty to make meaning clear	3	14%

Using the classroom checklist, the researchers collected data in order to determine teachers' oral proficiency during classroom instruction.

As shown in Table 6, 82% of the teachers produced less accurate utterances during classroom lesson presentation. At the same time, only 18% of them were able to produce accurate utterances. Regarding fluency during classroom instruction, 68% of the participants' speech was much constrained, while only 32% could speak with much ease. On top of that, a sizeable proportion of teachers under observation (73%) were found deficient in vocabulary, while only 27% had a fairly sufficient vocabulary size and thus had no pronounced problem in expressing their ideas because of vocabulary shortage. Surprisingly, a noticeable characteristic of secondary school English teachers was that they never used body language as part of their oral language to communicate meaning. As indicated in Table 6, 46% never used body language, and 50% occasionally used body language while speaking. Similarly, these teachers showed the same behavior by using fillers. As in the data, the majority (82%) rarely used fillers, while only 18% occasionally used them. Regarding conveying their message to students, a considerable number (82%) seemed to experience some difficulty, while a few of them (14%) could communicate their intended meanings well to their respective students.

Insights Gained from Classroom Observations

Most teachers used isolated sentences to exemplify the usage of a grammatical point. The students might not know how to use the sentences as the teachers presented them without context. Almost all of the teachers used the L1 (i.e., Amharic) to varying degrees. Some used the L1 throughout the period, while others used it to some extent. The teachers used the L1 to clarify the usage of grammatical points or to make instructions clear.

English Language Teachers' Interpersonal Communication Skills

Table 7

English Teachers' Oral Proficiency during Interpersonal Communication (i.e. Interview)

Variables	Performance	F	%
Use of accurate language or utterance	inaccurate language	2	8.7
	less accurate language	15	65.2
	more accurate language	6	26.1
Use of appropriate vocabulary	inappropriate vocabulary	1	4.5
	less appropriate vocabulary	16	72.7
	more appropriate vocabulary	5	22.7
Ability to express ideas freely	full of interruptions and hesitations	1	4.5
	less interruptions and hesitations	14	63.6
	no interruptions and hesitations	7	31.8
Ability to understand oral input	fails to understand oral input	3	13
	experiences some difficulty to understand oral input	10	43.5
	Quite understands oral input	10	43.5
Ability to respond appropriately to oral input	Experiences much difficulty to maintain communication	1	4.3
	Experiences some difficulty to maintain communication	12	52.2
	Experiences no difficulty to maintain communication	10	43.5
Ability to modify and simplify oral input	Experiences much difficulty to modify or simplify oral input	7	30.4
	Experiences some difficulty to modify or simplify oral input	14	60.9
	Experiences no difficulty to modify or simplify oral input	2	8.7
Ability to compensate for failures through fillers	Barely uses fillers to compensate	14	60.9
	Sometimes uses fillers to compensate	8	34.8
	Often uses fillers to compensate	1	4.3

The Oral Proficiency Evaluation Guide Checklist was constructed around several speaking sub-skills. As indicated in Table 7, a large proportion of the interviewees (62.5%) produced less accurate language, while some of them (26.1%) articulated accurately during the interview. Similarly, a great number of them (72.7%) used less appropriate vocabulary, but a small number of them (22.7%) used more appropriate vocabulary. Regarding their speaking fluency, a considerable number of them (63.6%) spoke with some interruptions and hesitations, whereas quite a few of them (31.8%) could speak freely without making interruptions and hesitations. With regard to processing oral input, a proportionate number of them (43.5%) had some difficulty and no difficulty in understanding oral inputs. Almost half of the interviewees (52.2%) had some difficulty in appropriately responding to oral inputs, while 43.5% could appropriately respond to them. As an effort to clear up misunderstandings, a large proportion of them (60.9%) experienced some difficulty in modifying and simplifying oral outputs, and 30.4% had much difficulty in doing the needed modifications and simplifications. As a strategy to compensate for failures of communication, the majority of them (60.9%) barely used fillers, while quite a few of them (34.8%) could occasionally use fillers.

Assessment of English Teachers' Oral Proficiency Levels

As shown in Table 8, 41% of the participants showed consistency in the level of their proficiency, whereas the remaining 59% showed variations in their proficiency level. The classroom checklist data indicated that 53% of the observed teachers had *average proficiency,* while 35% identified as having *low proficiency* and only a small number of them (12%) appeared to have attained a *high proficiency* level. Unlike the evaluation of classroom proficiency, teachers' oral proficiency during interview sessions showed that 47% had *average proficiency*, 29% attained *high proficiency* and only 24% had a *low proficiency* level. This disparity between the two instruments might be due to the 59% of the participants who showed variations in their performances. However, both datasets appeared to have similarity as the majority of the teachers had *average proficiency***.**

Table 8

Assessment of Teachers' Oral Proficiency Level during Classroom Instruction and Interpersonal Communication

	Classroom Oral Assessment					Interview Oral Assessment				
Participant Code	High	Average	Low			High	Average	Low		
	15-18	11-14	<11	100%	Level	17-21	12-16	<12	100%	level
B2			10	56	Low			8	38	low
B1			10	56	Low		13		62	mid-level
S1		11		61	mid-level		13		62	mid-level
H1	16			89	high	17			81	high
H2			10	56	low		12		57	low
CH4		12		67	mid-level		16		76	mid-level
AB1	15			83	high	17			81	high
CH1			10	56	low		13		62	mid-level
CH3			10	56	low	17			81	high
CH2		11		61	mid-level			11	52	low
AM2		11		61	mid-level			11	52	low
AM4		12		67	mid-level		15		71	mid-level
AM1		11		61	mid-level	17			81	high
AM3		12		67	mid-level		15		71	mid-level
AB2			10	56	low		13		62	mid-level
AB3		14		78	mid-level	17			81	high
AB4		13		72	mid-level		16		76	mid-level

Classroom observation assessment				Interview sessions assessment	
Scale	Level	F	%	F	%
0-59	low	6	35%	4	24%
60-79	Mid-level	9	53%	8	47%
80-100	high	2	12%	5	29%

Teachers' Pedagogical Knowledge, Classroom Language Use, and Beliefs About Students Reported during Interview

As the English language is spoken worldwide and used for different purposes, it is important for students to learn it. The participating teachers believed that their students learned the English language in order to communicate with foreign people or people living elsewhere in the world. Besides, the teachers stressed that learning the English language helped students to learn other content subjects as the medium of instruction is English starting from Grade 5. The participant believed that learning English enables students to access information through the Internet and different types of media because the world is interconnected with technology.

During the interview, teachers stressed that students lacked the basic knowledge of the English language when they joined high school as the L1 is the medium of instruction at early grades. Because of their poor background, students were not confident enough to use the language. Since students perceived the English language as a difficult language to learn, they were too shy or afraid to use it. Hence, they lacked motivation and commitment to study the language. Since students found it difficult to understand classroom instructions, teachers were obliged to use the L1 quite often. As a result, students' exposure to the language was quite minimal. On top of that, there was no opportunity to practice the language outside the classroom.

The teachers seemed to lack oral fluency while teaching in the classroom. Teachers were not committed to improving their oral skills, and they didn't read reference books to broaden their knowledge. On top of that, they didn't use the language outside the classroom or to communicate with their colleagues as they feared being evaluated by their partners. Teachers preferred to teach the grammatical aspects of the language rather than its communicative aspects.

Universities graduated students who had not taken pedagogical courses. These were employed as English teachers in secondary schools. Some years later, these teachers were sent to universities to take the PGDT courses during the summer. As the summer season was quite short, teachers might not be adequately trained. Apparently, teachers might not get practical training on pedagogical skills because of the shortness of the summer. Hence, teachers lacked pedagogical knowledge.

Discussion

This study revealed that the majority of the teachers had moderate knowledge in their PCK. However, they showed variations in their knowledge between the components of PCK. Specifically, their knowledge of students' needs and preconceptions of language learning and the purpose of teaching English in Ethiopia was greater than that of the English curriculum and instructional strategies. Similarly, the majority of the teachers in this study had moderate knowledge about the English curriculum. The teachers reported that the textbook was organized around different topics, and pictorial support was provided to help students to understand various issues. Nevertheless, the participants of the study raised entirely different issues, saying that the textbook was rather voluminous and reflected Western culture and urban life, disregarding rural life. Moreover, as the participants lacked grammatical

knowledge and had limited vocabulary, they lacked fluency, and their speech was often constrained. Hence, their speech was full of interruptions and pauses. Because of their lack of confidence in using the language, they often preferred to use the L1 to explain concepts of grammatical structures to their students.

With regard to the specific components of PCK, the overall assessment showed that the majority had moderate knowledge about the purpose of teaching English. This was in line with Hirpa et al.'s (2023) findings, and the grand mean (3.84) suggested that 77% of the participants had moderate knowledge. Moreover, the teachers participating in the study agreed that the purpose of teaching English was to make learners succeed in academic studies, communicate with foreigners, and eventually become autonomous learners. Similarly, the teachers expressed during the interview that the purpose of teaching was two-fold: (1) to enable learners to communicate with foreign people and access information through the Internet, and (2) to study content subjects and become successful in their studies.

The overall assessment showed that the majority of the participants had moderate knowledge about instructional strategies. The teachers demonstrated that they had substantial knowledge of pre-reading activities and the process approach to writing. However, they seemed to have moderate knowledge about post-reading activities and written corrective feedback. Therefore, the teachers seemed to have partial knowledge about instructional strategies. This finding was consistent with that of Hirpa et al. (2023). Besides, teachers who participated in the interview sessions reported that they were not adequately trained in teaching methodologies. The researchers, during classroom observation, also noticed that teachers had limited methodological knowledge as they were heavily dependent upon the textbook.

The majority of the study participants seemed to have high levels of knowledge about students' needs and preconceptions. Moreover, the teachers seemed to have a high level of knowledge of students' preferences for learning grammar over other language skills, vocabulary deficiencies, and lack of confidence in using the language in communicative events. Nevertheless, they appeared to be uncertain about students' confusion with verb structures, and thus they had moderate knowledge about it. However, this was in contradiction with that of Hirpa et al. (2023). Besides, the teachers reported in the interview that students never used the language because of their poor background and attitudes toward the language.

During classroom observations and interview sessions, the participating teachers appeared to lack oral fluency as they spoke with interruptions and hesitations, and thus their speeches were much constrained. The teachers often used isolated sentences that seemed to have been studied. They often uttered isolated sentences which they might have used repeatedly on a daily basis. Taddese (2014) reported a similar finding to the current study. Similarly, they seemed to be deficient in vocabulary and thus used less appropriate vocabulary on both occasions. Consequently, the teachers had difficulty conveying their messages during classroom instructions and interview sessions. Hence, they preferred to use the L1 because they ran short of vocabulary and were not confident of the accuracy of their language. In this regard, Grenecheal (2019), Mijena (2013), and Negash (2006) had similar findings. As the teachers lacked confidence in their oral skills, they kept themselves busy writing on the board as a strategy to evade speaking in the target language.

Classroom observations and interview sessions revealed that Ethiopian secondary school English teachers had striking similarities as they never used body language and fillers as part of their oral language to communicate meaning. Eventually, classroom observations and interviews indicated that the majority of the teachers had average proficiency.

Conclusions

Concerning the language use of English teachers, a sizeable proportion of teachers are constrained in their speech as they lack the necessary vocabulary to express themselves. Their utterances are characterized by frequent interruptions and hesitations. They often resort to the L1 as a strategy to compensate for their vocabulary deficiency and lack of grammatical knowledge. They have difficulty understanding oral inputs and experience some difficulty responding appropriately to the oral input. Surprisingly, they use little body language and rarely use fillers. Moreover, they are unable to simplify or modify their oral inputs in an attempt to clarify their meanings. Hence, the majority of teachers have average or low oral proficiency.

The overall assessment of teachers' PCK reveals that a sizeable proportion has moderate or partial knowledge. However, they have more knowledge about their students' needs and preconceptions and about the purpose of teaching English than about the English curriculum and instructional strategies.

Thus, the research outcome suggests that English teachers lack the most important professional qualities. In other words, teachers need to have a good command of the instructional language as language is essential for sharing knowledge with their respective students. Hence, deficiencies in these areas may require stakeholders in the educational sector to intervene and take measures to improve English language teaching in secondary schools.

School administrators need to improve the work environment by taking important measures. Specifically, they should request for employing more English teachers so as to reduce the workload of teachers so that they may have time for lesson preparation. In addition, school administrators should seek assistance from universities, NGOs, the British Council, and the American Embassy in Ethiopia for educational resources.

English teachers need to develop their vocabulary power by reading a lot of literature in English. They have to read or refer to grammar books while preparing classroom grammar lessons. Besides, they have to use the Internet, social media, and electronic media (i.e., TV, radio, etc.). Teachers should watch films in English to develop their speaking and listening skills. They have to read methodology books to get more knowledge about instructional strategies. Furthermore, teachers should be involved in professional development activities aimed at improving their methodological knowledge and skills.

The Ministry of Education has to develop English language proficiency standards for teachers and supervise teachers on the job, and newly employed teachers should meet the standard. If teachers don't meet the standard, the MoE should organize training to improve this situation. In addition, it should assess the PCK of teachers periodically and ensure these teachers get training to develop their profession. It should also supply schools with audio-visual materials dealing with global issues or educational topics so that students and teachers can use them during their spare times.

Universities and colleges that are in close proximity to the secondary schools should work in collaboration with the MoE and secondary schools. They should prepare workshops aimed at improving English language teachers' oral proficiency and pedagogical content knowledge.

Eventually, the few studies done in relation to English language teachers' oral proficiency and PCK are far from being rigorous. They couldn't clearly show the status or level of teachers' language proficiency and pedagogical knowledge. Nationally, it seems that we don't have standards by which to measure teachers' language proficiency and PCK levels. As the current study focuses on a quite limited number of schools, we suggest that future researchers undertake studies at the national level and propose standards to measure English language teachers' oral proficiency and PCK levels.

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Van Hiele group-guided discovery instructional approach and tenth-grade students' motivation in learning plane geometry

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Abstract

This study examined the effects of the VHGGDIA on tenth-grade students' motivation to learn plane geometry using a mixed-methods quasi-experimental non-equivalent control group design. Three secondary schools were purposively chosen for the main study out of eleven secondary schools in Hawassa city, Ethiopia. The study employed a Likert-scale motivation questionnaire, observation, and interview to collect data. The quantitative data were analyzed using ANOVA, paired samples t-test, and the qualitative data were analyzed through thematic analysis. The intervention led to significant gains in mean scores among the participants in one of the experimental groups. The study demonstrated a strong preference for the VHGGDIA, as indicated by a significant mean gain difference in post-intervention motivation between groups. The study also revealed significant changes in motivation from pre- to post-intervention. The results further showed that a small class size, enough time and space and adequate resources are essential for the successful use of the VHGGDIA. Finally, it is concluded that the VHGGDIA holds significant potential for enhancing secondary school students' motivation in learning plane geometry.

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Introduction

Mathematics and the visual arts are crucial in creating meaningful products, objects, and religious symbols that represent aesthetics, harmony, patterns, mathematical accuracy, and geometrical logic for every civilization (Papageorgiou, 2018). By improving students' visual imagination, deductive reasoning, logical argumentation, and proof skills, geometry instruction help students to understand geometric shapes, relationships, and principles

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(Erdogan et al., 2009). According to Zhang (2017), geometry is an essential component of mathematics that helps students in understanding more complex subjects in science, technology, and engineering by analyzing and assessing the physical environment. The idea put forward by Zhang emphasizes the significance of geometric concepts in school mathematics due to its deep links with human experiences and its role in solving everyday problems (Zhang, 2017). Increasing students' motivation in learning plane geometry is crucial, as motivation initiates the internal state and sustains goal-directed behavior (Schukajlow et al., 2017).

Researchers classify academic motivation into various groups one of which is intrinsic motivation. It refers to the sense of fun experienced while engaging in academic tasks and significantly influences mathematical achievement by promoting persistence, time investment, and creative strategies (Guvendir, 2016). Guvendir's study emphasized the importance of real-world application, integration into other subjects, and its interrelationships with other areas for long-term intrinsic motivation. Extrinsic motivation, on the other hand, encompasses a wide range of behaviors where the goal of an action extends beyond its intrinsic nature (Rosenzweig & Wigfield, 2016). Utility motivation refers to students' desire to learn mathematics through inquiry-based learning, problem-solving techniques, critical thinking exercises, and practical applications (Rosenzweig & Wigfield, 2016). Self-efficacy motivation is closely linked to students' expectations for success, as it measures their confidence in understanding concepts and completing assignments on time (Herbert et al., 2019). Students with learning motivation are more likely to engage, value, and commit to learning activities, leading to improved persistence and enactment, whereas those without fun are less attentive (Adao et al., 2015). Academic success is significantly influenced by students' desire and promise, as a lack of these abilities lead to useless diligence and enactment (Denzine & Brown, 2015).

The study of Serin (2018) suggests that students' motivation to learn decreases if the exercises are tedious. Therefore, the assignments that students do during instruction should have an acceptable level of difficulty (Serin, 2018). Motivating students in the classroom is crucial for topic mastery, overcoming obstacles, and achieving higher levels, particularly in secondary schools where learners' identities are crucial (Hogheim & Reber, 2015). Supporting unmotivated students during crucial times like the transfer to secondary school is essential to prevent future difficulties with schoolwork (Renninger & Hidi, 2019). The low geometry success rate is attributed to student lack of motivation to study and this can reduce geometrical reasoning ability (Hassan Hossein-Mohand & Hossein Hossein-Mohand, 2023). Students' motivation to learn mathematics is hindered by anxiety and the perception that the subject is uninteresting (Petersen & Hyde, 2016). Additionally, disinterest in geometry stems from insufficient teaching resources and ineffective instructional methods (Tong et al., 2021). Tachie (2020) also asserts that ineffective teaching strategies reduce student motivation.

The problem of poor student performance in secondary school mathematics instruction is being addressed globally, with a particular emphasis on student motivation as one of the components. Schukajlow et al. (2017) found that students' motivation has a significant impact on how well they learn mathematics. Students need to understand plane geometry to capably tackle everyday classroom issues, as it is vital for human understanding (Adao et al., 2015; Zhang, 2017). As a result, learning geometry needs students' will to

participate, which calls for timely completion of tasks, focused care, critical thinking, and idea sharing (Guvendir, 2016; Rosenzweig & Wigfield, 2016).

Despite the importance of geometry concepts, its instruction in secondary schools is still below the required level (Widada et al., 2019). Students face problems in mastering geometric concepts due to a lack of motivation (Ayele & Dadi, 2016). A case study conducted by the Japan International Cooperation Agency in Ethiopia found that there is a major problem with mathematics education in Ethiopia, mainly because students are not motivated to master the subject (Belay et al., 2017). The motivation of students to learn mathematics and science subjects is decreasing, with many struggling to solve problems (Jetu & Wariso, 2019; Walde, 2019).

Research indicates that a student-centered teaching approach significantly increases students' motivation (Nurbavliyev et al., 2022; Silmi Juman et al., 2022). Further, to keep students motivated to complete tasks, the degree of difficulty must be interesting, clear, and appropriate (Mart, 2013, 2017). Burger and Shaughnessy (1986) claim that an active teaching approach that progresses from simple to challenging learning improves students' academic achievement, topic perception, and cognitive capacity. However, most secondary school mathematics teachers in Ethiopia employ teacher-centered methods, which do not effectively foster student participation (Begna, 2017; Egne, 2022). Teacher-centered methods may lead to student frustration, diminished self-confidence, and passive learning (Niyukuri et al., 2020). Studies reveal that students struggle with learning geometry due to teaching methods that misalign with their current understanding of the subject (Saadati & Celis, 2023). Furthermore, teacher-centered methods of instruction in the classroom have a low possibility of increasing student motivation (Egne, 2022; Niyukuri et al., 2020). This strategy led students to be passive listeners in the classroom, and it showed their lack of motivation in geometry classes could cause difficulties in solving problems (Silmi Juman et al., 2022). Thus, this study intended to assess how students' motivation to learn plane geometry could be improved through a careful intervention using the VHGGDIA.

Theoretical Framework

The Van Hiele Group Guided Discovery Instructional Approach (VHGGDIA) is a modified approach that derives from the Van Hiele theory, discovery learning theory, and social constructivist learning theory (Fuys et al., 1984; Bruner, 1961; Vygotsky, 1978).

The Van Hiele theory: Developed by Pierre and Dina van Hiele-Geldof in the late 1950s, the Van Hiele theory of learning consists of five hierarchical levels of geometric thinking, emphasizing learning characteristics and suitable instructional methods to address appropriate conceptual understanding (Fuys et al., 1984). Van Hiele's five levels of understanding illustrate how learners progress in their understanding of geometry. Level-0 (*visualization*) involves recognizing shapes by appearance; Level-1 (*analysis*) focuses on recognizing properties without precision on necessary and sufficient conditions; Level-2 (*informal deduction*) emphasizes understanding figures and logical connections; Level-3 (*formal deduction*) covers grasping definitions and proofs while establishing theorems; and Level-4 (*rigor*) compares Euclidean and non-Euclidean geometries with a focus on axioms and proofs (Howse & Howse, 2014).

Van Hiele also introduced the following characteristics: *Fixed sequence*: Students must master lower levels of learning before advancing to higher levels, *Advancement*: Students' learning styles are influenced by delivery methods, with some strategies offering faster learning opportunities. *Distinction*: Language symbols differ based on levels. *Intrinsic and extrinsic*: Students go from recognizing forms in Level 1 to investigating the properties of natural objects in Level 2. *Mismatch*: Misalignment of teaching strategy, vocabulary, and materials with students' cognitive abilities negatively impacts learning outcomes (Howse & Howse, 2014).

*Guided Discovery Learning Theory***:** In the early 1960s, Jerome Bruner developed the Guided Discovery Learning Approach, which emphasizes the creation of new information via practice with trial and error (Bruner, 1961). Learned people expand their knowledge by absorbing new information and potentially rejecting or altering their beliefs. By providing direction and encouragement, teachers play a critical role in promoting effective learning because inadequate support can result in mistakes and displeasure (Prasad, 2011). Achera et al. (2015) developed a five-phase classroom teaching system. *Initiation*: The teacher assesses students' existing knowledge, connects it to new content, and involves them in activities to enhance retention and facilitate future learning. *Exploration***:** The teacher employs a method where students first work independently on tasks before engaging in group discussions, supplemented by warm-up activities. *Evaluation*: Students' understanding is evaluated by the teacher using an individual test, which is followed by a review, activity exploration, and presentation of student work.

*Social constructivist learning theory***:** By encouraging students to learn from their experiences, constructivist instruction enables them to realize their full potential and actively participate in the growth of their knowledge (Bada & Olusegun, 2015). Vygotsky's social constructivism theory suggests that human cognitive practices are influenced by social interaction within cultural contexts, necessitating a new social framework for understanding instruction (Vygotsky, 1978). Cooperative work is stressed by the social constructivist theory, which holds that teachers serve as facilitators in small groups to help students develop their motivation, social skills, and collaboration (Singh & Agrawal, 2011). In this study, jigsaw group cooperative learning techniques were used to promote student teamwork by assigning each member a significant role that fosters listening, involvement, and mutual understanding, which is essential for successful outcomes. This approach significantly improves students' learning in a collaborative setting (Dhull & Verma, 2019).

These three learning theories serve as the basis for the current study. Thus, the study employed Van Hiele theory-based instruction to assess students' prior knowledge and enhance their thinking skills. Further, cooperative and guided discovery learning approaches were utilized, emphasizing trial and error practice to boost student motivation for the enhancement of prior knowledge while learning new concepts collaboratively. Teachers use scaffolding techniques to help students form conceptual connections (Vygotsky, 1978).

Van Hiele Group Guided Discovery Instructional Approach (VHGGDIA)

VHGGDIA is a teaching method that integrates Van Hiele, guided discovery, and cooperative learning, focusing on student knowledge, participation, sharing, and classroom discussions to foster shared understanding. The VHGGDIA framework combines Van Hiele's

and guided discovery learning phases to create five stages (Howse & Howse, 2014; Achera et al., 2015). Based on students' prior knowledge, the teacher sets objectives and assigns assignments. Learning is facilitated via group discussions, information exchange, summary presentations, and evaluations. Below are the steps that VHGGDIA follows.

Brainstorming Activity (Think-Pair-Share): Van Hiele emphasized the importance of teachers evaluating their students' prior knowledge before introducing new content. Thus, the teacher employs the think-pair-share approach to assess students' prior knowledge. After a broad prior knowledge assessment, the classroom learning process consists of the following five steps:

Introduction: Through simple language symbols, observations, and questions the teacher helps students understand a topic, assesses their past knowledge, and gets them ready for future sessions.

Discussion: The teacher organizes structured activities for students to recognize new concepts, explore relationships, and discover unique structures, with individual and group work. The teacher continually supervises and examines students' portfolio completion.

***Presentation*:** Group members discuss students' solutions to discussion phase challenges, with class providing comments. Students understand interactive level structure after careful explanation.

***Reflection*:** Students engage in exploring individual and group work, learning to navigate concepts and grasp qualities via experience. Students' problem-solving abilities are enhanced by ample understanding of facts and their connections across various contexts, and on their study area.

***Evaluation*:** After administering a test to gauge students' understanding, the teacher carefully measures, investigates, and presents the students' work to make sure they fully grasp the current content before introducing the next new lesson.

Rational of the Study

First, Niyukuri et al. (2020) suggest that a teacher-centered teaching strategy in the classroom has a small chance of boosting student motivation. Additionally, a crisis in science and math instruction is expected to result from the existing traditional teaching approach's decline in student interest (Egne, 2022). The present researchers have also encountered this issue in their professional life as math teachers. Therefore, the lack of intervention study at the study sites prompted us to carry out this investigation.

Second, research from around the world demonstrates that guided discovery learning and Van Hiele theory-based instruction greatly enhance mathematics instruction (Al-ebous, 2016; Erdogan, et al., 2009; Halat, 2003; Maharani et al., 2019; Naufal et al., 2021). However, to the best of the reserachers' knowledge no practical study has been conducted that shows how integrating these teaching methods could influence students' motivation in learning plane geometry. Thus, the present study investigated how the VHGGDIA influences secondary school students' motivation to learn plane geometry.

Third, geometry is a crucial component of mathematics, enhancing spatial awareness, promoting reasoning, and inspiring learning, and is also essential for numerical and algebraic problems (French, 2004; Luneta, 2014). For both aesthetic and intellectual reasons, geometry is a fascinating and useful field because it helps us grasp things like the symmetry of many

objects in our surroundings, the parabolic trajectory of projectile motion, the common uses of geometric shapes, and more (French, 2004). In our country, the study of geometry is often unenjoyable because of a focus on memorization and routine problem-solving instead of understanding its contextual meaning. Thus, the study implemented an intervention that emphasizes the foundational principles of plane geometry.

Thus, the study examined the impact of VHGGDIA on students' motivation in learning plane geometry. Therefore, it aimed to achieve the following objectives:

- Investigate students' motivation in learning plane geometry between groups and within groups.
- Examine the influence of the VHGGDIA on student motivation in learning plane geometry.

Specifically, the study answered the following research questions:

1. Are there statistically significant changes in the mean score gains of students' motivation in learning plane geometry within and between experimental and comparison groups after the intervention?
2. How does the VHGGDIA influence student motivation in learning plane geometry?

Methods

Research Approach and Design

To investigate the effectiveness of the VHGGDIA on improving student motivation in plane geometry, the study employed a mixed-research methods with a concurrent triangulation strategy (Creswell & Creswell, 2018). Further, the study employed a quasi-experimental non-equivalent control group pre- and post-test design because random group assignment was not feasible in the actual classroom setting (White & Sabarwal, 2014). Different scholars applied the quasi-experimental design for mixed-research methods (Carlisle et al., 2023; Lang et al., 2024)

Population and Sample

The city of Hawassa, Sidama region, Ethiopia, served as the study's site. The study focused on tenth-grade students in government secondary schools during the 2022/2023 academic year. Financial limitations, an absence of empirical studies on learning geometry in the area, and my own experience of students' low motivation in math classes led me to select this location. This grade level was chosen for the study because, in accordance with the nation's national education policy, the grade 10 mathematics textbook used for the academic year thoroughly explaines the concepts of plane geometry and encourages students to learn how to apply them. The study purposively selected four government secondary schools from eleven schools in the city based on stakeholders' willingness, infrastructure, and teacher experience and qualifications for successful implementation. A pilot study was conducted at the fourth school, which was distant from the other three schools, while the remaining schools were the main study sites. From each school one degree holder in mathematics education with teaching experience between 20 and 23 years was selected. These teachers were willing to patrcipate in the study. A single section in tenth grade was randomly selected from the participating teacher's previously taught sections in each school to ensure a smooth

teaching-learning process. For continued observation, two nearby schools were randomly assigned as Experimental Group I and Experimental Group II. The third school, situated away from the two experimental groups, utilized a conventional teaching method to prevent data contamination.

Data Collection Instruments

An interview and a questionnaire with a motivation rating scale were used to gather data. To assess student motivation, a modified 5-point Likert scale questionnaire developed by Fiorella and associates, as well as Zakariya and Massimiliano, was used. Some items from the questionnaire were also used for interviews (Fiorella et al., 2021; Zakariya & Massimiliano, 2021). The study examined four motivating factors: intrinsic motivation to boost students' internal drive (Guvendir, 2016), extrinsic and utility motivation to stimulate students' interest in applying their skills to solve practical problems (Rosenzweig & Wigfield, 2016), and self-efficacy to boost students' confidence in learning mathematics (Herbert et al., 2019).

Validity and Reliability of the Instruments

The instruments were adapted based on a literature review and feedback from peers and advisors to ensure their validity. A pilot study was conducted to refine the interview questions and evaluate the reliability of the motivation rating scale's questionnaire, achieving an internal consistency of 0.879 as measured by Cronbach's alpha. Furthermore, the reliability coefficients of its components revealed that intrinsic motivation (0.716), extrinsic motivation (0.762), utility motivation (0.762), and self-efficacy motivation (0.724) were the most consistent.

Pearson-bivariate correlation values less than 0.8 indicated that there was no meaningful relationship between the items in the pre-intervention motivation data. Thus, a principal component factoring approach with varimax rotation was used to conduct an exploratory factor analysis on the 40 motivation items. The analysis involved suppressing all item loading coefficients less than 0.400 and retaining factors with eigenvalues greater than one, as suggested by Kaiser's criterion. This approach highlights that SPSS's default number of factors is often excessively high (Kaiser, 1974). As a result, four components were identified, leading to a stable solution of 22 items after removing those with cross-loading and communality ratings below 0.300. Using Bartlett's test of sphericity, the meaning of the correlation matrix was evaluated. A chi-square (χ^2 (166) = 1056.693, $p < .01$) revealed substantial correlations between the components, indicating that the matrix was suitable for factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy indicates data acceptability for factor analysis, with a value of 0.698 > 0.500 being suitable (Kaiser, 1974). Finally, the analysis revealed that four factors accounted for 55.26% of the data's variation, with an eigenvalue > 1.5 and item factor loading > 0.400. Moreover, the average communality of the retained items was 0.555, which is acceptable for a sample size between 100 and 200 (MacCallum et al., 1999; Samuels, 2017). The correlation matrix's determinant of 0.001 is greater than 0.00001, making it suitable for factor analysis (Field, 2013).

Intervention Procedure

The study involved the following steps: (1) before the beginning of the intervention, meetings were held with school directors and teachers participating in the study to discuss the intervention, (2) The participating teachers signed a consent form after which the researcher individually trained for five days the two teachers who implemented the intervention in the two experimental groups, spending three hours every day during their free time on the chosen teaching method. Before introducing plane geometry, the two teachers used the new method to teach trigonometric functions in chapter five, (3) One week before the intervention, the motivational scale was distributed to the participants of the study, (4) Following the pre-intervention data collection, the intervention was implemented for six weeks with the researcher observing each group two days a week using the prepared observation protocol. The topic covered in this intervention was plane geometry (theorems on triangles, special quadrilaterals, more on circles, and regular polygons) taken from a tenth-grade student mathematics textbook used throughout the country and found in Chapter Six (Ministry of Education, 2010), and (5) after the intervention, the participants' motivation was measured and analyzed.

Different instructional methods were employed with the experimental groups, in contrast to the traditional techniques used with the control group. Specifically, the method used with the Experimental Group I activated students' prior knowledge using the think-pair-share approach, followed by implementing a structured five-stage learning process during the full classroom period. During the introduction stage, the teacher introduced the new content and created jigsaw groups in the class, then divided the topic into sub-topics. The teacher distributed these sub-topics to each individual in the home group using the lottery method. During the discussion stage, the teacher facilitated discussions among the participants who recived the same sub-topic in each home group as another expert group. During the third satge called the presentation stage, after carefully sharing ideas about the assigned sub-topic, each member in the expert group returned to their home group, presenting the ideas they discussed with the expert group members to the home group, and finalizing the group discussion. During the reflection stage, each group shared what was discussed with the whole class, then the entire class discussed based on each group's presentation. There were also debates if any confusion occurred in the presentations, and finally the discussion was concluded. In the fifth and final stage called the evaluation stage, the participants reviewed and summarized their tasks based on the individual assignment given by the teacher. The teacher of Experimental Group II implemented the GGDIA using the stages established by Achara et al. (2015) and his colleagues in combination with the jigsaw groups.

Data Analysis

Since the data was normally distributed, the study used ANOVA and paired sample t-test for answering RQ1 and thematic analysis for RQ2. The observations were independent because the data collected were from independent groups found in different schools. Variances on the dependent variable were equal across groups based on the results from the Levene's test ($p > 0.05$). The dependent variables were normally distributed for each group since the skewness and Kurtosis in the experimental and control groups were between -1 and

1 (Demir, 2022). The researchers transcribed the interview data, analyzed it and developed themes.

Results

Group Difference in Students' Motivation before the Intervention

The study assessed student motivation in learning plane geometry prior to the intervention, and Table 1 below displays the results from descriptive analysis.

Table 1

Descriptive Statistics of Pre-Intervention Motivation

		N	Intrinsic		Extrinsic		Utility		Self-efficacy		Motivation	
Group	**Time**		**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
EG I	Pre-test	56	3.76	.655	3.66	.684	3.68	.756	3.75	.850	3.71	.400
EG II	Pre-test	54	3.75	.591	3.56	.684	3.44	.637	3.55	.885	3.57	.427
CG	Pre-test	56	3.59	.610	3.49	.811	3.61	.741	3.47	.822	3.55	.374

Note: *EG I = Experimental group I, EG II = Experimental group II, CG = control group*

Table 1 shows descriptive statistics on student motivation prior to the intervention, suggesting that the two experimental groups had comparable levels of intrinsic motivation, whereas the control group had lower levels. The three groups displayed different levels of extrinsic motivation. Utility motivation is comparable in Experimental Group I and the control group, both of which exceeded the intrinsic motivation of Experimental Group II. Experimental Group II and the control group had comparable levels of self-efficacy motivation, which were both lower than the intrinsic motivation of Experimental Group I. Generally, Experimental Group I had the greatest level of motivation. The study used one-way ANOVA to determine if the difference between the groups was statistically significant.

Table 2

ANOVA Test Results for Pre-Intervention Motivation

Source		df	Sum of square	Mean square	F	Sig.
Intrinsic Motivation	Between Groups	2	1.043	0.522	1.357	.260
	Within groups	163	62.537	0.384		
	Total	165	63.580			
Extrinsic Motivation	Between Groups	2	.821	.411	.772	.464
	Within groups	163	86.682	.532		
	Total	165	87.504			
Utility Motivation	Between Groups	2	1.691	0.845	1.658	.194
	Within groups	163	83.126	0.510		
	Total	165	84.817			
Self-efficacy Motivation	Between Groups	2	2.222	1.111	1.529	.220
	Within groups	163	118.386	0.726		
	Total	165	120.608			
Combined Motivation	Between Groups	2	0.877	0.439	2.734	.068
	Within groups	163	26.147	0.160		
	Total	165	27.024			

Table 2 shows the comparison of group differences before the intervention; the results indicate that all components and combined motivation show statistically non-significant

differences between the groups (sig.>.05). This implies that the three groups before the intervention had the same motivational in learning plane geometry.

Group Differences in Students' Motivation after the Intervention

After the intervention, the study investigated students' motivation in learning plane geometry.

Table 3

Descriptive Statistics of Post-Intervention Motivation

Group	Time	N	Intrinsic		Extrinsic		Utility		Self-efficacy		Motivation	
			M	SD	M	SD	M	SD	M	SD	M	SD
EG I	Post-test	56	4.43	.373	4.40	.431	4.39	.455	4.15	.595	4.34	.257
EG II	Post-test	54	4.30	.403	4.11	.528	4.06	.538	4.05	.479	4.13	.293
CG	Post-test	56	4.05	.478	3.85	.526	3.82	.581	3.84	.498	3.89	.287

Note: *EG I = Experimental group I, EG II = Experimental group II, CG = control group*

Table 3 displays post-intervention descriptive motivation scores for the three groups. The results show varying levels of intrinsic, extrinsic, utility, self-efficacy, and combined motivation. After successful intervention, the study showed the experimental groups experienced an improvement in cumulative motivation and its components in contrast to the control group. Specifically, Experimental Group I showed higher motivation compared to Experimental Group II and the control group. To determine the significant difference in the groups' post-intervention motivation, the study used an ANOVA test.

Table 4

ANOVA Test Results for Post-Intervention Motivation

Variables	Source	df	Sum square	Mean square	F	Sig.
Intrinsic Motivation	Between Groups	2	4.164	2.082	11.77	.000
	Within group	163	28.834	.177		
	Total	165	32.998			
Extrinsic Motivation	Between Groups	2	8.322	4.161	16.859	.000
	Within group	163	40.229	.247		
	Total	165	48.551			
Utility motivation	Between Groups	2	9.119	4.559	16.402	.000
	Within group	163	45.308	.278		
	Total	165	54.426			
Self-efficacy motivation	Between Groups	2	2.8o8	1.404	5.057	.007
	Within group	163	45.248	.278		
	Total	165	48.056			
Aggregate motivation	Between Groups	2	5.693	2.846	36.534	.000
	Within group	163	12.700	.078		
	Total	165	18.392			

Table 4 demonstrates the significant mean score differences in post-intervention motivation between groups. Intrinsic ($F(2, 163) = 11.77$, Sig. < 0.01); extrinsic ($F(2, 163) = 16.859$, $p < 0.01$); utility ($F(2, 163) = 16.402$, $p < 0.01$); self-efficacy ($F(2, 163) = 5.057$, $p < 0.05$); and combined motivation ($F(2, 163) = 36.534$, $p < 0.01$). The study further utilized the post hoc Tukey HSD test to identify where this significant difference exists.

Table 5

Post-Hoc Tukey HSD Test for Comparing Groups' Post-Intervention Motivation

Variables	Group (I)	Group (J)	Mean difference (I-J)	Sig.
Intrinsic Motivation	Experimental Group I	Experimental Group II	.125	.268
		Control group	.379	.000
	Experiment Group II	Control Group	.254	.005
Extrinsic Motivation	Experimental Group I	Experimental Group II	.291	.007
		Control group	.545	.000
	Experiment Group II	Control Group	.254	.022
Utility Motivation	Experimental Group I	Experimental Group II	.328	.004
		Control group	.568	.000
	Experiment Group II	Control Group	.240	.047
Self-efficacy Motivation	Experimental Group I	Experimental Group II	.102	.569
		Control group	.311	.006
	Experiment Group II	Control Group	.209	.097
Combined Motivation	Experimental Group I	Experimental Group II	.211	.000
		Control group	.451	.000
	Experiment Group II	Control Group	.239	.000

Table 5 reveals significant differences in all components and overall motivation between Experimental Group I and the control group ($p < .05$, d = 0.893, 1.129, 1.120, 0.567, and 1.654, respectively). Except for self-efficacy motivation, Experimental Group II and the control group differed significantly ($p < .05$, d = 0.566, d = 0.496, d = 0.585, and d = 0.827). However, self-efficacy motivation was not significantly different ($p > .05$). The participants in Experimental Group I and Experimental Group II showed no significant differences in intrinsic and self-efficacy motivation ($p > .05$), but there were significant differences in extrinsic, utility, and combined motivation ($p < .05$, d = .695, d = .588, and d = 0.763, respectively). The intervention was beneficial to the students in Experimental Group I. This result indicates that compared to students who learned using GGDIA and CTM, those who learned using VHGGDIA were more motivated to master plane geometry.

Differences in Students' Motivation within a Group

The study examined the significant shift from pre- to post-intervention motivation.

Table 6

Comparison of Pre- To Post-Intervention Motivation Results Within a Group

Post-pre	Group		MD	SD	t	df	Sig.
Intrinsic Motivation	Experimental Group I	56	.664	.696	7.142	55	.000
	Experimental Group II	54	.556	.743	5.495	53	.000
Extrinsic Motivation	Experimental Group I	56	.741	.758	7.316	55	.000
	Experimental Group II	54	.555	.800	5.105	53	.000
Utility motivation	Experimental Group I	56	.702	.777	6.765	55	.000
	Experimental Group II	54	.617	.807	5.624	53	.000
Self-efficacy Motivation	Experimental Group I	56	.404	.997	3.029	55	.004
	Experimental Group II	54	.500	.982	3.742	53	.000
General Motivation	Experimental Group I	56	.628	.417	11.254	55	.000
	Experimental Group II	54	.557	.507	8.070	53	.000

Note: *MD = Mean difference; SD = Standard deviation*

Table 6 presents the differences between pre- and post-intervention motivation in Experimental Group I and Experimental Group II. The results indicate a significant increase in intrinsic motivation within both Experimental Group I and Experimental Group II (t (55) = 7.142, p <.05, d = 1.304 and t (53) = 5.495, p<.05, d = 1.107), respectively. Similar results were found with extrinsic motivation (t (55) = 7.316, p <.05, d = 1.327 and t (53) = 5.105, p < .05, d = .908), respectively; utility motivation (t (55) = 6.765, p < .05, d = 1.173 and t (53) = 5.624, p < .05, d = 1.055), respectively; self-efficacy (t (55) = 3.029, p < .05, d = 0.554 and t (53) = 3.742, p < .05, d = 0.733), respectively. The combined motivation results exhibited similar results (t (55) = 11.254, p < .05, d = 1.918 and t (53) = 8.070, p < .05, d = 1.556), respectively. The paired samples t-test results showed a significant change in mean score gains between pre- and post-intervention motivation and its components in the two experimental groups.

Effects of VHGGDIA on Students' Motivation

Before and after the intervention, the researchers conducted unstructured interviews with the teachers who participated in the study, using questions to assess students' motivation in learning plane geometry. The interviewed teachers were coded as TT = Experimental Group I teacher and AT = Experimental Group II teacher. The analysis resulted in themes based on the findings of each qualitative data. These themes included the role of interest and enjoyment, external influence on learning, the importance of plane geometry, and self-confidence in classroom instruction.

Students' Interest and Enjoyment in Learning Plane Geometry

Before the Intervention

Both teachers explained that the students lacked enthusiasm in classroom learning. TT said, "Most students found math tedious and challenging, which decreased their interest in plane geometry" (TT, March 2023, 8:30). AT said, "Students did not enjoy mathematics because the students' frustration with mathematics stemmed from poor knowledge at the primary level, leading them to become passive learners in high school and always waiting for the teacher instead of making their own independent effort" (AT, 23 March 2023, 2:30). This evidence shows that students are uninterested in learning geometry, which has led to a lack of competence in solving problems. Most students quit trying when it proves difficult. Both groups initially exhibited this tendency.

After the Intervention

The interview results indicate that the intervention has enhanced students' willingness to participate in class activities across both experimental groups. They show increased interest for challenging tasks and problem-solving, thanks to the active teaching strategy employed. Students' interest in individual and group work increased, and they only needed a little assistance from the teacher for difficult problems. TT stated, "The intervention improved student enjoyment in learning plane geometry since the intervention initially concentrated on the students' past experience; once the students recalled the background information needed to discuss the new topic, it made easier for them to participate in class

dialogues, and they enjoyed practicing during class debates" (TT1, 25 May 2023, 8:30). AT stated, "Yes, the intervention improved students' desire in learning geometry, but their independent learning abilities were not fully developed within the stated time frame." Further, AT said, "Giving enough time to students' contribution in the classroom instruction increased their motivation" (AT, 25 May 2023, 2:30).

External Influences in Learning Plane Geometry

Before the Intervention

The respondents noted that prior to the intervention, their methods failed to promote student engagement and that their students lacked awareness of the real-world applications of geometry concepts. Both groups exhibited similar lack of interest in competitive activities. TT said, "Many students are disinterested in learning mathematics due to excessive lecture-based instruction, a lack of interactive activities, poor use of visual supports, a belief that plane geometry is very difficult, and an emphasis on memorization over understanding" (TT, 23 March 2023, 8:30). AT said, "Today's students have little interest in mastering math. As a result, some of my students stay in class to avoid being marked absent, while others have trouble understanding plane geometry" (AT, 23 March 2023, 2:30). The interviewees also expressed concern about the method they used. Both teachers said: "I use a teacher-centered teaching method because too many topics are covered quickly; there is little time for exploration, and there is no flexibility to adapt lessons; I prefer the lecture method" (TT, 23 March 2023, 8:30). Further, AT said, "Since students are sometimes unresponsive to my questions and inactive during class discussions, I accepted the lecture method" (AT, 23 March 2023, 2:30). The respondents noted that prior to the intervention, their methods failed to promote student engagement and that student's lacked awareness of the real-world applications of geometry concepts.

After the Intervention

The results of the analysis of the interview data indicate that students' enjoyment of classroom activities meaningfully increased as they competed, enhanced their subject knowledge, and confidently presented to others, demonstrating the effectiveness of this action. The participants wanted encouragement from teachers and peers after completing the tasks well, and the teacher's task motivated them to achieve the desired outcome. The treatment resulted in the participants enjoying plane geometry and competing with each other to complete assignments. TT said, "The implemented teaching method radically transformed the teacher-centered teaching approach into a student-centered approach, whereby the teacher's function is now limited to supporting rather than acting as a direct participant in the teaching-learning process." In addition, TT said, "In contrast, the students take on the role of direct actors by working with the teacher to complete various tasks individually and in groups. The method significantly increased the number of students who viewed themselves as independent learners and motivated them to learn plane geometry". (TT1, 25 May 2023, 8:30). AT said, "The technique significantly increased student motivation since the strategy encourages students to do different tasks and understand ideas by completing various activities, and these activities improved student's interest in plane geometry instruction." Additionally, AT said, "Students' responsibility changed from passively listening to actively

participating in the classroom instruction; however, I had trouble managing my time because of the students' lack of prior knowledge" (AT, May 25, 2023, 2:30).

Utilization of Plane Geometry

Before the Intervention

The results indicated that the participating teachers believed that their students viewed geometry as unimportant for daily life and primarily learned it to pass their grade level. With regard to this, TT said, “Majority of students did not see the importance of plane geometry concepts in day-to-day practice, memorizing formulas to operate equations instead of understanding applications” (TT, 23 March 2023, 8:30). Further, AT said, "Students feel math is too difficult and assume it as not useful and then fail to transfer math skills to real situations” (AT, 23 March 2023, 2:30). TT explained the reason, “Since the teaching strategy did not link the concept to real situations, students may not understand how math connects to careers or further instruction, and they said we never use the concept of geometry anyway” (TT, 23 March 2023, 8:30). AT also said, "Due to lack of contextual learning, students solve problems mechanically without knowing why they matter, and some think that math is only for scientists or engineers” (AT, 23 March 2023, 2:30).

After the Intervention

The findings indicated that by linking plane geometry to physics, visual arts, and construction, the treatment made the participants much more interested and motivated to learn it. This real-life application made them feel more confident, responsible, and happy with how they learned. This method got students more involved in class and helped them use ideas like Pythagoras' theorem in real life, which made them more confident. TT said, “By involving students in projects that tackle real-world issues, the approach improved their capacity to connect classroom ideas with practical applications, demonstrating the applicability of plane geometry in everyday circumstances” (TT1, 25 May 2023, 8:30). AT said, “The intervention successfully involved students in hands-on activities by stressing the importance of plane geometry concepts, which made them able to use measuring tools to gather environmental data and relate it to what they were learning in class” (AT, May 25, 2023, 2:30).

Self-Confidence in Classroom Instruction

Before the Intervention

The results revealed that the participating teachers believed that their students' trust in the teaching method significantly improved their academic performance, motivation, and engagement. When students lack confidence, they may avoid tasks and questions, leading to diminished interest and reinforcing a cycle of low self-esteem and delayed academic growth. TT said, “Students are confused and have low confidence” (TT, 23 March 2023, 8:30). AT also added, “Students' poor understanding of the concepts leads to frustration with advanced topics, resulting in low confidence in learning plane geometry” (AT, 23 March 2023, 2:30). TT said, “Students previous failures force them to believe that geometry is a hard subject, and this belief reduces their confidence in classroom instruction” (TT, 23 March 2023, 8:30). Further AT commented, “Students' math anxiety and the disconnect between theoretical concepts and practical applications hinder their confidence and limit them to merely

answering questions instead of encouraging the exploration and growth of their ideas" (AT, 23 March 2023, 2:30).

After the Intervention

The findings showed that each task assigned to students, which involved helping others, increased their interest in actively engaging in group discussions to understand the concepts. These tasks also developed their confidence in participating and heightened their desire to assist others after they had clearly grasped the concepts during these discussions. The results highlighted that students' confidence in readiness to participate improved due to their swift acceptance of instructions, independence in task completion, readiness for duties to help others, and clarity in explanations. TT said, "During the intervention period, the classroom activities greatly boosted the students' confidence in group discussions, remembering things, and taking part in new ideas since the assignment encouraged students to assist their peers, find alternative solutions to difficulties, and engage in debates. These tasks helped the students to enjoy studying plane geometry" (TT, 25 May 2023, 8:30). AT said, "The teacher's tasks, which were intended to help their peers after they had a solid understanding of specific concepts, boosted students' confidence in learning plane geometry. However, students' participation in classroom learning was reduced by the little time given in a single period" (AT, 25 May 2023, 2:30).

Overall, the quantitative and qualitative findings show that the new teaching strategy (VHGGDIA) increased students' motivation by engaging them in practice and idea exchanges. Students' motivation increased comfort in studying plane geometry due to engaging class discussions and the incorporation of real-world examples. TT stated, "The intervention improved the students' motivation in learning geometry. To this end, the challenges I encountered during this intervention period was large class size, excess number of students, lack of supportive instructional materials, and lack of time for free interaction in group discussion" (TT1, 25, May 2023, 8:30). AT also stated, "The students poor background knowledge led them to become passive, anxious, and worried in the classroom, while limited allocated time and overcrowded classrooms also challenged the intervention" (AT, 25 May 2023, 2:30).

Discussion

The study evaluated how well a teaching strategy increased students' motivation to learn plane geometry. The analysis revealed no significant differences in motivation and its components between the three groups before the intervention (see Table 2). This outcome serves as the basis for testing the effects of an intervention. Once confounding variables, including time differences, teacher influence, and topics covered, were taken into account, the study demonstrated that the intervention had a significant effect on the experimental groups' students' post-intervention motivation. The paired samples t-test results showed that with a medium effect size ($.500 < d < .800$), the study discovered a significant rise in self-efficacy motivation in both experimental groups. Furthermore, significant rises in student motivation

and the other components revealed a greater effect size (d > .800), in line with Cohen's recommendations.

The ANOVA test was used to evaluate the actual influence of VHGGDIA. The study revealed significant differences in students' motivation and its components post-intervention, with a medium effect size on self-efficacy motivation and larger than typical effects on other components. Students who learn through a GGDIA also benefited from this intervention in contrast to the control group (See Table 5). This result aligned with Al-ebous' (2016) research, which showed significant improvements in interest in learning geometry among those who were taught using the van Hiele model. Halat (2003) also provided more evidence of the beneficial influence of the Van Hiele Model on students' motivation to study plane geometry. Different authors (Maharani et al., 2019; Naufal et al., 2021) agreed on the positive effects of the Van Hiele model on students' motivation in learning geometry that align with the results of the present study. This result suggests the success of the VHGGDIA in learning plane geometry. Teachers often face challenges when they lack suitable teaching strategies, leading to students' lack of interest in the subject matter (Tachie, 2020).

The VHGGDIA has been found to positively influence students' confidence and motivation. By checking students' previous knowledge, teachers can prepare them for future lessons, improving their ability to actively participate in classroom discussions and integrate them with the outside world. This approach encourages students to debate and support their views, drawing their attention and encouraging them to voice their opinions without shame. Tachie (2020) demonstrated that fostering a supportive learning situation enhances students' confidence and contribution in class discussions.

The strategy's effectiveness is influenced by factors such as limited space, large class size, low student prior knowledge, insufficient teacher engagement, and inadequate instructional materials. These findings are also recognized by Saadati and Celis (2023). The lack of suitable instructional materials reduces students' motivation to learn plane geometry (Tong et al., 2021). The two-way communication in the experimental groups increased student interest in learning plane geometry. Tang and his colleagues support this finding (Tong et al., 2021).

Conclusions

Motivation is what drives every person. Many scholars studied student motivation from various perspectives and contexts. Students exhibit intrinsic or extrinsic motivation for learning when they improve results and show interest in course materials. The study found that VHGGDIA significantly enhanced student motivation compared to the conventional method used to teach plane geometry. Due to active engagement in detailed classroom discussions, the students' background knowledge improved within a fixed period. Students will be more motivated to acquire new knowledge by connecting what they already know to new contexts once they can recall their prior knowledge. The effectiveness of this teaching strategy relies on classroom safety, manageable student numbers, ample space, and relevant materials which are crucial for successful implementation.

The study indicates that VHGGDIA is an effective method for enhancing student motivation in learning plane geometry. Secondary school mathematics teachers should

implement VHGGDIA by providing adequate classroom space, managing student numbers, and using appropriate instructional materials to boost student motivation and achieve desired goals. It is recommended that additional research be done on this teaching strategy in other fields as well, as the VHGGDIA was only utilized in a mathematics course.

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Effects of interactive multimedia and differentiated instruction on secondary school students' attitudes towards biology multimedia: Evidence from Bahir Dar City Administration, Amhara region, Ethiopia

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Abstract

This study examined the impact of interactive multimedia and differentiated instruction (DI) on biology multimedia attitudes (BMA). A quasi-experimental design with a non-equivalent control group was employed with 94 students. The experimental group was taught using interactive multimedia and DI, while conventional teaching methods were used with the comparison group on the topic of energy transformation. Data were collected using a BMA scale and focus group discussion. The quantitative data were analyzed using descriptive and inferential statistics, whereas the qualitative data were analyzed thematically. The results revealed a significant difference in BMA between the experimental and the comparison groups, with a large effect size ($\eta^2 = .70$). This implies that the treatment group using interactive multimedia and DI demonstrated greater BMA enhancement compared to those subjected to the conventional teaching approach. Moreover, the findings from the qualitative data analysis indicated that multimedia and DI simplified abstract content, captured students' attention and interest, and created a more active learning environment than the conventional teaching strategy. In applying differentiated learning, no significant gender differences were observed, indicating that the instructional strategy was free from gender bias. Therefore, the study recommends that policy makers and practitioners integrate interactive multimedia and differentiated instruction to enhance students' BMA.

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Introduction

Educational quality in biology is influenced by various factors, including learning infrastructure, curricular materials, instructional approaches, and individual characteristics of both teachers and students (Munyemana et al., 2022; Rodríguez-Rodríguez, 2022). Among these factors, psychologists emphasize that learners' attitudes toward learning are particularly important because they shape how students engage with instruction and ultimately improve academic performance (Aencha et al., 2024; Iqbal et al., 2023). In line with this view, employing constructive teaching approaches, such as cooperative learning, can positively influence learners' attitudes toward their schooling (Aencha et al., 2024). However, the specific mechanisms through which such teaching strategies enhance students' learning attitudes remain insufficiently examined. Therefore, the current study assesses the effect of technology, particularly interactive multimedia and DI, on improving biology multimedia attitudes of secondary school students in learning complex biology contents, energy transformation or respiration and photosynthesis.

Biology plays a crucial role in society by deepening our understanding of living organisms, supporting ecological conservation, strengthening food security, improving health outcomes, and driving technological innovation. However, studies show that many students perceive biology as a boring subject, suggesting shortcomings in biology education (Akinbadewa, 2020). Similarly, Geeltu (2023) showed that biology education in Ethiopia faces unique challenges due to its abstract, complex, and technical content. In this regard, Cimer (2012) and Chavan (2016) reported that learning difficulties in biology are largely associated with the inherent complexity of the content, teachers' teaching styles, difficulties in teaching complex life-science concepts, students' study habits, negative attitudes toward the subject, and insufficient learning resources. Because biology includes many ideas, theories, practices, and beliefs, this complexity creates significant challenges for both teachers and students during the teaching–learning process (Coley & Tanner, 2012). Consequently, teaching microscopic contents in biology instruction can be understood as multifaceted and dynamic systems (Smit et al., 2022).

Building on this, teaching respiration and photosynthesis presents additional challenges because topics such as ATP synthesis, glycolysis, the Krebs cycle, photosystems I and II, and the Calvin cycle involve abstract concepts and intricate biochemical reactions. As a result, students often develop negative attitudes toward these contents, which may ultimately contribute to lower achievement (Munyemana et al., 2022). To respond to these challenges, multimedia-integrated instruction has been proposed as a promising approach for improving students' attitudes and supporting higher-order thinking (Hidayati & Irmawati, 2019). Biology multimedia is the integration of multiple digital media tools like video, animation, simulation, and PowerPoint to represent biological concepts, structures, and dynamic processes.

Biology multimedia plays a multidirectional role, simplifying abstract content and enhancing students' attitudes toward learning. In this regard, scholars argue that learners' success is strongly influenced by their attitudes and related beliefs (Akinbadewa, 2020). Students' attitudes shape both their learning processes and their academic outcomes (Adigun et al., 2015; Cam et al., 2016). Moreover, although multimedia-integrated instruction can

positively affect students' attitudes, the extent to which those attitudes translate into academic performance may depend on other factors (Ozcan, 2021). Supporting this view, Weng et al. (2018) reported that learning attitudes are key determinants of educational outcomes and that multimedia teaching materials can enhance students' attitudes. Olufemi (2012) describes attitude as learners' feelings, beliefs, and reactions toward a particular object or learning situation. Given that students' attitudes may differ, a dynamic and responsive approach such as differentiated instruction (DI) is crucial for meeting students' needs (Ismajli & Imami-Morina, 2018).

In constructivist instructional strategies, it is increasingly important to recognize the dynamic nature of the classroom environment in order to address individual needs. Ghafarpour and Moinzadeh (2020) emphasized that classrooms operate as complex, dynamic systems, reflecting a comparatively novel perspective in the arena of teaching. Furthermore, studies have demonstrated that differentiated teaching practices effectively enhance students' motivation for science learning and positively influence their attitudes (Demir, 2021). Taş and Minaz (2024) further stated that activities tailored to different learning styles actively engage students, facilitate classroom management, and generate a dynamic and enjoyable education atmosphere that embraces individual differences and varying learning paces. The present study employed interactive multimedia and DI to achieve its objectives.

This study was conducted to evaluate the effects of interactive multimedia and DI on students' BMA regarding the topics of photosynthesis and respiration. This content is basic content for all biology students; however, it is an abstract topic, including ATP synthesis, the Krebs Cycle, the two Photosystems, and the Calvin cycle, which are microscopic and complex theories having a series of chemical reactions with various complex compounds involving reactants and products, which make it challenging to create understandable knowledge and attitude in the learners. Thus, the present study sought to determine the instructional strategies' effects on BMA. In this context, the study aimed to address the following research questions:

1. What are the effects of interactive multimedia and differentiated instruction on students' attitudes towards biology multimedia compared with the conventional instructional method?
2. Is there a significant gender difference in the attitudes of students towards the use of interactive multimedia and differentiated instruction after energy transformation lessons?
3. What differences exist in students' attitudinal perceptions about biology multimedia after learning about respiration and photosynthesis before and after the intervention?

Literature Review

Role of Attitudes as a Psychological Factor in Student Achievement

Interactive multimedia addresses individual differences which result in enhancing students' achievement and attitude (Kassa et al., 2024). Attitudes are vital in shaping student achievement as they significantly affect both behavior and learning outcomes (Fan et al., 2018). Students who maintain a positive attitude towards learning are more likely to engage with the material, participate actively in class discussions and seek assistance when necessary. This engagement often leads to higher academic achievement (Anghelache, 2013;

Kpolovie et al., 2014). In this regard, Sölpük (2017) pointed out that an attitude has a moderate positive influence on student performance. Moreover, according to Bishop (2017), students who view failure as a learning opportunity rather than a setback are more resilient. This perspective encourages them to take on challenges and persist in their studies, ultimately enhancing their performance. Attitudes toward learning can be also shaped by peers. A supportive peer group and cultural background that values academic success can foster positive attitudes, while a negative peer environment may lead to disengagement and lower achievement (Chiu & Chow, 2015).

Students' attitudes toward their teachers and teachers teaching style can significantly impact their motivation. A positive relationship with teachers and an instructional method that attracts them towards their learning can boost students' confidence and willingness to learn, fostering better academic outcomes (Kapri, 2017). By cultivating positive attitudes in students, teachers can enhance motivation and engagement, ultimately resulting in enhanced academic achievement. Using constructivist teaching strategy such as interactive multimedia plays a crucial role in enhancing students' attitude towards learning. Since understanding and respecting diverse attitudes can help teachers to create inclusive environments that support all students. Indeed, attitudes toward science significantly influence students' performance in chemistry, biology, and physics (Mulatie, 2018).

Indeed, students' underachievement can be linked to various factors, including a negative attitude toward learning (Akinbadewa, 2020). According to studies by Ugwuoke et al. (2023), Abdulrahaman et al. (2020) and Ishaq et al. (2020), multimedia-integrated instruction has many uses, including enhancing positive attitudes, accommodating students with diverse learning abilities and individual differences; it is a type of inclusive learning; and it removes tedious task instruction. Therefore, appropriate multimedia in dynamic teaching design is crucial to reduce students' frustrations, obstacles and learning difficulties (Zhang et al., 2016). Rolfe and Gray (2011) stated that multimedia learning was more effective than many conventional teaching strategies. It would be effective when the teacher considers various variables. In this regard, Zaidel and Luo (2010) researched the effectiveness of multimedia based on the methods employed for content delivery as well as the adaptation of instruction to accommodate varied learning preferences and to simplify microscopic topics.

Furthermore, beyond understanding learners' attitudes toward multimedia in the classroom, it is essential to identify learners' needs and implement dynamic, multimedia-integrated instruction to effectively address those needs. Differentiated instruction is vital for accommodating individual requirements and has been demonstrated to have a positive effect on students' success (Demir, 2021). The purpose of differentiated instruction is to customize teaching activities to match students' learning styles and interests (Taş & Minaz, 2024).

The reviewed literature indicates that various topics within biology such as the nervous system (Koseoglu & Efendioglu, 2015) genetics (Faruk et al., 2022) cell biology, respiration, and photosynthesis (Chavan, 2016; Frederick-Jonah & Tobi, 2022), digestive system, transport system, and excretory system (Sakiyo et al., 2018) and human physiology (Hidayati & Irmawati, 2019), which are inherently complex.

Multimedia instructional techniques remain an attractive, creative, and inclusive methods of instruction that enhance positive attitudes and engagement in learning biology

(Akinbadewa, 2020; Kassa et al., 2024). Kapri (2017) pointed out that the potential pedagogical value of using multimedia in the teaching space is to increase concentration levels, improve understanding, and memorability. However, Ethiopian students in science education often demonstrate a lack of interest, struggle to embrace scientific concepts as a way of understanding the world and do not show enjoyment in the subject; moreover, they tend to exhibit unfavorable attitudes toward science (Negassa, 2014). Moreover, multimedia integrated instruction is not well and effectively practiced in secondary schools although in each secondary school and classroom there was a closed plasma TV. Numerous scholars have identified mechanisms to improve the quality of education by synthesizing various solutions to educational challenges, yet many obstacles remain unsolved. For instance, Kareem (2018) found that there are mixed findings regarding differences between male and female students' attitudes toward biology. Therefore, in addition to investigating students' Biology Multimedia Attitude (BMA) in the context of energy transformation, this study also aimed to assess the impact of multimedia and DI on gender differences in attitudes toward biology multimedia. The present intervention examined how interactive multimedia and DI influence learning outcomes in secondary school biology, specifically respiration and photosynthesis topics.

Methods

Study Design

In this study, a quasi-experiment with a non-equivalent control group design was implemented, with experimental and comparison intact groups. The quasi-experimental design with intact classes was chosen because administrative constraints prevented the random assignment of individual secondary students. Utilizing pre-existing classrooms maintains ecological validity by reflecting a natural school environment, while keeping the experimental and comparison groups physically isolated prevents treatment diffusion. To strengthen the internal validity of this non-randomized design, pre-tests were administered to establish a baseline and control for selection bias; post-tests captured long-term treatment effects; and parallel test versions were rigorously evaluated to ensure absolute comparability.

Participants of the Study

The study focused on secondary school students within the Bahir Dar City Administration, Amhara region, Ethiopia, specifically targeting all 11 government secondary schools. To facilitate a valid comparison, Tana Haik and Fasilo Secondary Schools were randomly selected from a pool of six schools with similar characteristics. Schools with limited technological infrastructure such as electrical power, plasma TV, intermate, and digital center were excluded to ensure comparability. The experimental group consisted of 48 students, while the comparison group included 46 students. To mitigate the impact of confounding factors between the two schools, we ensured that the teachers' qualifications and experience were comparable. Additionally, class sizes and students' prior knowledge were assessed through a pretest. Both schools had similar access to technology, and the socioeconomic status among the student populations was consistent. Furthermore, students were randomly allocated to either the experimental or comparison group to enhance the

validity of the findings. For the qualitative data analysis, eight participants contributed their insights in an FGD both before and after the intervention. Codes were assigned to the participants in the experimental group (ES1, ES2, etc.) and the comparison group (CS1, CS2, etc.).

Data Collection Instruments

Biology multimedia attitude scale was used to measure the participants' attitudes towards biology multimedia-integrated instruction. The scale was used as a way of positioning the responses of students to multimedia instruction. Biology multimedia attitudes of the participants towards biology multimedia-integrated instruction before and after the treatment for both groups were assessed. The instrument was adapted from the Multimedia Instructional Package Attitudinal Scale for Biology Students developed by (Akinbadewa & Sofowora, 2020). The items were prepared in the form of a Likert scale, each offering five response options: strongly disagree, disagree, neutral, agree and strongly agree.

To explore the changes observed in the participants' attitudes, focus group discussions were conducted before and after the intervention. The abstractness of the topic (energy transformation) and students' interest in learning concepts in this topic were introduced during the FGD. Following the interventions, the participants' perceptions of the teaching strategies used and their attitudes toward biology-related multimedia resources utilization were evaluated. The focus group data were collected in Amharic, then transcribed, and translated into English for analysis. The primary purpose of the FGD was to qualitatively explore students' attitudes and perception toward learning abstract biological concepts, specifically respiration and photosynthesis, following the intervention. Furthermore, the discussions aimed to gauge student perceptions regarding the necessity of integrating interactive multimedia and DI into their learning, and to assess whether this multimedia-integrated approach enhanced their overall interest in studying biology.

The Intervention

The intervention was carried out for six weeks at two different schools, having similar conditions. The experimental group in one of the schools used interactive multimedia and DI, while the comparison group in the second school was taught using the conventional teaching method (see Figure 1).

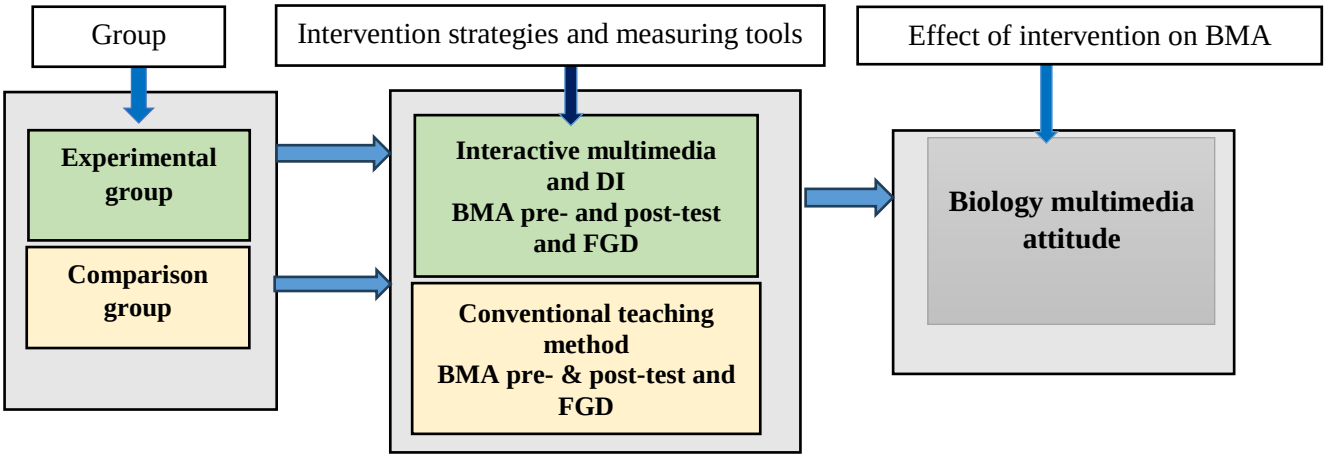
The experimental group was taught using interactive multimedia and DI, whereas the conventional instructional method was used for the control group. The use of interactive multimedia and DI is underpinned by the constructivist instructional approach which considers the dynamism of a classroom condition which has become a crucial issue. In this regard, Ghafarpour and Moinzadeh (2020) pointed out that classes evolve as a complex and dynamic system, which is a relatively new concept in the field of instruction. However, according to (Melese, 2019) the implementation of differentiated instruction in a dynamic situation is affected by different factors such as learning abilities, gender, learning attitudes, personal life experiences, and learning styles. Integration implies that the teacher considers and incorporates diverse circumstances in instruction to address these individual differences. Multimedia-integrated instruction in the present study involved PowerPoint presentations, YouTube videos, animations, and simulations, giving emphasis to various learning styles to

enhance the attitudes of students toward biology multimedia. According to Bhat et al. (2021), the way a student prefers to acquire knowledge or skill is possibly the single most decisive factor in student academic achievement.

Also known as traditional teaching, the conventional teaching method is characterized by a one-way flow of information, with the teacher playing an active role while students remain passive listeners. In conventional teaching strategies, the classroom environment is teacher-centered, which makes the learning process boring for students. Such types of traditional methods of teaching ignore students' level of interest, creative thinking, and participation. Moreover, this method focuses on coverage of content of the curriculum, rote memorization, and cramming for examinations (Dagar & Yadav, 2016; Khalid & Azeem, 2012). From the conventional teaching strategy perspective, students are often seen as "blank slates" waiting for teachers to impart knowledge and fill them with information (Kaya & Akdemir, 2016; Kim, 2005). This teaching strategy is widely implemented in Ethiopian secondary schools (Serbessa, 2006). However, the emphasis has shifted away from merely memorizing and recalling information, as well as conveying textbook knowledge that did not engage students' attitude for learning. Currently, the constructivist approach which is a modern method of teaching that considers students need and experiences were given higher attention than the conventional teaching methods.

Figure 1

Intervention Strategies



Validity and Reliability

To assess and improve the quality of the data gathering instruments, a pilot study was conducted in a school not selected for the study. Thirty-two participants were involved in the pilot study. From the results of the pilot study, some improvements (making more interactive instruction, addressing learners need) were taken and employed for the main study. Prior to data analysis, a reliability test was conducted, yielding results indicating that in all groups the Cronbach Alpha were found above 0.70 confirming the test scores were reliable (Table 1).

Table 1

Reliability Test of Student's Biology Multimedia Attitude

Group		Pretest	Posttest
Experimental		.	.
	8	704	758
Comparison		.	.
	6	801	897

Procedure

This study utilized a quasi-experimental, non-equivalent control group design among secondary students in Bahir Dar, Ethiopia. Over six weeks, an experimental group received multimedia-integrated differentiated instruction, while a comparison group followed conventional teaching methods. Data were gathered through pre- and post-intervention attitude test and focus group discussion. Prior to the intervention, a BMA pretest and an initial FGD were administered to establish baseline performance and document baseline student perceptions. Following the six-week intervention, a posttest and a concluding FGD were conducted to evaluate the overall impact of the treatment. To ensure validity, the schools were matched for infrastructure and teacher qualifications, and instruments were refined via a pilot study.

Data Analysis

The data analysis involved both descriptive and inferential statistical techniques. An independent samples t-test, paired samples t-test and a two-way ANOVA were employed to assess the significance of differences in mean scores related to biology multimedia attitudes. Variables with statistically significant effects were identified based on *p*-values of less than 0.05 and a 95% confidence interval. Additionally, qualitative data were thematically analyzed and triangulated with the findings from the quantitative data analysis.

Results

A total of 94 students (48 in the experimental group and 46 in the comparison group) participated in the present study. The biology multimedia attitude scale and FGD were employed before and after the intervention. Prior to data analysis, a reliability test was conducted, yielding results indicating that in all groups the Cronbach Alpha were found above 0.70 confirming the test scores were reliable (Table 1).

Table 2

Reliability Test of Student's Biology Multimedia Attitude

Group	N	Pretest	Posttest
Experimental	48	.704	.758
Comparison	46	.801	.897

Effects of Multimedia and Differentiated Instruction on Students' Attitudes

Prior to data collection, an analysis was conducted to determine whether the experimental and comparison groups were homogeneous in their biology multimedia attitudes. As shown in Table 2, the experimental group had a pretest mean score of 21.39 (SD = 0.54), while the comparison group scored 22.54 (SD = 0.74). The analysis revealed no significant difference in biology multimedia attitudes between the two groups ($t(92) = -1.263$, $p = 0.210$. This indicates that the assumption of homogeneity was met, confirming that both groups were comparable in their levels of biology multimedia attitudes.

Table 3

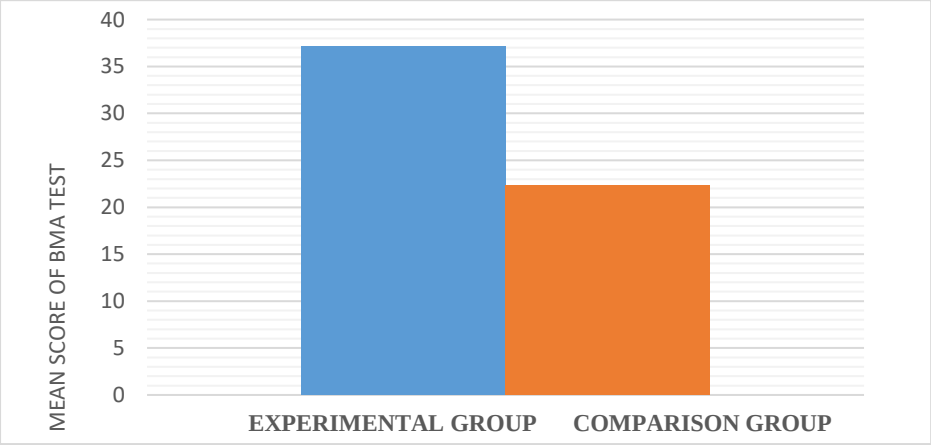
BMA Comparison between Pretest Scores in the Control and Experimental Group

Group	N	Mean	SD	SEM	T	df	Sig.
Experimental	48	21.3958	3.71162	.53573	-1.263	92	.210
Comparison	46	22.5435	5.02309	.74061			

As shown in Figure 2, a comparison of the measures between the experimental and comparison groups reveals that the experimental group exhibited a more positive attitude to biology multimedia after the treatment. The participants in the experimental group demonstrated substantial positive changes in their attitudes from pretest to posttest. In contrast, the comparison group did not show pronounced changes. While there were slight increases in their posttest scores, their mean scores remained lower than those of the experimental group. This indicates that interactive multimedia and DI teaching had a more substantial effect on the treatment group.

Figure 2

Mean Biology Multimedia Attitude Scores of the Experimental and Control Groups



An independent-samples t-test was performed to compare the biology multimedia attitude scores between the two groups. The results indicated a statistically significant difference, with the experimental group scoring a mean of 37.16 (SD = 5.24) compared to the comparison group, which had a mean score of 22.30 (SD = 4.33); $t(14.90) = 9.92$, $p < 0.001$.

The effect size was large, with an eta squared of .70, indicating that 70% of the difference in scores can be attributed to the impact of interactive multimedia and DI (Table 3).

Table 3

Students Biology Multimedia Attitudes Difference among Instructional Strategies

Group	N	Mean	SD	SEM	T	Df	Sig.
Experimental	48	37.1667	5.26463	.75988	14.906	92	.000
Comparison	46	22.3043	4.33523	.63919			

Gender Differential Effect of DI Strategy on BMA

To determine the effects of sex and instructional approach on learners' biology multimedia attitudes, a two-way ANOVA analysis was conducted. The descriptive statistics showed that the participants in the experimental group that were taught using multimedia and DI had a mean score of (37.13, SD = 5.84) for males and (37.20, SD = 4.79) for females, while in the comparison group taught using the conventional teaching method, male and female participants scored (22.00, SD = 3.93) and (22.61, SD = 4.77), respectively. The computed results of males and females between the experimental and comparison groups were found to be (37.17, SD = 5.26) and (22.30, SD = 4.34), respectively, implying the treatment group had a higher biology multimedia attitude than the comparison group (see Table 4).

Table 4

Mean and Standard Deviation for BMA by Gender and Instructional Strategy

	Male			Female			Total		
Group	N	M	SD	N	M	SD	N	M	SD
Experimental	23	37.1304	5.84111	25	37.2000	4.79383	48	37.1667	5.26463
Comparison	23	22.0000	3.93123	23	22.6087	4.77436	46	22.3043	4.33523
Total	46	29.5652	9.09616	48	30.2083	8.75666	94	29.8936	8.88210

As presented in Table 5, there was a statistically significant effect of instructional approach based on gender [F (1, 90) = 217.56, $p < 0.001$] and a large effect size (partial eta squared = 0.707). In contrast, the effect of sex was not statistically significant [F (1, 90) = 0.113, p = 0.737], nor was the interaction effect [F (1, 90) = 0.072, p = 0.790] for the two variables (partial eta squared =.001), implying that between teaching strategies there was a significance difference between groups, whereas in terms of gender and the interaction effect of gender and teaching strategy the participants did not show significant variations in biology multimedia attitudes.

Table 5

Effects on Biology Achievement as a Function of Sex and Instructional Strategy

Source	df	MS	F	Sig.	Partial Eta squared
Biology multimedia attitude					
Group	1	5183.107	217.566	.000	.707
Sex	1	2.699	.113	.737	.001
Group*Sex	1	1.705	.072	.790	.001
Error	90	23.823			

Students' Perceptions of Multimedia Attitude

The qualitative data collected from the focus group discussions (FGD) were analyzed thematically and several themes emerged as a result.

Attitudes of Students to Learning Energy Transformation

Before the intervention, the experimental and comparison groups reported that respiration and photosynthesis involved complex molecules, pathways, and different reaction centers for various stages, and that they required multiple lessons to complete a single chemical reaction. As a result, they had lack of interest in learning these abstract topics. In relation to this point, FGD participant *CS2* stated:

> Mostly, I enjoy learning biology. However, when I learn about processes like respiration and photosynthesis, it becomes complex and difficult to understand the long chain of chemical reactions. Have you considered the process of ATP formation in aerobic respiration? Completing this content took us more than three days. I began with glycolysis on the first day, followed by the transitional stage and Krebs cycle in the next session, and concluded with the electron transport chain the following day. As you can see, I started glycolysis as the first stage of cellular respiration, and by the third period, we had completed the entire chemical reaction. Have you seen how it is complex? In continuing our lessons while remembering the previous complex chemical reactions is also crucial. I tried to read my textbook and follow my teacher's explanations in the classroom, but I still faced difficulties. As a result, this interesting subject is now becoming challenging and my attitude towards learning this topic changed.

Another FGD participant (Participant ES3) described the topics respiration and photosynthesis as challenging for both students and teachers and noted that the topics need a mechanism that simplifies teaching and learning them.

Importance of the Intervention

After the intervention, the participants in the experimental group noted that interactive multimedia and DI were the most effective teaching strategies for substituting impractical laboratory activities. They emphasized that these methods helped transform abstract concepts into concrete knowledge through visual and auditory experiences, as well as mental simulations. While it is impractical to conduct hands-on experiments on glycolysis, the Krebs cycle, photosystems I and II, and the Calvin cycle in traditional biology laboratories,

simulations and animations allow us to observe these processes in action. Regarding this, FGD Participant ES4 stated: "I can't see processes like the Krebs cycle in a regular lab, but the animations made that invisible knowledge tangible". Similarly, Participant ES6 said, "The lessons showed me that technology isn't just for TikTok or movies; it actually made me excited to look up educational resources on my own."

Furthermore, interactive multimedia and DI encourage teachers to make the most of classroom time and effectively meet lesson objectives, unlike conventional teaching methods that often prioritize content coverage without addressing these critical elements. In the experimental group, all the participants were actively engaged in the lesson, showing great attention and enthusiasm. They demonstrated a higher level of engagement with the interactive multimedia and DI compared to traditional teaching approaches. This implies that multimedia effectively captured the participants' attention. Specifically, the participants explained that their classroom experience with technology-integrated learning inspired them to explore additional content and information learned in the classroom through technology, without any environmental limitations. They understood that technology offers not only games, TikTok, films, and other entertainment but also many crucial educational resources. They benefited from this teaching strategy, not only in biology but also in other subjects and in their lives in general.

Learners in the comparison group had negative attitudes to the internet to obtain additional information for the content they learned. In contrast, the experimental group benefited more from technology in their schools and homes. By using their phones, family phones, laptops, and school computers, they were able to find additional information from the internet. With this regard, Participant CS6 from the comparison group stated, "I don't really like using the internet for my biology lessons. It takes a long time to find anything useful, and mostly, when I am on the internet, I get distracted by watching social media."

Effects of Interactive Multimedia and DI on Students' BMA

In the experimental group, the use of interactive multimedia enhanced understanding of energy transformation. These digital technologies and the DI strategy proved to be the most effective techniques for teaching respiration and photosynthesis. They clarified abstract concepts, supported the realization of learning objectives, captured the participants' attention, fostered interest, and encouraged active participation. Consequently, the participants' attitudes toward learning biology had showed significant improvement when using interactive multimedia and DI. However, in the comparison group the participants stated that, all students, including high achievers, became passive and the classroom was unsuitable for learning. As a result, they either left their biology classes less motivated or were absent from respiration and photosynthesis classes. Where laboratory infrastructure is lacking, multimedia serves as an important teaching aid for complex biology content. Students learned through multimedia and DI were more attentive, engaged actively, participated eagerly in class activities, and demonstrated greater knowledge construction, making the classroom more participatory than the comparison group. Participant CS2) explained, "Respiration and photosynthesis lessons were just many lectures without visuals, making the class dull. Even the top students stopped paying attention, and many of us just skipped the periods because we weren't learning this abstract content."

Discussion

The present study revealed that multimedia-integrated instruction significantly enhanced students' Biology Multimedia Attitude (BMA), which is defined as the interest in learning biology using interactive multimedia. This improvement was evidenced by significantly higher post-test scores and positive focus group discussion (FGD) feedback in the experimental group compared to the comparison group, which utilized conventional teaching methods. Data analysis confirmed a significant enhancement in the experimental group's BMA ($p < 0.001$) with a large effect size (0.70), indicating that 70% of the variance in scores can be attributed to the interactive multimedia and differentiated instruction (DI). This substantial increase can be credited to the ability of interactive multimedia and DI to simplify abstract concepts, command student attention, foster constructive learning, and create a dynamic, technology-supported environment. Consequently, the effective use of this technology significantly enhanced students' BMA, which holds promise for boosting future academic performance.

The reasons that multimedia-integrated instruction improve learning attitudes could be due to the fact that the approach presents content in a way in which different senses are involved at a time, simplifies abstract theories, and addresses diversified learning styles. Studies further found that the use of multimedia in the teaching of photosynthesis, nervous system, fungi, genetics, human anatomy, cell division, and evolution significantly improves students' achievements compared to conventional instructional methods (Koseoglu & Efendioglu, 2015; Sukenda, 2019; Tyoor et al., 2024). Beyond improving academic achievement and attitudes of students, studies have also pointed out that multimedia-integrated instruction serves as a guide for teachers and enables students to pave the way for mastery of the different competencies in biology (Mutya & Ramas, 2022), substitute for laboratory practical activities (Rolfe & Gray, 2011), and are more effective in fostering acquisition of science process skills (Shah & Khan, 2015).

After the intervention of the two teaching strategies, there was a statistically significant difference in biology multimedia attitude (BMA) between the experimental and comparison groups. This implies that the intervention group in the posttest showed positive attitudes towards biology multimedia rather than the comparison group which similar to the work of Ercan (2014) that indicated that students could achieve better in learning biology when instruction was integrated with multimedia. In science, multimedia-integrated instruction has been shown to improve students' learning attitudes more effectively than conventional teaching methods (Shah & Khan, 2015). The reasons provided by scholars include the fact that multimedia present content visually and move dynamically, which motivate students (Sukenda, 2019), enable learners to learn by interacting with instructional tools, are more attractive, help students develop a positive attitude towards learning biology (Kareem, 2018), and boost interest, attitude and creativity (Nachimuthu, 2012). Moreover, video presentation makes it easier to explain complicated content and improve conceptual understanding and critical thinking skills (Fan et al., 2018). In fact, recent age studies have shown that students have positive attitudes toward technology that promotes their learning attitudes (Ercan, 2014; Nouri, 2016; Weng et al., 2018) .

Currently, studies show that multimedia-integrated instruction improves attitudes of learners in many of the quasi-experimental studies designed to determine its effects. Variations in magnitude across gender might be due to the variables that the investigator emphasize in the study, nature of the selected content, effectiveness of the intervention and the challenges related to controlling the impact of other extraneous variables. Due to these, contradictory findings were observed in multimedia-integrated instruction in terms of gender differential effects although the problem was the same and the same research procedures were used. In conclusion, in contrast to conventional teaching methods, multimedia and DI enhanced biology multimedia attitudes, and this finding was not affected by differences in gender.

The literature shows that gender is not as such a factor that can create a difference in learning outcomes (Cam et al., 2016). Borokhovski et al. (2018) in their meta-analysis study indicated that no significant differences existed between male and female students' attitudes toward ICT. The findings of these studies are in line with the findings of the present study. In contrast to this, Kareem (2018) found mixed findings regarding the differences in attitudes towards biology between male and female students. However, Nachimuthu (2012) revealed that female students exhibited stronger positive attitudes towards biology multimedia than male students which was statistically significant. Moreover, scholars have identified the effects of multimedia type on gender academic achievement. In this regard, Coward et al. (2012) stated that females performed better when learning from animations, while males showed better performance with static images. Other studies showed that boys were more kinesthetic and peer-oriented than girls (Honigsfeld & Dunn, 2003). These studies imply that more research should be conducted in multimedia-integrated instruction related to gender differential effects and multimedia attitudes. Generally, in the present study before the intervention students had no interest in learning respiration and photosynthesis (energy transformation) due to its complexity and abstractness of the contents. But after the intervention, students' perceptions of their attitudes towards learning these topics were improved. The reasons were multimedia and DI enhanced their BMA by simplifying the microscopic concepts.

In contrast to these findings, Kareem (2018) reported mixed results on the existence of differences in male and female students' attitudes towards biology multimedia integrated instruction. According to Nachimuthu (2012), a significant difference in attitude toward biology multimedia was observed in favor of females. This suggests that more research would be beneficial in multimedia-integrated instruction related to gender and attitudes.

Conclusions

This study demonstrates that the conventional teaching method is insufficient for rendering complex, abstract biological contents like respiration and photosynthesis accessible to secondary school students. By integrating interactive multimedia with differentiated instruction (DI), this research provides empirical evidence that student attitudes toward interactive multimedia-integrated learning can be significantly enhanced. The practical implication of these findings is that when physical laboratory infrastructure is lacking, dynamic digital simulations serve as a vital pedagogical bridge transforming passive

classrooms into highly participatory environments. Ultimately, fostering a positive attitude and perception toward interactive multimedia not only engages student attention in the short term but also serves as a critical catalyst for sustained academic interest and knowledge construction in secondary biology education.

Currently, multimedia-integrated differentiated instruction has received increased attention in teaching biology to improve students' performance. However, many educators have not fully embraced the use of interactive multimedia-integrated differentiated instruction or have not employed technology-integrated differentiated instruction effectively. Therefore, to provide quality education for respiration and photosynthesis content, implementing interactive multimedia and DI is recommended. Interactive multimedia and DI not only simplify complex concepts but also serve to enhance students' attitudes toward multimedia in learning biology. Moreover, during multimedia-integrated instruction, considering various factors related to differentiated instruction including learning styles, gender, attitudes, and achievement levels is crucial.

The study indicates that interactive multimedia and DI significantly increased student engagement with complex topics like respiration and photosynthesis. This suggests that such teaching methods can transform traditionally challenging subjects into more accessible and interesting content for students. The significant improvement in biology multimedia attitudes (BMA) among the experimental group indicates that these instructional strategies can positively influence how students feel about learning biology. This shift in attitudes may lead to increased motivation and willingness to engage with the subject matter. The results demonstrate that multimedia tools can effectively simplify complex biological concepts. This finding supports the integration of technology in education, particularly for topics that students may initially find daunting.

The study focused exclusively on the topics of respiration and photosynthesis, which may limit the applicability of its findings to other biological concepts or disciplines. Additionally, the assessment of biology multimedia attitudes (BMA) was conducted immediately after the intervention, without measuring long-term retention or sustained changes in attitudes. This omission means that insights into the lasting impact of the teaching methods remain unexplored. Furthermore; the study utilized a relatively small sample size and the study does not address potential disparities in access to technology or familiarity with multimedia tools among students, which could influence both the effectiveness of the intervention and the attitudes measured. These factors collectively restrict the broader applicability or generalizability and understanding of the study's conclusions.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this manuscript.

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Exploring the effectiveness and challenges of international educational aid in Ethiopia through the Theory of Change and the Paris Declaration lenses

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Abstract

This study explored the effectiveness and challenges of international educational aid delivered by UNESCO-Ethiopia, using the Theory of Change (ToC) and the principles of the Paris Declaration as analytical lenses. Utilizing a qualitative research approach with a descriptive case study design, data were collected through interviews with key informants from UNESCO-Ethiopia and a review of relevant policy documents. The study highlights the discrepancies and tensions between theory and practice, as identified through ToC and the principles of the Paris Declaration, including inadequate responsiveness to beneficiaries' needs, challenges in identifying chronically impoverished and highly vulnerable populations. The focus of UNESCO-Ethiopia appears to be predominantly on general education, indicating low emphasis on the transition from primary to tertiary education. Subsequently, it is suggested that UNESCO address the pressing need for tertiary education in Ethiopia to better prepare the country for the challenges of the 21st century. Moreover, the study proposes some practical measures, such as engaging beneficiaries, local communities, and stakeholders at all levels, committing to coordinated support for education, and establishing clear guidelines for goals and results to enhance the effectiveness of educational aid.

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Introduction

As reported by the World Bank, Ethiopia's Gross National Income (GNI) per capita reached USD 940 in 2021, a notable rise from USD 280 in 2008 (World Bank, 2023). Approximately 40% of the population resides in rural areas, which account for over 90% of the country's impoverished individuals, as indicated in the 2005 Plan for Accelerated Sustainable Development to End Poverty (PASDEP). Pervasive poverty significantly affects the majority of Ethiopian children, compounded by the challenges faced by vulnerable groups such as pastoralist communities, inadequate local implementation capacity, unequal gender roles, and the disparity in service delivery between urban and rural regions (UNICEF, 2018).

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Ethiopia ranked 173 out of 189 on the Human Development Index and 92 out of 95 on the Human Poverty Index (UNDP, 2021). These figures highlight the pressing issues that many interventions and initiatives aim to address, particularly the low levels of human development and high poverty rates in the country.

The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and subsequent Education Sector Development Plans (ESDP I-V) placed education at the forefront of national development, articulating a clear intent to use aid to expand access and improving quality. This policy foundation provides a critical benchmark for this study's analysis. The findings indicate that while UNESCO-Ethiopia's programs are formally aligned with these priorities, supporting goals like teacher training and improved learning outcomes, a gap persists between this strategic intent and on-the-ground implementation. The challenges identified, such as fragmented capacity development and difficulties in reaching the most vulnerable, suggest that translating the objectives of PASDEP and ESDPs into equitable and high-impact educational outcomes through aid remains a complex undertaking beyond policy alignment alone.

One of the most crucial components of global development initiatives is the provision of educational aid (UNESCO, 2021a). In contrast to the theory of change, dependency theory posits that underdeveloped nations such as Ethiopia rely heavily on foreign aid and investment from developed countries. This reliance, according to dependency theorists, not only exploits their natural resources and labor but also hinders their capacity to achieve self-reliance and autonomy (Moyo, 2009).

According to human capital theory, investing in education can enhance an individual's productivity and earning capacity, thereby contributing to economic progress and advancement (Schultz, 1961). Nevertheless, it has been disputed whether educational aid initiatives in Ethiopia are effective. According to a case study on the efficiency of aid in Ethiopia (Assefa & Admassie, 2016), a number of problems, including poor governance, corruption, and a lack of coordination among donors, have hindered the effectiveness of aid programmes in Ethiopia.

The present study, therefore, seeks to explore the effectiveness and challenges of UNESCO's educational aid implemented in Ethiopia by employing a guiding theory and evaluation framework. The guiding theory is the Theory of Change (ToC), which outlines how particular actions or programs can contribute to achieving social change goals through evidence and logical reasoning (Vogel, 2012). The framework is founded on the five key principles of the Paris Declaration (2015): ownership, alignment, harmonization, managing for results, and mutual accountability. These principles are the foundation for effective aid (Das, 2021). They ensure help does more than provide short-term fixes; it builds strong, independent educational systems that last (Klees, 2010), and measures success by the strength of its partnerships and its long-term impact.

Statement of the Problem

Ethiopia's education sector plan, introduced in 2015, seeks to enhance both the quality and equity of education for all, reflecting the characteristics of a developmental state. Developmental state theory posits that the government plays a crucial role in fostering economic and social progress by strategically intervening in key sectors and mobilizing

resources (Mkandawire, 2001). UNESCO-Ethiopia contributes to this plan by funding educational aid programs across the country. However, the effectiveness of these programs and the challenges they encounter remain unclear. This study, therefore, aims to investigate these issues through the analytical frameworks of the Theory of Change (ToC) and the principles of the Paris Declaration.

Several research gaps exist regarding the impact and challenges of international educational aid in Ethiopia. Firstly, there is a lack of empirical evidence on the effectiveness of such aid, especially on its effects on human capital development and dependency (Harris, 2021; McGillivray, 2009). Secondly, there is an inadequate understanding of how theories of human capital, dependency, and developmental states intersect and influence educational aid within the Theory of Change (Mitchell & Anderson, 2019). Thirdly, a more critical contextual analysis is needed to assess the impact and hurdles of international educational aid, taking into account the political and economic factors that shape the aid process and its outcomes (Begena, 2017). Additionally, there is a literature gap regarding the perspectives and experiences of beneficiaries and local communities directly impacted by international educational aid in Ethiopia, particularly regarding their views and involvement in aid initiatives (Assefa & Admassie, 2016; Gebremariam & Assefa, 2020).

By addressing these gaps, this study seeks to provide a thorough understanding of the effectiveness and challenges of international educational aid through the lens of the Theory of Change, considering current conditions in comparison to historical data. By analyzing developments over the past ten years (2014-2023/2024) and applying lessons learned to the present, we aim to propose insights for future improvements. This may offer valuable guidance for international organizations seeking to promote education effectively and equitably in developing countries like Ethiopia.

In this context, the study poses the following two research questions: (1) How effective has the international educational aid provided by UNESCO-Ethiopia been in enhancing the quality of education in Ethiopia? (2) What are the main challenges facing UNESCO-Ethiopia in implementing its educational aid programs?

Theoretical Framework

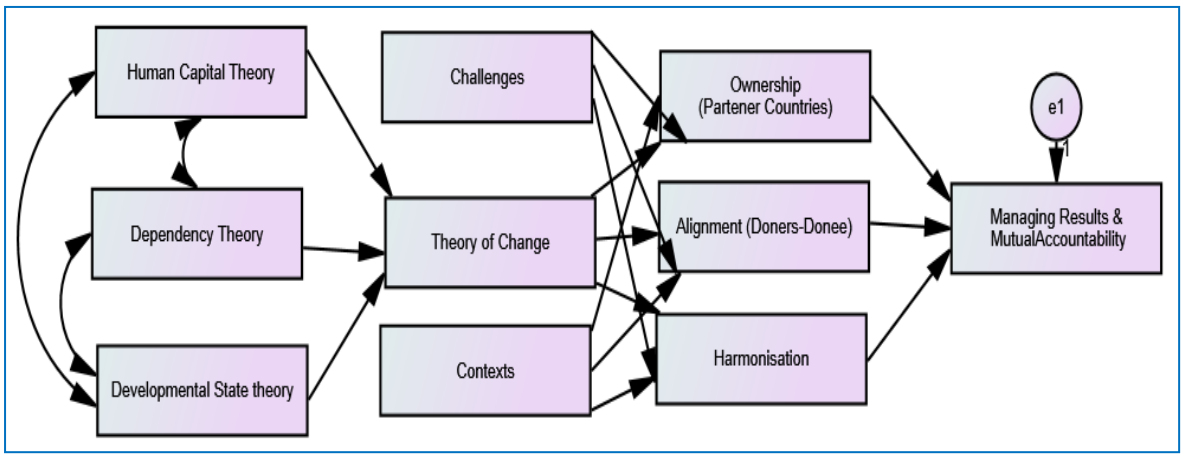
This study examines the means to enhance international educational aid in Ethiopia through a new framework that integrates the Theory of Change (ToC) with the principles outlined in the Paris Declaration. The ToC delineates how aid can facilitate social change by establishing concrete objectives, anticipated outcomes, causal relationships, underlying assumptions, and supporting evidence. In contrast, the Paris Declaration principles focus on ensuring that aid is aligned, owned, harmonized, managed, and adaptable. This new framework also takes into account the unique challenges and contextual factors involved in implementing educational aid. Figure 1 below delineates this model.

Figure 1 above illustrates how the Theory of Change can be used to understand the effectiveness of international educational aid. It demonstrates how the interconnections among ownership, alignment, and harmonization impact the management of results and mutual adaptability, while also reflecting the challenges and contexts pertinent to educational aid (Begena, 2017). Furthermore, the figure illustrates how various theoretical perspectives

(human capital, dependency, and developmental state) contribute to a holistic understanding of educational aid effectiveness (Cichos, 2021).

Figure 1

Mapping the Conceptual Framework of International Educational Aid Effectiveness in Light of the Paris Declaration Principles through Theory of Change



The human capital theory posits that investment in education enhances individuals' skills and productivity, consequently driving economic growth and development (Harris, 2021). Conversely, dependency theory contends that underdeveloped nations, such as Ethiopia, often rely on foreign aid and investment from developed countries, potentially fostering unequal power dynamics and impeding their development (Moyo, 2009). Meanwhile, developmental state theory emphasizes the government's role in nurturing industrialization, innovation, and human capital development through strategic interventions and partnerships with the private sector (Riddell, 2012; Klees, 2010).

The Theory of Change integrates these perspectives by highlighting the significance of both foreign aid and local ownership in advancing a nation's development goals. It advocates for a balanced approach among these viewpoints to achieve sustainable development through high-quality education (Mitchell & Anderson, 2019; Easterly, 2006). Additionally, the Theory of Change stresses the need to carefully assess the various challenges and circumstances that influence educational aid implementation (Rogers, 2008). By addressing these factors, the Theory of Change can effectively capture the intricate and dynamic processes affecting educational aid outcomes.

According to Mavrotas (2007), the effectiveness of aid is ultimately measured by its impact on the lives of the poor in developing countries. Nevertheless, the extensive literature on the macroeconomic effects of aid has provided limited insights on this crucial aspect and even fewer practical recommendations for policymakers and aid administrators aimed at enhancing development aid efficacy (Kim, 2015). Evaluating the extent to which aid aligns with its intended objectives is a significant indicator of its effectiveness, as suggested by Baliamoune-Lutz and Mavrotas (2009). This evaluation can be conducted at the micro level by analyzing specific outcomes of aid-funded initiatives. However, the macro-level

implications present a more complicated picture. The inconsistency in empirical literature up until the late 1990s has led to what Mosley (1987) describes as the micro-macro paradox.

Following the 2007 Senate Committee Report that criticized Canadian help for its "40 years of failure" in Sub-Saharan Africa, Moyo's (2009) book "Dead Aid" has sparked a lively discussion regarding the effectiveness of aid in Africa. Many civil society organizations in Canada and Africa also echoed similar criticisms of aid delivery, a sentiment reflected in Ethiopia.

To increase access to education and improve educational quality, several educational aid initiatives have been implemented in Ethiopia (Weldesilassie & Woldehanna, 2018). However, questions persist regarding the effectiveness of these programs in achieving their objectives, particularly in light of numerous challenges (Brautigam & Knack, 2004; Begena, 2017). To enhance the impact of educational aid initiatives and promote sustainable development, we argue, it is essential to adhere to five key principles: ownership, alignment, harmonization, results management, and mutual accountability. These principles, the authors contend, are closely connected to both the developmental state theory and the Theory of Change.

The authors argue that this study may be of great significance as it aims to provide a thorough analysis of the effects of aid on education and development in Ethiopia, underscoring the complex interplay between these dynamics. By integrating various theoretical frameworks including human capital, dependency, and the developmental state and offering a more distinct evaluation of the effectiveness of educational aid, the study is expected to better understand the Theory of Change. Additionally, by examining the challenges faced by UNESCO-Ethiopia and proposing actionable strategies, the study may contribute to the sustainability and efficiency of educational programs in alignment with the five key principles of the Paris Declaration. By consolidating insights from relevant policy documents and reflecting a decade of developmental progress, this study may serve as an invaluable resource for the course " International Development Cooperation and Project Management in Education," addressing requests from our previous postgraduate students for a clear framework to understand and evaluate educational aid from bilateral and multilateral organizations. Finally, this study can assist policymakers and practitioners in making informed decisions about educational aid in Ethiopia and similar contexts.

Methods

Research Approach and Design

The primary purpose of this study is to examine the effectiveness and challenges associated with the international educational aid implemented by UNESCO-Ethiopia. To achieve this purpose, a descriptive case study design grounded in the qualitative research approach has been employed. According to Creswell and Poth (2018), qualitative research is a systematic inquiry that seeks to develop a detailed, predominantly narrative account of a social or cultural phenomenon to guide researchers. The descriptive case study design offers a comprehensive understanding of the topic under investigation (Yin, 2018).

Population and Sample

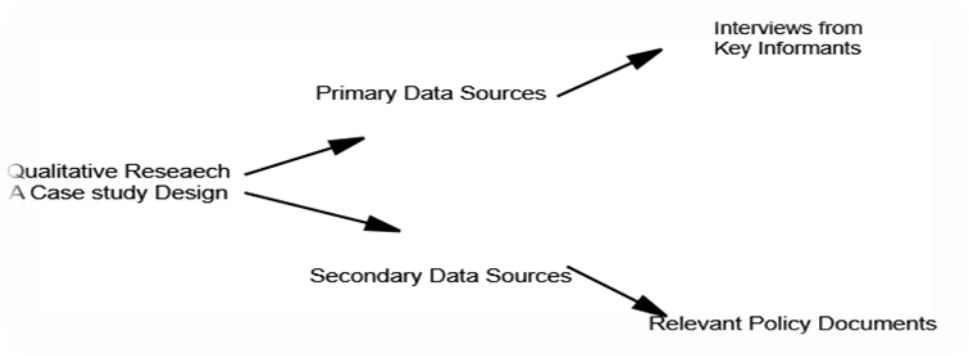
Drawing on the expertise within UNESCO-Ethiopia, this research is built on in-depth conversations with four purposefully chosen key staff members, offering a window into the operations of this vital educational aid organization. To further ensure our findings reflect the most current organizational context and direction, a dedicated effort was made to integrate and analyze recent policy documents, allowing the primary data to be contextualized and enriched by the latest strategic frameworks.

Data Gathering Methods

As illustrated in Figure 2, the data collection process in this study adheres to the fundamental principles of qualitative research, which seek to develop a comprehensive understanding of the subject under investigation. Consequently, the data essential to the study were collected both from primary sources and secondary sources.

Figure 2

Data Sources and Methods of the Study



To be specific, primary data were collected through semi-structured interviews that were conducted with four informants from UNESCO-Ethiopia. Secondary data, on the other hand, were derived from an analysis of various documents, including the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP, 2005), the national review of Education for All (EFA, 2015), the first Growth and Transformation Plan (GTP I, 2010/11-2014/15), the second Growth and Transformation Plan (GTP II, 2015/16-2019/20), GTP III, Education Sector Development Programmes (ESDPs), the Ethiopian Education Development Roadmap (2018-2030), and UNESCO's Education in Emergency Response Strategy for Ethiopia (2024/25-2028/29).

Data Analysis

The data were analyzed through thematic analysis (Braun & Clarke, 2006) to discern emergent patterns, with insights gathered from semi-structured interviews and document reviews being systematically coded and organized into five primary themes aligned with the Theory of Change (Rogers, 2008) and the principles of the 2005 Paris Declaration, while also integrating the challenges encountered by UNESCO-Ethiopia in implementing educational aid as a distinct, cross-cutting thematic concern.

Ethical Considerations

To safeguard the privacy and confidentiality of the research participants (interviewees) in this study, their identities are not disclosed (Creswell & Poth, 2018). Instead, pseudonyms such as David, Martha, Mohammed, and Akpan have been assigned to them. These names reflect the diverse cultural backgrounds and experiences of individuals involved in or impacted by educational aid programs in Ethiopia. In doing so, efforts were made to conduct the study in an ethical, respectful, and engaging manner (Patton, 2015).

Results

Effectiveness of International Educational Aid by UNESCO-Ethiopia

Alignment

The Paris Declaration on aid effectiveness highlights alignment as a fundamental principle. In the context of Ethiopia, this principle is essential to ensuring that educational aid programs align with the country's vision and policies.

As the data obtained through document analysis revealed, over the past decade (2014-2023/2024), Ethiopia has made substantial strides in aligning its educational aid programs with national development strategies. This commitment is reflected in various policy documents. For example, the Ethiopian Education Development Roadmap (2018-2030) outlines transformative initiatives designed to address the educational demands of the 21st century while supporting Ethiopia's broader socio-economic growth and industrialization objectives.

Quantitative and qualitative evidence support this alignment. For instance, the Education Sector Development Programme V (ESDP V, 2015-2020) explicitly prioritized alignment with the second Growth and Transformation Plan (GTP II), directing over 70% of its foreign-aid-funded projects toward national priority areas such as curriculum reform, teacher training, and technical and vocational education (TVET) (Ministry of Education, Ethiopia, 2015). Furthermore, an independent review by the Overseas Development Institute (ODI) noted that between 2018 and 2021, the proportion of education aid channeled through government systems, a key indicator of alignment, increased from 45% to approximately 60% in Ethiopia, surpassing the average for sub-Saharan Africa (Barder & Rogerson, 2022). This shift demonstrates a growing donor commitment to using national frameworks. Additionally, UNESCO-Ethiopia's Country Programme Document (2022-2025) is structurally mapped to the GTP III and the United Nations Sustainable Development Cooperation Framework (UNSDCF) for Ethiopia; ensuring programmatic activities directly contribute to national targets in inclusive quality education and skills development (UNESCO, 2021b).

Most importantly, the two key national development documents, the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and the third Growth and Transformation Plan (GTPIII), emphasize the necessity of aligning educational aid initiatives with Ethiopia's national priorities.

The GTP III (2020-2025) identifies education as a foundational pillar for becoming a lower-middle-income country, specifically aligning aid objectives with strategic goals like increasing the gross enrollment ratio in higher education to 20% and enhancing digital

literacy (National Planning Commission, Ethiopia, 2020). An analysis of donor portfolios by the Ethiopian Ministry of Finance shows that, as of 2023, more than 80% of bilateral and multilateral education support was reported as "on-priority," meaning it was directly linked to GTP III or ESDP VI objectives (Ministry of Finance, Ethiopia, 2023). This represents a significant improvement from a decade prior, when fragmented project-based aid was more common. Scholarly analysis corroborates this trend, with studies indicating that the establishment of strong sector-wide coordination mechanisms (Yizengaw, 2004), like the Joint Sector Review (JSR), has been instrumental in improving policy dialogue and aligning donor interventions with the government's Education Sector Plan (ESP) (Beyene, 2019).

To understand the implementation of this fundamental principle of the Paris Declaration in the educational aid programs offered by UNESCO-Ethiopia, interviews were conducted with four members of the organization. The participants were asked to share their perspectives on how well the educational aid programs align with Ethiopia's national development strategies and priorities, as well as their impact on enhancing the quality of education in the country.

The results from these interviews indicate that the principle under discussion has been fairly practiced. Specifically, three of the interviewees, Akpan, Martha, and Mohammed, expressed opinions that affirm that international educational aid aligns well with Ethiopia's national development initiatives and policies.

On the other hand, David shared a different perspective. In this regard, he noted that capacity development initiatives supported by development partners often appear fragmented in terms of their alignment. This participant's insights highlight critical challenges, suggesting that alignment can sometimes be hindered by the dependency dynamics between aid providers and recipient countries.

While strategic alignment between educational aid and national policies is evident and well-documented (Beyene, 2019), its operational execution often falters, revealing a persistent implementation gap where donor-driven initiatives fragment against local systems (Moyo, 2009; Whitfield, 2009). This contradiction exposes a core tension in aid effectiveness: the enduring divide between the rhetoric of partnership and the realities of dependency (Weldesilassie & Woldehanna, 2018).

Ownership

Ownership is another fundamental principle of the Paris Declaration on aid effectiveness. It emphasizes the responsibility of partner countries to lead their own development initiatives and to design, implement, and monitor development aid programs.

A thorough analysis of relevant documents reveals the government's progress between 2014 and 2023/2024, highlighting its emphasis on ownership through the establishment of priorities and policies for the education sector. In this regard, the Ethiopian Education Development Roadmap (2018-2030) is found to be relevant, demonstrating the Ethiopian government's commitment to ownership as follows:

For instance, the Roadmap was developed through an extensive, government-led consultative process involving federal and regional education bureaus, universities, and domestic stakeholders, rather than being drafted by donors (Ministry of Education, Ethiopia, 2018). Furthermore, it institutionalizes ownership by mandating that all external support be

channeled through the government's single treasury account and aligned with the national planning and budget cycle, a system strengthened under the Education Sector Medium Term Expenditure Framework (ESMTEF). A review by Organization for Economic Cooperation and Development (OECD) (2021) noted that Ethiopia's use of country systems in the education sector increased from 52% to 68% between 2017 and 2020, a key indicator of ownership. The Roadmap also establishes a government-chaired Joint Technical Review Committee responsible for approving, monitoring, and evaluating all donor-supported programs, to ensure they address nationally identified gaps (FDRE, 2018).

The interview data, however, brought different viewpoints. During interviews, the participants were asked to share their thoughts on the commitment of partner countries to take ownership of their development initiatives and lead the design, implementation, and monitoring of programs aimed at enhancing the quality of education. Two respondents, Martha and Mohammed, indicated that the principle of ownership is being practiced effectively.

Martha explained that we have seen a significant shift. The government now chairs all sector coordination meetings and has the final say in the annual work plans. For example, in the curriculum reform program, the syllabi and teacher guides are developed by Ethiopian experts at the Ministry and the Education Strategy Centre, with partners like us playing a technical support role. The budget is also increasingly managed through their system. Mohammed added that ownership is visible in how priorities are set. The current focus on digital education and secondary education led to the expansion of GTP III, which came directly from the government's analysis. Our role at UNESCO is to backstop their vision, not to bring in our own separate agenda. The established government-led thematic working groups are a practical example of this ownership in action.

In contrast, Akpan and David expressed uncertainty regarding this issue. In this regard, Akpan stated, "There needs to be more research on the fact that development aid programs are typically designed, executed, and monitored by donors rather than the recipients." Similarly, David shared, "In my experience, it is the donor who drives the program".

From these perspectives, it appears that recipients are not viewed as equal partners in sharing the responsibilities involved in implementing educational aid programs.

Harmonization

Harmonization, as articulated in the Paris Declaration on aid effectiveness, prioritizes coordinating of aid programs among various donors and development partners. This principle aims to ensure that aid initiatives are consistent and synergistic, effectively preventing duplication and fragmentation. Using interviews and document analysis, this study has attempted to evaluate the state of this principle within the context of Ethiopia.

During the interviews, participants were invited to share their experiences regarding the implementation of this essential principle in Ethiopia. Accordingly, most interviewees indicated that their aid programs were well-aligned with those of other donors operating in the country. They further asserted that this coordinated and harmonized educational assistance has significantly enhanced the quality of education in Ethiopia.

However, interview and documentary evidence also point to persistent challenges in harmonization. One interviewee noted that, despite high-level coordination forums such as the Education Sector Working Group, duplication of efforts still occurs at the sub-national level, particularly in regions with multiple parallel donor projects (Personal communication, October 2023). A review of project reports from 2020–2023 indicates that while strategic frameworks are harmonized, implementation modalities such as teacher training approaches, monitoring tools, and procurement systems often remain donor-specific, leading to fragmentation on the ground (Ministry of Education, 2022b).

Furthermore, document analysis reveals that the proliferation of emergency-focused initiatives, such as those for internally displaced persons, has at times created coordination silos, where humanitarian and development actors operate with separate reporting lines and funding cycles, undermining sector-wide harmonization (UNICEF & UNESCO, 2022).

In essence, while harmonization efforts have improved strategic coordination and reduced policy-level fragmentation, operational harmonization remains inconsistent. Continued attention to aligning implementation practices, strengthening government-led coordination mechanisms, and integrating humanitarian and development planning is essential to fully realize the harmonization principle in Ethiopia's education sector.

Results Management

The principle of managing for results, a cornerstone of the Paris Declaration on aid effectiveness, underscores the necessity for aid programs to be designed and implemented with a clear emphasis on achieving measurable results and outcomes. This principle embodies the essence of the theory of change, a framework emphasizing the need to dream, act, learn, and improve social change projects, while clarifying goals, the pathways to reach them, and the crucial factors influencing success (Vogel, 2012).

In this study, we sought to explore how this principle has been applied in Ethiopia through interview data. Hence, participants were prompted to reflect on whether educational aid programs in Ethiopia have been designed to achieve measurable results and outcomes that contribute to enhancing the quality of education in the country.

Accordingly, all four interviewees Martha, Mohammed, Akpan, and David acknowledged that the principle of managing for results, as articulated in the Paris Declaration, has been fairly implemented.

Martha explained: "We've moved away from simply counting inputs like textbooks distributed or teachers trained. Now, each program has a results framework linked to national indicators, such as improvements in Grade 4 reading fluency or secondary school completion rates. Our recent Girls' Education Initiative, for example, tracks not just enrollment but retention and learning outcomes over three years." Mohammed added, "The shift is clear in our reporting cycles. We now conduct joint annual reviews with the Ministry, where we assess outcomes, not just activities. If a target isn't met, we revise the approach; it's about adaptive management." Akpan supported this view but noted a qualification: "While results frameworks are in place, sometimes the indicators are still donor-driven. That said, the focus on measurable change, like reducing dropout rates in priority regions, is real and has improved accountability." David concurred on the structural shift: "The entire sector is more outcome-oriented. For instance, the national learning assessment system now directly informs

where we target remedial support. Programs are designed with clear theories of change from the start."

The above qualitative data suggest that educational aid programs in Ethiopia have been developed and implemented with a clear focus on improving educational quality and achieving tangible improvements in student learning outcomes.

Accountability

Mutual accountability is another fundamental principle of the Paris Declaration on aid effectiveness. It emphasizes shared responsibility between donors and partner countries for the outcomes of aid programs. The principle suggests that mutual accountability enhances educational outcomes by fostering trust, transparency, ownership, alignment, harmonization, result orientation, and mutual learning among stakeholders. To monitor and evaluate the progress and effectiveness of mutual accountability, various tools and mechanisms could be used. These include joint reviews, performance assessment frameworks, and mutual feedback surveys.

Against this backdrop, the present study attempts to explore the role of mutual accountability within the Ethiopian context. During interviews, research participants were invited to share their views on how this principle has been applied in the implementation of educational aid programs of UNESCO-Ethiopia in Ethiopia, and its contributions to enhancing the standard of education in the country. The participants, including Mohammed, Akpan, and David, noted that shared accountability has been adequately practiced and contributed significantly to improving educational quality in Ethiopia. They also emphasized that collaborative efforts have been made to ensure these programs are designed and implemented to yield measurable improvements in educational quality.

Akpan explained that we now have structured platforms like the Education Sector Annual Joint Review, where the Ministry and all development partners present their progress against the same set of indicators. The Ministry assesses our contributions, but we also provide feedback on government leadership and system bottlenecks. It's a two-way evaluation. David added that the introduction of mutual accountability frameworks, like the one used in the General Education Quality Improvement Program, has formalized shared responsibility. Donors commit to predictable funding and technical support, while the government commits to policy implementation and data transparency. I've seen this improve program coherence and reduce blame-shifting.

In contrast, Martha reflected a differing perspective, pointing out that, in practice, donors and recipients often do not share equal responsibility in the delivery of educational aid. She further asserted that the issue of accountability is frequently overlooked in donor-beneficiary relationships, indicating a pressing need for further research to address this discrepancy.

Mohammed, Akpan, and David's positive views align with documented formal mechanisms of accountability. For instance, the Ethiopian Education Sector Medium-Term Expenditure Framework (MTEF) Performance Assessment Framework includes mutual assessment matrices where both government and donors are scored on their commitments (Ministry of Education, 2022a). Annual Joint Review reports from 2020–2023 consistently show agenda items dedicated to donor performance feedback from the government side,

indicating a structured, bidirectional review process (Education Sector Working Group, 2023).

However, Martha's critical perspective points to gaps in substantive equity and downward accountability. Document analysis reveals that while mutual review mechanisms exist, the evaluation criteria and reporting templates are still largely designed and owned by donors (OECD, 2021). Furthermore, government reports note that donor accountability often focuses on financial disbursement and output delivery to headquarters, rather than responsiveness to local contextual challenges or community-level impact (Ministry of Finance, 2023). This creates an asymmetry: the government is held accountable for results, while donors are primarily accountable to their own institutions.

Hence, mutual accountability in Ethiopia operates effectively at the technical and procedural level, fostering collaboration and transparency among partners. Yet, it remains unequal in terms of power and agenda-setting. True mutual accountability requires not only shared review meetings but also shared control over evaluation frameworks, indicators, and consequence management. Future efforts should aim to balance the formal architecture of accountability with more equitable participation in its design and enforcement.

Challenges Encountered by UNESCO-Ethiopia in Implementing Educational Aid

Needs Assessment and Beneficiary Engagement: A recurring challenge identified in interviews is the difficulty of accurately recognizing and responding to the contextualized needs of beneficiaries. As noted by the interviewees, there is often a significant gap between program design and on-the-ground realities, attributable to power imbalances and information asymmetries that limit meaningful beneficiary participation in the planning process. This suggests that while UNESCO-Ethiopia engages in needs assessments, the mechanisms for ensuring local voice and ownership in identifying and prioritizing those needs may be insufficient. Document reviews of national plans such as the PASDEP and GTP II & III corroborate that top-down planning approaches have historically been a systemic constraint in the sector, affecting how well externally supported programs can be locally adapted.

Targeting the Most Vulnerable: Interview data consistently highlighted the operational challenge of ensuring access and quality for the most vulnerable groups, particularly women and girls in remote and emergency-affected regions. Participants highlighted the practical difficulty in identifying and reaching these populations due to mobility constraints, social norms, and insecure environments. This is less a criticism of UNESCO-Ethiopia's intent and more a reflection of the complex operational environment in which it works. National documents, such as the Education Sector Development Plans, acknowledge these systemic barriers, indicating that UNESCO-Ethiopia's challenges in this area are intertwined with broader institutional and socio-economic constraints within the country.

Modality and Sectoral Focus: All interviewees indicated that UNESCO-Ethiopia's aid modality is predominantly technical assistance, such as curriculum development, teacher training, and provision of educational equipment, rather than direct financial aid. Furthermore, respondents observed that the organization's focus is heavily weighted toward general education, meaning primary and secondary levels, with relatively less emphasis on tertiary education. This represents a programmatic limitation regarding sectoral balance.

While this focus aligns with national priorities for foundational learning, it may constrain the organization's contribution to higher-order outcomes (Hillman & Tandberg, 2019), such as advanced skills development, research capacity, and innovation, which are critical for long-term socio-economic transformation as outlined in the national Growth and Transformation Plans.

Systemic and Contextual Constraints: Document analysis further reveals that UNESCO-Ethiopia operates within a landscape marked by systemic constraints that inevitably affect implementation. These include coordination complexities within the crowded donor landscape, dependency on government systems for delivery, and contextual factors such as regional instability and displacement. Rather than UNESCO-Ethiopia itself, external factors affect and sometimes restrict the effectiveness and scalability of the organization's operations.

In summary, UNESCO-Ethiopia encounters a number of challenges when providing educational support. These include internal programmatic limitations related to needs assessment, beneficiary engagement, and sectoral focus, as well as external operational constraints stemming from Ethiopia's complex educational landscape and systemic barriers. These findings highlight the space between organizational intent and implementation reality, underscoring the need for adaptive management and stronger feedback mechanisms to enhance the relevance and impact of UNESCO-Ethiopia's educational aid.

Discussion

The main purpose of this study was to examine the effectiveness of UNESCO-Ethiopia's educational aid programs through the dual lenses of the Theory of Change (ToC) framework and the Paris Declaration on Aid Effectiveness (PDP) principles, a methodological approach increasingly employed to bridge normative ideals with practical implementation pathways (Vogel, 2012; OECD, 2005). The findings reveal a strong formal alignment between UNESCO-Ethiopia's programs and national strategies, reflecting Ethiopia's documented progress in integrating donor support into frameworks such as the Education Sector Development Plans (Beyene, 2019). However, this formal alignment is contrasted with operational misalignment, particularly evident in fragmented capacity development initiatives, underscoring the well-documented global phenomenon in which donor procedures undermine national systems despite high-level policy agreement (Whitfield, 2009; Booth, 2012). This disconnect, corroborated in the Ethiopian context by Weldesilassie and Woldehanna (2018), represents a critical blockage in the ToC implementation pathway, demonstrating how the assumption that strategic alignment leads to coherent action is disrupted by enduring structural asymmetries, a challenge widely noted across Sub-Saharan Africa (Moyo, 2009; Mosse, 2005).

Similarly, the principle of ownership presents a duality, with the Ethiopian government demonstrating clear leadership in policy formulation yet facing constraints in program execution, a pattern mirrored in other aid-recipient countries such as Ghana and Rwanda, where ownership is strong in design but limited in practice (Whitfield, 2009). In Ethiopia, this is confirmed by research from Admassu (2020), which notes that donor influence remains pronounced in technical assistance and budgeting processes despite

government-led sector planning. This limitation directly affects the "act" and "learn" phases of the ToC, constraining the local agency and adaptive learning that Vogel (2012) identifies as essential for sustainable change.

Reported progress in harmonization and a shared focus on measurable results reflects Ethiopia's advanced donor coordination architecture, consistent with positive assessments by the OECD (2012). This mirrors findings from Tanzania and Mozambique, where harmonization has been shown to improve efficiency without necessarily addressing deeper systemic issues (Carlitz, 2013; Perez et al., 2012). In Ethiopia, despite improved coordination, persistent challenges such as low enrollment and high dropout rates (UNESCO, 2021b) indicate that harmonization and results-based management are necessary but insufficient for transformative outcomes, aligning with global critiques of the "indicator tyranny" that can divert attention from complex qualitative improvements (Merry, 2019). Furthermore, structural barriers such as poverty and infrastructure gaps highlight the limitations of the ToC in fragile contexts, where systemic constraints can overwhelm even logically sound pathways, as emphasized in research on conflict-affected states (Novelli et al., 2017).

The tension between structured joint reviews and perceptions of unequal responsibility is also well documented, with studies from Malawi and Uganda showing that accountability mechanisms often reinforce upward accountability to donors rather than fostering genuine mutual responsibility (Molenaers et al., 2015; Hickey, 2013). In Ethiopia, research by Feyissa (2011) confirms that agenda-setting and evaluation criteria within mutual review forums remain donor-dominated. This asymmetry undermines the trust and shared learning that Eyben (2006) identifies as foundational to adaptive management and to transformational rather than transactional partnerships.

Overall, this study illustrates that while the PDP and ToC provide valuable normative and analytical frameworks, their implementation in Ethiopia reveals a persistent rift between procedural adoption and substantive transformation, supporting broader critiques that technical approaches often overlook deeper political economy constraints (Mosse, 2005; Andrews et al., 2017). The findings indicate that future applications of the ToC in complex environments must more explicitly integrate political economy analysis and power-aware approaches, as advocated by Booth and Unsworth (2014), to realistically assess underlying assumptions. Ultimately, the effectiveness of educational aid in Ethiopia depends less on further refining principles and more on addressing the root causes of power asymmetries and institutional fragmentation, necessitating a shift from technical cooperation to more politically engaged, context-sensitive partnerships, a direction increasingly supported in both Ethiopian and international scholarship (Weldesilassie & Woldehanna, 2018; Gulrajani & Swiss, 2020).

Conclusions

This study explored the effectiveness of UNESCO-Ethiopia's educational aid programs through the analytical lenses of the Paris Declaration Principles (PDP) and the Theory of Change (ToC) framework. The findings present that UNESCO-Ethiopia has demonstrated procedural effectiveness by establishing strong formal alignment with national strategies, participating in donor harmonization efforts, and implementing results-based

management frameworks. However, the study reveals a significant gap between this procedural compliance and substantive effectiveness. Critical principles such as genuine country ownership, equitable mutual accountability, and deep contextual alignment are often compromised in practice. This is evidenced by fragmented implementation, power asymmetries in decision-making and a continued disconnect between program designs and on-the-ground beneficiary needs. Consequently, while UNESCO-Ethiopia's aid contributes to system strengthening and capacity building, its effectiveness in catalyzing transformative improvements in educational quality and equity, particularly for the most vulnerable, remains limited by the very aid architecture within which it operates.

Based on the study's findings, UNESCO-Ethiopia's educational aid programs have contributed to enhancing the quality and equity of education in Ethiopia, particularly through improved alignment with national development strategies, efforts toward harmonization among donors, and a focus on managing for measurable results. However, the effectiveness of these programs is constrained by persistent challenges, including gaps in beneficiary engagement, inadequate responsiveness to local needs, and a predominant focus on general education at the expense of tertiary education. These limitations highlight disconnect between the principles of the Paris Declaration ownership, alignment, harmonization, results management, and mutual accountability and their practical implementation in the Ethiopian context.

Limitations of the Study

Designed as a responsive academic resource, this study operated within intentionally defined parameters. Its investigation was grounded in qualitative dataset derived from the authors' earlier doctoral coursework. A central scholarly undertaking has been to critically synthesize this foundational material with current literature and policy analysis, thereby situating historical insights within modern discourse. A key interpretive constraint remains that the primary interview narratives originated from a prior academic period and may not be temporally aligned with the current context.

Furthermore, the research was conducted to address a defined academic need. It was initiated by graduate students in the course "International Development Cooperation and Project Management in Education," who highlighted a critical lack of specialized reference material on educational aid within Ethiopia. Although studies on general development aid are prevalent, analyses that focus specifically on the mechanisms, outcomes, and challenges of aid in the education sector remain limited. Consequently, this study prioritizes depth over breadth, offering a detailed archival case and a synthesized resource rather than an expansive, nationwide empirical study. Thus, this study positions itself as a targeted academic intervention. Its principal contribution is to bridge historical insights with contemporary analysis, creating a concrete, context-specific reference. This fulfills a pressing need for localized teaching materials and provides a foundation for future, more extensive research into educational aid in Ethiopia.

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The essence of this study is rooted in the experiences generously shared with us years ago. We extend our deepest gratitude to each participant who devoted their time and insight during the interviews. Their words form the invaluable archival foundation upon which this work stands, and for that, we remain sincerely thankful.

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The trend of investigating teachers' pedagogical knowledge in Ethiopian education: A narrative review study

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Abstract

Teachers' pedagogical knowledge is widely acknowledged as central to effective teaching and student success. International scholarship, especially Shulman's framework, highlights three dimensions: content knowledge (CK), pedagogical content knowledge (PCK), and general pedagogical knowledge (GPK). While PCK has attracted global attention, GPK remains less explored. In Ethiopia, research on pedagogical knowledge is still developing. This narrative review examined 20 publications produced between 1986 and 2024 to map trends, strengths, and gaps in Ethiopian teacher education research. A systematic search was conducted across international databases (Google Scholar, ERIC, Scopus, PubMed, PsycINFO, EBSCO host, Social Science Index, Web of Science) and local Ethiopian journals. Studies were included if they explicitly addressed teachers' pedagogical knowledge in Ethiopia. Screening was performed by two reviewers, applying consistent inclusion and exclusion criteria, with methodological quality assessed using a structured extraction form. The findings showed Ethiopian research was fragmented, often treating pedagogy as general instructional practice rather than a professional knowledge base. PCK dominated, while GPK was rarely studied. Interestingly, a newly emerging pedagogical-variant framework has appeared in recent studies. This imbalance mirrors global trends but is especially concerning in Ethiopia, where GPK is vital for tackling challenges such as large classes, diverse learners, and limited resources.

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Introduction

Teachers are universally acknowledged as the most significant contributors to student learning outcomes and the overall quality of education (Darling-Hammond, 2010; Engida et al., 2024; Murray, 2021; Ulferts, 2019; Ventista & Brown, 2023). They are expected not merely transmit knowledge, but also orchestrate classroom interactions, foster environmental

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conduciveness for growth, and influence both academic achievement and personal development (Berliner, 2004; Loewenberg Ball et al., 2008).

Teacher-effectiveness depends largely on their knowledge base, which encompasses subject-matter or content knowledge (CK), pedagogical content knowledge (PCK), and general pedagogical knowledge (GPK). Together, these dimensions form the foundation of professional teaching competence (Baumert & Kunter, 2006; Kunter et al., 2013; Shulman, 1987).

Globally, Shulman himself (Shulman, 1987) has revolutionized thinking about teacher knowledge by introducing the concept of PCK, describing it as a "special amalgam" of subject matter and pedagogy. His framework emphasized that effective teaching requires more than mastery of content; it requires the ability to transform content into forms accessible to learners. Later scholarship expanded this framework to include GPK, which refers to principles of teaching and learning that apply across subjects, such as classroom management, instructional design, assessment, and equity-oriented practices (Baumert & Kunter, 2006; Guerriero, 2017; König et al., 2014). Research has demonstrated that both PCK and GPK contribute significantly to student achievement, with GPK playing a particularly important role in adapting instruction to diverse learners and contexts (Baumert & Kunter, 2006; Guerriero, 2017; König et al., 2014; Schneider & Plasman, 2011; Voss et al., 2011).

Despite this recognition, GPK has often been overshadowed by subject specific pedagogy in international research. In many contexts, teacher education programs emphasize content delivery and subject specific instructional strategies, while neglecting the general principles that underpin effective teaching across disciplines. This imbalance has implications for classroom practice, as teachers may be well prepared in subject matter but less equipped to manage diverse classrooms or apply general pedagogical strategies.

In Ethiopia, research on pedagogical knowledge remains limited and fragmented. Much of the available literature focuses on subject specific pedagogy, particularly in English language teaching, science, and mathematics. While these studies provide valuable insights into classroom practices, they rarely address GPK explicitly. Teacher preparation programs often emphasize content delivery, with less attention to general principles of pedagogy. This reflects a broader trend in which PCK is prioritized while GPK is overlooked, leaving a significant gap in the literature. The purpose of this review is to provide a narrative synthesis of existing studies on pedagogical knowledge in Ethiopian education. Specifically, the review seeks to:

1. Summarize how pedagogy is conceptualized in Ethiopian educational contexts.
2. Identify trends in research on pedagogical knowledge.
3. Examine the emphasis placed on Shulman's framework (CK, PCK, and GPK).
4. Assess the extent to which GPK has been studied in Ethiopian education.

By mapping existing research, this review aims to highlight strengths, weaknesses, and gaps in the literature. The findings are intended to inform researchers, policymakers, and practitioners, and to support evidence-based improvements in teacher education and professional development. In doing so, the study contributes to a clearer understanding of how pedagogical knowledge is addressed in Ethiopia and underscores the need for greater attention to GPK in both research and practice.

Literature Review

Effective teachers are expected not only to transmit knowledge but also to actively orchestrate classroom interactions, cultivate environments conducive to growth, and influence both academic achievement and personal development (Berliner, 2004; Darling-Hammond, 2010). Research on effective teaching underscores this active duty. For example, Berliner (2004) documents the observable behaviors and accomplishments of expert teachers, showing how their daily practices shape student outcomes. Similarly, Ball et al. (2008) highlight the distinctive nature of content knowledge for teaching, emphasizing how teachers enact specialized knowledge in practice to foster learning. Complementing these perspectives, Hattie (2008) synthesizes over 800 studies in a meta-analysis to demonstrate that teachers' active engagement in setting clear goals, providing feedback, and structuring classroom experiences has one of the most significant impacts on student achievement. Building on this, Darling-Hammond (2010) argues that teachers' ability to fulfill these duties depends on robust preparation and ongoing professional development, which cultivate the pedagogical knowledge necessary to connect theory with practice. Together, these works reinforce the view that teachers' responsibilities extend far beyond knowledge transmission, encompassing the active orchestration of learning environments that shape both academic and personal development.

According to Shulman (1986b), modern pedagogical knowledge represents the distinctive dimension of teacher expertise that integrates subject matter with instructional skill. This integration forms the foundation that enables teachers to fulfill their active duties effectively. His framework has profoundly shaped how teacher preparation, professional development, and classroom practice are conceptualized worldwide (Guerriero, 2017; Ulferts, 2019). Shulman's early work reframed teacher expertise as a multidimensional construct. In his influential article "Those Who Understand: Knowledge Growth in Teaching," he argued that pedagogical knowledge is the distinctive foundation of teaching, integrating subject matter with instructional skill to enable teachers to fulfill their professional duties effectively (Shulman, 1986b). This insight challenged the prevailing dichotomy which separated content mastery from that of pedagogy. Nowadays, his framework has profoundly shaped how teacher preparation, professional development, and classroom practice are conceptualized worldwide (Darling-Hammond, 2010; Guerriero, 2017; Ulferts, 2019).

Teachers' pedagogical knowledge is widely recognized as a cornerstone for effective teaching and student success. Shulman's seminal works (Shulman, 1987) introduced the concept of pedagogical content knowledge (PCK), emphasizing the integration of subject-matter expertise with instructional strategies. His framework highlighted that effective teaching requires not only mastery of content but also the ability to transform that content into forms accessible to learners. Later scholarship expanded this framework to include general pedagogical knowledge (GPK), which refers to principles of teaching and learning applicable across subjects, such as classroom management, instructional design, assessment, and equity-oriented practices (Baumert & Kunter, 2006; König et al., 2016; Leijen et al., 2022). Together, PCK and GPK form the foundation of professional teaching competence and remain central to international debates on teacher education (Guerriero, 2017).

Globally, research has demonstrated that both PCK and GPK contribute significantly to student achievement. Teachers with strong GPK are better able to adapt instruction,

manage classrooms, and support learning across disciplines (Evens et al., 2016; Schneider & Plasman, 2011). For example, Baumert and Kunter (2006) found that GPK plays a critical role in classroom management and instructional quality, while König et al. (König et al., 2014) emphasized its importance in teacher education programs. More recent empirical studies confirm that teachers' pedagogical knowledge directly influences student outcomes in science and mathematics (Guerriero, 2017; Ulferts, 2019). Despite this recognition, GPK has often received less attention than subject-specific pedagogy, leading to an imbalance in teacher education research (Sonmark, 2017).

In Ethiopia, research on pedagogical knowledge remains limited and fragmented. Much of the available literature focuses on subject-specific pedagogy, particularly in English language teaching, science, and mathematics (Getu & Teka, 2018; Mihiretie, 2023). While these studies provide valuable insights into classroom practices, they rarely address GPK explicitly, reflecting a broader trend in which PCK is prioritized while GPK is overlooked (Gemeda & Tynjälä, 2015; Herut & Setlhako, 2025). These studies often describe the difficulties teachers face in implementing effective pedagogy but do not systematically investigate GPK.

As a result, the literature generally provides a fragmented picture of pedagogical knowledge in Ethiopia, with limited analytical depth and weak integration into broader theoretical frameworks. This scarcity of GPK research creates a significant gap, limiting policymakers' ability to design evidence-based reforms and practitioners' ability to apply comprehensive pedagogical strategies in diverse classrooms.

Methods

Review Design

This study employed a narrative review approach to examine research on teachers' pedagogical knowledge in Ethiopia. Unlike meta-analysis, which statistically aggregates findings, a narrative review synthesizes studies qualitatively, allowing for thematic analysis and identification of trends, strengths, and gaps (Sylvester et al., 2013). This design was chosen because the available literature is limited and heterogeneous, making narrative synthesis more appropriate.

The purpose of this narrative review was to examine research trends related to pedagogical knowledge within the Ethiopian education system. A narrative review methodology was employed to investigate how teachers' pedagogical knowledge has been studied, conceptualized, and applied. As outlined in the objectives, this review synthesizes evidence from internationally recognized journals and accredited Ethiopian publications, covering the period from Shulman's seminal work on pedagogical knowledge (1986a) to the present.

This approach was chosen to address the review questions by thematically summarizing findings across heterogeneous study designs, rather than statistically aggregating results as in a meta-analysis. The review sought to close identified gaps by systematically mapping model-type and the trend followed to conduct research on pedagogical knowledge in Ethiopia-particularly on Content Knowledge (CK), Pedagogical Content Knowledge (PCK), General Pedagogical Knowledge (GPK).

Review Questions

- **RQ1:** How is pedagogy conceptualized within the Ethiopian educational context, and what theoretical frameworks are most commonly applied?
- **RQ2:** To what extent, and in what ways, is pedagogical knowledge empirically examined in Ethiopia's education system?
- **RQ3:** Which dimensions of Shulman's theory of teacher knowledge (CK, PCK, or GPK) are emphasized in Ethiopian research studies, and which remain underexplored?
- **RQ4:** How extensively is General Pedagogical Knowledge (GPK) investigated within Ethiopian educational research, and what methodological approaches are used?

Search Strategy

Following PRISMA guidelines, the review process included:

a) identification of studies through structured searches in Google Scholar, ERIC, Scopus, Web of Science, and accredited Ethiopian journals;
b) screening based on inclusion and exclusion criteria;
c) eligibility assessment; and
d) final inclusion of 25 studies. Full search strings, Boolean operators, and exact search dates (2000 through to 2024) are reported in the PRISMA flow diagram. Studies were included if they were empirical, peer reviewed, and focused on Ethiopian teacher knowledge models; conceptual papers, editorials, and non-empirical reports were excluded.

Quality appraisal was conducted using the (MMAT) Mixed Methods Appraisal Tool (Hong et al., 2018). Each study was assessed for methodological rigor, and appraisal scores were used to weight interpretations of findings. Two reviewers independently coded the studies, with inter rater reliability established (Cohen's k = 0.82). Coding was inductive, allowing themes to emerge across diverse study designs. Discrepancies were resolved through discussion, ensuring transparency and consistency in data extraction.

A comprehensive search was conducted across multiple electronic databases, including local journals as well. Keywords and search strings combined terms such as "pedagogy," "pedagogical knowledge," "general pedagogical knowledge," "teacher knowledge," and "Ethiopia." Boolean operators (AND, OR) were also used to refine searches, ensuring inclusion of both international and local terminology.

Inclusion and Exclusion Criteria

The review synthesized three clusters of studies, each examined to determine their focus on pedagogical knowledge models and the extent of emphasis placed on these models. The procedural quality of each study was independently assessed by two reviewers, and data extraction followed a pre-designed criterion to ensure consistency and transparency.

Studies were included if they met all of the following criteria:

- **Publication period:** Conducted between the year interval 2000 through to 2024.

- **Contextual scope:** Focused exclusively on the Ethiopian education system.
- **Conceptual focus:** Addressed one or more pedagogical knowledge models or their sub models.
- **Publication type:** Found in reputable peer reviewed journals or in formally and institutionally accepted local graduate monographs.

Exclusion criteria were also applied to ensure methodological rigor: (a) studies not peer reviewed or lacking institutional acceptance (e.g., local graduate monographs, opinion pieces, editorials; short-communications); (b) purely conceptual papers without empirical data; (c) studies outside the Ethiopian context; (d) publications prior to 2000, given the limited relevance to contemporary teacher education reforms; and (e) studies with no English language as a medium, due to accessibility or translation constraints. These exclusions were necessary to maintain consistency and comparability across the evidence base.

Data Sources and Search Strategy

This study was grounded in a comprehensive, investigative, analytical, and methodical retrieval process, culminating in a critical review of 25 publications that reported relevant empirical findings after excluding 4 none. The methodology includes full details on evidence synthesis, search terms and engines, and study selection criteria. A systematic search was conducted across international and local databases to identify empirical studies on teacher knowledge in Ethiopia. Searches were performed between March and May 2024, with an update on 15 May 2024. The search was restricted to English-language publications from the year 2000 to 2024, so as to capture contemporary reforms in teacher education.

Databases searched include Google Scholar, ERIC, Scopus, Web of Science (Core Collection, SSCI), PsycINFO (via EBSCOhost), PubMed, and reputable Ethiopian academic journals (such as the Ethiopian Journal of Education and regional university journals for instance, Bahir Dar Journal of Education-BJE).

Search terms combined three groups of keywords using Boolean operators:

- Concept group: “teacher knowledge,” pedagogy, “pedagogical knowledge,” “pedagogical content knowledge,” PCK, “general pedagogical knowledge,” GPK,
- Context group: Ethiopia OR Ethiopian
- Education scope: education, schools, “teacher education,” “teacher training”

The generic Boolean string applied across databases was: ("teacher knowledge" OR pedagogy OR "pedagogical knowledge" OR "pedagogical content knowledge" OR PCK OR "general pedagogical knowledge" OR GPK) AND (Ethiopia OR Ethiopian) AND (education OR schools OR "teacher education" OR "teacher training").

Database-specific adaptations were applied (e.g., TITLE-ABS-KEY in Scopus, TS in Web of Science, DE/AB fields in ERIC). In Google Scholar, the first 200 results per query were screened by title and abstract. Local Ethiopian journals were searched manually and via site queries.

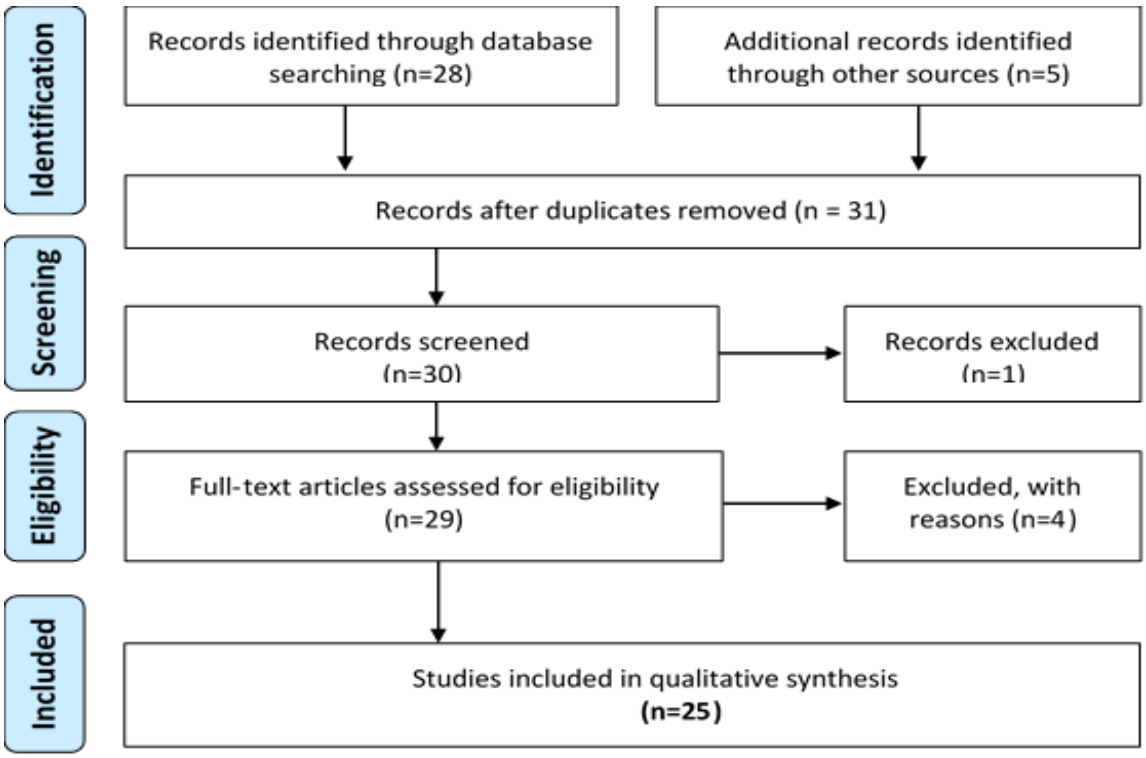
Screening and selection followed PRISMA guidelines:

- Identification: records retrieved across databases; duplicates removed.
- Screening: titles and abstracts screened against inclusion criteria.
- Eligibility: full texts assessed for empirical focus on CK, PCK, or GPK within Ethiopia.
- Included: 25 studies met all criteria; 4 were excluded (conceptual-only, opinion pieces, non-Ethiopian context, pre-2000, non-English).

Search results were managed in a shared spreadsheet, with duplicates identified via title/DOI matching. Study selection decisions were logged for transparency and auditability.

Figure 1

PRISMA Flow Diagram (*Adapted from the PRISMA 2020 Guidelines)*



Data Extraction and Analysis

Following the PRISMA protocol (see Figure 1), a total of 25 studies were retained after the removal of duplicates during the quality screening stage. Data were collected using a pre-designed extraction sheet capturing: the pedagogical models and sub models addressed; methodological approaches; and key findings. Remember that this study is based on narration (meta synthetic review). Contrasting to meta analyses which statistically aggregate findings, this approach thematically synthesizes and interprets existing literature.

Two reviewers independently appraised each study for methodological rigor and theoretical alignment. Quality appraisal was conducted using the MMAT tool (Hong et al., 2018), ensuring systematic evaluation across qualitative, quantitative, and mixed methods designs. Inter rater reliability was established (Cohen's k = 0.82), and discrepancies were

resolved through discussion, thereby strengthening the credibility of the synthesis. Emerging themes were identified through inductive thematic coding, then systematically organized, assessed, and analyzed.

To address each review question, the study narratively presents emerging research on pedagogy in Ethiopia, situating findings within the national educational context. Themes were explicitly mapped to the five review questions (RQ1 to RQ4), ensuring that conclusions directly respond to the questions posed. This alignment enhances conceptual rigor and addresses concern about coherence between questions and conclusions. The review also outlines the primary types of literature reviews discussed in preceding subsections, highlighting the distinguishing features of each.

Based on the inclusion criteria, the analysis yielded three thematic clusters of studies:

1. **Cluster 1**: Studies addressing pedagogy in a general sense.
2. **Cluster 2**: Studies explicitly addressing Shulman's dimensions (PCK, GPK).
3. **Cluster 3**: Studies indirectly referencing pedagogy through classroom practice or teacher preparation.

Cluster 1: Studies Addressing Pedagogy in a General Sense

As shown in Table 1, all available studies in this category - whether published internationally, locally, or in institutional repositories - are listed. Target evidence indicates that three studies did not explicitly align with neither of Lee S. Shulman models (Shulman, 1987). This could have been largely because the research themes under the heading pedagogy were treated as broad educational concepts rather than as model-specific constructs. These studies were conducted in varied educational settings, including schools, colleges, sectoral programs, and informal learning centers. None directly examined pedagogy through the lens of formal models; instead, they explored conceptual understandings of pedagogy in a general instructional sense. For example, Abraham and his colleagues (Abraham et al., 2022) examined the effects of ICT assisted teacher training on English language teachers' pedagogical knowledge and language proficiency through a quantitative quasi experimental design. The key findings indicate that ICT assisted training significantly improved teachers' pedagogical knowledge. Although "pedagogy" was used in the title and discussion, it was framed as a general instructional or methodological term rather than a model specific construct.

Elka and Zhao (2023) investigated parent play beliefs, play as a teaching technique, teachers' pedagogical knowledge, and children's early numeracy and literacy skills using a quantitative correlational design. The key finding: significant positive relationships among the three variables. The term "pedagogy" was employed as a general methodological concept, without explicit reference to a formal model.

Similarly, Biku et al. (2018) explored the effects of teaching without formal pedagogical training in a private Ethiopian college. Methodologically, a qualitative phenomenological case study was used. The key finding: teachers lacking formal pedagogical preparation relied on personal or commonsense teaching approaches. The term "pedagogy" again referred to instructional practice in general terms.

Generally, all these studies in Cluster 1 collectively investigated holistic but non-model specific conceptions of pedagogy. While valuable in understanding how pedagogy is

perceived and enacted in diverse Ethiopian educational settings, they do not directly address the two frameworks central to this review - Shulman's models. This directly responds to RQ1 ("How is pedagogy conceptualized within the Ethiopian educational context?"), showing that pedagogy is often treated as a broad instructional idea rather than a structured theoretical construct.

Table 1

Studies Related to the Concept of Pedagogical Knowledge (Unspecified Model)

Author	Title	Objective	Design	Key Results
Abraham Mihireteab et al.	Effects of ICT-assisted teaching training on English language teachers' pedagogical knowledge and English language proficiency	To examine school English language teachers' pedagogical knowledge.	Quantitative: quasi-experimental	Training in ICT-assisted teaching has a significant effect on the pedagogical knowledge
Zebdewos & Wei Zhao	Parent Play Beliefs, Play as a Teaching Technique, and Teachers' Pedagogical Knowledge, and Children's Early Numeracy and Literacy Skills	To examine the correlation among parental beliefs of play teachers' pedagogical knowledge, and early literacy	Quantitative: Correlation	Significant positive associations or relationship among the variables
Teshale Birku & Wondimu	The effect of teaching without pedagogical training	To explore the effect of teaching without pedagogical training,	Qualitative: phenomenological study	Gap of pedagogical knowledge, implied personal methods sage.

Cluster 2: Studies Explicitly Addressing PCK and GPK (Shulman's Models)

As presented in Table 2, this cluster includes three studies explicitly aligned with Pedagogical Content Knowledge (PCK) and one study focusing on General Pedagogical Knowledge (GPK) as conceptualized in Shulman's (1987) framework. These studies were conducted across varied educational settings and shared the common feature of directly operationalizing and defining the pedagogical models under investigation.

For example, Aguye and Berlie studied EFL teachers' perceptions and practices of PCK in teaching reading skills through a qualitative observational design (Samuel & Damtew, 2024). Findings support that teachers demonstrated a clear theoretical understanding of PCK but showed limitations integrating it into classroom practice. This contradiction between awareness and enactment highlights the gap between theory and practice.

Secondly, Getu and Teka (2018) investigated PCK in secondary school teacher education practicum supervision in Ethiopia using a qualitative case study combining interviews and document analysis. Practicum supervisors addressed GPK and PCK separately, with limited structured emphasis on their integration. Although GPK emerged in findings, it was not referenced in the study's title.

Thirdly, Dhinsa and Duguma (2022) explored upper primary school novice EFL teachers' PCK application in teaching speaking lessons. They employed a qualitative case

study using observations and interviews. Findings revealed that novice teachers exhibited strong content knowledge (CK) but lacked learner responsive pedagogical strategies, constraining effective PCK application. The study explicitly examined PCK as a standalone model of teachers' pedagogical knowledge.

Fourthly, Kasa et al. (2024) studied mathematics teachers' perceptions of general pedagogical knowledge for teaching pre-engineering students through a qualitative case study. Findings indicate that teachers reported limited but gradually improving awareness of GPK, with identified gaps in pedagogical strategies. This remains the only identified Ethiopian study explicitly investigating GPK as a separate model, underscoring its underrepresentation.

To sum up, this cluster directly addressed specific pedagogical knowledge models, operationalizing either PCK or GPK in line with Shulman's theoretical framing. The findings highlight both recognition of the models and persistent challenges in their integration into practice. This directly responds to RQ2 ("To what extent is pedagogical knowledge examined in Ethiopia's education system?") and RQ3 ("Which dimensions of Shulman's theory are emphasized?"). From the sum 25 included studies, 4 (16%) fell into Cluster 2, with 3 focusing on PCK and only 1 on GPK.

Table 2

Studies Pertinent to PCK and GPK Models (Shulman's Frameworks)

Authors	Title	Objective	Design	Key Results
Samuel & Damtew	EFLTeachers' Perceptions and Practices of PCK in Teaching Reading Skills	To explore how secondary EFL teachers perceive and apply PCK in reading instruction	Qualitative: Observation	Teachers showed theoretical awareness of PCK, but classroom practice integration or application
Getu Tesfamichael & Mulugeta	PCK in Secondary School Teacher Education Practicum Supervision in Ethiopia	To examine how PCK incorporated into practicum supervision	Qualitative: Case study Interviews Document analysis	Practicum supervisors focused on GPK and PCK separately; little structured emphasis on PCK integration
Dhinsa & Duguma	Exploring Upper Primary School Novice EFL Teachers' PCK Application in Teaching Speaking Lessons.	To investigate how newly deployed primary EFL teachers apply PCK during speaking lessons	Qualitative: Case study Observation Inter views	Teachers had content knowledge but lacked pedagogical strategies and PCK was underdeveloped
*Yosef Kassa, Solomon & Mulugeta Woldemichael	Mathematics teachers' perceptions on general pedagogical knowledge for teaching pre-engineering students	To explore mathematics teachers' perceptions on GPK in higher education context	Qualitative Case Study	Teachers had limited but growing awareness of GPK; gaps in pedagogical strategies identified

***Note*:** Study 4 is the only one explicitly addressing GPK.

The search identified 25 studies related to the Ethiopian education system that met the inclusion criteria. These comprised 16 quantitative (64%) and 9 qualitative/mixed methods

(36%) investigations. This distribution shows a stronger reliance on quantitative approaches, though qualitative insights remain critical for contextual interpretation. The results are organized below according to the study's review questions (RQs).

RQ1: How is pedagogy conceptualized in the Ethiopian educational context?

In this review, conceptualization refers to the process of defining or framing a construct. Across the included studies, pedagogy is generally conceptualized as an academic discipline - the study of how knowledge and skills are imparted in educational contexts, incorporating the interactions essential for effective teaching-learning processes (Shulman, 1987). Most studies situated teacher pedagogical knowledge and its model interrelations in close alignment with leading theoretical perspectives (Mishra & Koehler, 2006; Shulman, 1987). However, only 1 study (4%) explicitly conceptualized General Pedagogical Knowledge (GPK) alongside other theoretical models, underscoring its underrepresentation.

RQ2: To what extent is pedagogical knowledge studied in Ethiopian education?

The body of evidence (n = 25) suggests that, nationally, the systematic study of pedagogy is at a relatively early stage of development compared to the scope of global literature. Nevertheless, there is a positive upward trajectory, with noticeable growth in scholarly attention - placing Ethiopia ahead of several peer African nations in pedagogical research momentum. This trend reflects increasing recognition of pedagogy as a research priority, though methodological rigor and theoretical integration remain uneven.

RQ3: Which areas or sub models of Shulman's theory are emphasized?

Shulman's framework distinguishes seven categories of teacher knowledge, three of which are foundational cores that dominate in the scientific literature:

1. ***Pedagogical Content Knowledge (PCK)*** - the integration of pedagogy and subject specific content knowledge.
2. ***General Pedagogical Knowledge (GPK)*** - principles and strategies for classroom management and organization that apply across subjects.
3. ***Content Knowledge (CK)*** - subject matter expertise (This model is indeed non-issue for various reasons).

Internal analysis revealed that only one study purely tried to investigated GPK, while most research addressed PCK or related CK elements. This imbalance highlights Ethiopia's stronger emphasis on subject specific pedagogy (PCK/CK) at the expense of general pedagogical principles (GPK).

RQ4: To what extent is GPK studied in the research trend?

Only one study explicitly examined General Pedagogical Knowledge. Internationally, GPK is recognized as a critical dimension of teacher effectiveness (König et al., 2014; Kunter et al., 2013; Ulferts, 2019), encompassing cross curricular strategies and principles for effective classroom organization and management. Within Ethiopia, however, research attention to this model remains scarce, representing a significant gap in the literature. This finding directly responds to RQ4, confirming that GPK is the least examined dimension of Shulman's framework in Ethiopia.

Results

The primary objective of this systematic review was to examine trends in the scientific investigation of pedagogical and technological knowledge models within the Ethiopian education system. Emerging themes from 25 included studies were carefully identified and analyzed. A narrative systematic review methodology was adopted to explore teachers' pedagogical knowledge in context. Searches were conducted in both international electronic databases and reputable domestic journals, using combinations of topic subject headings and indexed terms derived from predefined keywords. Manuscripts were included if they addressed the pedagogical knowledge of teachers or related constructs. As a result, the main findings are summarized as follows: -

1. **Conceptualization** - Most studies conceptualized teacher pedagogical knowledge and its interrelation with theoretical models in close alignment with the work of leading theorists, particularly Shulman models (Shulman, 1987) and that of Mishra and Koehler (2006). However, only single study explicitly examined General Pedagogical Knowledge (GPK) as a distinct construct, underscoring its underrepresentation.
2. **Research Trend** - While the systematic study of pedagogy in Ethiopia remains at an early stage relative to global literature, it shows notable growth and currently ranks second in Africa, following South Africa, in terms of research output in this domain. This trajectory reflects Ethiopia's emerging role in pedagogical scholarship, though methodological rigor and theoretical integration remain uneven.
3. **Available Dominance** - Unlike PCK and GPK, the most frequently investigated model is found to be Technological Pedagogical Content Knowledge (TPACK). Unexpectedly, from the whole 25 studies, 7 (28%) explicitly addressed TPACK, which is recently discovered variant as a new framework by Mishra and Koehler(Mishra & Koehler, 2006).
4. **Disparities and Gaps** - There is a marked underrepresentation of research on General Pedagogical Knowledge (GPK) in the Ethiopian context. The reasons for this gap remain unclear, underscoring the need for targeted future investigations. This finding directly responds to RQ4, confirming that GPK is the least examined dimension of Shulman's framework in Ethiopia, despite its recognized importance internationally (König et al., 2014; Kunter et al., 2013; Ulferts, 2019).

Synthesis of Findings

The distribution of the 25 studies included in this review, categorized by the pedagogical knowledge model they addressed, is summarized in *Table* 3. The classification reflects the explicit theoretical framing of each study as aligned with

Shulman's models or the TPACK framework, as well as studies with no model specific orientation.

Overall, the synthesis shows that Ethiopian research has concentrated more on technology integrated pedagogy (TPACK). But subject specific pedagogy (PCK) and General Pedagogical Knowledge (GPK) remains severely underrepresented. This imbalance highlights both progress and persistent gaps in the national research landscape.

Table 3

Summary of Studies about Pedagogical Knowledge Models Identified

Models of Pedagogy	Studies Identified	Remark
Content Knowledge (CK)	---	Non-Issue (Unidentified)
General Pedagogical Knowledge (GPK)	1 (4%)	Directly related
Pedagogical Content Knowledge (PCK)	3 (12%)	Directly related (Topical)
Technological and Pedagogical Content Knowledge (TPACK)	7 (28%)	Variant (non-focal)
Non-Model Pedagogy	4 (16%)	Indirectly related
Other constructs/related themes	10 (40%)	variously integrated
Total	**25 (100%)**	**Included in the review**

Analytical Synthesis

- ***RQ1 (Conceptualization):*** *Pedagogy is often treated as a broad instructional concept, with 4 studies (16%) addressing non-model pedagogy.*
- ***RQ2 (Extent of study):*** *25 studies show Ethiopia's growing research momentum, though methodological rigor varies.*
- ***RQ3 (Shulman's sub models):*** *PCK is moderately represented (12%), while GPK is almost absent (4%), highlighting a major gap.*
- ***RQ4 (GPK trend):*** *Only one study explicitly examined GPK, confirming its underrepresentation compared to international literature.*

This synthesis underscores Ethiopia's uneven progression: from general pedagogy (Cluster 1), to model specific pedagogy (Cluster 2), and finally to technology integrated pedagogy (Cluster 3). While TPACK (non-focused, new framework variant) research is expanding, the neglect of GPK remains a critical limitation in the national literature.

Key Insights from the Distribution

1. **Model prominence** - TPACK is emerging as the most frequently studied model among explicitly defined frameworks, with 7 studies (28%) addressing it. This could reflect Ethiopia's policy shift toward technology integration in education which could draw research attention in the future.
2. **Underrepresentation** - Research on GPK remains scarce, with only 1 study (4%) dedicated to it, despite its recognized importance in international teacher knowledge literature(König et al., 2014; Kunter et al., 2013; Ulferts, 2019). This finding directly responds to RQ4 ("To what extent is GPK studied?") and highlights a critical gap in Ethiopia's pedagogical research landscape.

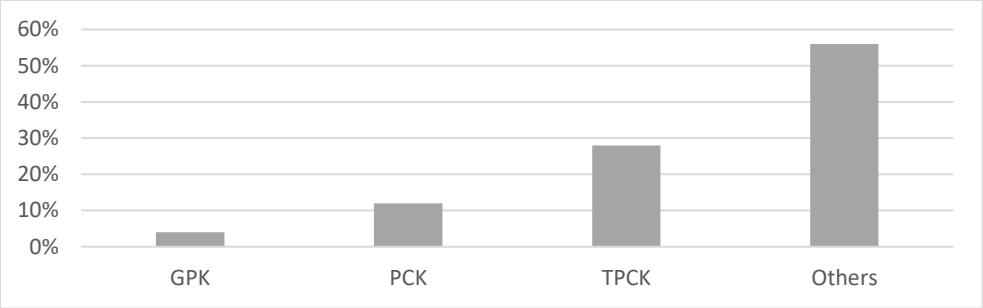
3. **Theoretical alignment** - While most PCK and TPACK focused studies clearly articulated their theoretical underpinnings, several non-model studies still used the term pedagogy in broad, unspecific ways. This reflects RQ1 ("How is pedagogy conceptualized?"), showing that Ethiopian research often treats pedagogy as a general instructional concept rather than a structured theoretical construct.
4. **Emerging trajectory** - The growing body of TPACK research could be increasing methodological redirection of educational design in country's pedagogical research. However, contradictions remain: professional development initiatives improve short term competencies, but gaps persist in longitudinal and cross regional coverage. This uneven progression underscores the need for more sustained and geographically diverse studies, directly addressing RQ2 ("To what extent is pedagogical knowledge studied in Ethiopia?") and RQ3 ("Which areas of Shulman's theory are emphasized?").

Distribution Overview

In total, eight studies (44% of the 25 included) were identified as explicitly examining the three established core models of pedagogical and technological knowledge frameworks (see Figure 2).

Figure 2

Frequency Distribution of Studies Conducted Per Models of Pedagogy



These three established models as depicted in the pie chart can also be explain percentage frequency as follows:

- Seven studies (28%) on Technological Pedagogical Content Knowledge (TPACK),
- Three studies (12%) on Pedagogical Content Knowledge (PCK), and
- Only single unit of study (4%) on General Pedagogical Knowledge (GPK).

The remaining 14 studies (56%) either addressed pedagogy in several ways, as non-model sense or explored related constructs without strict model adherence. However, since the study covers a large list, the researchers could not include a table in the paper, though it is available upon request.

This distribution directly responds to RQ2-RQ4, showing that while Ethiopia's research community increasingly engages with model specific frameworks. However, the emphasis remains uneven and unexpectedly TPACK is the most frequently studied model, whereas PCK and/or GPK is severely underrepresented, highlighting a critical gap in the literature.

Discussion

Most pedagogical knowledge studies in Ethiopia align closely with Shulman's (1987) teacher knowledge framework. Even though, Technological Pedagogical Content Knowledge (TPACK) model was lately developed by Mishra and Koehler (2006), Shulman's work remains foundational in defining pedagogy as a specialized domain of teachers' professional knowledge.

In Ethiopia, however, the systematic investigation of these models is still emergent when viewed against global scholarship, though the trend is positive. The literature points to notable national progress within Africa, placing Ethiopia behind only South Africa in research activity on teacher knowledge frameworks. From the total of 25 studies reviewed, 3 (12%) addressed PCK, 1 (4%) addressed GPK, 7 (28%) addressed TPACK, and 14 (56%) addressed pedagogy in general or related constructs. This distribution highlights both progress and imbalance; however, there is clear imbalance in the distribution of focus:

- **PCK dominance:** Most Shulman aligned studies concentrated on pedagogical content knowledge, particularly in EFL, STEM, and teacher practicum supervision. These works often reveal a contradiction between theoretical awareness and classroom enactment, a familiar challenge in teacher development literature globally. This directly responds to RQ3 ("Which areas of Shulman's theory are emphasized?").
- **GPK gap:** General pedagogical knowledge, while internationally recognized as a critical cross curricular skill set (Guerriero, 2017; König et al., 2014; Kunter et al., 2013; Ulferts, 2019), has been almost entirely absent from Ethiopian research. The single identified GPK study points to limited awareness among teachers and underdeveloped classroom management strategies. This finding directly addresses RQ4 ("To what extent is GPK studied?") and underscores Ethiopia's strategic gap in foundational pedagogy.
- **Unexpected model momentum:** By contrast, TPACK based studies are more numerous and diverse, addressing ICT assisted teaching, in service professional development, and topic specific pedagogical innovations. These works generally report positive short-term impacts on teacher competence and student learning, particularly in STEM. However, they also highlight structural barriers such as limited ICT infrastructure, uneven technological skills, and a lack of longitudinal tracking to measure sustained impact. This redirects our attention to further educational investigation shifting from that of Shulman models to the new derivative of framework.

When the three clusters are considered together, a pattern emerges: Ethiopian research is gradually aligning with international pedagogical frameworks, but with a tilt toward technology enhanced pedagogy (TPACK) and subject specific integration (PCK), leaving a strategic gap in generalizable pedagogical foundations (GPK). This imbalance has implications for teacher education policy - a strong GPK base is essential for ensuring that PCK and TPACK are applied effectively in diverse contexts.

The evidence also suggests that while Ethiopia has embraced 21st century teaching models, further work is needed to strengthen the integration of GPK, PCK, and TPACK rather than treating them as isolated domains. It also addresses systemic constraints - from teacher training design to technological infrastructure - that limit sustained model implementation. Further, it invests in longitudinal and comparative research to capture the durability of pedagogical improvements.

Conclusions

The primary objective of this systematic review was to examine trends in the scientific investigation of pedagogical knowledge within the Ethiopian education system. The review revealed that Ethiopia has made discernible progress in adopting empirically and globally recognized pedagogical models grounded in the modern theory of pedagogy. Notably, there has been growing evidence on engagement with technology enhanced instruction through the TPACK framework.

However, the implementation of these models remains uneven. While pedagogical content knowledge (PCK) was addressed in limited studies, its depth of development in practice is limited. TPACK was addressed in more studies, showing promising applications but constrained by systemic barriers such as infrastructural limitations and inconsistent teacher preparation. General pedagogical knowledge (GPK), addressed in limited studies, remains severely under-researched in the Ethiopian context despite its international recognition as a core dimension of effective teaching.

Globally, scholarship on GPK has flourished for decades, framing it as a shared professional competency across disciplines and teaching environments. In Ethiopia, however, the evidence base is insufficient to map its development, application, or integration into teacher training. This directly responds to RQ4, confirming Ethiopia's strategic gap in foundational pedagogy. Policy frameworks and teacher education curricula therefore need to give greater priority to GPK to ensure balanced pedagogical competence.

Overall, modern pedagogical knowledge theory holds a central place in the country's teacher education and research discourse. Yet, the translation of theoretical understanding into classroom practice remains inconsistent. While PCK and TPACK show tangible outputs, GPK is largely absent from the national research record. A more intentional integration of all three frameworks - supported by curriculum reform, sustained professional development, and locally adapted pedagogical innovation - is essential for building a strong and context responsive teacher workforce.

The Ethiopian educational research landscape shows a promising trajectory: teachers increasingly demonstrate foundational competencies in PCK and TPACK, particularly through targeted professional development initiatives such as workshops, guided inquiry, and ICT focused training. These engagements have contributed to positive shifts in technology integration and pedagogical collaboration.

However, budgetary constraints, infrastructure gaps, and limited opportunities for sustained professional development hinder the widespread adoption of fully integrated pedagogical models. This calls for policy level action from the Ministry of Education, state

authorities, and educational funding bodies to systematically promote, support, and evaluate the adoption of PCK, TPACK, and GPK frameworks.

Looking ahead, several priorities emerge for advancing pedagogical knowledge research in Ethiopia. First, closing the gap in general pedagogical knowledge (GPK) requires investigating why it has been so rarely studied and developing strategies to embed it more systematically into teacher education and classroom practice. Second, greater attention must be given to rural and resource-constrained settings, particularly in exploring how technology-integrated pedagogy can support equitable learning opportunities. Third, future studies should move beyond short-term interventions by adopting longitudinal designs that assess the sustainability and scalability of outcomes related to pedagogical content knowledge (PCK) and technological pedagogical content knowledge (TPACK). Finally, teacher preparation programs need to apply integrated frameworks that combine PCK, TPACK, and GPK into cohesive training models. By addressing these gaps, Ethiopian education research can progress from model adoption toward model integration, ensuring that pedagogical theory consistently informs and enhances classroom practice across diverse contexts.

Taken together, the findings of this review address each of the five research questions by mapping the conceptual framing, extent of investigation, and model specific emphases within Ethiopian pedagogical knowledge research. From the 25 studies, 3 (12%) addressed PCK, 1 (4%) addressed GPK, 7 (28%) addressed TPACK, and 14 (56%) addressed pedagogy in general or related constructs.

- RQ1 and RQ2 revealed that while pedagogy is conceptualized in alignment with internationally recognized theories, its empirical study remains at an early but upward stage.
- RQ3 and RQ4 highlighted the imbalance in model coverage, with PCK and TPACK receiving the most attention, and GPK almost entirely absent from sustained inquiry.

This integrated picture underscores the need for balanced, interconnected model implementation - where GPK provides a foundational base, PCK ensures subject specific pedagogical depth, and TPACK could equip teachers with technology rich learning environments. Advancing this agenda will require targeted research, coherent policy alignment, and systemic investment in teacher preparation to close current gaps and strengthen Ethiopia’s alignment with global pedagogical standards.

While this review followed systematic search, screening, and synthesis procedures, several limitations should be acknowledged. The scope of included literature was restricted to studies published between 2000 and 2024, meaning that relevant works outside this range-particularly earlier teacher education reforms or unpublished institutional reports-may not be represented. Although both international and local databases were searched, the indexing of Ethiopian journals remains uneven, and some potentially relevant domestic studies may have been omitted due to limited discoverability. Language constraints also shaped the review, as it focused primarily on studies published in English, thereby excluding potentially valuable works in Amharic or other Ethiopian languages. In addition, the categorization of studies by PCK, GPK, TPACK, or non-model specific pedagogy relied on how explicitly authors framed their work, which may have overlooked implicit model applications. Variations in

study design, context, and reporting also limited opportunities for direct comparison or meta-analysis, requiring reliance on narrative synthesis. Finally, potential publication bias must be considered, as studies with null or negative findings may be underrepresented in the available literature, skewing the apparent trends. Acknowledging these limitations is essential for interpreting the findings and for guiding future research toward more comprehensive, balanced, and methodologically diverse coverage of pedagogical knowledge in Ethiopia.

Global research consistently affirms that teachers' professional knowledge - grounded in the modern theory of pedagogy - significantly impacts students' learning gains and overall educational quality. Documented benefits include higher levels of student engagement, improved instructional quality, greater lesson appeal, stronger orientation toward classroom rules, and reduced student reported pressure.

Building on these insights, this review examined the conceptualization, application, and research trends of pedagogical knowledge within the Ethiopian education system, situating national developments within the broader international discourse. The study contributes theoretically by highlighting Ethiopia's uneven progression across pedagogical models: PCK and TPACK show momentum, while GPK remains critically underrepresented. This imbalance underscores the need for integrated frameworks that combine general, subject specific, and technology enhanced pedagogy.

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The authors declare that they have no conflicts of interest related to the study context, data interpretation, or publication of this manuscript.

Ethics Approval and Consent to Participate

Not applicable because, this study is a systematic review of published literature (in other words, it is a study of studies). So, we did not involve human participants as a primary data collection, or interventions.

Data Availability

All data generated or analyzed during this review are included in this published article and its supplementary information files. Data are also available from the corresponding author upon scientifically reasonable request.

Code Availability

The thematic analysis code/scripts used in this review are available from the corresponding author upon reasonable request.

Teacher educators' conceptions, practices, and challenges of assessment orientation in colleges of teacher education in the Amhara Region, Ethiopia

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Abstract

This study examined teacher educators' conceptions, practices, and challenges of assessment orientation at colleges of teacher education in Amhara region, Ethiopia. A concurrent mixed-methods design was employed, involving four colleges selected via convenience sampling. Three-hundred ninety teacher educators participated in this study. Quantitative data were collected using a validated 5-point Likert scale questionnaire and the data were analyzed using mean, standard deviation, and one-sample t-test. Qualitative data were collected via semi-structured interviews and were thematically analyzed. The findings revealed that teacher educators misconceived assessment orientation and inadequately implemented it, particularly before and during instruction. One-sample t-test results showed that assessment before instruction ($t(389) = 98.071$, $p < .05$) and during instruction ($t(389) = 85.283$, $p < .05$) were inadequately implemented, whereas assessment after instruction was dominant ($t(389) = 190.753$, $p < .05$). Challenges included large class sizes, heavy workload, traditional assessment mindsets, misaligned curriculum, and students' weak academic backgrounds. The study recommends that the regional Education Bureau and colleges of teacher education implement in-service training programs, develop effective assessment plans, and provide institutional support to strengthen formative and integrated assessment practices.

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Introduction

Assessment has traditionally been seen as a method for tracking and measuring student learning outcomes at the conclusion of instruction (Brown & Abeywickrama, 2019; McMillan, 2020; Andrade & Brookhart, 2020). According to the conventional assessment paradigm, learners were often held accountable for poor academic achievement rather than

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instructional strategies or assessment design (McMillan, 2020; Brookhart, 2017). According to Brookhart (2017) and Brown and Abeywickrama (2019), these teacher-centered techniques placed a strong emphasis on summative evaluation, where assessment was primarily used to rank students, appraise achievement, and certify competence after instruction had ended.

However, this approach has been under increasing pressure from modern educational reforms, which support a shift from assessment of learning to assessment for learning and from teacher-centered instruction to student-centered pedagogies (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006). This new paradigm recognizes that assessment should actively promote learning, enhance student motivation and foster self-regulation rather than merely measure learning outcomes (Black & Wiliam, 1998; Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006).

Assessment orientation is viewed as a continuous and integrated process that takes place before, during, and after instruction, ensuring that assessment is embedded throughout the learning cycle rather than being limited to end-point evaluation (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006). Prior to instruction, assessments provide a diagnostic role by identifying learners' prior knowledge, preparedness, and learning needs, which informs instructional planning. Assessment during instruction focuses on formative processes that provide continuous feedback to adjust teaching strategies and improve learning in real time (Black & Wiliam, 1998; Hattie & Timperley, 2007). Assessment after instruction is summative in nature, measuring the extent to which intended learning outcomes have been achieved (Black & Wiliam, 1998).

This perspective broadens assessment by positioning instructors as facilitators of learning who integrate assessment with instruction to support student development (Nicol & Macfarlane-Dick, 2006). This shifts assessment from a static measurement tool to an interactive, ongoing, and reflective process that promotes deeper learning, learner autonomy, and self-regulated learning throughout the instructional cycle (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006).

The theoretical foundation for this shift is largely grounded in constructivist learning theory, which conceptualizes learners as active participants who construct knowledge through engagement, reflection, and social interaction (Sharma & Bansal, 2017). From this perspective, assessment should be integrated with instruction and designed to provide meaningful feedback that guides learners' cognitive and metacognitive development. In higher education contexts, assessment serves multiple functions beyond grading, including monitoring student progress, informing instructional decisions, evaluating teaching effectiveness, and ensuring institutional accountability (Boud & Molloy, 2013; Black & Wiliam, 1998). Empirical evidence consistently demonstrates that assessment methods significantly influence the quality and depth of student learning (Gikandi et al., 2011; Biggs & Tang, 2011). What educators choose to assess shapes students' learning priorities, study strategies, and levels of engagement (Carless, 2015; Nicol & Macfarlane-Dick, 2006). Thus, assessment functions not merely as a measurement tool but as a powerful driver of learning.

Despite strong policy emphasis on student-centered learning and formative assessment in Ethiopian higher education, a considerable gap persists between policy intentions and classroom practices. Research conducted at national and regional levels indicates that teacher educators frequently maintain traditional, examination-oriented

approaches, emphasizing grades and recall of information rather than diagnostic and formative strategies that promote deeper understanding (Shishigu et al., 2017; Teferra, 2022). This disconnect suggests that teacher educators' conceptions of assessment substantially influence their assessment practices and the extent to which assessment is used as a tool for learning. Educators' beliefs about the purposes and functions of assessment largely determine the strategies they employ and the feedback they provide (Brown, 2004; Remesal, 2011). Therefore, examining educators' conceptions is essential for understanding how assessment orientation is enacted in practice.

This issue is especially important in Colleges of Teacher Education (CTEs), which prepare future teachers and shape classroom assessment practices. Empirical studies indicate that teachers often replicate the assessment approaches they experienced during their own professional preparation, suggesting that weak or traditional assessment orientations in teacher education programs may be reproduced across the education system (Shepard, 2019; Wiliam, 2018). Research further shows that teacher candidates frequently enter the profession with limited assessment literacy, which constrains their ability to effectively implement formative and student-centered assessment practices (McMillan, 2020; Brookhart, 2017). As a result, misconceptions about assessment within teacher education institutions may undermine broader national educational reform efforts aimed at improving teaching quality and student learning outcomes (Conley, 2014).

Furthermore, empirical data identifies many contextual constraints that impede effective Assessment implementation occurs prior to, during, and after teaching. Studies have identified institutional constraints, heavy teaching workloads, misalignment between curriculum and assessment policies, and inadequate student preparedness as major barriers to the adoption of assessment reform (Black & Wiliam, 2018; Stobart, 2021). These findings indicate that successful assessment reform requires not only policy changes but also continuous professional development, institutional support, and strong alignment among curriculum design, pedagogy, and assessment practices.

Therefore, this study investigated teacher educators' conceptions, practices, and challenges of assessment orientation in colleges of teacher education in the Amhara National Regional State. Specifically, it examined how teacher educators understood and implemented diagnostic (before instruction), formative (during instruction), and summative (after instruction) assessments; how they conceptualized and applied feedback; and what contextual factors hindered effective assessment orientation. By addressing these dimensions, the study aimed to contribute to improving assessment literacy, strengthening instructional practices, and informing policy and professional development initiatives in Ethiopia's higher education system.

Statement of the problem

Educational assessment reforms are gaining global attention as educational institutions recognize that traditional examination-based procedures are insufficient for promoting meaningful learning and developing twenty-first-century competencies (Shepard, 2019; Wiliam, 2018). At the global level, reforms emphasize competency-based education, student-centered pedagogy, and assessment-for-learning approaches that integrate formative assessment into everyday teaching practices (Black & Wiliam, 2018; Andrade & Brookhart,

2020). International organizations such as UNESCO advocate transforming assessment from a certification mechanism into a process that actively promotes learning, equity, and sustainable development. Similarly, the Organisation for Economic Co-operation and Development (OECD) promotes innovative assessment systems aligned with future-oriented competencies, such as critical thinking, collaboration, and problem solving, through frameworks like the Learning Compass 2030 (OECD, 2019). This reflects a global shift toward assessment systems that enhance learning rather than simply measure achievement.

In Africa, assessment reform has become central to broader efforts aimed at improving educational quality, teacher effectiveness, and graduate employability. The African Union's Continental Education Strategy for Africa (CESA 16–25) identifies continuous assessment, outcomes-based education, and competency-oriented curricula as key strategies for improving learning outcomes among member states (African Union, 2016). In line with this strategy, many African education systems have introduced reforms aimed at reducing reliance on high-stakes examinations and promoting learner-centered and formative assessment practices (UNESCO, 2015; Wiliam, 2018). Empirical studies indicate that strengthening classroom-based assessment and enhancing teachers' assessment literacy are essential for achieving sustainable educational improvement and workforce readiness across the continent (Shepard, 2019; Black & Wiliam, 2018).

In Ethiopia, educational reforms have also aimed to modernize teaching, learning, and assessment practices at all levels of the education system in response to concerns about educational quality, graduate competence, and workforce preparedness. The Ministry of Education's Education and Training Policy established learner-centered pedagogy, continuous assessment, and active learning strategies as foundational principles intended to shift classroom practice away from teacher-dominated instruction toward more participatory and competency-oriented learning environments (Ministry of Education, 1994). Empirical studies conducted in Ethiopian schools and teacher education institutions indicate that these reforms were designed to enhance students' higher-order thinking skills, classroom engagement, and instructional effectiveness, although implementation varies across institutions due to contextual constraints (Negash, 2006; Dufera, 2015).

The Education Development Roadmap (2018–2030) has further strengthened competency-based curriculum implementation, active learning methodologies, and continuous assessment practices with the goal of improving graduate competence and national human resource development (Ministry of Education, 2018). The roadmap aligns Ethiopian education with global competency-based reform trends by emphasizing assessment approaches that support learning before, during, and after instruction, rather than relying solely on summative examinations. Reforms implemented under the General Education Quality Improvement Program (GEQIP) have prioritized teacher professional development, assessment literacy enhancement, curriculum alignment, and institutional accountability mechanisms (World Bank, 2013).

Despite strong national reform aspirations, empirical evidence suggests that traditional examination-oriented assessment practices still dominate many Ethiopian classrooms. Studies indicate that large class sizes, heavy teaching workloads, limited assessment training, and deeply rooted examination cultures hinder the effective implementation of continuous and formative assessment approaches (Asgedom, 2014;

Williams, 2018). These conditions contribute to an ongoing gap between policy intentions and classroom realities. Additional research highlights that limited assessment literacy among teacher educators, along with institutional constraints, frequently obstructs the implementation of reform initiatives. Assessment scholars argue that meaningful reform requires teachers to integrate assessment into instruction in ways that actively support student learning and improvement rather than merely measuring achievement (Shepard, 2019; Black & Wiliam, 2018). Consequently, assessment reform often remains at the level of policy ideals rather than classroom practice due to insufficient continuous professional development, weak institutional commitment, and limited pedagogical alignment. Because Colleges of Teacher Education (CTEs) are responsible for preparing future teachers, their assessment orientations play a critical role in determining whether national reforms are effectively implemented or whether traditional assessment practices persist.

Empirical research in Ethiopian higher education consistently identifies ongoing challenges in the implementation of effective assessment practices. Studies show that traditional examination-oriented assessment systems remain dominant despite national reform efforts aimed at promoting competency-based and continuous assessment approaches. For instance, Sewagegn (2019) found that instructors in an Ethiopian higher education institution relied predominantly on traditional written examinations, with limited use of formative, diagnostic, and performance-based assessment methods. National-level analyses further indicate uneven implementation of assessment reforms across institutions, suggesting that policy commitments to competency-based education and continuous assessment are not consistently translated into classroom practice (Asgedom, 2014; Ministry of Education, 2018).

A second set of studies highlights the role of teacher educators' professional characteristics in shaping assessment practices. Wondim (2024) found that academic qualification, teaching experience, and prior assessment training influence the use of assessment strategies, with more qualified and experienced educators more likely to apply formative assessment approaches. This is consistent with research showing that teachers' assessment literacy strongly affects classroom assessment quality (Brookhart, 2011; Popham, 2009). However, studies also show that even skilled educators face barriers such as heavy workloads, limited institutional support, and inadequate professional development opportunities, which constrain effective assessment practice (Darling-Hammond, 2000; Guskey, 2002; Stiggins, 2005). Overall, assessment reform depends on both individual competence and institutional conditions that enable or restrict implementation.

A third strand of empirical research focuses on quality-related issues affecting assessment effectiveness in higher education. Studies report persistent challenges such as academic dishonesty, limited or delayed feedback, misalignment between assessment tasks and learning outcomes, and an overreliance on lower-order cognitive skills. These issues reduce the effectiveness of assessment in promoting learning and higher-order thinking skills (Boud & Falchikov, 2007; Biggs & Tang, 2011). Such weaknesses in assessment design and implementation also hinder the development of critical thinking, creativity, and problem-solving skills, which are central to graduate attributes in higher education reform agendas (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006).

Although existing studies provide useful insights into assessment practices in higher education, most research focuses on universities, with limited attention to teacher education colleges. This is a common gap in assessment literature, where teacher education contexts are often underexplored despite their importance in shaping instructional practice (Darling-Hammond, 2000; Cochran-Smith & Zeichner, 2005). In particular, evidence suggests that feedback practices, diagnostic assessment, and institutional constraints significantly influence student learning outcomes, but are often inconsistently implemented in resource-constrained teacher education systems (Black & Wiliam, 1998; Hattie & Timperley, 2007). This gap is concerning because Colleges of Teacher Education (CTEs) are central to implementing reforms such as competency-based education, continuous assessment, and student-centered pedagogy, all of which depend on strong assessment capacity and institutional support (Boud & Falchikov, 2007; Biggs & Tang, 2011). However, limitations in assessment literacy and institutional capacity may reduce the effectiveness of these reforms.

Taken together, the research emphasizes the crucial relevance of improving assessment literacy, ongoing professional development, and institutional support mechansms in Colleges of Teacher Education (CTEs) (DeLuca et al., 2019; Xu & Brown, 2016). Addressing these challenges is critical for closing the persistent gap between reform policy and classroom practice, as well as ensuring that assessment reforms improve teaching quality, student learning outcomes, and overall national educational transformation (Black & Wiliam, 1998; Shepard, 2000). In this context, CTEs, notably in the Amhara National Regional State, play a critical role in transforming national education reforms into classroom practice by training future teachers. As a result, bridging this gap is not merely an intellectual concern, but also a practical requirement for guiding policy and implementation. A better understanding of teacher educators' assessment concepts, procedures, and challenges can help align teacher education programs with national reform agendas that promote continuous assessment, learner-centered instruction, and competency-based education (Popham, 2009; Brookhart, 2017). Furthermore, empirical evidence from the Amhara context can help the Ministry of Education, the Amhara Regional Education Bureau, and individual teacher education institutions develop contextually relevant professional development programs, strengthen assessment frameworks, and improve instructional support systems that promote assessment for learning (Heritage, 2010; Wiliam, 2011).

As a result, the purpose of this study was to investigate teacher educators' conceptions, practices, feedback mechanisms, and obstacles associated with assessment orientation in teacher education colleges in the Amhara National Regional State. The study's goal was to improve the quality of teacher training in Ethiopia by providing evidence-based insights, promoting effective assessment integration with instructional planning, and strengthening assessment literacy among teacher educators. Finally, the findings are expected to help educational stakeholders develop targeted interventions that foster a culture of continuous, learner-centered assessment, improve student learning outcomes, and contribute to the larger national vision of producing reflective, competent, and innovative teachers capable of addressing Ethiopia's social, economic, and educational challenges (Brookhart, Moss, & Long, 2009; Hattie & Timperley, 2007; Black & Wiliam, 2004).

Research Questions

1. How do teacher educators conceive assessment orientation (assessment before, during and after instruction) at colleges of teacher education in the Amhara National Regional State?
2. To what extent do teacher educators implement assessment orientation before, during, and after instruction in colleges of teacher education in the Amhara National Regional State?
3. How do teacher educators provide feedback to students in colleges of teacher education in the Amhara National Regional State?
4. What are the major challenges that teacher educators face in implementing assessment orientation in colleges of teacher education in the Amhara National Regional State?

Theoretical and Conceptual Frameworks

The theoretical and conceptual foundation of this study is grounded in the interrelationship among educational philosophy, learning theories, and assessment practices, which collectively shape teacher educators' orientations and implementation of assessment before, during, and after instruction. Understanding these interconnections provides insight into why certain assessment approaches are prioritized over others and how teacher educators' philosophical and theoretical orientations influence classroom practice.

Educational Philosophy and Assessment

Educational philosophy offers a lens through which teaching, learning, and assessment are conceptualized. Philosophical perspectives such as idealism and realism emphasize objective knowledge, structured learning, and measurable outcomes (Arduini-Van Hoose, 2020; Tan et al., 2006). In such frameworks, the primary goal of education is to transmit established knowledge from teacher to student, which aligns closely with behaviorist learning theories (Shepard, 2000). Behaviorism views learning as a change in observable behavior resulting from reinforcement and feedback, often measured through summative assessments after instruction, including written tests, quizzes, and examinations (Birenbaum & Dochy, 2012; Underhill, 2006). In this approach, assessment serves primarily as a tool for judging correctness, ranking performance, and certifying achievement, rather than as a mechanism to support ongoing learning.

In contrast, contemporary philosophical perspectives such as pragmatism and constructivism emphasize learner-centered, experiential, reflective, and collaborative approaches to education (Biesta, 2022; Schiro, 2013). These perspectives align closely with constructivist learning theories, which view learning as an active and socially mediated process through which learners construct knowledge based on prior experiences, inquiry, interaction, and reflection (Schunk, 2020; Vygotsky, 1978). Within constructivist frameworks, learners are regarded as active participants in meaning-making, while educators function as facilitators, mentors, and co-constructors of learning rather than mere transmitters of information (Rust et al., 2005). Learning is therefore understood as an iterative and contextually grounded process in which students are encouraged to question, investigate, collaborate, discuss, and critically evaluate their understanding in authentic educational

settings (Biesta, 2022; Schunk, 2020). Consequently, assessment within constructivist approaches extends beyond the measurement of memorized knowledge and instead emphasizes formative, dialogic, and reflective assessment practices that support deep understanding, self-regulation, problem-solving ability, and continuous learning (Black & Wiliam, 1998; Carless, 2015).

Learning Theories and Assessment Orientation

The link between learning theories and assessment orientation is central to this study. Behaviorist approaches inform traditional assessment practices, where the focus is placed on observable outcomes and the measurement of knowledge acquisition after instruction (Shepard, 2000; Schunk, 2020). Within such approaches, assessment is primarily summative, emphasizing testing, grading, and certification of learning outcomes, while feedback is often corrective and teacher-directed rather than formative and developmental.

In contrast, cognitive and social constructivist theories provide the theoretical foundation for diagnostic and formative assessment by positioning assessment as an integral component of the learning process rather than merely a tool for evaluation (Rust et al., 2005; Schunk, 2020). Diagnostic assessment, conducted before instruction, enables teacher educators to identify students' prior knowledge, misconceptions, learning gaps, readiness levels, and diverse learning needs, thereby supporting more responsive and differentiated instructional planning (Carless, 2015; Rust et al., 2005). Formative assessment, implemented during instruction, promotes continuous feedback, learner reflection, active engagement, and the scaffolding of knowledge construction through ongoing interaction between teachers and students (Black & Wiliam, 1998; Hattie & Timperley, 2007). Although summative assessment continues to play an important role in evaluating learning outcomes and certifying achievement, contemporary learner-centered approaches increasingly emphasize balancing summative functions with formative and diagnostic practices that support meaningful learning and instructional improvement (Carless, 2015; Shepard, 2000).

Conceptual Framework for the Study

This study employs an integrated conceptual framework to explore teacher educators' assessment orientations and practices in Colleges of Teacher Education (CTEs) within the Amhara National Regional State. The framework is grounded in learner-centered education, constructivist learning theory, and contemporary assessment perspectives that view assessment as an essential part of the teaching–learning process rather than merely a tool for measuring achievement. In this regard, assessment is understood as a continuous and interactive process that supports learning, improves instruction, and promotes students' academic development.

The framework focuses on three interrelated dimensions: assessment practices across instructional stages, the quality and function of feedback, and the contextual conditions that shape assessment implementation.

The first dimension relates to assessment practices before, during, and after instruction. Before instruction, teacher educators may use diagnostic assessment to identify students' existing knowledge, misconceptions, readiness levels, and learning needs. Information obtained from diagnostic assessment can help instructors organize lesson

content, select suitable teaching strategies, and respond to differences among learners (Carless, 2015; Shepard, 2000). Through this process, assessment becomes an important foundation for instructional planning and classroom decision-making.

During instruction, formative assessment plays a central role in monitoring students' progress and supporting learning improvement. Teacher educators use formative assessment to gather evidence about students' understanding, provide guidance, encourage classroom participation, and adjust instructional practices according to students' responses and learning difficulties (Black & Wiliam, 1998; Hattie & Timperley, 2007). In learner-centered classrooms, formative assessment encourages active participation, reflection, collaboration, and deeper understanding. Rather than separating assessment from instruction, this approach integrates assessment directly into everyday teaching and learning activities.

After instruction, summative assessment is used to evaluate the extent to which learning outcomes have been achieved. Although summative assessment has traditionally focused on grading and certification, recent educational perspectives suggest that it should also contribute to instructional improvement and future learning opportunities (Brookhart, 2017; Carless, 2015). Accordingly, assessment after instruction serves not only accountability purposes but also provides valuable information for improving teaching effectiveness and curriculum implementation.

The second dimension of the framework concerns the role of feedback in supporting learning. Feedback is not viewed simply as correction or judgment; instead, it is considered an important instructional strategy that helps students understand their progress, recognize areas requiring improvement, and develop greater confidence in learning. Effective feedback is expected to be timely, constructive, understandable, and supportive of students' learning needs (Andrade et al., 2021; Hattie & Timperley, 2007). When feedback is meaningful and clearly communicated, students are more likely to become engaged in reflection and self-regulated learning.

The third dimension highlights the influence of contextual and institutional factors on assessment practices within teacher education colleges. The implementation of learner-centered assessment approaches may be affected by several challenges, including large class sizes, shortages of instructional resources, heavy teaching workloads, limited professional development opportunities, and differences in students' academic preparedness (Abraha et al., 2018; Teferra et al., 2017). These conditions may limit teacher educators' ability to consistently apply diagnostic and formative assessment practices in classroom settings.

Overall, the framework illustrates that teacher educators' assessment orientations are shaped by the interaction between educational beliefs, instructional practices, feedback processes, and institutional realities. By using this framework, the study aims to better understand the nature, quality, and challenges of assessment implementation in CTEs within the Amhara region. The framework also provides a basis for examining how assessment practices can contribute to improving instructional quality, strengthening assessment literacy, and supporting ongoing educational reform efforts in Ethiopia.

Rationale for the Framework

The theoretical and conceptual framework adopted in this study is important for understanding the complex nature of assessment practices in teacher education. By

combining educational philosophy, learning theories, and assessment perspectives, the framework offers a broad understanding of how assessment is conceptualized and practiced within higher education settings.

The framework helps explain how teacher educators' beliefs and understandings about assessment influence their classroom practices before, during, and after instruction. It also supports the examination of how feedback processes and assessment strategies affect students' learning experiences within learner-centered educational environments. In addition, the framework makes it possible to identify institutional and contextual factors that may either support or hinder effective assessment implementation.

The framework is also relevant to current educational reform efforts in Ethiopia, which emphasize competency-based education, continuous assessment, and active learning approaches. Through this connection, the study seeks to generate evidence that may contribute to improving assessment literacy, strengthening instructional practices, and enhancing professional development opportunities for teacher educators.

Ultimately, the framework serves as a guide for understanding the relationship between assessment theory and classroom practice while also addressing the gap between educational policy expectations and practical implementation in Colleges of Teacher Education within the Amhara National Regional State.

Examining the Influence of Philosophical Beliefs and Learning Theories. By connecting major educational philosophies—such as idealism, realism, progressivism, and social reconstructionism—with influential learning theories including behaviorism, constructivism, and sociocultural theory, the framework provides a comprehensive basis for understanding how teacher educators' beliefs influence their assessment orientations and instructional decisions. The framework helps explain how philosophical and theoretical assumptions shape educators' perceptions of teaching, learning, and assessment, as well as how these beliefs influence the selection and implementation of diagnostic, formative, and summative assessment practices within classroom settings (Schunk, 2020; Shepard, 2000). In this regard, assessment practices are understood not simply as technical procedures, but as reflections of broader educational values and pedagogical assumptions that guide instructional behavior.

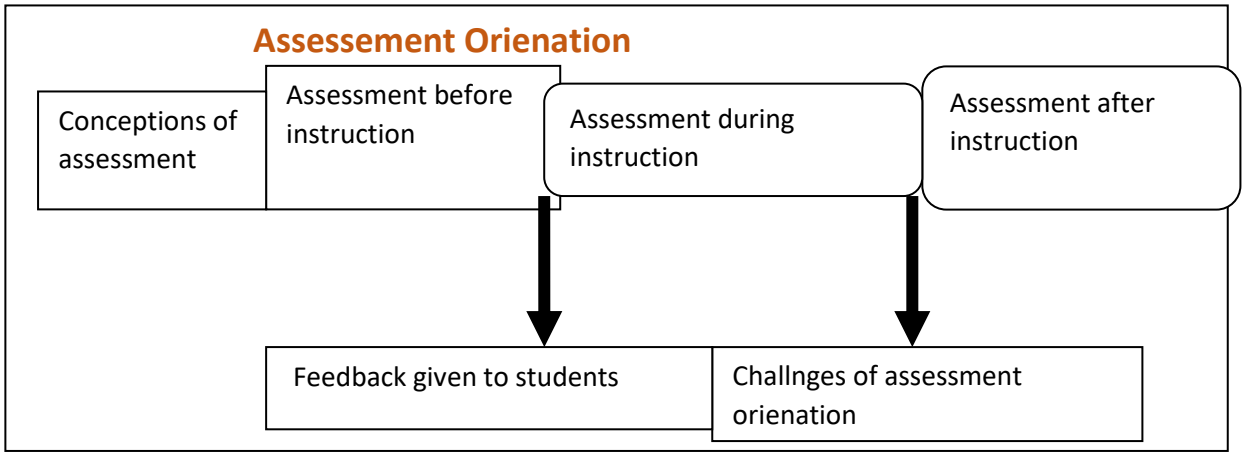
The framework also emphasizes the central role of feedback in promoting meaningful learning and improving educational outcomes. Contemporary assessment literature consistently highlights feedback as one of the most influential factors affecting student achievement, engagement, motivation, and self-regulated learning (Black & Wiliam, 2009; Hattie & Timperley, 2007). Within this study, feedback is viewed as an essential component of effective assessment practice because it enables learners to recognize their strengths, identify areas requiring improvement, and actively participate in the learning process. The framework therefore supports examination of how teacher educators provide feedback, including the timing, quality, focus, and mode of feedback delivery, and how these practices shape students' understanding, confidence, motivation, and academic development (Shute, 2008). This perspective aligns with learner-centered approaches that view assessment and instruction as closely interconnected processes that jointly support continuous learning improvement (Black & Wiliam, 2018).

In addition, the framework recognizes that assessment practices are influenced not only by teacher educators' beliefs and competencies but also by contextual and institutional realities. Teacher educators often operate within environments shaped by structural, organizational, and pedagogical constraints that may affect the successful implementation of learner-centered assessment approaches. Factors such as large class sizes, limited instructional resources, curriculum overload, institutional expectations, time limitations, and variations in students' academic preparedness may hinder the effective use of diagnostic, formative, and summative assessment practices in Colleges of Teacher Education within the Amhara region (Creswell & Creswell, 2018). By incorporating these contextual dimensions, the framework provides a realistic understanding of the conditions under which assessment practices are implemented in higher education settings.

Furthermore, the framework provides a structured analytical lens for generating evidence-based recommendations aimed at improving assessment literacy, strengthening instructional alignment, and enhancing teacher preparation programs. Through the integration of theoretical perspectives, assessment principles, and contextual realities, the framework enables the study to produce findings that are both academically grounded and practically relevant. Such an approach is particularly important in the Ethiopian higher education context, where ongoing educational reforms emphasize competency-based education, learner-centered pedagogy, and continuous assessment practices (Darling-Hammond et al., 2020).

Overall, the framework offers a multidimensional perspective that integrates educational philosophy, learning theories, assessment practices, feedback processes, and contextual influences into a coherent analytical model. It enables the study to examine the complex interaction among teacher educators' conceptions, practices, feedback mechanisms, and challanges while also highlighting the practical realities of assessment implementation in teacher education colleges. By situating assessment orientation within this broader conceptual perspective, the study underscores that effective assessment is both theoretically informed and contextually grounded, reflecting the educational realities, opportunities, and challenges experienced within Colleges of Teacher Education in the Amhara National Regional State.

Figure 4
Conceptual Framewor of the Study



Methods

This study employed a concurrent mixed-methods design (Creswell, 2013; Creswell & Hirose, 2019; Guetterman et al., 2015), which enabled the simultaneous collection and analysis of qualitative and quantitative data. The qualitative component explored the lived experiences of teacher educators regarding their conceptions of assessment orientation, the nature of feedback provided to students, and the challenges that impeded effective assessment orientation (Holstein & Gubrium, 2000; Malpas, 2001; Maypole & Davies, 2001). This approach allowed for an in-depth understanding of the participants' beliefs, attitudes, and experiences.

The quantitative component employed a descriptive approach to examine the extent to which teacher educators implement assessment orientation before, during, and after instruction. By integrating both methods concurrently, the study provides a comprehensive perspective on assessment practices and their underlying determinants in colleges of teacher education (CTEs).

Participants of the Study

The sample was determined using a two-stage sampling procedure. In the first stage, four colleges of teacher education (CTEs) were selected from the Amhara National Regional State: Debre Markos CTE, Finote Selam CTE, Injibara CTE, and Bege Midir CTE, using convenience sampling. In the second stage, all teacher educators from the selected colleges were invited to participate, totaling 408 potential participants. Out of these, 390 teacher educators completed and returned the questionnaires, resulting in a response rate of 95.6%. Among the respondents, 100 were female and 290 were male, representing diverse teaching disciplines and varying years of experience. This sample provided a broad range of perspectives and practices, ensuring that the findings were both statistically reliable for quantitative analysis and sufficiently rich for qualitative exploration.

Data Collection Instruments

Two instruments were employed for data collection: a questionnaire and a semi-structured interview. Both instruments were designed to complement each other and triangulate findings across quantitative and qualitative data. A closed-ended rating-scale questionnaire with 30 items was developed to measure the extent of assessment practices. The questionnaire was divided into three sections, each comprising 10 items: assessment before instruction, assessment during instruction, and assessment after instruction. Responses were recorded on a five-point Likert-type scale (5 = always, 4 = frequently, 3 = occasionally, 2 = rarely, 1 = never). Questionnaire items were developed based on a review of the related literature (Askalemariam, 2015; Sewagegn, 2019) to ensure alignment with the research objectives and the study's theoretical and conceptual framework.

Semi-structured interviews were conducted to explore teacher educators' conceptions of assessment orientation, their assessment practices, the nature of feedback provided to students, and challenges encountered in implementing assessment before, during, and after instruction. Semi-structured interviews are particularly suitable for investigating lived

experiences and capturing in-depth perspectives (Sidman, 2013). A total of 12 teacher educators were interviewed, with each session lasting approximately 30–45 minutes.

Validity

Ensuring the validity and reliability of the research instruments was critical to guarantee the accuracy and consistency of the collected data. Content validity was established through careful review by a panel of experts drawn from Colleges of Teacher Education (CTEs), including experienced teacher educators, educational researchers, and psychologists specializing in assessment and pedagogy. In particular, professionals from institutions such as Finote Selam College of Teacher Education (Finote Selam CTE) participated in the validation process, ensuring that the instrument reflected the contextual realities of teacher education practice. These CTE experts evaluated each questionnaire item to determine whether it appropriately measured constructs related to assessment practices before, during, and after instruction within teacher education settings. Their feedback led to minor revisions aimed at improving clarity, relevance, language precision, and alignment with the study's objectives and the practical realities of assessment implementation in CTEs. This systematic expert review process ensured that the instrument comprehensively represented the intended domain of assessment practices while minimizing the risk of construct underrepresentation and enhancing overall content validity (Gay et al., 2000; Moreno, 2010; Salkind & Rasmussen, 2008).

Reliability

The internal consistency of the questionnaire was assessed using Cronbach's alpha. All subscales measuring assessment before, during, and after instruction exceeded the 0.70 threshold, indicating high reliability (Nunnally & Bernstein, 1994). High internal consistency suggests that the respondents interpreted the items in a coherent and stable manner, enhancing the dependability and replicability of the findings.

By establishing both content validity and reliability, the study ensured that the questionnaire accurately captured teacher educators' assessment orientations and practices, supporting the credibility of subsequent analyses.

Data Analysis

The participants' responses were summarized using descriptive statistics such as frequencies, percentages, means, and standard deviations. Inferential statistics, specifically a one-sample t-test, were used to establish whether assessment techniques were substantially different from the expected standard. The cut-off mean value of 3.0 on a five-point Likert scale was used to determine satisfactory implementation levels. Before running the t-test, the data were checked for accuracy, missing values, and outliers. In addition, normality assumptions were tested using both graphical approaches (histograms and Q-Q plots) and statistical tests (Shapiro-Wilk test), which revealed that the data were roughly normally distributed ($p > 0.05$). Based on these findings, the assumptions for parametric testing were deemed satisfied. The level of significance was fixed at $\alpha = 0.05$.

Interview data were analyzed using thematic analysis, allowing identification of recurring patterns, categories, and themes related to teacher educators' conceptions, feedback

practices, and challenges. Thematic analysis provided rich, contextualized insights that complemented and explained quantitative findings.

The combination of qualitative and quantitative data enhanced the credibility and comprehensiveness of the study. Triangulation allowed for a holistic understanding of assessment practices in the context of teacher education in the Amhara National Regional State, providing evidence to address all research questions effectively.

Results

Teacher Educators' Conceptions of Assessment Orientation

Qualitative data analysis findings revealed that the teacher educators held limited and often misconceived understandings of assessment. Most could not differentiate clearly between the purposes of assessment before, during, and after instruction. Feedback was often narrowly conceptualized as correcting students' work, encouraging responses to oral questions, or providing correct answers. Overall, assessment and feedback practices were teacher-centered, directive, and largely aligned with behaviorist approaches, rather than constructivist strategies that integrate assessment, instruction, and formative feedback. These practices suggest that students in these colleges may not fully benefit from assessment-oriented instruction.

Conceptions of Assessment before Instruction

The participants described assessment before instruction primarily as a means to check prior learning: AmhaT-1: "I teach them again the previous lesson if they were not clear; if they were clear, I proceed to the next lesson. I use oral questions to assess students' previous learning" (NSTE-1, 5-4-2024); NSTE-2: "Assessment before instruction is a method to ensure students' understanding of previous lessons. Feedback includes written comments on students' work, including corrections" (5-4-2024); SSTE-1: "I assess students before instruction using oral questions, practical work, homework, assignments, tests, and exams. While assessment is beneficial for teachers, it has little relevance for students because they are unaware they are being assessed" (10-4-2024); LANG-3: "Before starting a new topic, I ask students a few oral questions. If most answer correctly, I move on; if not, I repeat the lesson. I don't use the results to adjust my teaching plan" (12-4-2024) and PSTE-3: "I consider pre-assessment as checking homework and giving grades. I rarely use it to guide instructional strategies" (14-4-2024).

Assessment before instruction is largely procedural, focusing on verification rather than guiding teaching and learning, reflecting a teacher-centered orientation.

Conceptions of Assessment during Instruction

During instruction, the participants reported monitoring students' progress and identifying struggling learners: AESTE-2: "Formative assessment is about using assessment along the journey of learning so students can learn from mistakes, remedy deficiencies, and advance their learning" (2-4-2024); PSTE-1: "I ask students oral questions during instruction. If they cannot answer, I reteach the point. Teaching and assessment are interrelated" (10-4-2024); MTE-3: "During lessons, I walk around to see if students are following. If someone is

struggling, I give hints, but I do not formally record their progress" (16-4-2024); AESTE-3: "I encourage peer correction during class activities. However, I mostly rely on oral questions and provide the correct answers myself" (18-4-2024). Although some teachers attempt formative strategies, practices remain informal, inconsistent, and focused on immediate correction, rather than long-term student learning.

Conceptions of Assessment after Instruction

Post-instruction assessment was primarily summative, focusing on evaluating learning outcomes: LANG-2: "Assessment after instruction ensures students' learning. It involves oral questions, group discussions, and homework to determine comprehension" (5-5-2024); NSTE-1: "Students who receive frequent assessments learn more. However, assessments often benefit only teachers, as students are unaware they are being assessed" (5-5-2024); SSTE-4: "I provide written feedback on assignments, but students often don't read it carefully. Assessment mainly serves to generate marks for reports" (17-5-2024); AESTE-4: "Exams are the main tool to know if learning occurred. I rarely conduct follow-up assessments unless students request it" (18-5-2024).

Assessment after instruction is dominated by summative purposes, with feedback provided in a limited and often superficial manner.

Teacher Educators' Implementation of Assessment Orientations

Table 1 presents descriptive statistics and one sample t-test results for assessment orientation implementation.

Table 1

Descriptive Statistics and One Sample T-Test for Assessment Orientation

Assessment Orientation	N	Expected Mean (EM)	Observed Mean (OM)	SD	t	df	p
Assessment before instruction	390	3.00	2.06	3.49	98.07	389	.000
Assessment during instruction	390	3.00	2.27	4.49	85.28	389	.000
Assessment after instruction	390	3.00	3.20	2.96	190.75	389	.000

Note. N = number of respondents; EM = Expected Mean; OM = Observed Mean; SD = Standard Deviation; t = t-value; df = degrees of freedom; *p* = significance level.

As shown in the above Table 1, Implementation before instruction (M = 2.06) and during instruction (M = 2.27) were significantly below the expected mean (M = 3.00), indicating low implementation. Implementation after instruction (M = 3.20) exceeded the expected mean, confirming a predominant reliance on summative assessment.

These quantitative findings align with the qualitative results, confirming that teacher educators focus largely on auditing student learning post-instruction rather than integrating continuous, formative assessment.

Challenges of Assessment Orientation

The qualitative analysis identified multiple challenges. The first one was lack of awareness and traditional mindset which led to misconceptions about assessment purposes and feedback practices. The second one was large class size. This posed difficulty in managing assessment and providing individualized feedback. The third challenge was inadequate provision of teaching-learning facilities which was characterized by limited resources and instructional materials. The fourth one was lack of motivation which led to low student engagement and high teacher workload and curriculum misalignment. The last challenge identified was the non-alignment of modules and content with assessment objectives.

The following quotes provide evidence for the challenges the teacher educators faced in implementing effective assessment:

SSTE-2: "Problems include awareness, inadequate facilities, large classes, low motivation, and weak teacher-student relationships" (15-5-2024);

MTE-3: "Even when I want to give continuous feedback, the large class size makes it impossible. Some students do not even submit assignments on time" (22-4-2024);

LANG-5: "Sometimes we have the resources, but the curriculum is too rigid, so I cannot adjust assessment methods to fit student needs" (23-4-2024); and

SSTE-5: "Students are often passive; even if I try formative assessment, they don't engage actively. Motivation is a real barrier" (24-4-2024).

The above quotes from the interviews highlight systemic, structural, and attitudinal barriers that limit effective assessment-oriented practices, emphasizing the interplay between institutional constraints and teacher-student dynamics.

Overall, the results indicate that teacher educators' conceptions and implementation of assessment orientation are limited, predominantly teacher-centered, and heavily focused on summative post-instruction assessment. While some formative strategies are employed during instruction, these are inconsistent and often informal. Structural barriers such as large class size, limited resources, low student motivation, and curriculum misalignment intensify the challenge. Addressing these gaps requires targeted professional development, systemic reforms, and stronger integration of formative and student-centered assessment practices to enhance learning outcomes.

Discussion

Teacher Educators' Conceptions of Assessment Orientation

The qualitative data analysis revealed that teacher educators in CTEs in the Amhara region have misconceptions about assessment and struggle to differentiate among assessment before, during, and after instruction. Most of the participants perceived assessment primarily as a tool to determine whether students had learned a concept, reflecting a predominantly summative orientation. This perception aligns with previous research indicating that instructors often view assessment as a form of testing rather than a multifaceted tool to support learning (Brookhart et al., 2009; Askalemariam, 2015).

The t-test results corroborated these qualitative findings, showing that pre-instruction assessment was minimally implemented. This contrasts sharply with the principles of

diagnostic and formative assessment, which aim to identify prior knowledge, misconceptions, and learning gaps to inform teaching strategies (Edelenbos & Kubanek-German, 2004; Nichols et al., 2009; Jang & Wagner, 2014). Feedback practices were also misconceived, with many teacher educators viewing feedback primarily as correcting homework or providing the "right answers", rather than as a dynamic tool to guide student learning. This aligns with Hattie and Timperley's (2007) assertion that feedback is most effective when it is targeted, constructive, and aligned with learning objectives.

In the context of Amhara region, these misconceptions are compounded by systemic and institutional factors. Teacher educators often face workload pressures, limited professional development, and inconsistent access to instructional resources, which reinforce reliance on summative assessment and reduce engagement with diagnostic or formative methods.

Teacher Educators' Implementation of Assessment Orientation

The quantitative and qualitative results indicate that assessment before and during instruction were implemented at lower levels than expected, while assessment after instruction predominated. Interviews showed that teaching practices were largely teacher-centered, directive, and orally oriented, reflecting a behaviorist rather than constructivist approach. This misalignment between theory and practice suggests that students in Amhara CTEs are not fully benefiting from assessment as a tool for learning. Formative assessment techniques—including peer review, self-assessment and interactive feedback—were rarely employed (Stiggins & DuFour, 2009; Doğan, 2013). As a result, opportunities for students to reflect, improve, and engage in deeper learning were limited (Black & William, 2004; Carless, 2015; Shepard, 2000b).

Implementation of Assessment before Instruction

Pre-assessment techniques were rarely used to diagnose prior learning or misconceptions, meaning lessons often began without a clear understanding of students' knowledge bases. This confirms prior findings that diagnostic assessment is frequently neglected in higher education contexts (Rice, 2013; Edelenbos & Kubanek-German, 2004). In CTEs in the Amhara region, the absence of pre-assessment is exacerbated by large class size, diverse student preparedness levels, and limited instructional resources, which make individualized diagnosis challenging.

Effective diagnostic assessment can help guide lesson preparation, promote learning continuity, and give evidence for teachers to alter instruction to fit the requirements of their students (Black & Wiliam, 2018; Shepard, 2019. Its absence adds to a one-size-fits-all teaching style that inhibits student engagement and learning growth while reducing opportunities for differentiated instruction (Hattie, 2012; Wiliam, 2018).

Implementation of Assessment during Instruction

Formative assessment during instruction was inconsistently applied across CTEs in the Amhara region. Feedback tended to be generic, corrective, and untargeted, with minimal attention to individual student needs. Such practices undermine the potential of formative

assessment to scaffold learning, identify misconceptions in real time, and promote long-term retention (Andrade et al., 2015; Hattie & Timperley, 2007).

Best practices suggest integrating ongoing, personalized feedback, peer assessment, and interactive assessment methods to improve student learning outcomes (Gikandi et al., 2011; Andersson & Palm, 2017). However, teacher educators' limited assessment literacy, high workloads, and institutional constraints in the Amhara region hinder the consistent adoption of these methods.

Implementation of Assessment after Instruction

Assessment after instruction was the most commonly implemented practice, reflecting a traditional summative orientation. While these assessments provide a measure of student achievement, they rarely support learning improvement or inform instructional adjustments. Excessive reliance on summative assessment limits opportunities for reflection, re-learning, and skill consolidation (Shepard, 2000b; Huba & Freed, 2000; Carless et al., 2010).

In CTEs in the Amhara region, summative assessment dominates due to institutional norms, lack of training in formative methods, and systemic pressures to cover content, leaving little room for continuous, formative evaluation that supports learning.

Integration of Qualitative and Quantitative Findings

Integrating qualitative and quantitative findings highlights a clear convergence: teacher educators' misconceptions about assessment, limited use of formative and diagnostic assessment, and dominance of summative practices are mutually reinforcing. The quantitative data indicated low implementation of pre- and during-instruction assessment, which qualitative interviews explained as stemming from conceptual misunderstandings and institutional constraints. Similarly, feedback practices were limited both in theory (misconceptions) and practice (quantitative measures), highlighting the interdependence between knowledge and behavior.

These findings are consistent with prior research emphasizing that assessment literacy and institutional support are critical for implementing formative assessment effectively (Brookhart et al., 2009; Nichols et al., 2009; Hattie & Timperley, 2007). The combined evidence underscores that teacher educators' assessment orientation is shaped by both individual understanding and systemic context, confirming that interventions must address conceptual, practical, and institutional dimensions simultaneously.

Challenges of Assessment Orientation

Several interrelated challenges were identified as hindering effective assessment practices in CTEs in the Amhara region:

***Large Class Size*:** High student-to-teacher ratio limits individualized feedback and active engagement.

***Traditional Assessment Mindset*:** Teacher-centered, summative approaches dominate, with minimal use of constructivist or formative practices.

***Limited Resources*:** Shortage of instructional materials, classroom technology, and assessment tools constrain implementation.

***Time Constraint and Workload*:** Heavy teaching load and pressure to cover content reduce time for formative assessment and reflective feedback.

***Students' Academic Preparedness*:** Variability in prior knowledge and skills complicates differentiated assessment**.**

***Limited Knowledge and Skills*:** Teacher educators often lack sufficient training and understanding of diagnostic and formative assessment methods.

These challenges are consistent with prior studies highlighting structural, institutional, and pedagogical barriers in Ethiopian higher education (Abraha et al., 2018; Alemu, 2024; Gebremariam & Gedamu, 2023; Tebeje & Abiyu, 2015; Teferra et al., 2017, 2018). Addressing these challenges requires a multi-level approach combining policy support, institutional resources, professional development, and pedagogical innovation. A shift from a predominantly summative assessment culture toward balanced, learner-centered assessment—integrating diagnostic, formative, and summative practices—is critical for improving student learning outcomes, instructional quality, and teacher preparation in the Amhara region.

Conclusions

This study revealed that teacher educators in colleges of teacher education in the Amhara region predominantly employ summative assessment practices after instruction, while diagnostic and formative assessments before and during instruction are inadequately implemented. The findings indicated that many teacher educators conceptualize assessment mainly as a mechanism for measuring achievement rather than as a continuous process that supports learning. Feedback practices were largely corrective and teacher-centered, limiting opportunities for reflective and learner-centeredengagement.

The study also identified major barriers to effective assessment orientation, including large class sizes, heavy teaching workloads, limited instructional resources, insufficient assessment literacy, curriculum misalignment, and varying academic preparedness among students. These challenges constrain the implementation of formative and diagnostic assessment practices.

The findings suggest the need for targeted professional development programs focused on assessment literacy, formative assessment strategies, and constructive feedback practices. Colleges of teacher education and educational authorities should strengthen institutional support, improve access to instructional resources, and promote balanced assessment frameworks that integrate diagnostic, formative, and summative approaches. Future research should further examine students' perspectives and the long-term impact of learner-centered assessment practices in teacher education.

Conflict of Interest

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Data Sharing

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Effects of art materials and space on implementing the primary school PVA curriculum: A comparative study in Ethiopia

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Abstract

This qualitative comparative case study investigated the impact of the availability of art materials and spatial considerations on the implementation of the performing and visual arts (PVA) curriculum in primary schools in two major cities in Ethiopia. The data were collected through semi-structured interviews, document analysis and classroom observations. Key informants included art education experts, primary school principals, art teachers, parents, and students. The data were analyzed using thematic analysis. The findings of the study indicated that Ethiopian primary schools face significant challenges in their plan to implement PVA education, primarily due to lack of access to art materials and dedicated instructional space. This drawback hinders the effective delivery of lessons in music, theater, visual arts, and dance, which are important for fostering creative and critical thinking skills among students. Therefore, it is crucial for stakeholders to collaborate in providing the necessary resources and facilities. The study offers practical insights into the strengths and weaknesses of PVA education implementation in Ethiopian primary schools.

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Introduction

The significance of arts education is consistently underscored within numerous global conventions and declarations. As articulated in the Road Map for Arts Education, arts education constitutes "a universal human right for all learners" (UNESCO, 2006, p. 3). Conforming to this foundational principle and associated international frameworks, primary curricula across Africa, including Ethiopia, systematically incorporate the performing and visual arts (Tan et al., 2005; Kabanda, 2014).

Performing and visual arts education is implemented within school curricula due to its demonstrable efficacy and its instrumental role in equipping students for future success (President's Committee on the Arts and the Humanities, 2011; Biag et al., 2015). In the

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contemporary era, wherein information is increasingly transmitted through non-textual and non-numerical modalities, fostering artistic literacy is imperative to encourage student engagement with the arts (National Core Arts Standards, n.d.). Furthermore, the availability of artistic media and the optimization of spatial environments constitute critical determinants that influence not only primary students' efficacy in their own creative production, but also their capacity to respect the artistic outputs, intentions and perspectives of others.

Ethiopian music and visual arts have a rich history that dates back to the old ages, encompassing the practice and oral transmission of these art forms. The written documentation of musical culture in Ethiopia can be traced back to ancient chronicles and hagiographies such as the sixth-century account of Saint Yared. In 567 A.D., St. Yared, a key figure in the development of traditional Ethiopian music, composed four volumes that represented the seasons of the year in different modes: Ge'ez, Ezil and Araray (Betreyohannes, 2010). The three modes are believed to have a metaphor associated with the holy trinity: the Ge'ez mode represents God the Father, the Ezil mode represents God the Son, and the Araray mode represents God the Holy Spirit (Shelemay et al., 1993). Foreign scholars also confirmed that Ethiopian music has a long history. As stated in Shelemay and Jeffery (1997), travelers like Mariano Vittorio compiled valuable documents on Ethiopian music. Francisco Alfarez and Job Leuthold were among the travelers who made significant records regarding Ethiopian music (Moorefield, 1975).

The Ethiopian king, Menelik II, recognized the limitations of traditional schools and established the first modern school in Ethiopia, located in the capital city of Addis Ababa, in 1908 (Pankhurst, 1968; Wagaw, 1979). The curriculum of this school included various subjects, one of which was arts education, initially referred to as calligraphy (Pankhurst, 1968; Wagaw, 1979). Until 1913 only four modern primary schools were established in Ethiopia. The schools aimed to transform the lives of the society. Empress Zewditu, the successor of Emperor Menelik II, acknowledged the importance of vocational education (Tamiru & Lasser, 2012). Her education proclamation of 1929 stated, "…after learning writing and reading …the child must learn one of the available handcrafts in our country [Ethiopia]" (Shibeshi, 2000, p. 159). The 1929 education proclamation also stated that "parents need to initiate their children to learn local skills that could help them lead their future" (Bender, 1976). Emperor Haile Selassie recognized education as vital to nation-building when he came to power in 1930 and established the Ethiopian Ministry of Education and Fine Arts (Tefera, 1996). The fact that the value of arts has been recognized can be deduced from the naming of the newly established educational institutions.

In the history of education in Ethiopia, the first girls' school, known as Empress Menen School, was established in 1931 (Teffera, 2005). Empress Menen recognized the importance of vocational education, which led to handcrafting being a significant part of the curriculum. Before the Italian invasion in 1935, there were 28 government schools with a total enrollment of approximately 4,000 students. During the Italian invasion, Ethiopian students were prohibited from progressing beyond the fourth grade. As stated in Pankhurst (1972), " …. 'Following the principle of 'divide-and-rule'… the medium of education was Amharic in Addis Ababa, Oromigna in Oromo regions, Sidamigna in Sidama, Kafficho in Kafa, and Somale in Somali regions" (p. 367).

The period from 1936-1941 had been a dark age to Ethiopia's education (Tefera, 1996). Education was prohibited and educational materials were destroyed by the Ethiopian invader, fascist Italy. In 1942, schools were re-opened using teachers and teaching materials from Britain. The first Ethiopian primary school curriculum of 1947 included music, handcraft and physical education (Tefera, 1996). The second curriculum was developed in 1949, the third and fourth curriculums which were used between the years 1954 and 1974 all included music, arts and handcraft subjects (Mengistie, 2020). Ethiopian modern education offers music and arts education in primary schools based on the 1994 education policy. The present education policy integrated visual arts, dance, music, and theater arts as a single subject named "Performing and Visual Arts" (PVA) in primary schools. The General Education Curriculum Framework document clearly states: "Performing and visual arts help learners to express their imagination and feelings and develop a sense of personal and cultural identity" (Ministry of Education [MoE], 2020, p. 34).

Problem and Rationale

This study examined the delivery of PVA education in selected schools in Ethiopia, focusing on the availability of art materials and physical space for instruction. The issue of allocating proper resources to performing and visual arts education in countries like Ethiopia needs policy decisions. Policies, as indicated in Mahlmann (2003), "help organizations deal with change, respond to their members' needs, address real-world situations, allocate resources, and solve problems" (p. 71).

Space plays a decisive role in the proper implementation of PVA education. International evidence underscores that physical school infrastructure, including specialized art and music installations, is significantly and positively correlated with student achievement and successful curriculum execution (Andrade et al., 2024). Furthermore, because arts-based learning relies heavily on active, collaborative, and multi-sensory experiences; traditional, rigid classroom spaces often fail to accommodate the movement and cooperative setups necessary for these activities (Lauss & Helm, 2024).

In light of the aforementioned challenges surrounding the implementation of the performing and visual arts curriculum within the Ethiopian context, this study seeks to address the following central research questions:

1. How does the availability of art materials affect the implementation of PVA education in Ethiopian primary schools?
2. How does the provision of space affect the implementation of PVA education in Ethiopian primary schools?

Literature Review

Policy and Implementation of Arts Education in Africa

Cultural acts, such as music, drama, dance, and visual arts (PVA) are recognized as drivers of development, a means of reducing poverty, and used as instruments to enhance the well-being of every human being. Leading development organizations like World Bank Group (WBG) set goals to end extreme poverty and foster income growth in developing countries through their rich cultural assets (Kabanda, 2014).

The African Union Agenda 2063 provides policy guidance on achieving development in the African continent through cultural and creative industries by creating jobs, generating

income as well as by empowering sections of a society such as women and youth (African Union, 2020). In most developing countries little research has been conducted on the benefits of arts education (Glenn, 2011).

The Southern African Development Community (SADC) faces profound resource deficits in arts education due to regional policies prioritizing macroeconomic development over cultural sectors (Cleary, 1999). This systemic marginalization stems from historical colonial paradigms and neoliberal structural adjustments that forced fiscal austerity, shifting national curricula away from the humanities toward basic technical skills (Chibambo, 2026). Consequently, as Lebetche (2003) observes, "…insufficient funds and resources are available for most of the art institutions in the region.… little or no financial support is provided for the performing arts due to other priorities" (p. ix). This financial scarcity leaves the creative sector dependent on erratic foreign aid rather than sustainable state policy. Furthermore, educational execution across the member states is routinely hindered by implementation gaps, including severe shortages of specialized educators and inadequate instructional materials (Mbazi, 2025). This resource deficit creates a stark disconnect between local realities and broader continental frameworks such as those championed by the African Union, which position cultural education as a vital catalyst for cognitive innovation, social reconciliation, and economic growth (Sirayi, 2007). Ultimately, individual governments within the bloc continue to treat arts education as an expendable luxury rather than a strategic driver for the regional creative economy (Gamiet, 2011).

Within the discourse of primary education in developing nations, the formulation of educational policy often diverges significantly from classroom reality. This disparity is particularly pronounced in visual arts education. While curriculum frameworks frequently validate the arts as an approved and essential component of holistic student development, the actual implementation of these programs is severely compromised, leading scholars to classify visual arts as an "endangered subject" (Westraadt, 2011).

This endangerment is driven by a combination of material scarcity and volatile institutional frameworks. A primary operational barrier is the critical shortage of specialized art materials, which severely restricts educators' capacity to deliver pedagogical content effectively. When schools lack fundamental resources, the visual arts are often reduced to theoretical instruction rather than experiential, hands-on learning.

Furthermore, continuous structural revisions to national curricula exacerbate these implementation challenges. As Westraadt (2011) observes within the context of post-apartheid South African educational reforms, the rapid succession of curricular reviews and policy shifts over the past few decades has inadvertently compromised the quality of visual arts education. Instead of fortifying the discipline, these systemic pressures often marginalize the arts in favour of high-stakes, tested subjects (such as literacy and numeracy), thereby threatening the sustainability of meaningful artistic pedagogy in primary schools.

Primary School Arts Education in Ethiopia

Ethiopia's primary school education has federal and regional arrangements. In the country, the regional education bureaus have the responsibility of preparing plans and programs based on a national policy. The regional bureaus also have the responsibility of preparing and implementing primary school curricula, recruiting and training primary school

teachers and educational personnel, and ensuring the provision of textbooks and educational materials (Ministry of Education, 2010; Tan et al., 2005).

In a study conducted by the financial assistance of USAID, in the former Southern Nations and Nationalities and Peoples Region (SNNPR) of Ethiopia, music and visual arts was one of the five subjects which all students had to take (Ababa, 2015). This study investigated how PVA curriculum is currently being implemented in Hawassa, which was the capital city of the former SNNP and the capital city of the present Sidama region.

Conceptual Framework

Among the six premises that Leung et al. (2008) consider as impactful factors for the effective implementation of arts education, resource and space were selected to build the framework for the investigation of the implementation of PVA curriculum in Hawassa and Addis Ababa. These variables have huge impact on the implementation of visual and performing arts. The modified California Department of Education (2021) and the framework for 21st Century Competencies and Student Outcomes, Ministry of Education Singapore (2018), were also adopted to explore the implementation of PVA in the primary schools selected for this study. It is impractical to investigate the proper implementation of PVA education without having arts materials and space.

Methods

Research Design

This study used a comparative case study approach which features an iterative and consistent tracing of factors, incorporates social actors in the study, and conducts rich descriptions of the study milieu (Bartlett & Vavrus, 2017; Goodrick, 2014). The worldview in which this research is guided is an interpretive paradigm because it relies on thick description and analytical orientation. Interpretation as a worldview assumes that social reality is multiple shaped by human experiences (Patton, 2002; Creswell, 2009). Therefore, this study is based on the assumption that universality does not exist because art has subjective nature and the social world is considered external to individual cognition.

Context and Areas of the Study

Situated in the Horn of Africa, Ethiopia represents the second most populous nation on the continent, with an estimated population of 126.52 million in 2023, comprising approximately 89 distinct ethno-linguistic groups. The country encompasses a total land area of roughly 1,104,300 square kilometers (426,400 square miles). Historically, Ethiopia has been characterized as one of the least urbanized nations globally (World Bank, 2024). The country is currently experiencing a period of rapid urbanization (UN-Habitat, 2020). Consequently, this study is situated within a geographically expansive and demographically complex national context.

Addis Ababa is a city which is significant for its political, economic and diplomatic activities. Recently the population of Addis Ababa is around 6 million. It has 527 square kilometers area. It has a vibrant mix of Ethiopian ethnic groups. (Taye, 2025). Hawassa, one of the two cities sampled for this study, is located six-hour drive from the capital city of

Ethiopia, Addis Ababa. Hawassa was experiencing rapid urbanization in the south of Ethiopia. According to Wondrade et al. (2014), between 1987 and 2011 the area of Hawassa "had increased by 234.5 percent … and the yearly population growth rate was 27.6%" (p. 223). In 2024, the estimated population of Hawass was 577,000 and its population density was 5,200 per square kilometer.

The population and size of the study areas give good opportunity in the representation of the Ethiopian PVA education as the cities are metropolitans. Our research focuses in these cities because the cities can give good picture on how Ethiopian current PVA education is implemented.

Participants and Sampling Strategy

The cases of the study were selected based on the principles of comparative case study. As indicated in Goodrick (2014), comparative case study involves the analysis and synthesis of the similarities, differences and patterns across two or more cases that share a common focus or goal. Creswell (2009) stated that qualitative study comprises fewer subjects. Accordingly, a few cases were selected to explore how the availability of arts materials and space impacted the teaching of performing and visual arts education in primary schools in two cities. Addis Ababa and Hawassa were selected because the cities were relatively expected to implement better performing and visual arts education as they had schools with long years of experience and better resources.

For this study, primary school arts experts from the Ministry of Education and from the two regional education bureaus, primary schools' principals, performing and visual arts teachers, students and parents from each school were selected. Snowball sampling technique was used to select parents and students through school teachers who have better follow up in the teaching learning process. Arts experts from education bureaus, school directors and art teachers were sampled based on availability.

Table 1

Sample Sizes of the Study

Participants	Addis Ababa	Hawassa	Total
Educational experts	3 experts	3 experts	6
Principals	2 principals	2 principals	4
Art teachers	4 teachers	4 teachers	8
Students	4 students	4 students	8
Parents	4 parents	4 parents	8
Total	17	17	34

Procedure and Data Analysis Methods

In this study, thematic analysis-which is a widely used qualitative method and a method of data analysis that is suited to inform policy development, was used (Roulston, 2001; Braun & Clarke, 2006; Dawadi, 2020). The first stage of the analysis was transcribing the recorded verbal data in order to instigate the interpretative act. The transcribed data was read and reread in a systematic way (Riessman, 1993; Bird, 2005; Chamberlain, 2015). The purpose was to be familiar with the data. At this stage, 295 initial points of interest were

detected and highlighted. These points of interest were cross-referenced against the research questions.

Initial codes were generated through an iterative reading of the interview transcripts (Gibbs, 2018) to identify core elements relevant to the study's scope. These preliminary points of interest were systematically categorized into codes, which served as the foundation for developing emergent themes. These themes directly addressed the specific interview inquiries designed to illuminate the overarching research questions. As delineated in Table 2, these inquiries specifically investigated the sufficiency of physical space, classroom seating arrangements, the procurement sources of art materials, the overall availability of resources, and the specific types of materials utilized. These themes were derived from the initial points of interest which were highlighted in the familiarization stage of the data.

Table 2

Points of Interests Cross-Referenced Against the Research Questions

Research questions	Codes	Initial Points of Interests
How is adequacy of space understood in the schools?	Adequacy of space (in the schools, classroom, hall, gallery, open air space)	66
How is space used in relation to seating arrangements?	Seating arrangements (face-to-face, group, semi-circle)	38
Who are the providers of art materials to the students?	Providers of art materials (schools, teachers, parents, students, donors)	61
How is the availability of art materials described?	Availability of art materials (minimum, sufficient)	77
What are the main types of materials used?	Materials used (students textbooks, softcopy, hardcopy, art materials, downloads from internet sources)	53
Total		295

Ethical Considerations

An informed consent form was prepared and read by the participants who signed and returned it. All interviews were recorded with the permission of the participants. Fortunately, permission was obtained from all participants to be recorded. The participants were informed about the purpose of the research and their involvement was made clear, and their decision about participating in the research including withdrawing their participation from the research was respected. After consent was obtained from teachers and parents, consent was also obtained from the students who were minors. The students were informed about the purpose of the research and what their involvement entailed; in addition the students' decision about participating in the research including withdrawal from the study was respected. The students were interviewed in their schools when their teachers or parents/guardians were around. For the sake of anonymity and confidentiality, the participants were assigned codes such as "Participant 1 from Hawassa", "School Principal 2 in Addis Ababa", School 1 in Hawassa" and the like (Gallagher, 2009; Powell et al., 2011).

Results

The findings of this study are categorized into two primary themes: the availability of artistic media for teaching and learning, and the adequacy of dedicated instructional spaces for the performing and visual arts.

Table 3 delineates the minimum range of media required for students to engage in artistic production within the selected primary schools. Observational data revealed that art educators faced significant instructional challenges due to the systemic absence of these essential materials in their classrooms.

Table 3

Art Forms in Comparison to Range of Media

Art Forms	Range of Media
Visual Art	Pencil, paper, colored pen, ink, markers, crayon, chalk, watercolor, brushes, acrylic, tempera, clay, wire, found objects, leaves and seeds
Theater	Costumes, hall
Music	Traditional and modern music instruments, bottles, containers, tins, plastic pipe and wooden sticks
Dance	Costumes, hall

Notwithstanding the acute shortage of artistic resources, some noteworthy student works were produced. These creative outputs reflect a pronounced engagement with art education on the part of both educators and learners. Moreover, this evidence suggests that primary schools possess substantial latent capacity that could be fully realized through the provision of materials and adequate, instructional environments (see Figures 1 and 2).

Figure 1

Artwork Created by Grade Five Students Using Local Materials (8x10 Inches)

Source: Survey data (Photograph by Abate M. June 9, 2023, courtesy of the school)

Figure 2

A Painting by a Student Using Tempera on Canvas (11x14 Inches)

Source: Survey data (Photograph by Abate M. June 9, 2023, courtesy of the school)

Regarding the availability of artistic media, a primary school art educator at a government institution in Addis Ababa noted:

> The school does not offer art materials to students except for art exercise books. If basic materials were available the student's participation would be better … Students can do better in visual arts when they have materials to do art, if the lesson is dominated by theory learners will lack interest in the subject.

Discussing resource constraints, an art educator from a private school in Addis Ababa noted that the scarcity of materials extended to a deficit in student textbooks. He explained that "students' textbooks were provided in softcopy [and] shortage of the textbook in hard copy is one basic problem." Beyond textbook access, this teacher identified the high financial cost of artistic media as a substantial barrier that impeded the execution of practical, hands-on classroom activities.

A boy from grade 5 said the following regarding the shortage of art materials:

> We don't have big-size sheets of paper to draw on, but we have exercise books that we can use for drawing. We also have a shortage of colors and paper. My parents offer me A-4 size paper to do art; they buy me pencils, rubbers, and erasers to do art. My problem is I do not have enough colors. The colors are expensive. We don't have a dedicated place for art lessons. Mostly, I do my artwork at home, outside of my school.

Providers of Art Materials

One parent viewed her efforts to provide artistic materials merely as an incentive to foster her child's general academic performance. This perspective indicates that the parent's

primary interest did not reside in the Performing and Visual Arts (PVA) curriculum itself; rather, her material support served as an extrinsic motivator for other academic disciplines. Highlighting this approach, a parent whose child attends a private school remarked:

> We [the family] are cautious in our support, so that he would not disregard his education. Our child would be interested in his education by continuing our support for his passion. He may say, “My parents do this and that to support my interest in music so I need to be good at my education and make them happy”.

A teacher professional development expert within the Ministry of Education recommended utilizing traditional musical instruments to address material shortages. However, this solution presents underlying challenges, given that implementation necessitates rigorous planning and adequate funding. The expert remarked:

> To reduce the cost of musical instruments, we encourage the use of cultural instruments … Local instruments like *masinko* (a traditional music instrument, one string on the bow and one string on the main part) and *kirar* (a five string cultural instrument) need to be used. Our cultural instruments are numerous, and Ethiopia is rich in its cultural instruments from different clans and tribes.

Corroborating these concerns, an arts education expert at the Addis Ababa City Education Bureau similarly highlighted the deficit of instructional materials and physical space within the schools, stating:

> In a study we conducted on the implementation of PVA, the shortage of rooms and spaces like halls and galleries was clearly observed. In relation to art materials students were not largely able to get art materials except for pencils and exercise books. Students did not have a dedicated room for arts.

According to this expert, availability of art materials and space are major issues that need attention at policy level. The issue of art materials is not given clear direction by experts. An art expert from the Ministry of Education suggested that “in relation to art materials for PVA, we advise art teachers to use the materials they can get from their surroundings.” However, such solutions are not practical when it comes to the issue of fulfilling art materials in the classroom.

The participant stated that both material availability and physical space are structural issues requiring strategic policy interventions. Currently, administrative experts fail to provide clear operational directives on the matter. While an art expert from the Ministry of Education suggested that "in relation to art materials for PVA we advise art teachers to use the materials they can get from their surroundings," the evidence demonstrates that localized sourcing cannot translate into actual classroom practice without exhaustive upfront planning and the structural conditions necessary to make it actionable.

The suggestion of one art teacher on the problem of fulfilling arts materials clearly indicated the problem on the ground. Her statement is a common knowledge but it has been said by most arts teachers and stakeholders of arts education. Her statement is: “The school has few materials to arts education.” The expert at the MoE also had no different idea on the

issue of shortage of arts materials. The expertise said, “Shortage of PVA material is one of the major problems to teach arts subject.”

Sufficiency of Space for Improved Implementation of Performing and Visual Arts

The National Art Education Association (NAEA, 2017) recommends that the ratio of educator to student be 20–25:1 and that regardless of grade level the art room should have a minimum of 55 square feet per student. The average number of students in a classroom in the schools which were the focus of the present study was 40-45, which was almost more than double the expected number. In the case of Ethiopia, an estimated number of 40-60 students learn in classrooms with an average size of 40-50 square meters (Addis Standard, 2020). In the schools where the present study was conducted the sizes of the classrooms were not different from the national average. Such numbers are too congested for art classes.

Seating Arrangements

In one of the schools, it was observed that space for art had been deteriorating from time to time. One PVA teacher complained, “Lack of space has huge influence on the implementation of PVA in the school. There is no proper room for art in the school”. Because of lack of space for art, teachers are obliged to give homework while students need to do some of the exercises in class. In the primary schools (both in Hawassa and Addis Ababa), it was observed that art was mainly offered in regular classrooms where students sat facing their teacher.

In the art clubs the seating arrangement was changed in a way so that they could interact with each other, and in a way they could better learn PVA demonstrations and presentations. In the art clubs U-shaped or horseshoe seating arrangements were used as space was available, and students were seated in a way that one can learn from the other. However, such experiences were rare and inadequate.

A student in grade five aged 11 said the following in relation to space for PVA presentations or demonstrations: “The regular classes are not comfortable to do dance and perform theater. So, we get out of class to get enough space. The problem is when it rains the field becomes muddy.”

Space Used

One private school teacher in Addis Ababa mentioned that the school had a place to display students’ artwork by saying: “Students display their works quarterly in the corridors and the school hall.” Such creative ideas are important and they should be shared because they can be used by many schools due to their cost-effectiveness. Students can be highly motivated if art teachers use such opportunities and display their artworks.

The principal of a private school in Hawassa, which is one of the primary schools included in this research, stated the following in relation to space in the school for PVA subjects:

> Our school is ready to improve the teaching of PVA. In relation to space, we don’t have a problem. We are ready even to build an additional hall which can be useful for art subjects. Parents are interested in practical subjects. Subjects like PVA and CTE

(Craft and Technical Education) are creating good learning atmosphere by changing theoretical education to practical education.

Discussion

The findings of this study illuminate a critical paradox in the Ethiopian primary education landscape. Although historical skepticism toward arts education has ostensibly shifted, performing and visual arts curricula continue to suffer from marginalization. While the study participants exhibited a conceptual appreciation for the arts, this rhetorical support has failed to translate into concrete institutional advocacy or resource allocation. This issue directly corroborates the theoretical framework of Lebetche (2003), who posited that the structural prioritization of core academic disciplines over creative subjects constitutes the definitive barrier to the arts curriculum implementation within developing nations. Consequently, the data suggest that despite a century of modern educational evolution in Ethiopia, the peripheral status of PVA remains deeply entrenched within primary schools practices.

The findings demonstrate that shortage of art materials across the four sampled primary schools was an impediment to preparing students for future civic and career success through the robust execution of the arts curriculum. Consequently, resource scarcity directly undermines the foundational purpose of arts education which President's Committee on the Arts and the Humanities (2011) and Biag et al. (2015) argue as vital for fostering long-term student success. Achieving artistic literacy necessitates adequate physical space and material resources; without these structural inputs, pedagogical improvement remains untenable (National Core Arts Standards, n.d.). Notably, while some parents independently provide materials such as indigenous musical instruments, these provisions are seldom intended to support formal arts education. Instead, parents utilize them as external motivators to incentivize performance in core academic disciplines.

The acute deficit of artistic materials identified herein mirrors a pervasive macro-level crisis across the continent outlined by Zickafoose et al. (2024); these scholars contend that persistent financial neglect and spatial classroom limitations constitute the primary structural obstacles hindering the realization of pedagogical excellence within sub-Saharan primary schools. Art teachers need to think of space in terms of how much space is required for the comfortable execution of the experience itself and how much is necessary to allow a student to put distance between them and others, and between them and their work. In the schools selected for this study, students sit facing their art teachers. As stated in Mishra (2015, p. 103) "each student should be actively engaged in learning activities, taking account of individual differences." Accordingly, the significance of proper seating arrangement is undeniable. In relation to the performing and visual art classes, students were working in class which was not properly organized to teach art. As per the findings of this study, the sufficiency of space was almost five times less than the standard while the number of students was more than double the expected number of students in art classes (NAEA, 2017).

Conclusions

This investigation evaluated the execution of the performing and visual arts (PVA) curriculum within sampled Ethiopian primary schools, specifically scrutinizing the availability of instructional resources and dedicated physical infrastructure. Addressing the systemic resource deficits that undermine arts education within the Ethiopian context demands decisive and structurally integrated policy interventions.

This study addresses its primary research questions by revealing stark structural disparities and severe resource deficits that undermine the performing and visual arts curriculum. Regarding the impact of spatial constraints, a critical divergence emerged between school types: while private institutions utilized functional halls and specialized studios, public schools subjected over forty students to congested, small classrooms which can be used as art class only for more than ten students, effectively paralyzing kinetic and practical arts pedagogy. Regarding material shortages, the study identifies an acute logistical crisis; the reliance on digital textbooks shifted the economic and printing burden onto parents, resulting in resource fragmentation. Ultimately, these findings confirm that the availability of a minimum aggregate of material and spatial infrastructure is the definitive determinant of curriculum execution, without which meaningful arts education remains untenable.

By grounding its inquiry within the foundational objectives of primary education—namely, fostering critical thinking, collaboration, and civic responsibility—this study offers critical pragmatic contributions to the field of performing and visual arts pedagogy. By empirically revealing the shortages of art materials and dedicated instructional spaces across urban Ethiopian primary schools, this research provides educational administrators and curriculum specialists with a diagnostic baseline necessary for structural reform. Ultimately, these insights contribute to improving field practices by demonstrating that the cultivation of innovative, collaborative citizens through PVA education cannot be realized through theoretical mandate alone; rather, it requires the systematic provisioning of tangible material and spatial resources to transform classroom realities.

Based on the empirical evidence, it is recommended that educational stakeholders urgently remediate the deficit in spatial infrastructure and material provisions, as current levels fall below the requisite baseline for effective arts curriculum delivery. To bridge this gap, a synchronized, multi-tiered support framework must be mobilized, wherein parents, institutional/school leadership, regional education bureaus, and the Ministry of Education (MoE) systematically secure essential arts logistics and dedicated physical facilities. Furthermore, despite the documented enthusiasm of local administrative and community actors, the findings underscore an imperative demand for strategic policy interventions and practical adjustments to align the highly ambitious scope of the performing and visual arts framework with objective classroom realities. Given that these structural impediments are pervasive across the national primary education landscape, future large-scale research must be commissioned to examine the systemic scalability of resource distribution models throughout Ethiopia.

Certain limitations qualify the scope of this study. First, dance was excluded from the scope of this study due to its omission as a formalized component within the active primary curriculum. Second, all interviewed educators held credentials exclusively in either music or

visual arts, with none trained across the full, integrated spectrum of performing and visual arts (PVA) disciplines. Consequently, empirical data collection was restricted to music and visual arts instruction. Finally, given the qualitative design of this inquiry, the findings present diagnostic depth rather than generalizability across the macro-level national framework.

Ultimately, this study demonstrates that the transformative goals of primary arts education cannot be achieved through theoretical mandates alone. Bridging the gap between curriculum design and classroom reality requires an immediate, structurally integrated national commitment to resource allocation. By systematically resolving material fragmentation and spatial deficits, educational stakeholders can transition the performing and visual arts from a marginalized, passive exercise into a dynamic, practical catalyst for student innovation and creative agency.

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Pedagogical perspectives on citizenship education: Insights from middle school teachers in Sidama Regional National State, Ethiopia

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Abstract

This study examined the pedagogical perspectives of middle school citizenship teachers in Sidama Regional State. The aim of the study was to examine the prevalence of constructivist and traditional pedagogical perspectives among teachers and assess the alignment between their stated views and actual classroom practices. Data were collected from 172 teachers through a survey and 10 teachers were subsequently selected for interviews. The quantitative data were analyzed using both descriptive and inferential statistics, including t-tests, correlations, and one-way ANOVA, while the qualitative data were analyzed using content analysis. The results of the study revealed a fundamental contradiction. Middle school teachers showed a clear preference for constructivist approaches, reflecting their professional commitment to active teaching methods that emphasize critical thinking, active engagement, and student agency. However, this theoretical inclination was undermined by inconsistent implementation that reverted to traditional practices. These findings necessitate that the relevant bodies address contextual factors that may affect teachers' practical work.

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Introduction

The twenty-first century is marked by unprecedented global challenges, including social division, political disengagement, the spread of fake news and misinformation, the rise of populism, and widespread human rights violations (Battista, 2024; Clements, 2018; Van Bavel et al., 2021). These challenges are further compounded by the rapid pace of globalization, increased migration, and technological advancements (Enchikova et al., 2021). Addressing this complexity necessitates the promotion of social responsibility, critical thinking, and decision-making skills (Niewiadomski et al., 2023). Within this context, Citizenship Education plays a crucial role. It equips students with an understanding of justice

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and legal knowledge, empowering them to actively engage in their communities and foster a social environment that upholds and exemplifies democratic values (Resh & Sabbagh, 2017). Fundamentally, Citizenship Education provides students with the essential knowledge, skills, and attitudes needed to contribute meaningfully to society as responsible and informed adults (Martin, 2017; Niewiadomski et al., 2023).

However, despite its increasing importance, Citizenship Education is susceptible to a continuum of interpretations regarding the attributes of good citizenship and the pedagogical approach best suited to achieve the objectives of the subject (Brooks & Holford, 2009; Kerr, 2000; Veugelers et al., 2017). These interpretations can be placed on a spectrum from minimalist to maximalist orientation. In the former, the emphasis is on imparting knowledge of history, geography, government, and governance, primarily through a content-based, teacher-led, instructional, and examination-oriented approach. In this approach, due importance is given to the maintenance of social order, respect for authority and and inculcating citizenship narrowly as a mere act of voting for representatives. The latter, however, focuses on developing active citizenship skills and values alongside the knowledge component by engaging students in meaningful ways through critical reflection and problem solving inside or outside the classroom (Dieltiens, 2005; McLaughlin, 1992).

Given this divergence, it is necessary to understand from which perspective the goals of Citizenship Education are interpreted in the overall educational framework, especially from the perspectives of teachers in Ethiopia. Historically, Citizenship Education in Ethiopia has been repeatedly repurposed to serve as an instrument of indoctrination rather than active citizenship and sincere democratic participation under different regimes (Muluye, 2018). During the monarchy, for example, citizenship education (moral education then) was deeply embedded in the traditions of the Orthodox Church and aimed at rendering uncritical obedience to the regime (Bayeh, 2016; Gelaneh, 2012; Kihishen, 2017; Tadesse, 2019; Tafese & Desta, 2014)

Similarly, during the Derg regime (1974-1991), the subject (political education then) was reoriented to serve Marxist-Leninist indoctrination, the aim of which was to introduce socialist nationalism to the neglect of democratic pluralism (Gelaneh, 2012; Semela et al., 2013; Yohans, n.d.). Even in the post-1991 period, the subject was introduced under the Ethiopian People's Revolutionary Democratic Front (EPRDF), espousing democracy and human rights as its core values. However, the subject questionably continued to serve the purpose of legitimizing the regime by condemning the previous regimes as undemocratic (Yamada, 2014 ; Muluye, 2018). This is notably evidenced by the congruence of the elections (2000, 2005 and 2010) with the curriculum reforms that reinforced political stability at the expense of democratic empowerment.

More recently, the new government which came to power in 2018 took an immediate action to reform the curriculum, criticizing the former modality of civic and ethical education as inadequate in cultivating critical thinking, problem solving and social cohesion (Teferra et al., 2018). The new general education curriculum framework took its inception from these limitations with the stated aims of shifting from the traditional, conformist, and teacher-centered approach to a broader participatory approach together with the change in the nomenclature of the subject from civics to citizenship education (Ghebru & Lloyd, 2020). Consequently, given the persistence of using Citizenship Education as an apparatus of social

conformity and ongoing educational reforms, it becomes imperative to empirically re-examine teachers' perspectives on citizenship education in Ethiopia particularly in Sidama National Regional State beyond the state's narratives to ensure its progressiveness and empower students.

Statement of the Problem

Teachers' pedagogical perceptions, that is, their beliefs about what should be taught, how to teach it, and the priorities they establish, and the goals that animate their teaching (Estelles & Romero, 2019) have a significant effect on how well citizenship education is implemented. Indeed, "to what extent is the students' later participation a goal?" also needs to take center stage (Reichert & Torney-Purta, 2019) in exploring the pedagogical perspectives of teachers. This is primarily because teachers' pedagogical perspectives are crucial and have a significant effect on their methods of instruction, how they run their classrooms, and how decisions are made regarding Citizenship Education practices in classrooms (Li et al., 2016; Tadesse et al., 2020). Furthermore, in line with the favored teaching method, teachers' pedagogical beliefs dictate how lesson assessments should be carried out (Ibarra et al., 2023).

Therefore, the proficient execution of Citizenship Education fundamentally necessitates an examination of the objectives that guide the instructional approach. In this regard, promoting conformity and indoctrination as the primary goal is undesirable for teachers since it deters students from engaging in critical thinking and holistic development (Rietbergen-McCracken, 2012). Instead, the development of critical thinking skills must be consciously and purposefully adopted to transcend uncritical socialization, engage in debates and discussions, and affect social change (Adebayo, 2019). This transition is smooth when teachers of Citizenship Education are preoccupied with constructivist perspectives rather than traditional ones in an effort to prepare students for possible opportunities and challenges (Zeybek & Şentürk, 2020).

Particularly in the context of middle school education, where youth undergo both personal and group identity formation, it is highly recommended that teachers line up with a constructive, developmental, and emotionally attuned pedagogical framework (Johnson & Smith, 2008). This derives from the fact that their perspectives can have a significant influence on students' understanding of responsible citizenship (Boyden et al., 2019; Mee & Haverback, 2017) . Accordingly, teachers at this level of education must adopt an educational perspective that views adolescence as a crucial developmental period. Boyden et al. (2019) go beyond the mere imparting of knowledge to instill values that serve as a cornerstone for civic engagement and active participation in society (Johnson & Smith, 2008) to be politically active adults (Reichert et al., 2021).

However, extant studies on citizenship education have focused exclusively on teachers' perceptions of the subject itself or on teachers' conceptions of good citizenship rather than on the pedagogical inclination of the teacher (Zaman, 2006; Leenders et al., 2008; Georgiou et al., 2021; Li et al., 2016 ; Sampermans et al., 2021; Wong, 2021).

Moreover, most studies in Ethiopia have overlooked the middle school level, focusing instead on higher education or secondary schools and neglecting the pedagogical views and beliefs of middle school teachers. As a result, there is a significant gap in the literature, particularly regarding the pedagogical perspectives of middle school teachers in the Ethiopian

contexts in general and in Sidama in particular. The current understanding of how teachers perceive and implement citizenship education lacks specific and localized evidence.

To address this gap, the present study attempted to explore this important topic by highlighting the perceptions of teachers who teach citizenship education in middle school settings. The study examined their pedagogical views, emphasizing how teachers' perceptions align with the educational expectations of citizenship education, thereby enabling relevant stakeholders and decision-makers to design targeted interventions or support systems that effectively facilitate citizenship education.

With this intent, this study aimed at bringing together teachers with diverse teaching experiences to answer the following research questions:

1. To what extent do teachers' pedagogical perceptions align with either constructivist or traditional approaches?
2. Do teachers' pedagogical perceptions differ significantly based on their gender, educational level, and years of teaching experience?
3. Is there a significant correlation between teachers' self-reported pedagogical perceptions and their reported classroom practices?

Theoretical Framework

Building on the stated aim of this article, it was deemed necessary to provide a strong theoretical framework to analyze the pedagogical perspectives of citizenship education teachers. Therefore, in this study, constructivist theory is considered to examine the extent to which teachers' pedagogical perspectives and practices promote knowledge construction through active teaching practices such as debate, discussion, reflection, collaborative learning, problem solving, and critical thinking (Johnson, 2019). Furthermore, it is assumed that a specific link will be made to key theoretical frameworks in the field of citizenship education in order to analyze how well teachers' pedagogical perspectives are aligned to promote active citizenship.

To achieve this, the study draws on several theories of citizenship. Specifically, Biesta's (2011) notion of “citizenship as becoming” provides a strong theoretical foundation to examine whether teachers’ pedagogical perspectives focus on restoring students’ traditional socialization into existing norms, which alienates democratic practices from students’ daily lives, or whether they shift toward the continuous development of active citizenship. This study addresses the latter, namely allowing students to experience democratic citizenship in their schools, which he explains as a space for democracy where students experience agency, deliberation, debate, and dialogue. Consequently, this view provides theoretical perspectives for determining whether pedagogical perspectives and practices should promote unquestioned obedience and conformity or encourage critical engagement, agency, and the treatment of students as citizens.

In addition, Westheimer and Kahne's (2004) framework of "citizen types" (personally responsible, participatory, and justice-oriented) was used as a complementary theoretical stance to critically analyze teachers' pedagogical goals. By analyzing teachers' perspectives using this framework, we can assess whether teachers’ pedagogical insights emphasize the cultivation of passive obedience or the promotion of active community engagement or critical commitment to social justice, which has significant implications for the type of citizens they are shaping.

Methods

Research Design

This study aimed to examine the pedagogical attitudes of middle school civic education teachers. This study used mixed-methods research to better understand middle school teachers' views on citizenship education. This method is flexible and adaptable to various study designs (Wisdom & Creswell, 2013). The study adopted a pragmatic theoretical philosophy that supports the idea of multiple interpretations of reality rather than a singular reality (Okesina, 2020). This research philosophy was chosen in the view that it allows the researcher to employ various research methods together to adequately address the research problems compared to employing a single research method (Makombe, 2017).

In the present research, the whole process for data collection and analysis was meticulously formulated within the contexts of convergent parallel mixed methods, wherein both qualitative and quantitative data were systematically gathered concurrently. Ultimately, the analysis of both datasets was conducted within the QUAN+QUAL framework, subsequently synthesizing the findings into a cohesive interpretation of the overarching results (Creswell & Creswell, 2017).

Participants and Sampling Strategy

A multistage sampling strategy was employed to select the participants. In the first phase, the Sidama region was deliberately selected, keeping in mind the following considerations. First, the researchers' knowledge and experience of the sociocultural context of the region were taken into account to facilitate data collection and reduce research costs. This would simplify the process of contacting individuals and requesting assistance from the local education department. Furthermore, in this specific area, insufficient research has been conducted on the pedagogical perceptions of middle schools and teachers regarding citizenship education in this region.

In the second phase, out of 38 districts in the Sidama region, 11 (30%) districts were selected via a purposive sampling technique to take the opportunity of local knowledge for data collection. In the third stage, 89 (30%) of the 298 state middle schools in these districts were specifically selected. As Besekar et al. (2023) suggested, 30% of the total population of respondents is optimally suited for educational research. Furthermore, Cohen et al. (2018) suggested that the acceptable sample size for a study actually depends on the type of research design; however, a sample should be 30% or more if the population is large, whereas 35% might be acceptable if the population is small. Finally, all 178 teachers teaching citizenship education in these schools were comprehensively selected for the survey data, but six respondents did not return the questionnaires.

In qualitative research, determining sample size is contextual and depends in part on the scientific paradigm under which the study takes place. However, when considering theoretical saturation as a guide for designing qualitative research, a sample of 10 informants may be adequate to reach saturation in a relatively homogeneous population (Boddy, 2016). Similarly, Vasileiou et al. (2018) suggested that a sample size between 9 and 17 is sufficient

for a qualitative study. In relatively equal terms, Dworkin (2012) suggested that a sample of 5-10 participants would be sufficient for an interview if the population were homogeneous.

On the basis of these empirical facts, the researchers selected ten (10) teachers for a semi-structured interview. The participants were purposively selected on the basis of their experience teaching citizenship education (formerly civics). This is frequently the case with qualitative researchers because qualitative researchers generally utilize purposive sampling, in which researchers deliberately pick individuals who are aware of or are acquainted with the important themes being examined (Fraenkel & Wallen, 1990).

From the total respondents surveyed, 97 (56.4%) of them were women and 75 (43.6%) of them were men. In terms of educational qualifications, the majority of the respondents held a diploma 101 (58.7%), whereas the remaining 71 (41.3%) respondents held a B.A. degree. In terms of their teaching experience, the teachers had different teaching experiences, with teachers with 6-10 years of experience accounting for half of the respondents, 86 (50.0%); followed by teachers with 11-15 years of experience, 50 (29.1%); and those with 1-5 years of experience, 36 (20.9%). This distribution therefore shows that the majority (79%) of the teachers had sufficient teaching experience.

For the semi-structured interview, seven of the informants were male and three were female; five of them had a B.A. degree and five had a diploma; five of them had more than 10 years of teaching experience, while the other five participants had less than 10 years of teaching experience.

Data Collection Instruments

In this study, data were collected via survey questionnaire, interview schedule, and document analysis. To explore and understand complex phenomena, such as teachers' perceptions, qualitative data were collected through semi-structured interviews. Similarly, surveys have been used to collect quantitative data to identify trends or patterns in the teachers' viewpoints across a broader sample of teachers.

Survey

The questionnaire was distributed to middle school teachers to obtain information about the teachers' demographic characteristics, pedagogical perceptions, and the relationship between pedagogical perceptions and teachers' practices. To obtain the data regarding the teachers' pedagogical perceptions, the Teaching and Learning Conceptions Questionnaire (TLCQ) was used as a survey instrument. The TLCQ, developed by Chan and Elliott (2004) and further validated by Lee et al. (2013), was translated into Amharic by a language expert to eliminate potential language barriers for respondents, and was used to measure teachers' perceptions of their preferred teaching and learning methods in citizenship education. This questionnaire consists of 30 items categorized into two dimensions: constructivist belief (12 items) and traditional belief (18 items). The items were measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

Interview

Data related to teachers' opinions about how citizenship education should be taught, how teachers' pedagogical perceptions related to the curriculum they taught, and how

pedagogical views were related to actual teaching practices were gathered through interviews. Because it is important to offer flexibility to participants, the researchers used semi-structured interviews (Lodico et al., 2010) in a face-to-face setting. The interview schedule was prepared in English and conducted in a language they preferred (Sidaamu Afoo or Amharic). Before the interviews were conducted, the teachers were given a consent form regarding the confidentiality of the data, permission to record their voices, and a means to maintain the participants' anonymity. After permission was obtained, the interviews were conducted, with thirty minutes given to each respondent. Each participant was interviewed on suitable, noise-free sites.

Data Analysis

The data analysis began by carrying out tests of assumptions. In the first step, the data normality test was carried out via the Kolmogorov–Smirnov and Shapiro–Wilk tests. The normality test of the constructive perspective data was performed as follows: the Kolmogorov–Smirnov test ($D(172) = 0.067$, $p = 0.058$) and the Shapiro–Wilk test ($W(172) = 0.986$, $p = 0.079$). On the basis of these results, the *p*-values of both tests were found to be above the significance level of 0.05. Therefore, both tests revealed that the data on the constructive perspectives of the sample of teachers were normally distributed. Similarly, the normality of the data on traditional perspectives was determined via the same tests. The normality test results showed that the *p*-value of the Kolmogorov–Smirnov test (0.066) was slightly above the significance value (0.05), while the *p*-value of the Shapiro–Wilk test (0.073) was also above 0.05. Therefore, on the basis of these results, the data on traditional perspectives did not deviate from a normal distribution.

To analyze the quantitative data, the researchers subsequently used comparison group means, an independent samples t-test, a one-way ANOVA, and correlation analysis.

To classify and interpret middle school teachers' pedagogical perspectives on the crucial elements of middle school citizenship education, their preferred teaching style, and their role as educators, content analysis was used as a method of qualitative data analysis. Teachers' responses were then carefully registered manually and examined to identify any recurring themes dividing the answers of respondents into two main pedagogical frameworks: constructivist perspectives, which focused on critical issues such as critical thinking, voice and agency, active participation, participatory learning, and engaged decision-making, and traditional perspectives, which commonly include concepts such as knowledge transfer, discipline and preparation for social conformity, moral coaching, and respect for authority. On this basis, the participants' answers were coded according to their agreement with traditional or constructivist conceptions. The inclinations of the respondents' answers were then determined, taking into account the intensity and strength of the respondents in expressing their beliefs and feelings. Finally, by analyzing the data obtained from various sources, the researchers triangulated the results to ensure the accuracy and trustworthiness of the findings.

Validity and Reliability

The quality of research depends on its validity and reliability (Shah & Al-Bargi, 2013). Accordingly, the researchers have tried and pursued several strategies that could increase the credibility and trustworthiness of the results. To enhance the reliability of the quantitative data, an attempt was made primarily to outline the areas that the instrument was designed to measure. In addition, a pilot study was conducted. On the basis of the responses of 33 pilot study respondents, item reliability was tested via Cronbach's alpha, which was 0.75. According to Taber (2018), 0.7 is the most commonly accepted alpha value for survey items.

Moreover, to improve the validity and reliability of the data, the instruments were thoroughly reviewed by experts; the questionnaire and interview schedule were translated into the participants' favorite languages (Amharic and Sidaamu Afoo); the interview was meticulously recorded and transcribed; each participant was given sufficient time; all audit trials were appropriately maintained; and the member checking technique was also employed (Coleman, 2022; Nasrabad, 2017).

Results

This section analyzed data on the demographic distributions of respondents, differences in teachers' pedagogical perceptions based on demographic characteristics, the correlations between the teachers' perceptions and practices, perceived goals of teachers, effective citizenship teaching methods, teachers' perceptions of their role, and their perceptions of the impact of citizenship education.

Prevalent Pedagogical Perspectives

Table 1

Descriptive Statistics of Constructivist and Traditional Perspectives

Belief Category	N	M	SD
Traditional Perceptions	172	2.03	.78
Constructive Perceptions	172	3.40	.78

As shown in Table 1, the average mean score for teachers' constructivist perspectives was M = 3.40, SD = 0.78, while the mean score of the traditional perspectives was M = 2.03, SD = 0.78. This indicates that the participating teachers had a high level of constructive perceptions.

Differences in Pedagogical Perspectives Based on Demographic Characteristics

This section presents an analysis of the data used to assess whether there were differences in pedagogical perspectives between teachers in terms of gender, educational qualifications, and years of experience. For this purpose, the variables were first summarized in descriptive statistics, and then a comparative analysis was carried out via t-test and one-way ANOVA to determine the significance of the differences between the groups if they already existed.

Pedagogical Perceptions by Gender

Table 2

Mean, Standard Deviation, and Independent Samples T-Test Results for Pedagogical Perceptions by Gender

Perception Type	Gender	N	M	SD	F	p	t	df	p	MD
Traditional	Male	74	2.09	0.84	0.67	.414	0.82	171	.41	0.01
	Female	98	1.10	0.72						
Constructive	Male	74	3.22	0.91	11.76	.001	-2.53	124.1	.01	-0.31
	Female	98	3.54	0.64						

Note: t=t-test for Equality of Means

Table 2 presents the mean, standard deviation, and t-test results regarding the differences in pedagogical perspectives (constructivist and traditional) between male and female participants. For traditional perceptions, the Levene's test for equality of variances was not significant (F (1,170) = 0.672, p = 0.414), indicating that the assumption of equal variances was met.

The t-test for the equality of means revealed no significant difference between men (t (170) = 0.823, p = 0.41) in their traditional pedagogical perceptions, with M = 2.09, SD = 0.84, and women (M = 1.99, SD = 0.72). In contrast, women performed more significantly in terms of constructive perceptions. For constructive perceptions, the mean difference was -0.31, indicating that female teachers (M = 3.54) scored significantly higher than their male counterparts (M = 3.22, t (170) = -2.53, p = 0.01). The Levene's test for equality of variances was significant (F = 11.763, p = 0.001) revealing that the female teachers participating in this study had more constructivist perspectives than the male teachers did.

Pedagogical Perceptions by Educational Level

Table 3

Mean, Standard Deviation, and Independent Samples T-Test Results for Pedagogical Perceptions by Educational Level

Perception Type	Level	N	M	SD	F	p	t	df	p	MD
Traditional	Diploma	101	2.18	0.90	8.05	.005	3.36	158.92	.001	0.36
	B.A. Degree	71	1.82	0.48						
Constructive	Diploma	101	3.27	0.80	13.97	.000	-2.86	169.86	.005	-0.32
	B.A. Degree	71	3.59	0.59						

Note: t=t-test for Equality of Means

Table 3 shows significant differences in pedagogical perspectives between teachers at the diploma and B.A. levels. In the case of traditional perspectives, the independent samples t-test revealed a statistically significant difference, t (158.92) = 3.36, p = 0.01, between the

two groups, with the mean value of diploma holders (M = 2.18, SD = 0.90), which was greater than the mean value of teachers with a B.A. degree (M = 1.82, SD = 0.48). This shows that teachers with diplomas had more traditional perspectives than teachers with B.A. degrees did.

In the case of constructivist perspectives, the t-test results revealed that there was a statistically significant difference (t (169.86) = -2.86, p = 0.001) in pedagogical perspectives between B.A. degree holders (M = 3.59, SD = 0.59), who had significantly greater scores than diploma holders did (M = 3.27, SD = 0.87). This suggests that teachers with a B.A. degree have more constructive perspectives than those with a diploma. The Levene's test for equality of variances was also significant (F = 13.971, p = .005).

Table 4

Mean Distribution and ANOVA Results for Pedagogical Perspectives Based on Teaching Experience

Pedagogical Perspectives	Experience	N	M	SD	Df	F	Sig. (p)
Traditional	1-5 years	36	2.73	1.31	(2, 169)	31.333	.000
	6-10 years	86	1.75	0.36			
	11-15 years	50	2.02	0.38			
	Total	172	2.03	0.78			
Constructive	1-5 years	36	2.63	1.00	(2, 169)	29.661	.000
	6-10 years	86	3.60	0.57			
	11-15 years	50	3.61	0.54			
	Total	172	3.40	0.78			

Table 4 indicates significant differences in the pedagogical perspectives of teachers on the basis of their teaching experience. The teachers with fewer years of experience (1–5 years) showed a high mean score for tendency toward traditional pedagogy (M = 2.73, SD = 1.31), followed by those with 11–15 years (M = 2.02, SD = 0.38) and those with 6–10 years of experience (M = 1.75, SD = 0.36). The ANOVA revealed significant differences among the three groups based on experience (F (2, 169) = 31.333, p < .001). This highlights that newly employed teachers had more traditional perspectives than the other groups did.

Conversely, from a constructive perspective, teachers with 6–10 years of experience (M = 3.60, SD = 0.57) and 11–15 years of experience (M = 3.61, SD = 0.54) had significantly higher mean scores than teachers with 1–5 years of experience (M = 2.63, SD = 1.00). The ANOVA again revealed significant differences between groups (F (2, 169) = 29.661, p < .001), indicating that employees with more experience (6-15 years) reported more constructive perspectives than teachers with little experience did (1-5 years). Finally, this result shows that teachers with teaching little experience tend to have more traditional perspectives than those with long teaching experience.

In light of these findings, it is crucial to determine the degree at which educators' perspectives differ among various cohorts of professional experience.

Table 5

Multiple Comparisons Among Groups with Different Experience

Dependent Variable	(I) Experience	(J) Experience	Mean Difference (I-J)	Sig.
Traditional Perceptions	1-5 years	6-10 years	.95786*	.000
		11-15 years	.77607*	.000
	6-10 years	1-5 years	-.95786*	.000
		11-15 years	-.18179	.222
	11-15 years	1-5 years	-.77607*	.000
		6-10 years	.18179	.222
Constructive Perceptions	1-5 years	6-10 years	-.97308*	.000
		11-15 years	-.98370*	.000
	6-10 years	1-5 years	.97308*	.000
		11-15 years	-.01062	.996
	11-15 years	1-5 years	.98370*	.000
		6-10 years	.01062	.996

Note: The mean difference is significant at the 0.05 level.

Table 5 presents whether there exist significant differences in traditional and constructive perspectives across three groups with different durations of experience (namely 1-5 years, 6–10 years, and 11–15 years). Certainly, the results of the Tukey HSD post hoc analysis revealed the existence of significant differences in the dependent variables such as traditional perceptions and constructive perceptions across the three experience groups (1-5 years, 6–10 years, and 11–15 years). With regard to traditional perceptions, participants with 1–5 years of experience scored significantly higher than those with 6-10 years (mean difference = 0.95786, p = < .001, 95% CI [0.6695, 1.2462]) and 11–15 years (mean difference = 0.77607, p = < .001, 95% CI [0.4586, 1.0935]). However, no significant difference was observed between the 6-10-year and 11-15-year groups (mean difference = -0.18179, p = .222, 95% CI = [-0.4401, 0.0765]). In this specific case, the increase in teaching experience of teachers did not substantially cause a change in their pedagogical perceptions.

Similarly, with regard to constructive perspectives, teachers with 1-5 years of teaching experience had significantly lower perspectives than those with 6-10 years (mean difference = -0.97308, p = < .001, 95% CI [-1.2908, -0.6554]) and 11-15 years (mean difference = -0.98370, p = < .001, 95% CI [-1.3335, -0.6339]). However, no significant difference was found between the 6-10- and 11-15-year groups (mean difference = -0.01062, p = .996, 95% CI [-0.2952, 0.2740]). This suggests that the teaching experience of the teachers significantly influenced the perceptions of teachers with 1-5 and 6-10 years of teaching experience, however insignificantly contributing to the pedagogical perceptions of teachers after 10 years.

Correlation between Teachers' Pedagogical Perceptions and Practices

In this section, the analysis was carried out to examine the correlations between the teachers' pedagogical perspectives and their reported pedagogical practices.

Table 6

Correlations between Pedagogical Perceptions and Practices

Variable	1	2	3
1. Constructive Perceptions	—		
2. Traditional Perceptions	-.005	—	
3. Pedagogical Practices	.27*	-.80**	—

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

Table 6 shows the correlations between middle school citizenship education teachers' pedagogical perspectives and self-reported pedagogical practices. The results revealed negative relationships between traditional and constructive perceptions (r = -.005, $p > 0.05$), indicating that teachers with traditional perceptions were less likely to have constructive perceptions and vice versa. When the correlations between pedagogical perceptions and practices were taken into consideration, there were negative strong correlations between traditional perceptions and self-reported pedagogical practices of the teachers (r = -.802, $p <$ .001), whereas the pedagogical practices and constructive perceptions were moderately correlated (r = .27, $p <$ .000). These results illustrated that, compared with constructive perceptions; teachers' pedagogical practices were significantly linked to traditional perceptions.

Qualitative Analysis

In this section, the responses provided by the interview participants were subjected to a rigorous content analysis, through which the recurrence of themes was quantified and employed to facilitate a comparative determination regarding the themes that were articulated with greater frequency. The questions focused primarily on how teachers perceived the main goal of citizenship education, their roles in implementing citizenship education, their perceived best teaching methods, and what they thought about how citizenship education contributed to the future development of their students. The analysis considered the participants' responses from both traditional and constructivist perspectives by counting the frequencies of recurring themes.

Perceived Primary Goals of Citizenship Education

In this part, the teachers' responses were coded into four themes with the frequency of recurrence as follows:

Table 7

Perceived Primary Goal of Citizenship Education

Theme	Frequency	Teachers	Perspective
Foundational knowledge	3	A, B, E	Traditional
Respect for authority and social order	2	A, E	Traditional
Critical thinking and problem-solving	3	C, D, F	Constructivist
Active civic engagement/leadership	3	C, H, F	Constructivist

As presented in Table 7, the middle school citizenship education teachers perceived the goals of the subject in roughly different ways. On the basis of the content analysis, traditional themes such as delivering foundational knowledge, respect for authority, and

social order were mentioned five times, whereas constructive perspective themes such as critical thinking, problem solving, active civic engagement, and leadership were mentioned six times. However, the difference was not significant; the interviews revealed that constructive perspectives were more prevalent than traditional perspectives were.

Perceived Role of Teachers in Citizenship Education

In this section, an attempt was made to determine whether teachers saw themselves as the sole provider of knowledge or as a facilitator of knowledge construction. Implicitly, this shed light on what teachers perceived about the role they played in promoting democratic citizenship through their pedagogy.

Table 8

Perceived Role of Teachers in Citizenship Education

Theme	Frequency	Teachers	Perspective
Direct instruction/content delivery	3	A, B, E	Traditional
Authoritative knowledge transmission	3	A, B, E	Traditional
Inquiry-based learning/facilitation	3	C, H, I	Constructivist
Promoting open discussions	4	C, H, I, J	Constructivist

As Table 8 shows, teachers perceive their role in teaching citizenship education somewhat differently on the basis of the analysis of the interview data. When revisiting the topics considered, some teachers reported their pedagogical attitudes toward traditional perceptions and considered themselves conduits of knowledge, content deliverers, and authoritative knowledge transmitters by mentioning traditional perspective topics six times. However, the constructive themes in which teachers saw their role as facilitators of inquiry-based learning and open discussions were mentioned seven times. In fact, the emergence of traditional themes was not insignificant, but the return of constructive perceptions still outweighed traditional perceptions.

Perceived Effective Teaching Methods

In this section, the focus was on analyzing teachers' perceptions of effective teaching methods for citizenship education. Through content analysis, the researchers sought to determine which teaching method was considered most effective by teachers.

As shown in Table 9, traditional teaching methods, which are considered the most effective teaching methods for citizenship education, were mentioned four times, whereas constructive teaching methods, such as project-based learning, community engagement, learning from real experiences, and discussions, were mentioned six times. This shows that most teachers considered constructive teaching methods to be the most effective approach to teaching citizenship education.

Table 9

Perceived Effective Teaching Method for Citizenship Education

Theme	Frequency	Teachers	Perspectives
Textbooks/structured lessons	2	B, E	Traditional
Clear notes/assessments	2	B, E	Traditional
Project-based learning/community involvement	3	C, D, I	Constructive
Real-world issues/discussions	3	C, H, J	Constructive

Perceived Impact of Citizenship Education on Students' Citizenship

The aim of this section was to assess the participating teachers' perceptions of how they believed citizenship education could influence students' future development. Because teachers are key players in making students aware of their current and future roles, their views on how the subject influences learner development have a valuable influence on students' development both inside and outside the classroom.

Table 10

Perceived Impact of Citizenship Education on Students' Citizenship

Theme	Frequency	Teachers	Perspective
Respect for authority/social order	2	A, E	Traditional
National identity/pride	1	B	Traditional
Critical thinking/problem-solving skills	3	C, F, G	Constructive
Civic engagement/community participation	4	C, D, F, J	Constructive
Empathy, global awareness, ethical decisions	3	D, G, I	Constructive

Table 10 presents the middle school teachers' perceptions regarding the contributions of citizenship education to preparing future citizens. Conventional themes, such as deference to authority, laws and order, and national pride, were identified as themes. However, the constructivist themes—which see citizenship education as a subject for fostering citizens' capacity, critical analysis, and problem-solving—were identified ten times. These themes included empathy, global awareness, civic engagement and participation, and ethical decision-making. This demonstrates that constructive perception themes occurred more frequently than traditional themes did.

Table 11

Frequency Summary (Traditional vs. Constructive Perspectives)

Aspect	Traditional Frequency	Constructive Frequency
Primary Goal	5	6
Role of Teachers	6	7
Teaching Methods	4	6
Impact on Students	3	10
Total	18	29

Table 11 compares the recurrence of themes in content analysis regarding traditional and constructive perceptions. On the basis of the recurrence of themes among traditional and constructive perceptions, the content analysis results revealed that traditional themes were mentioned 18 times, whereas constructive themes were mentioned 29 times. Finally, the results of the content analysis revealed the complementarity between the findings from the quantitative data and those from the qualitative data.

Discussion

Analysis of the data revealed some important insights into the pedagogical perspectives of citizenship education teachers. According to the results, the traditional

perspective is preferred by male teachers. Accordingly, these results are discussed in this section in the context of previous studies in the field of citizenship education and pedagogy.

Research has frequently demonstrated that, compared with female teachers, male teachers tend to favor traditional teaching techniques (Chick, 2014; Cruickshank et al., 2020; Havung, 2000; Mogra, 2020). Furthermore, according to Zúñiga et al. (2020), compared with their female counterparts, the pedagogical inclinations of male citizenship education teachers were leaning toward traditional perspectives. Likewise, the research of (2017) also supports the finding that there is a difference in pedagogical preferences between male and female teachers, potentially because of the impact of gender norms in the classroom.

Similarly, the alignment of male teachers' pedagogical perspectives with traditional approaches reflects the influence of entrenched socio-cultural norms in Ethiopia. Specifically, in the patriarchal norm of Ethiopia, leadership and aggressiveness are often attributed to men, while women are assigned roles that manifest femininity, such as helpfulness, caring, and submissiveness (Lehmann, 2022; Molla, 2018; Wolle, 2024). Indeed, as many studies in Ethiopia show (Browes, 2015; Halkiyo et al., 2023; Istratii, 2023), the influence of patriarchal norms has strongly shaped the pedagogical style of teachers. Consequently, this socially entrenched norm often influences gender roles in favor of male dominance and authority to reinforce their dominance and hierarchical relationships in the classroom. As a result, a didactic, inflexible, and teacher-centered pedagogical style is perpetuated. In contrast, women who are influenced by the caring role tend to adopt a participative and inclusive teaching style. Based on this evidence, it can be argued that gender is an important variable in shaping the pedagogical beliefs of teachers.

The influence of educational qualifications on preferences for pedagogical approaches is highly supported by prior studies. Darling-Hammond et al. (2017) and Harber (2019) reported that teachers with lower academic qualifications were mostly oriented toward the traditional approach. Accordingly, the preference for the constructivist perspective by teachers with higher qualifications supports the idea that greater exposure to educational theory and pedagogical innovation can promote a shift towards more student-centered practices (Avalos, 2011; Guskey, 2002; Opfer & Pedder, 2011).

Analysis of the data in this study revealed that teachers with more teaching experience prefer constructivist pedagogical perspectives, whereas teachers with less teaching experience lean toward traditional perspectives. This is frequently reported in studies which have reported that more experienced teachers are more likely to prefer constructivist pedagogy, whereas less experienced teachers prefer traditional pedagogy (Harber, 2019; Vavrus, 2018; Zúñiga et al., 2020). Specifically, Vavrus (2018) argues that, as less experienced teachers lack confidence in and familiarity with constructivist pedagogy, they prefer to lean toward traditional pedagogy.

In contrast, Tatto and Coupland (2003) do not accept the claim that more experienced teachers simply prefer constructive pedagogy, citing that more experienced teachers with traditional perspectives are more likely to adopt traditional approaches, making it difficult to shift their position because of the entrenched traditional perceptions. Moreover, it is widely perceived that teachers with greater experience prefer constructivist pedagogy; however, traditional perceptions should not only be associated with less experienced teachers because

they can be held by teachers who have more experience depending on their exposure and opportunities for professional development and the support they receive (Lee et al., 2013).

Similarly, Gore et al. (2024) highlighted that there were no significant differences in the pedagogical perceptions of teachers regardless of their years of experience, which minimally impacted their pedagogical practices. However, Knowles (2019) suggested that the extent of teachers' exposure to civic issues and social processes influences the pedagogical perceptions of citizenship education teachers rather than taking service years into account.

The results of this study's quantitative and content analysis revealed that constructivist views about teaching citizenship education in middle schools outweigh traditional views. Several studies support this increasing alignment of citizenship teachers' pedagogical conceptions with constructivism, yet traditional views are persistently held. In this regard, Mijanović (2023) reported that constructive pedagogy gained greater preferences among teachers, whereas teacher-centered approaches are still perceived more favorably among a group of teachers. Similarly, another study conducted by Szabó and Csépes (2023) underlined the growing preferences of constructive pedagogy; however, factors such as conventional institutional settings still continue to influence teachers to adopt traditional perspectives. This aligns with a global inclination in educational discourses towards the constructivist pedagogy that gives emphasis to student-centered learning, critical thinking, and active participation (Hyde, 2020; Koptseva, 2020; Tan, 2017).

Even though constructivist views were more common among the teachers, the content analysis clearly showed that traditional themes recurred with significant frequency, demonstrating the persistence of conventional views. In this regard, numerous studies asserted that, while constructivist pedagogy is considered valuable for promoting critical thinking and creativity, preferences for traditional pedagogy are strongly sustained in citizenship education (Poudel & Subedi, 2024).

According to the findings of the study's correlational analysis, the prevailing pedagogical perspectives had no significant relationship with teachers' pedagogical practices. Despite the predominance of constructivist perceptions, the results showed that teachers' pedagogical practices were significantly correlated with traditional perceptions. Different studies support these incontinences in teachers' pedagogical perceptions and practices. In this context, Melesse and Jirata (2015) revealed that teachers with constructivist beliefs continue to practice traditional practices. Similarly, the study conducted by Ivorra-Catalá et al. (2024) indicated that there could be differences between teachers' pedagogical understanding and practices, suggesting that teachers use traditional pedagogy due to systemic challenges while pretending to be constructivist in their pedagogical beliefs.

Consequently, the predominance of constructive perspectives alongside the persistence of traditional perspectives, together with discrepancies between perceptions and practices, places middle school citizenship education in Ethiopia, particularly in the Sidama region, at a critical juncture. This can be further extrapolated with reference to theoretical frameworks in citizenship education. The dominance of constructivist perspectives demonstrates the teachers' intellectual support for Biesta's (2011) framework of "citizenship as becoming," endorsing the importance of deliberation, student agency, democratic participation, and critical engagement. This in turn implies their endorsement of the

participatory and justice-oriented citizenship of Westheimer and Kahne's (2004) framework, as constructivism emphasizes active learning, critical thinking, and problem-solving.

Conversely, the discrepancy between teachers' theoretical alignment (pedagogical perspectives) with constructivist pedagogy and their continued reliance on transmission-oriented methods shows that the transition to Biesta's concept of "citizenship as becoming" through pedagogy that promotes student agency and reflection is not complete. Moreover, this discrepancy between the perspectives and self-reported pedagogical practices that favor the traditional approach indicates a failure to move beyond Westheimer and Kahne's (2004) "personally responsible citizen" model. In this regard, it can be reasonably argued that the discrepancy in favor of the traditional approach corresponds to long-standing pedagogical expectations of the subject in the Ethiopian educational landscape that have historically encouraged unquestioning obedience and rigid patriotism, a deeply ingrained philosophy that was reinforced by the former curriculum. Since most teachers were trained and taught within this very system, it is not surprising that they tended to demonstrate these traditional pedagogical practices.

Consequently, in the Ethiopian context, addressing this discrepancy is critical, given the pressing demand for citizens who are knowledgeable of their rights and duties and are actively engaged in social, economic, and political issues to support democratization.

Conclusions

To summarize, this study reveals fundamental tension. The middle school teachers demonstrated a clear inclination toward constructivist approaches, reflecting their intellectual commitment to active teaching focused on critical thinking, engagement, and student agency. However, this theoretical inclination was undermined by inconsistent implementation that favored traditional practices. Thus, although citizenship education can be presented as an active process of developing citizenship through student agency and engagement, this is not realized in practice. The inference is that cultivating active democratic citizenship requires more than theoretical alignment and intellectual affirmation. It demands a fundamental shift from merely supporting constructivist pedagogy to its practical application, as teachers often revert to traditional, teacher-centered methods.

The challenge does not appear to stem from a lack of teacher understanding; rather, teachers' personal pedagogical views are largely shaped by the realities of their teaching contexts, which tend to reward traditional outcomes such as rote learning.

Based on the findings, several recommendations are forwarded. As a paradox persists between perceptions and practices, it is essential to emphasize the contextual factors that hinder the effective implementation of citizenship education. Along with this, it necessitates targeted training and professional development opportunities for teachers in constructivist pedagogy to address the primary goals of citizenship education. By providing such types of training, it becomes possible to meet the specific needs of different teacher groups. For instance, new teachers may need foundational training, while more experienced teachers who hold constructivist views but practice traditionally may benefit from workshops focused on practical application and overcoming classroom-specific barriers.

Additionally, the perceptual gap among the demographic groups underscores the need to explore opportunities for diffusing positive pedagogical outlooks, particularly among females, as well as experienced and educated groups. Therefore, to reconcile the perception-practice disconnection, school-centered peer mentorship programs need to be established in which teachers with constructivist convictions (more experienced and better qualified) mentor teachers with traditional pedagogical approaches to minimize the differences between teachers. Through this approach, teachers may have opportunities to access a supportive, collaborative environment where teachers can learn from their peers, exchange best practices, and gain the confidence to implement citizenship education constructively.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author, Basha Bekele, on reasonable request.

Ethical Approval

This study was conducted in accordance with the ethical standards of the Hawassa University Ethics Review Board. All procedures performed in the study involving human participants were in accordance with the ethical standards of Hawassa University. The Ethical Committee of the Hawassa University College of Law and Governance Research Ethics Review Committee has granted approval for this study on May 10, 2025 (Approval No.: CLGRECRC-006/25).

Consent to Participate

Informed written consent to participate in this study was obtained from all participants. There were no participants under the age of 16.

Consent to Publish

The authors affirm that the research participants provided informed consent for publication of the findings of the study.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could influence the work reported in this paper.

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