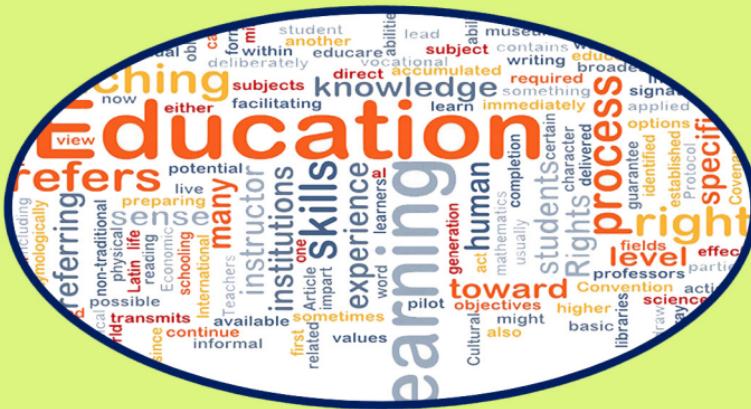




DILLA

JOURNAL OF EDUCATION



A peer-reviewed bi-annual journal of Dilla University

Volume 2

Issue 2

October 2023

DILLA UNIVERSITY JOURNALS SYSTEM
(DUJS)



DILLA JOURNAL OF EDUCATION (DJE)

Editorial Board

Editor-in-Chief

Daniel Gebretsadik (PhD, Associate Professor)
Dilla University, Ethiopia

Managing Editor

Misganu Legesse (PhD, Assistant Professor)
Dilla University, Ethiopia

Associate Editors

Mesfin Molla (PhD, Assistant Professor)
Berhanu Mekonnen (PhD, Assistant Professor)
Ababu Teshome (PhD, Assistant Professor)
Dilla University, Ethiopia

Language Editor

Tagel Elias (PhD, Assistant Professor)
Dilla University, Ethiopia

Layout & Graphics Editor

Abreham Assefa (PhD, Assistant Professor)
Dilla University, Ethiopia

Advisory Board

Laureate Prof. Tirusew Tefera - Addis Ababa University
Prof. Mishack T Gumbo - University of South Africa
Prof. VG Gasa - University of South Africa
Prof. Abebayehu Aemero Tekleselassie - George Washington University
Prof. Teresa Akinyi Wasonga - Northern Illinois University
Prof. N. Balasubramanian - Bharathiar University
Prof. Alemayehu Bishaw - Bahir Dar University
Prof. Yalew Endawoke - Bahir Dar University

Address

Dilla Journal of Education
Dilla University Journals System
Main Campus, Admin Bldg. 4th Floor
P.O.Box 419, Dilla, Ethiopia

Contact numbers:

+251911363403
+251911944488

Email: dje@du.edu.et

Journal website: <https://journal.du.edu.et/index.php/dje>

Submission link: <https://journal.du.edu.et/index.php/dje/about/submissions>

©2023 Dilla University



DILLA JOURNAL OF EDUCATION

A PEER REVIEWED BI-ANNUAL JOURNAL OF DILLA UNIVERSITY

Articles

Lived experiences of teachers in implementing Early Childhood Care and Education Policy in Government Pre-primary Schools of Hadiya Zone, Central Ethiopia Regional State

Morka Mogiso, Dawit Negassa, Garkebo Basha & Yirgalem Alemu

Teacher Educators' Professional Competencies: the Unrecognized Profession in Ethiopia

Alemayehu Teklemariam

GeoGebra: A Mediating Artifact to Minimize Students' Misconceptions in Learning Function Concepts

Ashebir Sidelil Sebsibe & Neja Muzea Abdella

Assessment of Community Service Practices in Ethiopia Universities: a case Study in Some selected Government Universities

Asnake Muluye, Simeneh Mola, Dejene Girma, Getasew Alemayehu & Mesay Mahabera

Determinants of Job Satisfaction among Teacher Educators in Ethiopia

Almaz Asharge, Alemayehu Bishaw, & Berhanu Mekonnen

Volume 2

Issue 2

October 2023

Message from the Editor-in-Chief

I am pleased to introduce the release of Volume 2 Issue 2 of the *Dilla Journal of Education*, a peer-reviewed bi-annual publication of Dilla University. This issue presents a diverse collection of articles that delve into critical aspects of education within Ethiopia.

On behalf of the editorial board, I invite you to explore the research presented, which examines topics such as principals' leadership styles and their impact on teacher organizational commitment, predictors of risky sexual behavior among trainee teachers, the challenges and practices of teacher performance appraisal in primary schools, the repercussions of higher education reform on mathematics students, and perspectives on principal power in secondary schools. It is my hope that this issue provides valuable insights, stimulates further discussion, and encourages continued research within the Ethiopian education landscape. I encourage you to engage with these articles and contribute to the ongoing dialogue surrounding educational improvement.

Finally, I extend my sincere gratitude to the authors for contributing their valuable research, to the reviewers for their rigorous and insightful feedback, and to the dedicated members of the editorial team for their tireless efforts in bringing this issue to fruition. Your commitment to scholarly excellence is highly appreciated.

Daniel Gebretsadik (PhD, Associate Professor)

Editor-in-Chief

Dilla Journal of Education



Lived experiences of teachers in implementing Early Childhood Care and Education Policy in Government Pre-primary Schools of Hadiya Zone, Central Ethiopia Regional State

Morka Mogiso^{1,*}, Dawit Negassa¹, Garkebo Basha², and Yirgalem Alemu³

¹Department of Special Needs and Inclusive Education, Haramaya University, Ethiopia

²Department of Adult Education and Community Development, Haramaya University, Ethiopia

³Department of Psychology, Haramaya University, Ethiopia

Received: 12 June 2023

Accepted: 22 September 2023

Published: 02 October 2023

ARTICLE INFO.

Key words/phrases:

Analysis, Early Childhood Care and Education, Implementation, Policy, Pre-primary

Abstract

The purpose of this study was to explore the lived experiences of teachers in implementing the Early Childhood Care and Education (ECCE) policy in government pre-primary schools in the Hadiya Zone, Central Ethiopia Regional State. A qualitative approach with phenomenological design was employed. Six information rich pre-primary teachers were purposively selected and involved in the study. Data were collected via semi-structured interviews, analyzed inductively, and developed into four major themes and five sub-themes. The results revealed a significant disparity between the policy documents and actual practices. The findings also showed that preschools faced constraints in facilities, teachers lacked pedagogical skills for teaching and assessing children, and there was low parental and community participation. The Hadiya Zone Department of Education, Health, and Women's and Social Affairs is recommended to work closely with pre-primary schools and other stakeholders to ensure effective policy implementation.

1 Introduction

Education is a process that facilitates learning through the acquisition of knowledge, skills, values, beliefs, and habits. It occurs in both formal and informal settings, influencing one's thoughts, feelings, and actions. Typically, education is structured into stages including pre-primary, primary, secondary, college, and university. pre-primary education plays a crucial role in young children's development before they transition to formal schooling, enhancing cognitive growth and preparing them for early grades. It significantly impacts children's attendance and participation in primary school. A lack of school readiness can hinder children's adaptation to school environments and increase dropout rates.

The Early Childhood Care and Education (ECCE)

program aims to provide appropriate education and care for young children, yielding long-term positive outcomes. As noted by the Ethiopian Federal Ministry of Education in 2007, this program shapes early childhood development, fostering socially responsible citizens and promoting economic growth by reducing mortality rates, childhood illnesses, school repetition, and dropout rates.

International organizations like UNICEF and UNESCO stress the importance of quality pre-primary education for all children, regardless of their background. Research supports the long-term benefits of quality early childhood care and education, as highlighted by Curtis, Maureen, & O'Hagan in 2003 and cited by Gebre Egziabher in 2014. As indicated above early childhood period is a bridge between a formal primary school and preschool which lays a base for future development of chil-

dren.

Globally, the critical nature of the first 2000 days from conception to age six is recognized for its impact on lifelong cognitive, psychological, and emotional development. Programs offering pre-primary education are essential for improving life fate for the poorest children, ensuring they are prepared for formal schooling.

Early childhood care and education is considered an integral part of basic education, foundational for achieving the Ethiopian Education for All goals and overall human development. All children should engage in preschool activities early and be exposed to enhanced learning environments to inspire their creativity and abilities. As articulated in the Africa Fit for Children declaration of May 2001, investing in children today builds tomorrow's peace, stability, security, democracy, and sustainable development.

The right to education is upheld by various international and national legislations, emphasizing the development of a child's personality and abilities. Significant policy and strategic initiatives have been adopted in Ethiopia since 2010, focusing on ECCE to increase access and improve quality in early childhood education. Notably, the government's strategic operational plans and national policy framework for ECCE, supported by UNICEF, have led to considerable advancements, with pre-primary gross enrollment reaching 34% in 2022/2023.

Studies on ECCE in Ethiopia, such as those by Fedlu (2018), Fekede (2021), Misahun (2020), and Mamo & Kenea (2014), have identified various implementation challenges, including inadequate facilities, insufficiently trained teachers, and lack of comprehensive policy execution, particularly in rural areas. These findings underline the need for ongoing research and policy adjustment to ensure the effectiveness of ECCE programs, especially in less-performed zones such as Hadiya Zone. As it was indicated in previous South Nations, Nationalities and Peoples Regional State education bureau 2022/2023 annual report indicated that from other zones and special districts, with various reasons dropout rate was very high. This motivates researchers for further investigation into the lived

experiences of teachers engaged in ECCE policy implementation in this zone, where similar studies were conducted in only private pre-primary schools in towns. However, no similar studies have been conducted in government-attached preprimary schools.

Research Question

The study aimed at addressing the following research question:

What are the lived experiences of teachers engaged in early childhood care and education policy implementation in government pre-primary schools of Hadiya Zone, Central Ethiopian Regional State?

2 Review of Related Literature

Scholars highlight that the first eight years of a child's life mark a period of rapid growth and development. Brain development reaches its peak in the first three years, while opportunities for promoting overall development remain high until around age eight. This period is often referred to as a critical "window of opportunity," which, if effectively utilized, ensures not only a child's individual well-being but also long-term societal benefits (Arnold, 2004).

Early Childhood Care, Education, and Development has increasingly gained recognition worldwide and across Africa as an essential area of focus (UNESCO, 2004). Reinforcing this idea, the Young Lives study (2016) stresses that early childhood represents the most crucial developmental phase. It also identifies this period as the most cost-effective stage for investment in preventive and intervention programs aimed at reducing poverty, inequality, and trauma.

Empirical research further illustrates that quality ECCE services encompassing care, learning opportunities, and enriching experiences play a transformative role in shaping lifelong success (ERPA, 2014). Beyond individual benefits, such programs help nations fulfill international commitments, such as the Convention on the Rights of the Child, by ensuring children can exercise their rights and realize their full developmental potential (UNESCO &

UNICEF, 2012).

Concept of Policy Implementation Analysis

The notion of policy plays a central role in shaping the operations and functions of both public institutions and private organizations. When an individual or private body adopts a policy, it is typically referred to as a private policy, whereas those formulated by the government or its agencies are considered public policies (Ozor, 2004). In the present study, the focus is on public policies designed and executed by government bodies.

Different scholars approach the concept of policy from varying perspectives. Some describe it primarily as a form of action, others see it as a matter of choice, while still others interpret it in terms of the scope of activities involved (Ikelegbe, 2006). These diverse perspectives account for the multiplicity of definitions. For example, Ezeani (2006) considers policy as a proposed plan of action the government intends to carry out in response to a particular problem or situation. By contrast, Ikelegbe (2006) offers a more comprehensive definition, describing policy as an integrated set of actions and programs established by government, serving as a framework to guide practices and responses in specific areas of concern. In essence, policy can be understood as a structured course of action that directs government activities and facilitates the achievement of predetermined goals or objectives.

The 2010 ECCE Policy Framework in Ethiopia

In Ethiopia, a formal policy framework for Early Childhood Care and Education (ECCE) was introduced in 2010 with the intention of improving children's early development. This framework clearly articulated its vision, mission, objectives, guiding principles, and areas of focus. The vision emphasized guaranteeing all children the right to a healthy start, access to nurturing and safe environments, and opportunities to reach their fullest potential. Its mission was defined as the provision of a holistic, integrated, high-quality, culturally responsive, and developmentally appropriate service that supports the comprehensive growth of every child.

The overall objective of the framework was to encourage early stimulation and provide children from

the prenatal stage up to seven years old with the best possible start in life. Additionally, it aimed to enhance equity, accessibility, and quality in early education services through efficient partnerships, institutional capacity building, and a more balanced distribution of resources (National Policy Framework, 2010).

Modalities of Pre-primary Education

Pre-primary education in Ethiopia is organized into four major modalities: Kindergarten, O-Class, Child-to-Child Program, and Accelerated School Readiness. Each has its own structure and approach to preparing children for primary school.

Kindergarten

Kindergarten is designed as a three-year program targeting children aged four to six. Using a child-centered approach, it encourages learning through play, which helps children acquire social skills, develop self-expression, and build their identities. The program ensures that children enter primary school better prepared for the demands of formal education (AACEB, 2013).

O-Class

The O-Class is one of the most widespread modalities of pre-primary education. It operates within existing primary schools and provides a one-year preparatory program for six-year-old children before they begin grade one. Its main objective is to bridge the transition between home and formal schooling, ensuring that children are ready academically and socially (MoE, 2013/14).

Child to Child Program

The Child-to-Child initiative is based on the idea of engaging older children, typically in grades five and six, as facilitators for their younger siblings and neighborhood children. These older children are trained and supported by teachers to conduct structured, play-oriented activities either at home or in community spaces. Parents also play a role by supervising and rotating responsibilities. The goal of this program is to strengthen school readiness among younger children and smooth their transition into grade one (MoE, 2012).

Accelerated School Readiness

It's one of the four modalities of pre-primary education program and it's a two-month program for 6+ year old children who do not have other access. Children attend the program on July and August before entering grade one on September. The purpose is to avoid negative influence on those children who come to school without passing through preschool education (MoE, 2017).

Learning Material and Environment

According to AACAE (2011/12), preschool classrooms should be equipped with a range of indoor learning materials, including puzzles, flash cards, geometric shapes, storybooks, construction blocks, toys, and resources for organizing learning corners such as family, health, science, language, shopping, and mathematics areas. Outdoor equipment should also be available, such as slides, balance beams, merry-go-rounds, and locally produced play items. These resources stimulate children's imagination, creativity, and problem-solving abilities, while also serving as emotional anchors and tools for connecting with their environment (NACECE, 2003).

Additionally, the natural outdoor setting plays a vital role in children's early development. A carefully planned outdoor environment offers richer experiences than the classroom alone, as it encourages children to notice weather patterns, plants, animals, and other aspects of their surroundings. Such environments nurture curiosity and critical thinking as children seek answers to their discoveries (Curtis, 1998, cited in Haile, 2010).

Parent and Community Engagement

Parents are considered the primary caregivers of children, making their involvement essential in early education. Collaboration between parents, teachers, and caregivers ensures that decisions about preschool activities and services reflect children's best interests. Parents can contribute by sending their children regularly, providing learning materials, assisting in monitoring classroom practices, and even mobilizing resources to support preschool operations (MoE, 2016).

The wider community, including neighborhood

members and NGOs, also plays a key role in ensuring that preschool environments are safe, supportive, and conducive to children's growth (OECD, n.d.). Communities are expected to organize families, state institutions, and social organizations to provide holistic support in areas such as care, health, and nutrition (MoE, MoH, & MoWA, 2010). Moreover, community-based programs can promote early childhood development through family participation and shared responsibility (Eagle *et al.*, 2007, cited in Yalew, 2011; Yalew, 2011).

Learning Methodology in the Pre-primary School

The ECCE policy framework recommends that teaching methods in pre-primary schools should be child-centered, interactive, and play-based. Lessons are expected to encourage cooperation, sharing of experiences, and active participation, with teachers using varied instructional materials to enhance engagement (MoE, MoH, & MoWA, 2010).

However, interviews conducted with pre-primary teachers revealed a mismatch between the guidelines and actual practice. Many teachers reported relying heavily on explanation and question-answer techniques, with limited use of discussions, role-play, storytelling, play-based activities, or group work. Observations also confirmed that classroom instruction in many schools was dominated by teacher-centered methods such as lecturing, reading, and demonstration, while child-centered strategies were rarely applied. This indicates a gap between policy expectations and classroom realities.

Assessment of Children in the Pre-primary Schools

The ECCE policy guideline specifies that assessment in pre-primary settings should be continuous, employ appropriate methods, and serve mainly to encourage children rather than determine promotion. In addition, results are expected to be communicated to parents (MoE, MoH, & MoWA, 2010). To evaluate how these practices are implemented, classroom observations and teacher interviews were conducted.

Findings indicated that most teachers relied pri-

marily on written tests, daily attendance records, and class participation as their main forms of assessment. In contrast, alternative methods such as drawing, portfolio assessment, checklists, direct observation, and homework were used infrequently, if at all. Principals also acknowledged that challenges such as inadequate training, the absence of ongoing professional development, shortages of instructional materials, and insufficient budgets made it difficult to apply more comprehensive assessment practices.

Beyond policy documents, scholars emphasize that the evaluation of young children should be a continuous process rooted in both indoor and outdoor observations rather than limited to paper-and-pencil tests. Effective assessment should capture children's activities, behaviors, and efforts, reflecting their overall growth and development (Isenberg & Jalongo, 1993).

Qualification of Pre-school Teachers

Establishing a structured qualification framework for ECCE teachers is critical to ensure consistency across different levels of training. Such a framework allows for both short-term certification and longer-term diploma programs, serving as an entry point for expanding the ECCE workforce (Biersteker, 2008). Given the rapid need for more teachers, relying solely on traditional pre-service training is often insufficient. One proposed approach is to provide new teachers with a multi-month certificate in preschool education, enabling them to begin teaching quickly while continuing to upgrade their qualifications over time to achieve full ECCE teacher status (Orkin *et al.*, 2012; Biersteker, 2010). For assistant teachers, a minimum requirement could include completion of Grade 8 education and possession of basic volunteer or assistant certificates in education or health (Orkin *et al.*, 2012).

The effectiveness of ECCE programs depends heavily on teachers' skills, attitudes, and behaviors. The curriculum and pedagogical approaches for pre-primary education should therefore shape the content of teacher training, which must also include substantial practical experience. Research shows that positive relationships and meaningful interactions between teachers, parents, and children

are often more influential in determining program quality than material resources alone (UNESCO, 2007).

Furthermore, training programs that encourage teachers to reflect on their practices and the environments in which they teach are particularly beneficial (UNESCO, 2007). Finally, ongoing learning through research, evidence, and innovation remains an essential component of strengthening teacher capacity and ensuring the quality of ECCE delivery.

Developmentally Appropriate Practice in ECCE Program

The National Association for the Education of Young Children (NAEYC) strongly advocates for the use of developmentally appropriate practices (DAP) in early childhood education. DAP serves as a research-based framework that guides teachers and caregivers in creating learning experiences suited to children's developmental levels, while still challenging them to achieve new goals. According to NAEYC (2020), DAP is at the heart of the organization's mission and resources, ensuring that children are supported in ways that match their current abilities but also encourage progress.

Copple and Bredekamp (2009) emphasize that DAP does not mean making tasks easier for children. Rather, it ensures that learning goals and experiences align with their developmental needs while remaining sufficiently challenging to stimulate growth and maintain interest. Teachers practicing DAP are expected to know their learners well enough to provide the right balance of support and challenge.

Within developmentally appropriate programs, children learn not only through teacher-directed activities but also through opportunities that are guided by their own interests and explorations. Such programs combine structured, teacher-led activities with child-initiated learning, as well as both small-group and large-group interactions (Copple & Bredekamp, 2009).

3 Research Design and Methodology

This section deals with the design, method, sample population, sampling techniques, data gathering tools, data collection procedures, method of data analysis and ethical considerations.

3.1 Description of the Study Area

Hadiya zone is found in the Central Ethiopian Regional State, (CERS) Ethiopia. This region is one of newly established regional state in Ethiopia. It was formed from the then northern part of the Southern Nations, Nationalities, and Peoples' Region (SNNPR) on 19 August 2023 after a successful referendum. It was located at a distance of 232 km away from the Addis Ababa, capital city of the country, to south direction. Hadiya is bordered on the South by Kembata Tembaro (KT), on the Southwest by the Dawro Zone, on the West by the Omo River which separates it from Oromia Region and the Yem Zone, on the North by Gurage, on the Northeast by Silte, and on the east by the Alaba Zone. Hossana town is the center for Hadiya Zone administration and center for Central Ethiopian Regional State. Besides this, the number of pre-primary schools found in this zone is 586. Of this, private pre-primary schools are 127 (21.6%) and government owned pre-primary schools are 459 (78.3%). Besides this, the number of pre-primary school learners found in this zone are $M=52,082$, $F=50604$ $T=102,686$. The pre-primary teachers found in this zone are $M=141$ (27.3%) $F=375$ (72.6%) $T=516$.

3.2 Research Design

To capture the essence of the lived experiences of pre-primary teachers, a qualitative phenomenological research design was selected for this study. In this phenomenological study, the researchers sought to describe the meaning of participants shared lived experiences regarding the phenomenon (Creswell, 2007). This research design allowed participants to share their lived experience of teaching with the researchers regarding the implementation of ECCE. In this regard, for this research undertaking, a qualitative approach with a phenomenological design was employed. Phenomenological research requires a researcher to focus on people's experi-

ences of a phenomenon to obtain comprehensive details that provide a basis for reflective structural analysis that ultimately reveals the essence of the experience (Linda A. Bliss, 2016).

3.3 Sampling Technique

A standard sampling method within phenomenological research is purposive sampling, which is often used when the characteristics of a specific group of individuals match the characteristics of the phenomenon being researched (McMillan and Schumacher, 2006). Purposive sampling guarantees information-rich responses from a knowledgeable audience (Higginbottom, 2004).

In the Hadiya zone, there are sixteen government structures (12 rural districts and 4 town administrations). By using a purposive sampling technique, the researchers took six pre-primary teachers from each well and rewarded six districts/town administration and primary schools, such as Danama, Bonosha, Shone number 1, Alemu Woldehana, Ansho, and Sokokta primary schools from West Badawacho, Shashogo, Shone town, Hossana town, Duna and Amaka, respectively. The reason for the use of these samples was that both the participants and the sampled study area were awarded from the Hadiya Zone Education Department for outstanding performance in ECCE in the 2012/2022 academic year. (Hadiya Zone Education Department annual report, 2022).

3.4 Data Collection Instruments

In phenomenological research, interviews are generally considered the most effective tool for collecting data, as they allow participants to describe their lived experiences in depth. Both open-ended and semi-structured interview formats are suitable, since they give informants the flexibility to explain their perspectives fully while enabling researchers to explore the phenomenon under study in detail. Such interviews provide rich descriptions that closely represent participants' realities (Padilla-Diaz, 2015).

For this study, researchers designed a semi-structured interview guide after conducting a thorough review of literature on ECCE policy imple-

mentation. This guide ensured that core issues were covered while still allowing participants to elaborate on their personal experiences. To validate the instrument, the draft guide was reviewed by two pre-primary teachers outside of the study area, helping to ensure its clarity and trustworthiness before actual data collection.

3.5 Data Collection Procedures

In a phenomenological study, data collection techniques have the flexibility to allow participants to provide detailed accounts of their own experiences (Smith, 2004). Phenomenological research methods use a systematic method to analyze shared experiences and gain meaning from them (Watson *et al.*, 2015).

The following procedures were used while collecting the data. A permission letter to conduct the study was obtained from the Department of Special Needs and Inclusive Education at Haramaya University and delivered to the head of the Hadiya Zone Education Department. The Hadiya Zone Education Department subsequently wrote a letter of permission to the sampled districts and town administration. The sampled districts and town administration subsequently wrote a letter of permission to the sampled primary schools. The field work was conducted intensively for a period of one month from 12 March 2023 to 12 April 2023.

3.6 Method of Data Analysis

Data analysis in a phenomenology approach attempts to analytically present the lived experiences of those who are participating in the study (Moustakas, 1994). The data analysis process heavily relies on the participant's dialogue to process and understand what is unique to the specific individual, their shared experiences, and the participant's views (Creswell, 2007).

Data collection, management and analysis were carried out concurrently. After the interview, the audio recordings were transcribed verbatim into text by the researchers within 12 hours. After the audio recordings were transcribed into text, the text was interpreted with field notes containing nonverbal clues from the participants to assist in the data analysis. Inductive thematic analysis was adopted

to obtain data-driven results.

3.7 Ethical Considerations

Before the data were collected, the participants were informed and agreed to participate in the study. It was also confirmed that no information would be disclosed without the consent of the study participants or kept confidential.

4 Results and Discussions

4.1 Results

The results and discussions are presented in a way to provide answers to the research question raised at the beginning of the study. The study question is about the lived experiences of teachers engaged in early childhood care and education policy implementation in government pre-primary schools of study area Hadiya Zone, Ethiopia. In doing so, the study result was categorized into four themes such as: theme one; pre-primary school facilities, theme two; teaching methodologies, theme three; the relationship between teachers and parents and theme four; an assessment of children in pre-primary schools.

Theme 1: Pre-primary School Facilities

The ECCE policy guideline mandates that pre-primary schools should be physically safe, distanced from garbage sites, and equipped with adequate latrine and water services, as well as sufficient classroom and compound space (MoE, MoH, and MoWA, 2010). Additionally, the South Nations, Nationalities and Peoples Regional Education Bureau (2012) emphasize that "learning by playing should be the primary instructional method in pre-primary schools, necessitating a safe and adequate area to foster the development of all children."

In light of these guidelines, experienced Preprimary Teachers (PPTs) were interviewed to ascertain the availability of fundamental facilities in pre-primary schools. One participant from School 2 noted:

"As a PP teacher, I observe that both the outdoor and indoor spaces are insufficient for children to learn through play or move freely. The school was originally not intended for PP use, lacking complete fencing and essential

facilities such as water, clean latrines, and ventilated classrooms". (PPT, 2)

When queried about the adequacy of outdoor and indoor environments, teachers from School 3 expressed significant concerns:

"As evident, the facilities are far from adequate for children's learning. Our school faces numerous issues; the learning spaces are unsuitable, and the outdoor area is cluttered with trash. The school infrastructure was initially designed for primary education, not pre-primary. Even parts of the school farm are leased to generate funds for stationery". (PPT, 3)

The investigation highlights that the physical environments (indoor and outdoor), learning materials, and equipment at these schools are subpar, necessitating the engagement and dedication of all school stakeholders. A teacher from school 2 detailed her struggles:

"I have repeatedly reported to the district education office that our learning spaces are inadequate, and the outdoor environment is littered. All planning and budgeting are geared toward primary education without considerations for PPE". (PPT, 2)

Moreover, teachers from school 6 shared their frustrations:

"Since my employment here, I have never felt content due to the unsafe physical conditions of the school. Despite frequent reports to the principal regarding the need for improvements in gateways, play areas, and toilets, no changes have been made". (PPT, 6)

Another teacher from school 1 remarked on the challenges of teaching without proper facilities:

"I often teach my students outside the classroom without any support or facilities, relying solely on oral instruction". (PPT, 1)

Furthermore, the overall physical and classroom learning environments, teaching materials, and equipment are described as unattractive and unsuitable for fostering a conducive educational setting.

Tovey (2007) underscores that both indoor and outdoor spaces should offer diverse play opportunities and quiet areas for solitary activities, essential for children's autonomy and security.

Despite the intentions of the ECCE policy to create garbage-free, spacious, and safe educational environments, its implementation has been markedly inadequate, particularly in providing sufficient space, sanitation facilities, and safety, thus compromising children's play opportunities and exposing them to potential hazards and distress.

Theme 2: Teaching Methodologies

According to the ECCE policy guideline, teaching learning methods should be child-centered and facilitate a group setting to help children share experiences. These methods should support and encourage children's efforts during the learning process, primarily employing a play-based teaching approach, and utilize various teaching aids in the classroom (MoE, MoH, and MoWA, 2010). To evaluate the policy's implementation, interviews were conducted with experienced Pre-primary Teachers (PPTs).

One participant from school 5 explained,

"As a teacher at this level, I am well aware of the appropriate teaching methods. However, I often resort to lecture methods due to the classroom's limited size and safety concerns. Additionally, the lack of proper playing fields and materials constantly raises concerns about the program's success in our school". (PPT, 5)

Similarly, a PPT from School 6 stated,

"I primarily use teacher-centered or lecture methods, both indoors and outdoors, due to the unmanageable class size, lack of space, and absence of play areas and teaching materials. Children often request to engage in sports and cultural games, yet I cannot facilitate these play-based learning activities. The school premises are partially covered by grass, with the remainder being farmland". (PPT, 6)

The responses highlight significant challenges in applying the ECCE guidelines, primarily due to inadequate facilities. From School 1, a participant shared,

"I possess adequate training and awareness in PPE teaching-learning methodologies. However, the nature of our school does not encourage the practice of these methods. Despite understanding the importance, I have yet to implement child-centered approaches due to the lack of suitable and safe conditions". (TPP 1)

Research by Paciorek and Munro (1999) suggests that methods emphasizing child-directed activities are more effective than teacher-directed instruction in the PPS curriculum. Education in PPS should focus on engaging with children to help them understand the world around them through cooperative work and responsible learning. This study reveals that reliance on teacher-centered methods hinders the curriculum's effective implementation, affecting the holistic development of children.

Theme 3: The Relationship between Teachers and Parents

The ECCE policy guideline emphasizes the importance of regular communication between teachers and parents through Parent Teacher Association (PTA) meetings and sharing information about the child's home environment to foster collaborative relationships (MoE, MoH, and MoWA, 2010). However, the investigation into parent-teacher partnerships revealed shortcomings.

A teacher from school 6 remarked,

"While I am familiar with the learners' behaviors and activities in the school environment, I lack insight into their home settings. Despite repeated attempts to engage parents, only a few consistently participate in meetings, suggesting that many view school as a respite from their responsibilities". (PPT, 6)

Another response from School 5 indicated a similar trend:

"I continuously reach out to parents to discuss their children's learning issues. Unfortunately, the majority of parents show

little interest in engaging with the school or addressing their children's educational challenges". (PPT 5)

MoE (2010) states that parents play a crucial role in their children's upbringing and development. Active parental involvement is necessary for selecting activities and services in pre-schools, contributing to learning materials, and supporting educational processes. Despite this, the practice of collaborating closely with parents and the community was found to be minimal, indicating poor implementation of the ECCE policy.

Theme 4: Assessment of Children in the PPS

The ECCE policy guideline describes the assessment in PPS as continuous, using appropriate methods that should not solely determine promotion but should involve parents in the process (MoE, MoH, and MoWA, 2010). Despite this, the assessment techniques employed often do not align with these standards.

A PPT from school 3 stated,

"Appropriate assessment in PPS should continuously evaluate children's activities across various environments. However, our school confines assessments to classroom-based tasks like homework and tests, which do not adequately measure children's innovative skills or promote their creativity". (PPT, 3)

From School 4, a similar observation was made:

"There is no continuous assessment of outdoor activities here; I only assess students through classroom tasks and final examinations. A suitable assessment should include diverse activities that reflect the children's learning in more dynamic environments". (PPT 4)

Mooney (2000) advocates that assessment should track understanding throughout educational activities, not just the outcomes. A multi-source and multi-measure assessment approach offers a more valid and comprehensive view of a child's progress. However, the findings suggest that such comprehensive assessment methods are underutilized in

many PPSs, necessitating improvements to align with the policy's intentions and the local context.

4.2 Discussions

The results of this study indicated that the real practices of early childhood care and education policy implementation in the study area were not implemented as the government as well as community expect. That is, the implementation did not boldly align with the MoE (Ministry of Education's) ECCE policy framework and strategic operational plan.

As various studies conducted in Ethiopia scholars in different regions showed that, the implementation status is differed from regions to regions and from pre-primary to pre-primary schools. Those Ethiopian researchers like Gebre Egziabher (2014), Fekede (2021), Misahun (2020), and Mamo and Kenea (2014), which almost unanimously indicated that the early childhood period serves as a bridge between preschool and formal primary school, laying a foundation for children's future development. These researchers argued that early childhood education is crucial in providing appropriate education and care for young children, yielding long-lasting positive consequences. They noted that such programs help mold socially responsible citizens and contribute to economic growth by reducing mortality rates, childhood illnesses, school repetition, and dropout rates.

From these point of views, this study presents different findings such as: the overall physical and classroom learning environments are unattractive and unsuitable for fostering a conducive educational setting for early grade learners, teaching methods did not emphasize child-directed activities rather than teacher-directed instruction, parents did not soundly play a crucial role in their children's upbringing and development, and the appropriateness of early grade learners assessment was not consider the age, level of understanding capacity and suitability of child-centered assessment techniques.

In general, the findings of this study result indicated that the real implementation of early childhood education did not align with the stated MoE, ECCE (2010) policy reality.

On the other hand, the study conducted by Arnold (2004), states that the first eight years of a child's life is a period of tremendous growth and development. Brain development is high in the first three years, and the potential for ensuring optimal development is very high up to age 8. It is imperative that this true 'window of opportunity' is fully used and strengthened to ensure long-term benefits, not just for each individual child's development but also for the larger community. In this regard, the current study highlights major challenges hindered the remarkable growth and development of children in pre-primary schools of the studied area such as: lack of safe indoor and outdoor materials and equipment, insufficiently trained teachers, inadequate facilities, and a lack of monitoring.

There was also limited participation among parents, the community, and pre-primary teachers. Moreover, the implementation of the pre-primary education policy was found to be weak due to misalignment with the established pre-primary education standards.

Similarly, the study conducted by the National Association for the Education of Young Children (2020), acknowledges and supports the effort of developmentally appropriate practices (DAP) in a child's early years of learning. The DAP is a framework designed to reflect research-based practices that promote a child's optimal learning and development and it is the heart of all National Association for the Education of Young Children's work and resources and educators and caregivers use developmentally appropriate practice to meet children where they are while challenging them to meet their achievable goals. However, this study result indicated that most pre-primary school's classroom as well as physical environment did not encourage the developmental and learning aspects of the early grade learners.

Major Findings

The findings indicate that government pre-primary schools suffer from a lack of attention from various stakeholders, including government officials, parents, community representatives, school management bodies, and non-governmental organizations. Confirming earlier research, this study identifies

significant obstacles in the implementation process, including inappropriate school facilities, a shortage of budgetary resources for the program, and inappropriate assessment techniques. Furthermore, there is a notable deficiency in learning materials, such as developmental play equipment, textbooks, and other teaching aids across all studied areas. Another crucial aspect for policy implementation is the involvement of active parents and the relationship between teachers and parents, which this study found to be insufficient and lacking regular communication regarding children's progress.

5 Conclusion

This study provided a comprehensive understanding of the challenges experienced by pre-primary teachers (PPTs) in implementing ECCE policy in Hadiya zone, Ethiopia; by using a phenomenological design and in-depth interviews. The findings reveal continuous deep-rooted problems and shortages that hinder effective policy implementation in the studied area. Although the policy includes approaches intended to make services available to all children, there remains a significant disparity in access between rural and urban areas, and it fails to address quality concerns.

In all studied areas, preschools are not managed independently, not secured and non-attractive school inside and outside environment, face high shortages of educational materials, and suffer from inadequate curricula, lack appropriate toilet and pure water in the school compound, outdated teaching methods, still now teacher centered teaching approach is dominant in most of studied areas pre-primary schools, old (classroom evaluation system was leading the assessment of early grade learners) and poor parent-teacher interactions, all of which obstruct the successful implementation of the ECCE policy.

Recommendations

To address the study problem and to reach to sustainable solution for early grade learners successfulness and to implement the ECCE policy in the studied area the following recommendations were forwarded to improve the early grade learners leaning capacity school stakeholders should fulfill infrastructure and teaching-learning inputs

for neighboring pre-primary school, to facilitate safe teaching environment for children's school stakeholders should provide appropriate classroom (avoid over classroom size) and avoid unbalanced teacher-student ratio in the classroom, to provide active and participatory learning environment; the pre-primary teachers should create child-centered teaching approach with attractive and stimulating classroom and play grounds and to encourage the children's learning, to understand their children's learning gaps and achievement and to take a common decision in every issues parents should work with teachers intimately.

References

Africa Fit for Children May, 2001. The African Common Position as African's Contribution to United Nation's General Assembly Special Session for Children on Cairo, Egypt, from 28-31 May 2001.

African Union. 2014. The African Union Education Outlook Report, Early Childhood Development: Continental Perspective and Evaluation: John Wiley and Sons, Inc.

Arnold, D. H. 2004. The Early Education of Socio-economically Disadvantaged Children. *Annual Review of Psychology*, 54 (1), 517-545.

Biersteker, L. 2008 *Scaling Up Early Childhood Development (ECD) (0-4 Years) In South Africa*, Cape Town: Growth and Development Initiative, Human Sciences Research Council and Early Learning Resource Unit.

Biersteker, L. 2010. *Scaling-Up Early Child Development in South Africa: Introducing a Reception Year (Grade R) for Children Aged Five Years as the First Year of Schooling*, Wolfensohn Centre for Development Working Paper 17, Washington DC.

Bliss, L 2016. Phenomenological Research: Inquiry to Understand the Meaning of People's Experiences. *International Journal of Adult Vocational Education and Technology*.

Copple, C., & Bredekamp, S. 2009. *Developmentally appropriate practice in early childhood*

programs serving children from birth through 8 (3rd ed.). National Association for the Education of Young Children.

Creswell, J. W. 2007. Qualitative inquiry and research design: Choosing among five approaches (2nd ed.). Thousand Oaks, CA, US: Sage Publications, Inc.

EFA Global Monitoring Report Team. 2004. EFA Global Monitoring Report 2005. The Quality Imperative. Paris: UNESCO.

ERPA. 2014. Evaluation of preschool education program: According to the views of prospective teachers (A case of Ankara University).

Ezeani, E. O. 2006. *Fundamentals of Public Administration*. Snaap Press, Ltd, Enugu.

Fedilu Redi. 2018. The implementation and challenge of the policy set for early childhood care and education in Addis Ababa city Administration.

Fekadu Ayana. 2021. The implementation and challenge of the policy set for early childhood care and Education Policy in Eastern Wellega Zone, Oromia Regional State, and Addis Ababa University.

G/Egziabher Assefa. 2014. Practices and challenges of Early Childhood Care and Education in Addis Ababa, Arada Sub-City Government Kindergartens. (Unpublished Master's Thesis) Addis Ababa University, Addis Ababa.

Haile G.S. 2010. The current practice of pre-school education in some selected woredas of Northern western zone of Tigray. MA Thesis. AA.

Higginbottom, G. M. A. 2004. Sampling issues in qualitative research. Nurse Researcher, 12(1), 7-19.

Ikelegbe, A 2006. *Public Policy Analysis: Concepts, Issues, and Cases*. Imprint Services, Lagos.

Isenberg, J. and Jalongo, M. 1993. *Creative Expression and Play in Early Child Hood Education*. Macmillan Pub, Company, New York.

Mamo Kenea. 2014. The Current Situation of Pre Primary Education in Government Schools at Administrative Towns Surrounding Addis Ababa. MA Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Mazur E. *Peer Instruction: A User's Manual*. Upper Saddle River, NJ: Prentice Hall; 1997. [Google Scholar]

McMillan, J. H., & Schumacher, S. 2006. Research in education: Evidence-Based Inquiry. New York. Pearson Education, Inc.

Misahun Shumetu. 2020. Early Childhood Care and Education Policy Implementation Analysis. The Case of Abichu Gnea Woreda, M.A Thesis.

MOE. 2007. *Status of early childhood care and education* in Ethiopia, Addis Ababa: printed.

MoE 2010. Early Childhood Care and Education Policy and Strategic Framework, Addis Ababa.

MoE 2010. *Education Sector Development Program IV 2010/2011-2014/2015 GC*. Addis Ababa: Ministry of Education.

MoE, MoH, and MoWA. 2010a. *Strategic areas operational plan and guidelines for early childhood care and education (ECCE) in Ethiopia*. Addis Ababa.

MoE. 2012. Child To Child Teaching Approach draft Manual, Addis Ababa: unpublished.

MoE. 2013-14. O-class Syllabus for Pre-school Education and Care, Addis Ababa: printed.

MoE. 2015. *Fifth Education Sector Development Programme*. Ministry of Education of the Federal Democratic Republic of Ethiopia, Addis Ababa.

MoE. 2016. *Educational Statistical Annual Abstract*. Author, Addis Ababa.

MoE 2017. Education Statistics Annual Abstract. Addis Ababa, Ethiopia: Education Management Information System (EMIS) and ICT Directorate.

Moustakas, C. 1994. Phenomenological research methods. Thousand Oaks, CA: Sage.

National Association for the Education of Young Children (NAEYC). 2020. *What is developmentally appropriate practice (DAP)?* Retrieved April 8, 2020, from <https://www.naeyc.org/resources/topics/dap-introduction>.

OECD 2001 *Starting Strong*, Early Child hood Education and care. Paris, France: OECD Publications Service.

Orkin, K. 2012. Are Work and Schooling Complementary or Competitive for Children in Rural Ethiopia?

Ozor, E. 2004. Public Enterprises in Nigeria: A study in Public Policy Making in Changing Political Economy. University Press Plc, Ibadan.

Paciorek, M. and Munro, H. 1999. Early Childhood Education, 4th edition. Michigan McGraw, Hill, New York.

Padilla-Diaz, M. 2015. Phenomenology in Educational Qualitative Research: Philosophy as Science of Philosophical Science? *International Journal of Educational Excellence*, 1 (2) 101-110.

Smith, J. 2004. Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. *Qualitative Research in Psychology*, 1(1), 39-54.

UNESCO. 2004. *Early Childhood and Family Policy Series no 9: ECD Policy Development and Implementation in Africa*, British Columbia.

UNESCO, 2007. Strong Foundations Early Child hood Care and Education, UNESCO Paris. Sustainable Development Goals (SDGs), (2012), United Nations.

UNESCO and UNICEF. 2012. *Asia Pacific end of decade notes on Education for all: Early Childhood Care and Education*, Thailand.

Vincent, J., 2015. Writing and reading using pen, paper, keyboard and screen -a cross cultural ex ploration. Presentation at COST Action FP1104 Plenary. Zagreb, 27 March 2015.

Watson, J. M., Mazur, J. M., & Vincent, S. K. 2015. Youth-driven Youth–Adult Partnerships: A Phe nomenological Exploration of Agricultural Education Teachers’ Experiences. *Journal of Agricultural Education*, 56(3), 105–120. <https://doi.org/10.5032/jae.2015.03105>.

Yalew Zeleke. 2011. Practices, challenges, and prospects of the provision of kindergarten: Education attachment with Government program. MA Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Young Lives, 2016. *Early Childhood Development in the SDGs*, Policy Brief 28.



Teacher Educators' Professional Competencies: the Unrecognized Profession in Ethiopia

Alemayehu Teklemariam*

* Department of Special Needs and Inclusive Education, CEBS, AAU

Received: 14 June 2023

Accepted: 24 September 2023

Published: 05 October 2023

ARTICLE INFO.

Key words/phrases:
Competence, Pedagogy, Professionalism, Student teachers, Teacher educator

Abstract

Inadequate transfer of knowledge, skills, attitudes and behaviors from the context of teacher education to the school environment, teaching children is a big concern in this 21st century. To realize this, teacher competence is the most respected part of educational assets. A person to be considered as a member of profession of teaching student teachers has to possess essential qualities and professional competence. Teachers should have personal, social, professional competences and positive attitude towards teaching profession. The present article aims at evaluating and synthesizing teacher educators' professional competencies from various sources. Systematic review method is employed to identify the uncertainty of teacher educators, policy and practice gaps, in Ethiopia. The entire attempt is to relate the synthesis to the Ethiopian context; while reflecting the drawbacks of the Ethiopian teacher education system. Fifty one articles were identified using web searching terms, and qualitative systematic review was employed. Available literature of various years (from year 1959 to 2019) were identified, selected, read, reviewed, analyzed, synthesized, interpreted, discussed and concluded. The available literatures those are focusing on teacher educators were selected. The findings of the reviews show that teacher educators professional competence has been supported by policy and give due attention in the other part of the world, unlike Ethiopia. No one should be a teacher educator without high quality professional competences; and this is achieved when teacher education is independently organized within its own structural set up, to work towards its vision, goals and mission. To create teachers professional competences, there must be high level professionally competent teacher educators in a well-organized teacher education system. High level of teacher educators' competence realizes greater achievement in education; whereas, low level of teachers' competence resulted in poorer education, like we are facing today. Ethiopia really needs teacher education system that meets the demands of Ethiopian people in this 21st century.

1 Introduction

The question of what kind of competences teacher educator need to possess, to enhance the quality of education, should be a question of what kind of teacher education programs we have. Teacher educators are expected to be competent enough in constructing knowledge, skills and positive attitude towards their student teachers, children, their profession, nature, diversities and societal devel-

opments in general. They are also expected to create positive physical and social environments of the schools, which are vital for learner's well-being and holistic development. In return, their students' teachers need to be competent enough in creating high level mental ability of their students; be competent in identifying, assessing and supporting divers needs, and create dynamic and fruitful learning environment. Quality education and training of students teachers can bring tremen-

dous change on children. Teachers play a central role in providing better opportunities to learn to interact, communicate, develop friendship, work together, and assist one another, considering their strengths, difficulties, differences and special needs. Teachers' influence is essential for children's social skills, emotional, cognitive, language, academic, behavioral and psychomotor developments. To play such a very significant role in the lives of students, they must be a graduate of quality teacher education programs; a program that is well organized and led by competent teacher educators. Teacher educators should be the best models for their student teachers, so that the student's teachers in their turn become models in their communication of academic content and in their response to the constantly changing social and emotional needs of all children with divers' needs and potentials. This tell us that the most important and expensive resource in any school, classroom and community are teachers.

Educating student teachers is not simply lecturing like preaching or talking to them; rather, talking with the candidates that help them to learn content knowledge, skills, personality and the didactics; for student teachers to repeat similar things to their young learners. These help teachers to understand learners' needs and learning potentials. These in turn help teachers to predict what the learners can do alone and perform with the support of adults (Vygotsky, 1978). It also helps to develop believes and appropriate expectation of their students. Teachers' beliefs and expectations of their students' potential can also affect their students' actual performance and directions in their development and career. Competencies of teachers can also create positive and welcoming academic environments for all learners. This helps to create citizens with good personalities and intrinsic motivation that may facilitate better learning. Hence, creating well organized teacher education and training program with highly competent teacher educators can yield teachers who have all rounded competencies.

Contrary to this, teachers' professional incompetence may demonstrate negative feelings, by rejecting, discouraging, discomforting, distracting, confusing, silence and indifference to the students' needs, unique potential, activity and experiences

(Rye, 1998). Teachers with professional incompetence may not able to analyze their relationship with their students, understand them and understand the learning environment. They may not keep a close watch on problems; potential problems, special needs, and may not able to apply appropriate knowledge and skill to meet the need of all children in their classroom. Teachers with professional incompetence may demonstrate negative feelings and undesirable communicative interactions with their pupils and may fail to enhance quality education; the education that help students to change their own life and the life of the nation. From the above paragraphs we can understand that there may be two kinds of teacher s in schools: those who transform education on the right track and those who go astray.

There is no policy that helps to exclude the incompetent teachers who are at risk for the development of the nation. With well-organized teacher education programs and the bets teacher educators, we must build teachers who are inspirational figures, motivators, architects, dynamists, and communicators to change, discover, and advance the potential of students to respond to the problems of present-day Ethiopian society. Therefore, the quality of education of student teachers depends on the quality of teacher educators, who are required to have the qualifications and competencies of experts in their fields. Establishing such independent teacher education institute and producing high quality professionally competent teacher educators, requires national policy for appropriate practices.

Having the above challenges in mind, the purpose of this article is to review teacher educators' professional competences from various research findings around the world; synthesize them in relation to the Ethiopian context; while reflecting the drawbacks of the Ethiopian teacher education system. Then, the paper includes, teachers' professional competency, methodological competences and the act of teaching motivational competences, material utilization competences, instructional competences, assessment competences, the practical knowledge, reflection and conclusion.

The main objective of the present desk review article is to discuss teachers' professional competences

based on the following specific basic research questions:

1. What are the major professional competences in teacher education around the world?
2. Why professionally competent teacher educators are important in the development of teacher education?

2 Methods of the Reviews

A systematic review method will be employed in this article. A systematic review is a multifaceted piece of research that aims to identify, select and synthesis all research published on a particular question or topic. Systematic reviews stick to a strict scientific design, based on pre-specified and reproducible methods (Jill *et al*, 2011). According to these authors systematic reviews are useful tool to promote research knowledge that need to put into action, after identifying gaps in knowledge and practices in teacher education. It is particularly valuable as a means of reviewing on a particular question, if there is some uncertainty about the answer; for example, in relation to teacher educator, to provide evidence-based information for policy input, develop practice and support professional development (Mark and Helen, 2006), which is the focus of the present article. Furthermore, systematic review is important when people have uncertainty about the professionalism of teacher educators; because, policies have not been issued in Ethiopia in relation to teacher educator. The practice of teacher educators is unprofessional and the questions who should train teachers are unanswered (Mark and Helen, 2006), particularly in Ethiopia. Systematic review has a scientific framework with a qualitative approach, i.e. interpretative paradigm which is unbiased, has technical procedure, rational and consistent and a transparent process to the reader (Jill *et al*, 2011).

The purpose of this review article is to provide a general description of teacher educators' professional competences and its systems. A systematic review is employed to extract data, evaluate, analyze and report. In the process of extracting data, the first step was identifying key words from my research statements such as teacher educator, teachers' professional competence. Similar and related words,

such as synonyms, broader terms or narrower terms were considered in browsing from online data base. Though there is scarcity of research focusing on teacher educators, the factors influencing the development of teacher educators' may be wide and unmanageable in a short essay like this. Therefore, the article tried to describe only some of the basic concepts and theoretical issues of teacher educators' professional competencies. The findings from various researches were gathered, reviewed in detail, analyzed, synthesized and discussed based on the research questions with bias free knowledge and lived experiences of the writer from the Ethiopian perspective.

Fifty one scientific sources of various cultures were identified, read through, categorized and used to discuss the phenomenon. Sources focusing on teacher educators and students teachers are identified and included. I have tried to collect all possible studies related to a given topic and design, review and analyze their results. Furthermore, I have also tried to avoid old articles, but, since there is serious scarcity of publication on teacher educators, I was forced to use the available primary and second sources. A search of electronic databases and reference lists was carried out. All full text studies published and unpublished between 1959 and 2019 with the aim of investigating teacher educators' professional competence were eligible for inclusion. Based on the identified objective search strategies such as terms and appropriate database such as Academia, ERIC, Google Scholar, Research 4 Life, and, Z-BOOK LIBRARY and PDF DRIVE were utilized. The findings from these literatures were selected, described, interpreted, synthesized, discussed, reported and finally concluded, below.

3 Results and Discussions

3.1 Teacher Educators' Professional Competencies

Fifty one studies were identified following screening and quality appraisal for systematic review of the professional competence of teacher educators. As it is indicated in the methodology part, a systematic review of the present study is an outline of main studies on teacher educators, comprising obvious statement of aims and methods to answer the

aforementioned research questions that have emphasize the why of professionally competent teacher educators and how international experiences are different from the Ethiopians context. In this result and discussion part, definition of teacher educator; effective teaching which consists of teaching mode, teaching methods, classroom competencies, instructional process competencies; competency for inclusion of diversity; assessment competencies; motivational competencies; teachers' practical knowledge competence; teacher's attitude towards their profession; teacher education institutions for development of competencies; personal reflections and conclusion. These result and discussion parts emphasize the importance of professionally competent teacher educators in the development of teacher education and its system, refereeing to the identified references list.

3.2 What does teacher educator mean?

According to research findings, the concept of competence in teaching involves tacit and explicit pedagogical subject knowledge, cognitive and practical skills and dispositions, such as motivation, beliefs, value orientations and emotions (Rychen & Salganik, 2003). Competence means that teachers act professionally and appropriately in a situation (Koster & Dengerink, 2008) and ensures teachers' undertaking of tasks effectively (achieving the desired outcome) and efficiently (optimizing resources and efforts).

Simply put, teacher educator means teachers of teachers in higher education institutions. They engaged in the education of school teachers through pre-service or in-service course teaching. Teacher educators need to be seen as a unique occupational group with distinctive knowledge, skills and understanding about teacher education and its importance for schooling (Swennen and Klink, 2009). According to these authors, in many countries, significant numbers of teacher educators have been teachers in primary and secondary schools. These teachers have cumulative wealth of professional knowledge and expertise acquired through previous teaching experience, unlike the Ethiopian situation. Teacher educators are responsible for teaching, supervising students on school placements, conducting research, providing service to the school and to the university.

Furthermore, they have to be engaged in lifelong learning for high level professional competencies. However, there is no policy or standards that determine the role of teacher educators; it seems that the issues of teacher educators are not give significant place; that is why any persons with content knowledge are preaching and claim to teach.

Teacher competence deals with pedagogical skills, personal skills and professional skills. Pedagogical skills refer to teachers' abilities to understand their learners, construct and implement, assess the development of students' learning potential and understand the learning and teaching process. Personal skills refer to teachers' honorable model personality, and professional skills are a mastery of subject knowledge and methodology of knowledge. Teacher educators professional competence is the ability to function effectively in the tasks considered essential, in learning and teaching with appropriate proficiencies, discipline-specific knowledge-base, technical skills and the ability to solve the type of problems encountered. The general characteristics of the teacher education program facilitate the development of teacher educators and maintenance of professional competence (Kautto-Koivula, 1996) of primary and secondary school teachers. Highly competent educators meet the vision, mission and the goals of teacher education institutions successfully (Willis and Dubin, 1990) through identifying and removing barriers that hinder the development of student teachers, children, institution, and at the end, the quality life of a given society. Teacher educators should be competent enough in pedagogical content knowledge, classroom management, instruction, literate in technology and competent in assessment and intervention. In addition to this, desirable attitudes towards teaching profession is paramount important. Without possessing appropriate professional competencies, significant numbers of people claim to become a teacher educator, in Ethiopia, unlike the experiences of many other countries, as disclosed in this paper.

Teacher education programs need to be strong, to create strong teacher educators, school teachers and strong students. Strong teacher education program mean, sowing a seed on a fertile land, and yield thirty, sixty and from some hundred, from a single

seed, unlike the Ethiopian situation that sowed a seed on barren land, yield few (Fafunwa, 1991). According to some research findings, the potential and quality of manpower for the nation's development, depends on the quality of teacher educators and a well-organized institutions that help to cultivate teachers suitable and interested in the teaching profession, possess the right attitude, dedicated to duty, and professionally qualified (Banjo, 1960; Aderounmu and Ehiametalor, 1985, Pillai, 2001). It is obvious that, if teacher education is poor, all the system of education may be deteriorating, and the quality of life the people become poor. Teacher educators' professional and academic competencies are linked to societal development in many ways. They can make their center of teaching on community development, focuses on changing the life of people, not simply preaching the single content in a static way for decades. This preaching the single content in a static way has been the Ethiopian practice with unsatisfactory success in enhancing quality education.

Since education is the door to emotional, physical, mental, behavioral, economical and socio-cultural development, quality teachers hold the key to the door; teachers are therefore great builders of national development. Professionally competent teacher should be the hubs of our educational system to enhance the quality of the learning and teaching. A school buildings and facilities are important input for learning, no doubt; but, they cannot function without the input of the teachers and as a result, teachers determine the quality of education. Therefore, the nation's educational system at all levels must to a great extent be improved by enhancing the quality of its professional teachers (Fafunwa, 1991). Producing quality teachers require resources, clear philosophical direction which is research based and given sufficient time. The Ethiopian education has missed directions for decades and swinging by individuals in power, like a pendulum, not transformed and move forward. Ethiopia needs, teachers with relevant competencies, exerting a great deal of influences on the positive behavioral formation, fixing values and the process of socialization of the learners placed under their physical, social, mental and emotional care.

Ethiopia has given irrelevant and rudimentary teacher education, before and after the practice of TESO. Of course, TESO had some limitations which were subject to adjustments. Unfortunately, instead of reforming, TESO was sadly closed down, to meet the interest of group of individuals; rather than the nation. TESO was replaced by producing unqualified teachers, who have undesirable attitude towards teaching profession, apathetic for meeting diversity needs. Negligence in installing values, shaping good behavior in enhancing mental abilities of the students and disregarding care for the formation of emotional intelligence were missing. We need teacher educators who are professionally competent and devoted in creating good and hard-working teachers and students, influencing vision, creativity, intelligence, ethics, values and democracy in the school.

Professionally unqualified persons who call themselves 'teachers', because, they simply lecture content in the classroom, cannot bring significant change in their student teachers' and students social, emotional, mental development and economic dynamicity of the nation. Unqualified teacher educators may be an enemy to the teachers and students' progress, a danger to the child's upbringing and to the nations' development as well. The enemies include those who hate the science of pedagogy. For a non-professional teachers to handle any subject in school is a very serious problem; because, teaching a subject concerns the intellectual, moral and emotional phases of the students' life, not simply talk and chalk of the contents. For example, from my observations, some unqualified 'teacher educators', working at teacher colleges in Ethiopia are writing on the board and talking to the blackboard, even not to the students. Some others talk down to the students, but not even with their students. From my three decades observation, and once a leader of teacher education program in the Ministry of Education and a teacher educator for two decades, our teacher education programs could not create highly professionally competent teachers for Ethiopia. This may be why they are not effective in their teaching, not proud of their profession and have not promoted and disrespect their own golden profession.

3.3 Effective Teaching

Effective teaching comprises of modes, methodology, classroom competencies, and instructional processes. Effective teaching connotes the ability on the part of the teacher educator to communicate, reflected in a logical presentation and the transmission of an enthusiasm or teaching with passion. A teacher educator is therefore a person who can communicate with genuine enthusiasm and skilled in teaching modes.

Teaching Mode

Gbamanja (1989) has identified the following four teaching modes and their implication for various patterns of curriculum organization and instruction. Imparting requires professional competence in didactic, heuristic, Philetic and Guristic modes. These are accompanied with lecture method, demonstration method, dramatizing, discussion method and questioning methods for better and effective classroom competencies.

Didactic Mode is the teaching mode that conveys information which is aimed at imparting knowledge and building skills for the students to remember. It allows students to learn concepts, skills, and formulas through texts, lectures, and study guides in classes that require active student involvement. In this mode students practice and master skills introduced in their classes (Eastwood Paideia, 2004). Heuristic Mode involves inquiry and discovery methods, the teacher as a resource person and a facilitator of meaningful learning; learning how to learn. In Philetic Mode, students' feelings or opinions are aroused, holding conference, think critically to understand ideas, solve problems, make decisions, resolve conflicts, and apply knowledge and skills to new situations (Eastwood Paideia, 2004). In Guristic mode teacher tries to explain his or her experience or feelings, as a good interpreter of the future, creating imagination for students, involving reflective thinking.

Teaching Methods

Teaching in schools is not something any person jump into it without knowledge in the teaching and learning methodology. Talking to the students and writing or detecting students cannot be considered

as the best teaching approach. A teacher educator who equipped with methodology can adapt his teaching to effective learning styles of the student teachers; analyze the task to be performed by him/herself and students; begin the process of teaching by creating enthusiasm into the students; understand the diversity needs of the learners in the classroom; perform the task successfully, analyze one's procedures and evaluate the level of the success for further intervention, that bring better achievements of all learners (Gbamanja, 1989).

Achievements here is to mean, the ability to analyze, synthesize, evaluate and create; rather than testing only for facts, that lead learners only to memorize facts. Installing the objective of the lessons for students learn effectively, through doing various activities, or experiment, by inquiry and solving problems. The teachers are expected to guide individual students to reach an intended learning, and how to learn in cooperative learning through solving problems (Gbamanja, 1989). All this requires classroom and instructional competencies.

Classroom Competencies

Teachers are expected to foster the adjustment of students, understand students' special needs, understand basic cognitive and social problems, match curricular offerings to the levels of mental development, make curricular specifications relevant and provide a smooth transition from home to school and from one level of education to another.

Amalah, (1979), identified the following required classroom competencies that teachers need to possess:

- 1. Competence to adjust students to learn:** Teaching in the contemporary world involves the task of assisting students in making worthwhile and satisfying adjustments to school work, social groups, creating the essence of harmony, remove barriers such as friction and frustration is a vital part of making learning meaningful for the child, thereby making him more interested in his schooling.
- 2. Competence to address the Divers needs of children:** Teachers must able to identify the needs of children with special needs and

vulnerable, their meet needs through full participation in education.

3. **Competence to understand student's cognitive and social problems:** Due to a lack of effective early stimulation, students may show weakness in cognitive, social problems and some areas of their learning. Teachers need to have full grasp of the situation and then remediate the child to alter the effects of lack of stimulation.
4. **Competence to matching curricular offering with levels of mental development:** Teachers should consider entering behavior such as the level of mental development; which is the foundation, upon which new knowledge must be built. Teachers need to ensure that teaching suit the developmental level; and children are adequately reinforced to maintain their levels of intelligence of their work.
5. **Competence to make the curricular relevance:** The right type of classroom teacher should be sufficiently knowledgeable about the current question and debate about designing a school curriculum to design lessons and curricula accordingly. Classroom teachers should appraise the curriculum specifications according to how they suit the students they are teaching.
6. **Competence to make smooth transition from home to school:** Research has shown that certain unnatural disruptions of intellectual life occurs when the child's environment changes drastically and his or her experiences are discontinuous. Short lived disruptions may happen to those who join University as well. Teachers are expected intervene in such maladjustments and emotionally support the learners.

Therefore, teacher educators should be competent enough in the above classroom competencies to educate student teachers and become a model that help to enhance quality teacher education.

3.4 Instructional Process Competencies

Instructional competence is doing well in the teaching profession which comprises caring, friendly,

firm, upright and welcoming behavior for her/his students (Banjo, 1960; Fafunwa, 1991; Hegarty, 2000; Wilson, Floden and Ferrini-Mundy, 2002) that help to learn effectively and improve students' academic achievement. Teachers' behavior in the classroom is positively related to students' achievement (Stringfield, 1994). This may include management of the classroom, high expectation, clear goal setting, structuring the content, clarity of presentation, collaborative teaching for students co-operative learning, questioning by means of low and higher order questions, personalized and adaptive instruction, immediate exercise after presentation, and evaluation of whether the goals are obtained by testing, feedback, and corrective instruction (Creemers, 1994). The quality of teacher educator has impacts on student teachers, students and the society as a whole. If quality of teacher educates failed, it fails education of student teachers; and if learners failed to be achieved, social, political and economic development may go astray or education may have little or no impact on the life of the society (Swennen and Klink, 2009). Within such condition we may remain in confusion and move towards the direction of the track of poverty, where quality life is unthinkable, and survival may be in question, as we are observing from the present Ethiopian context.

3.5 Competency for inclusion of Diversity

Unless the teacher educator is equipped with pedagogical science s/he may not able to accommodate the divers learning needs and styles. Through careful preparation and greater flexibility in instructional methods, all students can be appropriately accommodated according to their respective levels of understanding, need and potentials, and can progress at their own pace. Teachers are expected to facilitate the learning environment for all children regardless of their diversities (Beare, Caldwell and Millikan, 1989). Providing remedial materials and approaches for individual students and encouraging can help for the learning task of students and success (Gbamanja, 1989). Teacher educators should be exposed to courses that help them to accommodate learner with divers learning (Reid, Hopkins & Holly 1987), such as psychology, special needs education, sociology of education, philosophy of

education, pedagogical content knowledge, teaching method courses and curriculum development and evaluation... *etc.* From among these, special needs education remains a predominant element in understanding the need, potential and learning style of all learners.

Children with disabilities may include visual, auditory, mental, physical, learning disability, behavioral disorder, autism, multiple disabilities, children at risk, gifted and talented children, *etc.* Significant number of children with disabilities and special needs are in regular schools which may count to be 17.6% (WHO and World Bank, 2011) of the total children in the regular classrooms of general education and higher education institutions. Teaching is preparing the lesson in the way that children can learn: "*If I can't learn the way you teach; teach me the way I learn*" (Unknown source).

3.6 Assessment Competencies

Assessment is defined as the process of obtaining information that is used to make educational decisions about students, to give feedback to the student about his or her progress, strengths, and weaknesses; to judge instructional effectiveness, curricular adequacy, and to inform policy formulators (Sanders *et al.*, 1990). The various assessment techniques according to them include, but are not limited to, formal and informal observation, qualitative analysis of pupil performance and products, paper-and-pencil tests, oral questioning, and analysis of student's records. Students' assessment is an essential part of teaching and good teaching cannot exist without good student's assessment. Students' assessment helps to identifying the strengths and weaknesses of one's own professional capacity and commitment. Teachers' assessment competencies include the knowledge and skills critical to a teacher's role in the instruction process and assessment.

Among many other things dynamic assessment is very important for the development of individual learner. It is an interactive approach to psycho-educational assessment that embeds intervention within the assessment procedure. One purpose of dynamic assessment is to identify the need and potential of the learner and to apply intervention,

accordingly. Assessment need to focus on holistic development of children, including barriers for learning and development. Students cannot promote from grade to grade without assessment. Many teachers in Ethiopia may claim exams must be given and those who passed the exam promoted to the next level. Of course who failed to score below average, should repeat the same grade level. The assessment should not be used for single purposes, promotion. The purposes of assessment in education are to provide feedback, intervene, stabilize learning and enable all learners, regardless of their diversity in the needs, potentials and learning styles.

Furthermore, assessment is see the discrepancies of learners and make all learners learn best, score best and promoted to the next level with knowledge, skills and positive attitudes towards learning, school and development. Teacher educators' high-quality assessment practice is crucial to produce 'reflective practitioners' among student teachers (Schon, 1987). Teacher educators have the responsibility to educate student teachers to be competent teachers, who reflect on their own practices and improve, develop and change constantly. To measure to what extent a student teacher is a competent teacher and to help student teachers to reflect on their own practice and support their development

Teacher educators should educate their student teachers, continuously assess, provide support and promote the children with sufficient knowledge, skills and favorable attitude. Educational testing practices changed from what is referred to as 'the testing culture' such as multiple-choice, to the 'assessment culture'. In teacher education assessment, the crucial role of assessment is preparing student teachers to become flexible and reflective teachers (Gibbs, 1992). Changing from traditional tests to assessments that resemble teaching practice in all possible ways is a major challenge. Assessment should also be used during the learning process as it is for learning. This means that assessment is used to diagnose the current level of competence and to give feedback on this current performance in order to stimulate further development towards becoming a professional teacher (Boud, 1995; Elwood & Klenowski, 2002; Gulikers, Bastiaens, &

Kirschner, 2004).

Assessment results assist teachers in knowing whether the curriculum, teaching and learning experiences, and the practices has been effective. The assessment may not only primarily focus on the learners, the way we do today; instead, focus on the system of education; This may include, the quality of teachers, principals, curriculum, the effectiveness of the learning materials, the suitability of the instructional environment, learning strategies, the support system designed for children with special needs, and methods proposed to achieve the objective at hand (Sanders *et al.*, 1990). Teacher educators should educated student teachers to be skilled in developing diverse assessment methods appropriate for instructional decisions, administering, scoring, interpreting the results and applying for the improvement of learning and development of the individual. Finally, teachers must be well-versed in their own ethical and legal responsibilities in assessment (Sanders *et al.*, 1990).

3.7 Motivational competencies

Motivation is an essential component of teaching. Teachers should have the competence of enhancing intrinsic motivation in the learners that help them to initiate and persist behavior, especially goal directed behavior. Motivation is “... *the process whereby goal-directed activity is instigated and sustained*” (Pintrich and Schunk, 2002:5). Teaching and learning go on well in the school environment and they are being carried out by qualified teachers who can motivate students to learn under diverse conditions (Creemers, 1994). Students who are intrinsically motivated undertake an activity for its own sake, for the enjoyment it provides, the learning it permits, or the feelings of accomplishment it evokes, unlike extrinsically motivated students perform in order to obtain some reward (Lepper, 1988). Teacher educator with professional competence knows how to create relevant and appropriate motivation and how to capitalize on existing intrinsic motivation (Harris & Muijs, 2005; Hardre & Reeve, 2003).

Teachers possessing professional competence can motivate through environmental design, arranging attractive classroom-learning environment in the

ways that promote students' motivation. Teachers, who create warm welcoming and accepting students, promote persistent effort and favorable attitudes toward teaching and learning (Beare, Caldwell, & Millikan, 1989) can motivate the learners. Besides, teachers can motivate students by using instructional strategies which include joyful instruction by being friendly, adding educative humor, fun, exciting stories, happiness in their profession, caring, loving children and their job. These conditions inspire students to respond with interest and motivation (Condry & Chambers, 1978). Creating an environment where learners actively involved in their own learning, such as, cooperative learning and group problem solving exercises; (Niederauer, 1997; Austin *et al.*, 2003), has a power to motivate the learners. Hence, competent professional teacher educators should be equipped with motivation competence.

3.8 Teachers' Practical Knowledge competence

The content of practical knowledge includes the knowledge of subject matter, curriculum, instruction, classroom management, self and the milieu of schooling. Teachers need to have knowledge of the interaction between teacher and students, colleagues, administration and school environment, that developed through school based teacher education. School-based teacher education is based on the assumptions that teacher education should be based on the real problems student teachers need to address in order to do their work in schools and classrooms (Bullough, 1997). Teachers are expected develop lesson planning, implementation skills, classroom management and nurturing professional and personal qualities. Teacher educators should develop skills, attitudes, values and beliefs in the student teachers. Schools are learning places for both student teachers and children, where it should create excitement, engagement, passion, challenge, creativity and joy' (Hargreaves, 1995; Michalak, 2004). Teaching practice provides the student teacher with hands-on experience in schools, it is often the most valued experience by students during their course.

In the classroom teaching practices learning issues and teaching methods should be emphasized. The

learning issues includes creating the learning environment, lessen planning, encouraging students to actively participate and learn independent, assessing learners progress and accommodating diversity in the classroom. Teaching methods includes how teacher organize practical work of the learners, creating cooperative, whole class learning, support, mentoring learners and encouraging problem-based learning assessments. Colleges of teacher education need to work attaching their student teachers to the realities of life, closely work with school practitioners, instead of working from ivory tower.

The school based learning may be greatly enhanced by the utilization available resources in the institutions. Utilizing technologies make learning effective and easier, consume less time and help to search the type of materials they use for their professional development (Brown, Lewis & Harclerode, 1959). Teachers' should be acquainted with the teaching resources and basic equipment, such as ICT and other educational technologies. Fundamentally, educational technology introduces teachers to the evaluation, selection, and use of audiovisual materials and equipment including films, slides, transparencies, projectors, globes, charts, maps, bulletin boards, programmed materials, information retrieval systems, and instructional television. Educational technologies are important not to substitute a teacher with professional competencies, like plasma, but to complement teachers taught and students learning. However, there have been predictions that new teaching and learning technology would replace teachers, textbooks and even schools. This may omit the hidden curriculum that come as result of teachers' emotion and the context he or she is teaching. Of course, Professional Digital Competence (PDC) is crucial in teacher education.

When Ethiopia has little or concern for Professional Digital competence other nations are creating high priority in teacher education (TE) to educate and prepare student teachers to meet the changing demands of new technology in their teaching practice (Livingstone, 2016; McGarr & McDonagh, 2019; UNESCO (2011). They underlines that teacher education should ensure that future teachers can help pupils to develop digital competence. Teacher educators have a substantial responsibility for enabling

educational environments that will help student teachers to develop the sufficiently high levels of professional digital competence considered necessary for teaching in the classroom of tomorrow (Baran, Canbazoglu Bilici, Sari, & Tondeur, 2019). This means teacher educator's level of PDC is important (Jackson & Burch, 2019). Besides all competencies, technology proficiency should be one of focuses of knowledge and skill area for teacher educators (Instefjord and Munthe, 2016). Teacher educators should be digital role models and they are more than just teachers. This means, they teach future teachers, who will then teach pupils in school (Uerz *et al.*, 2018). According to Tondeur *et al.* (2019), teacher educators can be seen as gatekeepers in providing the next generation of teachers with possibilities to develop competences suitable for teaching and learning. They use technology for their own teaching and teach service teachers' professional digital competence (Instefjord and Munthe (2017). Hence, issuing policy that enforces teacher education institutions to integrate digital competence into teacher education and career development of their teacher education system is very crucial. Furthermore, equipping individuals with digital competence for new ways of thinking, ways of working, tools for working and living in the contemporary world cannot be put aside.

3.9 Teacher's Attitude towards their Profession

I personally believe that teachers' personality is the most critical factor in successful teaching. As stated by Cooper (1998:153), "*If teachers have warmth, empathy, sensitivity, enthusiasm, and humor, they are likely to be successful than if they lack these characteristics*". Without these attributes an individual is unlikely to be a good teacher. Cooper (1998:153) believe again that "*Effective teachers are fair, democratic, responsive, understanding, kindly, stimulating, original, alert, attractive, responsible, steady, poised, and confident*". He further described ineffective teacher as "*partial, autocratic, aloof, restricted, harsh, dull, stereotyped, apathetic, unimpressive, evasive, erratic, excitement, and uncertain*". Teacher attitude may be seen from four categories: teachers' attitude towards self, teachers' towards children and relationship between self and

children, towards peers and pupils' and parents, and the teachers' attitude towards the subject matter.

Teacher attitude towards self is an important aspect of teachers' attitude. Unless teachers recognize their own needs and anxieties, they may be unlikely to understand and empathize with their students' needs or expression of anxiety. They may not recognize those students' inability, needs, inattentiveness, impudence, or irritability may be the result of anxiety. Teachers' anxiety may make the students irritable, causing the students in turn to feel and to show similar symptoms. Self-understanding of the teachers may be achieved through teachers' education programs, through the integration of affective domains in the content teaching, through professional courses, such as psychology, methods of teaching, special needs education and the like, through reading books about teachers, classroom observation of model teachers and the like. If teachers achieve this part, their attitude towards children could be caring and positive.

Children are sensitive observers of adult behavior, and they often see, and become preoccupied with, aspects of the teachers' attitude towards them of which the teachers may not be unaware. Teachers' effectiveness may be reduced by this feelings and the result could be strong dislike for particular pupils and obvious fondness for others; biases toward or against particular ethnic group; a bias towards certain kinds of students' behavior, such as docility or inquisitiveness and discomfort in working with children who have disabilities. Hence, teachers' negative attitudes need to be converted into positive direction, before they start teaching children and spoil them with discriminations and biases through effective teachers' education program discussed through out this paper. Generally, teachers need to be genuine, value the learners, and develop empathic understanding that may be achieved through professional teacher education programs. Teachers' attitude towards themselves and toward children may also apply to their attitudes towards peers and parents.

Teachers' attitude towards peers and parents is another important factor need to be discussed. Due to their inappropriate attitude, teachers may have problems with authority. Teacher may also seek

cheap recognition and act negatively towards children and parents. Some other teachers may not tolerate authority, parents and students. Effective teachers, work well with colleagues, and parents to empower children to achieve, show attitudes of acceptance. Such teachers may deal with parents and teachers being genuine, value other persons as worthy in their own right, and show empathy.

3.10 Teacher Education Institutions for Development of Competencies

Teacher education is part of a country's educational system, organized in Universities and Colleges. Teacher Education institution like Kotebe University of Education (KUE) established recently can create teacher identity; bridge the gap between theory and practice, balance between subject studies and pedagogical studies. It can freely contribute to a higher status of teachers' teacher educator and student teachers that help to enhance science and technology for better life of its citizen. Independent and free teachers institute can decide the 'why', the 'what' and the 'how' of teacher education (Lundgren, 1983). Increased freedom is often associated with more accountability. The government may determine the why and what of teacher education. Besides, the government is responsible to establish teacher education institution, fund and demand quality education, and evaluate whether the outcomes have been achieved or not. Teacher education institutions organize the programs within their place, develop and implement curriculum without internal and external influence. Teacher education institutes and teacher educators are responsible to design the curriculum, and develop the strategy of the 'how', the way in which these outcomes can be achieved. Such outcome-based approaches give teacher education institutes and for teacher educators freedom, responsibility and accountable for decisions, organize inputs, processes the implementation and achieve the outcome of the quality of teacher educators in the country. Simply put, responsible to change 'cast-iron into steal', ending the incompetence of teachers in Ethiopia.

Teachers incompetence is the legacy of the near past and trends that Ethiopia has experienced in the history of teacher education. Because of it organizational problems, teacher education in Ethiopia

could not able to bring desirable change, and the Ethiopian education has been deteriorating in quality from year to year. Clear direction has never been in the place to create strong teacher Education program for the nation; except the attempt of Teacher Education System Overhaul (TESO) and the current decision of the government in founding Kotebe University of Education. TESO had been aborted by the Ministry of Education, after few years encouraging development in creating competent high school teachers. Kotebe may work hard to realize the goal of TESO, soon, reforming all the limitations of TESO had. Will Kotebe Education University (KUE) bring significant changing in quality education including teachers' education? How KUE and other Teachers Colleges, escape from the adverse effect of the negative legacy of the past and create teachers with high level professional competency? I expect radial change from KUE; because it is relatively autonomous, not oppressed by insiders, like other Education Colleges under Universities.

Education Colleges, those are under some selected universities are still in chaos. Its organizational structure may not allow creating teachers' professional competency with identified philosophical direction. The present teacher education is organized in four Colleges, with various vision, goal, mission, values and readiness. College of Social Sciences, College of Humanity, Language, Communication and Journalism, and College of Natural and Computational Science, are not established for relevant and appropriate teacher education. Their vision, goal, mission, values and readiness are not the same with philosophy of the right teachers' education and training. They can teach pure content that may be divorced from pedagogical content knowledge. After decline of TESO, students attended three years content knowledge and joined Post Graduate Diploma in Teaching (PGDT), with the assumption that creating strong graduate in content knowledge can be good input for teachers' education; but, how was that program? Were the students successful in the content knowledge? Have they developed positive attitude towards teaching profession? This must be explored through research.

From my personal and other colleagues' observa-

tions, those who joined PGDT after graduating in content knowledge have been observed and most of them were found with serious deficient in content knowledge. Their attitude towards teaching was not also desirable; the majority of them did not like to be teachers. They simply joined teaching profession, because, they do not have other employment opportunities. Furthermore, they joined PGDT with negative attitude; because, the philosophy, vision, mission, and readiness of the institute they got Bachelor degree were not similar to education institutions. In the present organization of teacher education in four colleges, the responsibility and accountability is unclear. If quality failed, one may convey the failure to the other; and if achieved, each may claim, it is because of their quality education and training. In both cases we can see hostility between the colleges. Then, what are the solutions? Professionals in pedagogical sciences have no any single bias on the importance of content knowledge. I strongly believe that content knowledge is important, but should not be divorced from pedagogical sciences, and/or pedagogical content knowledge. Besides content and pedagogical knowledge, professional teachers need to be imaginative, interested, curious, empathetic, friendly and above all hardworking in order to be effective in the classroom.

3.11 Personal reflections and Conclusion

My personal reflections may be observed in all part of this article, here and there, with referenced materials. However, this part is my strong final keynote I want to address. Quality teachers are architects of good education that determines our future. Good education promotes all-rounded development of an individual. Well trained doctors, lawyers, engineers, architects and so on, are results of teachers with high quality education; and the education of teacher depends largely on the system of teacher education programs, including teacher educators.

One of the arguments about teacher education in Ethiopia is found to be on who should be teacher educators. Some believes that any person with strong content knowledge can be a teacher educator. It is true that they may preach in a traditional way, the content of the subject matter. The questions is,

can they create teachers who possess professional competencies in instruction, classroom management, teaching methodology, education technology, motivation skills, interventional skills for children with diversities, assessment skill and have positive attitude towards their profession? It is clear that in Ethiopia, educating qualified teachers those who can teach students for the demands of the societal success in developments has been deteriorating from time to time. There are many reasons for this; but, the major reason could be due to lack of clear policy, regarding organizational structure of teacher education institutions and teacher educators, as distinct professional group. Of course, there is some directive that has been issued insisting teacher educators to go for professional development, such as HDP.

Teacher education is a complex and very demanding profession ever; where highly experienced teachers used to teach at primary or secondary level should involve with their current academic merit. Unfortunately, highly experienced, moderately experienced and newly employed instructors with no experience involve as teacher educator in Ethiopia. Then, how do we expect quality teacher education from these malpractices? Some countries have a policy that allows them to select teacher educators from best teachers of primary and secondary schools, with appropriate procedure of transition from school teacher to teacher educator, with the assumption that they will continue being models for their student teachers as their real experiences and theories are reflected in their teaching practices (Murray & Male, 2005), at lower level.

In Ethiopia teacher educators' identity is not established yet; the gap between theory and practice of teaching is not identified; integrating the content and pedagogy is not appropriately in a place; and the balance between subject studies and pedagogical studies are not clear; because, there is no clear policy that guides these practices. Policy would be in a place to define what and the how of teacher education. The policy would define further, the societal setting in which the teacher education takes place; the organizations' set up and the types of degrees and teachers qualification, including the nomenclature. According to Swennen

and Klink (2009), as part of countries education system, teacher education has its own place within the institutional structure.

Teachers need to be educated and be trained to be academically qualified as well as professionally competent educators; to be able to perform in their post and bring significant changes, primarily, in teacher candidates and then in the life of their students and the generation. Teacher educators are those who integrate academic and professional competencies focusing on what students learn in schools. Content and practical studies need to be integrated by bringing teaching practice and pedagogical theorization closer to each other; rather than, lecturing contents only. This is to help future teachers to independently distinguish the problems in their work and solve those using practical and theoretical methods.

Teacher educators should emphasize research in the teaching student teachers that helps them to integrate and base their teachings on it, or develop evidence based teaching. Qualified teacher educators can integrate pedagogical studies with subject studies in every teaching they carryout. Thus, teacher educators should be well educated and experienced with positive attitude towards teaching professions, to educate teachers for schools. To produces such quality teachers, professionalism and academics must go hand in hand so that there are no discrepancies in the job effectiveness of teachers. For teaching profession to be effectively performed there has to be a balance between academic, professional training and positive attitude towards their students.

The very best teachers do not tie students down; they pull students along; they are visionaries. Unlike being a great scholar in non pedagogical knowledge, being a great teacher requires a passion for his profession. After all, teaching is not just about ideas; it is about engaging hearts and minds in the process of learning. These qualities can create an excellence in students and teachers become memorable among their students and the community. Good teachers inspire students to work harder while poor teachers inspire students to skip class. Quality teachers are those who inspire for students to compete against themselves, and cooperate with others, to take on

tasks that seem to exceed their grasp, to discover and develop their real determination as thinkers. At the same time, the very best teachers also seem to be the ones who never stop learning themselves; they are the folks who never quit reading new books, listening to new voices, or discussing new ideas, whose quest for understanding is never end up and lifelong students.

Professionally competent teachers have a passion in their lives, a deep regard for their students, (love their students) and farsighted. Furthermore, to be effective in the classroom teachers need to be curious, imaginative, empathetic, interesting, friendly and hardworking, thereby creating a learning environment that enhances and strengthens the learning disposition of the students. They also consider, children with special needs and vulnerability, provide support and enrich learning, through organizing meaningful material such as ICT. Professionally competent teachers contribute not only for a given nation, but also contribute knowledge and practices for the whole world, if they graduate from well-established teacher education institutions and highly qualified teacher educators.

Contrary to these, teachers produced in the disorganized and full of chaotic system, cannot produce teacher educators, and in return cannot produce professionally competent school teachers. Teachers without professional competencies are ridiculous and dangerous. Such teachers are not good models of the generation and may not help a nation like Ethiopia to escape from poverty. They give high level pride for themselves, rather than creating pride in their students. They humiliate, rather than proving humility. I would like to then, underscore that if Ethiopia gives priority to produce quality and professionally competent teacher educators and then school teachers, the generation can make Ethiopia today and tomorrow to the better position in the world. If we are able to make the greatest teachers for Ethiopia, our civilization and our quality of life could be dynamic ever, and our poverty will be invisible among our nation, and remain a history. If we consider high level of teacher educators competence a greater achievement in education can be realized; this means low level of teachers competence resulted in poorer education.

Ethiopia really needs teacher education system that meets the demands of Ethiopian people in this 21st century. There should be a policy that certifies teacher educators as an exclusive professional to educate teacher at all levels. The certification can help to improve the quality of teacher educators and protecting the teaching profession from unprofessional practices, which can impair the image of the teaching profession. Furthermore, it also extends to the level of defending the society from unethical and unprofessional educational institutions, which yield poor, unproductive and dangerous teachers.

3.12 Research for Future

Finally, this paper is not without limitation. It doesn't empirically assess the teacher educators' professional competencies and attitudes in Ethiopia. In the future, other researchers may look at the following questions and conduct researches for better understanding of teachers' professional competencies in Ethiopia and its contribution for the nation's development. How many teachers in Ethiopia from kindergarten to tertiary level have favorable attitude towards teaching profession? How many of them possess appropriate professional competencies? Why teachers in Ethiopia didn't contribute to enhance quality education and societal changes in development? Why the Ethiopian educations fail to eradicate poverty and, bring significant social changes? Who decide on the fate and direction of teacher education? What is the best international trend and practices in teacher education programs that brings significant changes? Can such practices be applied to the Ethiopian conditions? What will be the prospects of teacher education program in Ethiopia? Why higher education couldn't significantly contributed to the development of teacher education system and professional competencies? Why the Ethiopian natural resources such as oil is not discovered by Ethiopians and used? Why our education does not contribute for technological inventions? Why we are inefficient in medical provisions? Why educations fail to help us feed ourselves? Why we depend on others? Why teacher education is not given high priority? Why teacher education has been controversial and the agenda are on the tables, ever...etc.?

References

Aderounmu W. O. & Ehiometolor E. T. (1985). *Introduction to Administration of schools in Nigeria*. Ibadan: Evans Brothers.

Amalahia, B. M. (1979). The Teacher in the Classroom. In Ukeje, B. O. (Ed) *Foundations of Education*. Benin-City: Ethiope Publishing.

Austin, H., Dwyer, B. & Freebody, P. (2003). *Schooling the Child: The Making of Student in Classrooms*. London & New York: Routledge Falmer.

Banjo, S. A. (1960). *A West Africa Teachers' Handbook*. London; University of London Press.

Baran, E., Canbazoglu Bilici, S., Sari, A., & Tondeur, J. (2019). Investigating the impact of teacher education strategies on preservice teachers' TPACK. *British Journal of Educational Technology*, 50(1), 357–370.

Beare, H., Caldwell, B. J. & Millikan, R. H. (1989). *Creating an Excellent School: Some New Management Techniques*. London: Routledge.

Boud, D. (1995). Enhancing learning through self-assessment. London: Kogan Page.

Brown, J. W., Lewis, R. B. & Harclerode, F. F. (1959). *A-V Instruction Materials and Methods*. New York: McGraw-Hill Book Company.

Bullough, R.V., Jr. (1997). Practicing theory and theorizing practice in teacher education. In J. Loughran and T. Russell (Eds.). *Teaching about teaching: Purpose, passion and pedagogy in teacher education*, (pp. 13–31). Washington, D.C.: The Falmer Press

Condry, J., & Chambers, J. (1978). Intrinsic Motivation and the Process of Learning. In. Lepper, M.R. and Greene, D. (Eds). *The Hidden Costs of Reward*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cooper, Ryan (1998). Those Who Can, Teach. Boston: Houghton Mifflin Company

Creemers, B. P. M. (1994). *The Effective Classroom*. London: Caseell.

Eastwood Paideia School (2004). *Three Modes of Learning/Teaching*. <http://eastwood.cps-k12.org/home.html>

Fafunwa, A. B. (1991). *History of Education in Nigeria*. Ibadan: NPS Educational Publishers.

Gbamanja P. T. (1989). *Essentials of Curriculum and Instruction. Theory and Practice*. Port Harcourt: Pam Unique Publishing Company.

Gibbs, G. (1992). Improving the quality of student learning. Bristol: Technical and Educational Services.

González, J., & R. Wagenaar (Eds.). (2005). Tuning educational structures in Europe II. Universities' contribution to the Bologna Process. Bilbao: University of Deusto & University of Groningen.

Gulikers, J. T. M., Bastiaens, T. J., & Kirschner, P. A. (2004). A five-dimensional framework for authentic assessment. *Educational Technology Research and Development*, 52(3), 67–85.

Hardré, P. L. & Reeve, J. (2003). A Motivational Model of Rural Students' Intentions to Persist In, Versus Drop Out, of High School, *Journal of Educational Psychology*, Vol. 95, 2, pp. 347–356.

Hargreaves, A. (1995). Teacher development in a postmodern world. Oxford, OH: National Staff Development Council.

Harris, A. & Muijs, D. (2005). *Improving Schools Through Teacher Leadership*. Berkshire: Open University Press.

Hegarty, S. (2000). Teaching as a knowledge-based activity, *Oxford review of education*, Sep. 2000, Vol. 26 Issue 3/4, p 451, 15p, 4 diagrams.

Instefjord, E., & Munthe, E. (2016). Preparing pre-service teachers to integrate technology: An analysis of the emphasis on digital competence in teacher education curricula. *European Journal of Teacher Education*, 39(1), 77–93.

Instefjord, E., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher

education. *Teaching and Teacher Education*, 67, 37–45.

Jackson, A., & Burch, J. (2019). New directions for teacher education: Investigating school/ university partnership in an increasingly school-based context. *Professional Development in Education*, 45(1), 138–150.

Jill, K. Jesson; Lydia, Matheson and Fiona M. Lacey (2011). *Doing Your Literature Review Traditional and Systematic Techniques*. Los Angeles: Sage

Kautto-Koivula, K. (1996). Degree-Oriented Adult Education in the Work Environment. In Ruohotie, P & Grimmett, P. P. (Eds) *Professional Growth and Development: Direction, Delivery and Dilemmas*. Canada and Finland: Career Education Books. Pp. 149–188.

Koster, B., & Dengerink, J. J. (2008). Professional standards for teacher educators: How to deal with complexity, ownership and function. Experiences from the Netherlands, *European Journal of Teacher Education*, 31, 135–149. <https://doi.org/10.1080/02619760802000115>.

Lepper, M. R. (1988). Motivational Considerations in the Study of Instruction. *Cognition and Instruction*, Vol. 5, 4. pp.289–309.

Livingstone, K. (2016). Teacher education's role in educational change. *European Journal of Teacher Education*, 39(1), 1–4.

Mark Petticrew and Helen Roberts (2006): Systematic Reviews in the Social Sciences A PRACTICAL GUIDE. Oxford: BLACKWELL PUBLISHING

McGarr, O., & McDonagh, A. (2019). Digital competence in teacher education. Output 1 of the Erasmus+ funded developing student teachers' digital competence (DICTE) project. <https://dicte.oslomet.no/>

Michalak, J. M. (2004). The priorities of Polish educational policy. Fostering teacher professionalism in schools. Paper presented at ERASMUS Intensive Programme “Education Policy Analysis in a Comparative Perspective” (EPAC), Tolmin, Slovenia, 16th August 2004.

Ministry of Education of Ethiopia (2003). Hand Book of Teacher Education System Overhaul, Unpublished

Murray, J., & Male, T. (2005). Becoming a teacher educator: evidence from the field. *Teaching and Teacher Education*, 21(2), 125–142.

Niederhauser, J. S. (1997). Motivating Learners at the South Korean University. *Forum*. Vol. 35, No. 1. page 8.

Pillai, R. (2001). Teachers must engage in active capacity building. *UNESDOC: Online UNESCO documents*.

Pintrich, P., R. & Schunk, D. H. 2002. Motivation in education: Theory, research and applications (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Rychen, D. S., & Salganik, L. H. (2003). Key competencies for a successful life and a well-functioning society. Göttingen, Germany: Hogrefe & Huber.

Rye, Henning 1998. Habilitation and Rehabilitation in Psycho- social Context. Lecture notes. DSNE. University of Oslo.

Sanders, J. R., Hills, J. R., Nitko, A. J., Merwin, J. C., Trice, C., Dianda, M. & Schneider, J. (1990). *Standards for Teachers Competence in Educational Assessment of Students*. American Federation of Teachers, National Council on Measurement in Education, and National Education Association.

Schon, D. (1987). Educating the reflective practitioner. San Francisco, CA: Jossey-Bass.

Stringfield, S. (1994). The Analysis of Large Databases in School Effectiveness Research. In Reynolds *et al.* *Advances in School Effectiveness research and Practice*. Willington: Elsevier Science.

Swennen, Anja and Klink, Marcel van der (2009). *Becoming a Teacher Educator: Theory and Practice for Teacher Educators*. Amsterdam: Springer

Tondeur, J., Scherer, R., Baran, E., Siddiq, F., Valtonen, T., & Sointu, E. (2019). Teacher educators as gatekeepers: Preparing the next generation of teachers for technology integration in education. *British Journal of Educational Technology*, 50(3), 1189–1209.

Uerz, D., Volman, M., & Kral, M. (2018). Teacher educators' competences in fostering student teachers' proficiency in teaching and learning with technology: An overview of relevant research literature. *Teaching and Teacher Education*, 70, 12–23.

United Nations Educational, Scientific and Cultural Organization (2011). UNESCO ICT competency framework for teachers. <http://unesdocunesco.org/images/0021/002134/213475e.pdf>

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*. Cambridge, MA: Harvard University Press.

Willis, S. L. & Dubin, S.S. (Eds) (1990). *Maintaining Professional Competence*. San Franicsco: Jossey-Bass Publishers.

Wilson, Floden & Ferrini-Mundy (2002). Teacher preparation research: An insider's view from the outside. *Journal of Teacher Education*, 53(3), pp 190–204

World Health Organization and World Bank (2011). World Report on Disability. <https://apps.who.int/iris/handle/10665/44575>, retrieved July 27/2022.



GeoGebra: A Mediating Artifact to Minimize Students' Misconceptions in Learning Function Concepts

Ashebir Sidelil Sebsibe^{1,*} and Neja Muzea Abdella²

¹Department of Mathematics, Wachemo University, Ethiopia

²Worabe Polytechnic College, Ethiopia

Received: 18 June 2023

Accepted: 23 September 2023

Published: 11 October 2023

ARTICLE INFO.

Key words/phrases:

Keywords: GeoGebra software, Misconceptions, Quadratic Function, Perception

Abstract

The quadratic function concept is the most significant but problematic to teach. Thus, it needs further consideration in order to provide the maximum benefit to students. The recently revised EGECAF believes in integrating technology into teaching and learning to cope with 21st-century advancements. GeoGebra is the most important mathematical software that joins two pillars of mathematics representation i.e. geometry and algebra. This study investigated the effect of GeoGebra software on overcoming students' misconceptions and attitudinal change in learning the quadratic function concepts. The study used a quasi-experimental, non-equivalent control group design, and sequential explanatory method to compare performance between grade nine students in two groups. The population for this study consisted of 473 9th-grade students in nine classrooms in two secondary schools of Worabe Town Administration (WTA), Ethiopia. The schools were repeatedly scored low in national examinations. Two samples of sizes $n = 42$ (experimental) and $n = 45$ (control) groups which are intact classrooms drawn randomly from classrooms in the two schools. The study was guided by activity theory and conducted in 2022/23. Pre-test/post-test, questionnaire, and interview were used to collect data. The findings of the study revealed that pre-test scores for both groups were comparable at the outset by determining the baseline knowledge since $T(85) = 0.0135$ and the p -value 0.81077 is greater than 0.05. The result of the post-test indicated that GeoGebra software has an important role in reducing students' misconceptions of concepts in quadratic functions. Besides, students had a positive attitude towards the GeoGebra applet. Moreover, the study showed that the application reduces teachers' and students' efforts on routine and procedural tasks to strategic and conceptual aspects. Hence, the study recommended that mathematics teachers be introduced to the software and experience its effects on themselves and their students. Furthermore, concerned bodies must take the initiative to incorporate GeoGebra software into the curriculum, teacher education programs, and in-service courses for mathematics teachers. This study has potential limitations and suggests comprehensive studies using other mathematics topics, far larger randomized sample sizes, at different schools of different composition and socio-economic status, which reflect the entire zone, region, or country level.

1 Introduction

One of the crucial challenges in Ethiopia is the poor performance of students in general and mathematics in particular (Sebsibe *et al.*, 2023) for various reasons such as misconception during instruction

delivery, the negative attitude of students towards mathematics, ineffective teaching strategies, and less practical aspects of the lessons (Walelign, 2014). Information about students' prior knowledge and the cognitive features that come along

©2023 Dilla University.

* Corresponding author; Email: ashebir145@gmail.com

Article DOI:10.20372/dje.v02i02.03

with it can assist us in knowing students more easily and provide an opportunity to design appropriate interventions. The literature revealed different definitions of the term “misconception”. Identifying and minimizing misconceptions made by students about mathematical concepts is important. Students’ misconceptions and attitudes are basic concerns of this study.

According to Murray *et al.* (1990), misconception can be observed at every age and educational level. It is a perception or conception that is incompatible with the opinion commonly agreed on by experts on a particular subject. For Michael (2002), a misconception occurs when there is an inconsistency between the concept that we want students to construct and the mental model that they build in their minds. According to Smith *et al.* (1994), a misconception is a student’s conception that results from a systematic pattern of errors observed in their performance. In other words, a misconception is information that contradicts currently accepted scientific theories (Clement, 1993).

Research shows that interactive learning plays a prominent role in students’ understanding of concepts. For instance, Aslam and Kingdon (2011) posits that teachers’ classroom practices and the teaching process, such as students’ participation, matter a lot in students’ learning. The literatures, (for instance, Elia *et al.*, 2007; Federal Democratic Republic of Ethiopia Ministry of Education, 2020; Melissa *et al.*, 2023; Misini & Kabashi, 2021; Övez, 2018) show that the integration of technological tools like GeoGebra has the potential to improve the effectiveness of the teaching and learning of mathematics in general and the quadratic function concept in particular (Melissa *et al.*, 2023; Misini & Kabashi, 2021; Övez, 2018). Though the recently revised Ethiopia General Education Curriculum Framework (EGECF) believes in integrating technology into teaching and learning to cope with 21st-century advancements (Federal Democratic Republic of Ethiopia Ministry of Education, 2020), its implementation has been slow (Sebsibe *et al.*, 2023). In this respect, this study intends to contribute towards narrowing the perceived gap in the existing literature by providing some insights into learning using GeoGebra to improve miscon-

ceptions in mathematics in general and quadratic function in particular in the context of secondary schools in Ethiopia.

One of the fundamental and core ideas in mathematics is the idea of a function. It emerges from the urge of humans to uncover patterns among quantities, which is as ancient as mathematics (Elia *et al.*, 2007; Gagatsis & Shiakalli, 2004). Any student who wants to better comprehend calculus and pave the way for progression in scientists, engineers, and mathematicians must have a firm grasp of the function notion (Carlson & Oehrtman, 2005). Likewise, understanding the graph of the quadratic function is very important for students because it is a fundamental subject before students work with functions with higher degrees and more complex polynomial functions (Septian *et al.*, 2020; Suzanne *et al.*, 2015). Summarizing students’ difficulties in learning concepts in function Övez (2018, p.3) mentioned that “solving and interpreting the graphic due to accepting the function’s graphic as a fixed object” is among the misconceptions that students form in function. Besides, the quadratic functions concept is the most problematic to teach (Övez, 2018). Therefore, the concept needs to be discussed further so that students’ best benefit from it.

According to Gebremeskel *et al.* (2018), negative attitudes toward mathematics and misconceptions in instruction is one of the reasons, among many different factors, for the poor performance of students in mathematics nowadays in Ethiopia. It is widely recognized that the traditional approach to teaching mathematics is not effective in reducing difficulties and misconceptions. Besides, in every discipline, concepts are the basis for further learning and development of a subject. This is especially true with mathematics, which is by its very nature highly sequential. If prerequisite concepts are not established clearly, understanding the following concepts is unlikely. As mentioned above, the function concept is a base for discussing and applying many advanced concepts in mathematics. Thus, designing a preventive strategy to overcome observed difficulties and improve students’ attitudes toward mathematics is important.

This study is part of subsequent studies aimed to

design an instructional approach that is supposed to enhance students' understanding of concepts in mathematics. At this stage, it is intended to examine the effect of GeoGebra-supported instruction compared to the traditional instruction on students' misconceptions and attitudes toward learning the quadratic function concept.

In line with this, the study addressed the following three specific research questions:

1. to what extent does Geogebra-supported instruction enhance students' capability to sketch Quadratic functions graphs?
2. to what extent does GeoGebra-supported instruction enhance students' abilities to identify the influence of coefficients and the constant on the shape of quadratic function graphs?
3. does applying GeoGebra software in teaching and learning quadratic functions develop a positive attitude in students?

Improving mathematics results in secondary schools in Ethiopia is a contemporary problem to which practical solutions are yet to be found. This study has sought to contribute in this regard by exploring alternative teaching and learning methods, especially for topics traditionally regarded as problematic to both teachers and students, such as functions and their graphs.

Theoretical Framework

Central to this study is how learners use artifacts, particularly virtual manipulative in the form of interactive, dynamic GeoGebra applets, to enhance their understanding of certain mathematical concepts i.e. in the study of quadratic functions. The Activity Theory underpins this study because computers potentially impact or mediate learning.

The Activity Theory: The activity theory states that an activity consists of a subject and an object, which are connected through a tool. The subject is a learner or learner engaged in the activity, and the subject holds the object and serves to motivate and direct the activity (Albusaidi, 2019). Culture, thought patterns, and language are only a few examples of the various material and mental instruments that can be used in mediation (Albusaidi, 2019). Figure 1 displays the interplay between a subject (human agent) and an object as mediated by tools or signs called Vygotsk's triangular model of a complex, mediated act (Mudaly & Uddin, 2016).

Using the activity theory, analysis, according to Leont and Laureate (1978, p. 37), considers three levels:

- assessing the activity and determining its purpose,
- analyzing the action and its aim, and
- studying the operation and its circumstances.

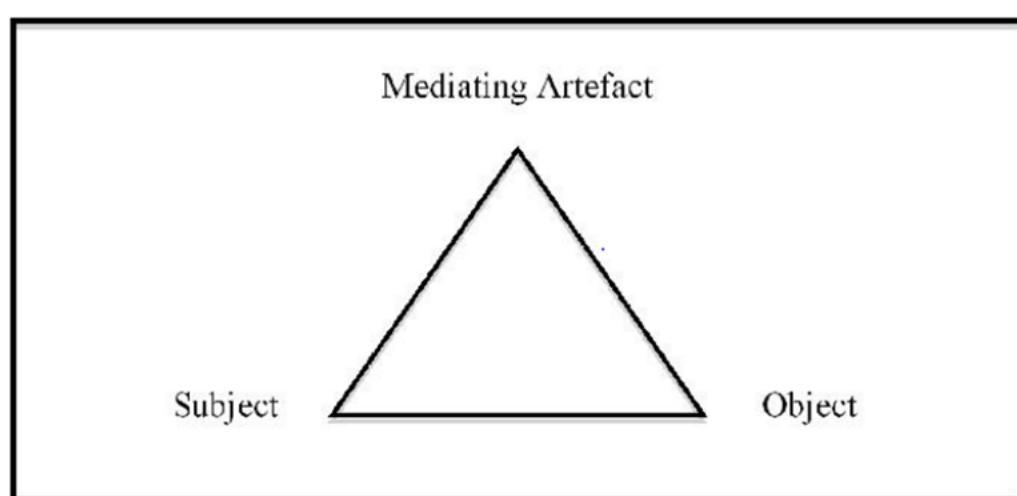


Figure 1: The interplay between a subject and an object as mediated by tools or signs

These are then combined into the actions the students will carry out to achieve a goal or perform better in courses.

During learning using tools like GeoGebra, the activity involves operating procedures on the computer screen including dragging sliders to manipulate the applets to visualize the outcome of a certain variable slide. Dragging the sliders achieves the purpose of comprehending how the function transforms as a result of changes to the function variable(s), resulting in a visual interaction with previously abstract notions. Conditions refer to the computer-driven environment in which this activity is conducted and how students use these applets to learn, explore, confirm, challenge, prove, and draw conclusions (Albusaidi, 2019).

The usual classroom system is described as the student, teacher, and subject matter interaction triangular model. Here the role of the teacher is a mediator of students' understanding of the subject matter. For teaching involving interventions like the present one, Vygotsky's Zone of Proximal Development (ZPD) enhances learning in collaboration with the teacher as facilitator, and fellow students as peers. The integration of GeoGebra as a scaffolding tool during teaching and learning does not substitute the teachers. Still, teachers must be aware of their students' cognitive demands and provide assistance and support in following those needs. The support can be delivered by the classroom instructor or a more capable individual (Guseva & Solomonovich, 2017; Siyepu, 2013). This collaborative social interaction benefits both higher and lower-ability students. To do this, they must complete certain tasks without entirely depending on their teachers but aim to attain a certain objective. According to Tinungki (2019, p. 134), students use their prior knowledge to carry out the task without guidance. Hence, the application of the activity theory in a GeoGebra integrated instruction (Mudaly & Uddin, 2016, p. 199) suggests rules, community, and division of labour in addition to the subject, object, and tool as a structure of an activity system.

While the following are explanations for each component of the system figure 2 displays the structure of the activity theory which is the interaction between components of GeoGebra integrated instruc-

tion.

- the subject stands for the individual(s) whose perspective is taken in the analysis of the activity. To do so, their prior knowledge of functions (definition, basic operations, and properties i.e. the change in behavior concerning change in some parameters) and computer manipulation skills are required.
- the object (or the objective) is the intended goal of the activity within the system. Visualising the effects of a variable change to the functions in different forms and drawing generalizations to a function given a standard form is expected.
- tools are internal or external mediating artifacts that help to achieve the outcomes of the activity. Engagement with GeoGebra applets to enhance understanding of the concepts will be performed.
- the community comprises one or more people who share the objective with the subject. Learners with different abilities and interests and the teachers are the main communities of this practice.
- rules refer to house rules, norms, and agreements implicitly or explicitly agreed upon that constrain actions and interactions within the activity system. The evaluation criteria, expectations of the teacher, the teacher house rule, rules of the school, and discipline of the computer lab are included.
- division of labor discusses how tasks are divided horizontally between classroom community members and refers to any vertical division of power and status. The roles and responsibilities of students (especially in their group work) and teachers, cooperation among teachers, and the support of the lab assistant are all included (Mudaly & Uddin, 2016).
- Outcome: conceptualization of transformation of functions. The reflection of the use of virtual manipulation in the teaching-learning process for the learning of students and instruction.

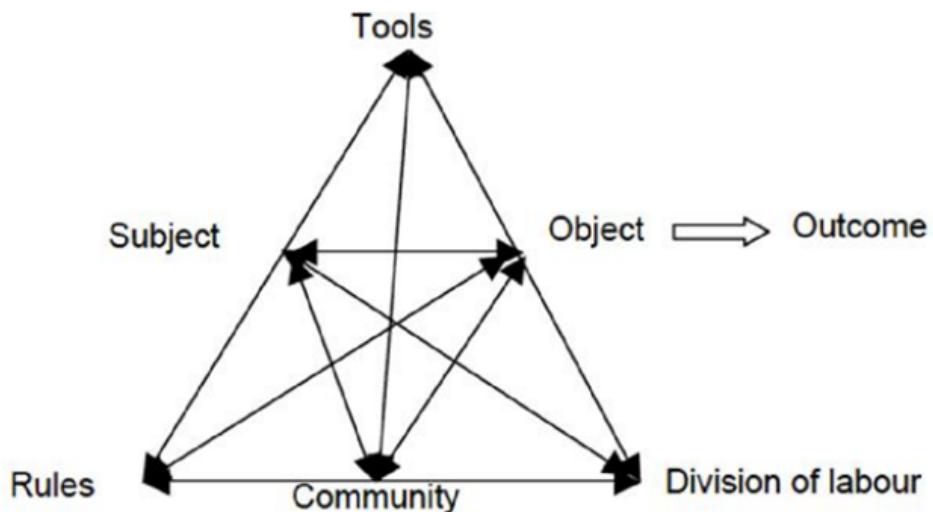


Figure 2: The Structure of the activity theory

Overview of the GeoGebra software

GeoGebra was designed by Markus Hohenwarter (Hohenwarter & Jones, 2007; Zengin *et al.*, 2012) as open-source dynamic mathematics software that incorporates geometry, algebra, and calculus into a single, open-source, and user-friendly package. GeoGebra's interface provides two presentations of each mathematical object, one in its graphic (geometry) window and the other in its algebra window, hence the name GeoGebra. GeoGebra. It is accessible in multiple forms: its desktop applications for Windows, Mac OS, and Linux, its tablet applications for Android (smartphone), iPad, and Windows, and its can be used either online or offline (Majerek, 2014).

GeoGebra has many possibilities to help students experience intuitive feelings and visualize adequate mathematical processes. Students can connect symbolic and visual representations using the tools provided by this software, allowing them to explore a wider range of function types (Diković, 2009). A change of an object in one of these windows will immediately result in a change in the other window thus increasing the learner's ability to recognize significant cognitive relationships. It is recognized

as a tool that raises students' performance and critical thinking as it involves experimental and guided discovery learning (Övez, 2018). Besides, students grow positive attitudes toward learning as it makes the teaching and learning process more conducive (Dockendorff & Solar, 2018; Övez, 2018).

The software provides a geometry window or working area, a toolbar, an algebra window, an input field, a menu bar, and a navigation bar. Although GeoGebra best provides a platform for the teaching of geometry, it offers equally well features for the teaching of algebra particularly in functions and graphs. Functions can be defined algebraically and then changed dynamically. For instance, by entering the equation, the resultant graph is immediately produced in the geometry area, and the corresponding algebraic component of the graph appears simultaneously in the algebra window. In this study, we use the GeoGebra applet to work with activities in quadratic functions. Figure 3 is a screenshot showing the GeoGebra window that connects algebra and geometry. As shown in the figure, simply by typing a single quadratic function of the form $f(x) = ax^2 + bx + c$ or $y = ax^2 + bx + c$ in the input area, one can see both algebraic, to the left side, and the graph, to the right side.

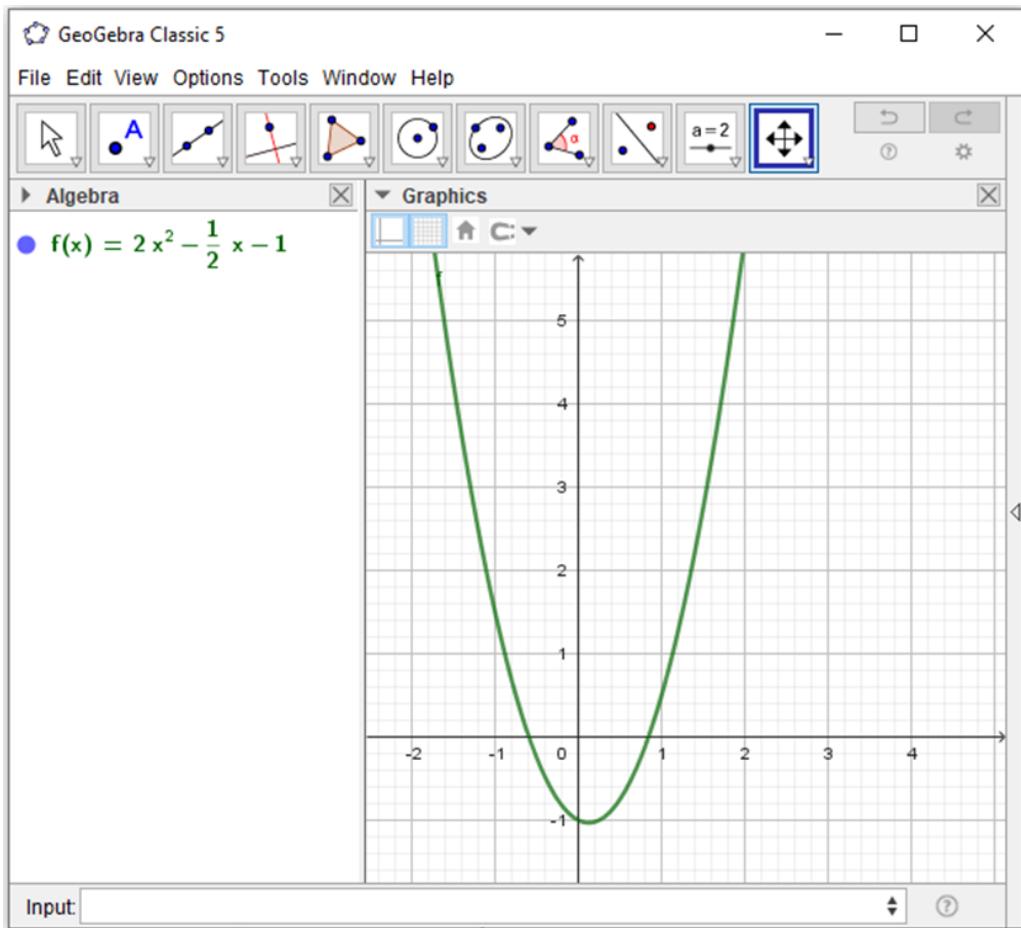


Figure 3: Screenshot from a GeoGebra window

The benefits of GeoGebra, include its ability to quickly and accurately illustrate geometry, to represent multiple functions with different colors or font sizes, and to provide animation and movement features that assist in visualizing the effect of change in parameters on the behavior of the function. For instance, what is the effect of changing the sign of a in $y = ax^2 + bx + c$? This study focused on the effect of using this software on students' ability to overcome misconceptions and enhancing attitude toward learning.

2 Method and Materials

The sequential explanatory and quasi-experimental methods of non-equivalent comparison group design were employed to address research questions. The study was conducted in Worabe Town Administration (WTA) in the Silte Zone, part of a regional state in Ethiopia. Among four schools in the Town administration, two schools that repeatedly scored

low in national examinations as compared to other schools in the Zone were used. Hence, the population for this study was all Grade 9 students in the two schools which consisted of 473 (210 male and 263 female) grade 9 students. Poor performance is usually due to making errors during examination and errors are mostly due to misconceptions in the subject matter which is why the researcher focuses on purposely poor performance as criteria to select samples. A sample of two intact classroom 9th grade students one from each school were randomly selected with a total of 87 students, which constitute around 18.4% of the population. One group ($N=42$) was assigned to be the experimental group and the other ($N=45$) was assigned to be the control group. The study was conducted in the 2022/2023 academic calendar.

This study mainly used quantitative data through pre/post-tests to compare the performance of the two groups and a questionnaire for attitudinal at-

tributes for the experimental group. Interviewed was also used to supplement and triangulate quantitative data. The pre-test was based on basic concepts of function in general. It was assumed that all learners were used their experience of mathematics content on a function to answer the pre-test. To compensate for the non-random assignment of students to the control and experimental classes, the pre-test was used to determine if the classes were comparable at the outset by determining the baseline knowledge or preparedness for learning the topic of quadratic function. It comprised of 18 multiple-choice questions covering basic function concepts from the grade 9 mathematics syllabus. The post-test comprised a total of 16 items of mixed type (all of which had their scoring key written at the end of the instruction) items which involved multiple choices, matching, essay, and procedural items developed by the researchers from National examination booklets of previous years, grade 9 mathematics syllabuses, textbook and minimum

learning competency, the literature, and model examinations of one of the special board secondary school at WTA.

The question papers were given to five experienced mathematics teachers and two curriculum experts to criticize and comment on the items. Besides, a pilot study ($N = 40$), was carried out at a remaining school to check the reliability and validity of the research instruments, and statistical viability. Based on the expert validation and the pilot test result the initially designed 25-item pre-test was reduced to 18 items after detecting the deficits that need modification and rejecting items that have unacceptable levels of difficulty (item difficulty index 95% and 5% respectively). The same procedure was applied for the post-test pilot but no item was rejected except modifications in three items' distractors which had poor discrimination power. Table 1 is a summary of the post-test items in themes based on the objective of the topics in the textbook.

Table 1: Post-test items into themes

Theme	Expected Outcome	Items addressing the theme
1	Interpret and use the vertex form of a quadratic function	1, 3, 4, 6, 8, 12, 13, & 14
2	Interpret and use the standard form of a quadratic function	2, 7, 9.1, 9.2, 15, 16.2.1, 16.2.2, 16.2.3, & 16.2.4
3	Interpret and use the graph of a quadratic function	3, 4, 7, 10.1, 10.2, 10.3, 10.4, 11.1, 11.2, 11.3, & 11.4
4	Applying the shifting rules to graph quadratic functions	5, 8, 16.1.1, 16.1.2, 16.1.3, 16.2.1, & 16.2.2

The questionnaire was used to analyze student's perception and motivation towards GeoGebra software in teaching mathematics. It is perception attributes based on five-point Likert scales (Strongly agree, Agree, Undecided, Disagree, and strongly disagree). The questionnaire items designed by the researchers focused on only motivation and perception attributes relevant to teaching and learning process i.e. participation during lesson delivery, concentration during lesson delivery, enjoyment of class activities, self-confidence, content mastery, and recommendation or preference of the teaching/learning method (adapted from Praveen & Leong (2013)). The interview items were designed after carefully scrutinized and discussed between the researchers. The interviews were conducted on a face-to-face basis and the responses of the interviewee were recorded and taken as a note.

The experimental group was instructed using GeoGebra-supported instruction in the school's computer laboratory, and the control group was instructed using the traditional method. Before the actual administration of research instruments and data collection, researchers visited the sampled schools to check the ICT infrastructure and suitability for the research and verbally communicated and explained the purpose of the study and minimized the Hawthorne effect. After consensus and classes had been arranged well for the research purpose, the pre-test was administered for both groups. Then the delivery of instruction continued with the aid of an overhead projector and after having had two days of introduction about the Geogebra software utilization for the experimental group. Two weeks of instruction (10 days) was given by the second researcher for both groups. While both instructions

are based on the content of the textbook, the difference is the method of working activities. In the experiment, the teacher uses a projector to guide on how to perform the tasks using the GeoGebra, while for the control group uses the conventional approach.

After two weeks of instruction, the post-test was administered to both groups. The questionnaire was also administered to the experimental group following the post-test. After carefully scrutinizing the post-test, six participants from the experimental group who scored high, medium, and low were interviewed to supplement and triangulate quantitative data.

The reliability of the pre-test and post-test was established using data from the pilot study. Two reliability tests were computed, the Kuder-Richardson 20 (KR20) for the pre-test and Cronbach's Spearman-Brown formula for the post-test. Accordingly, the reliability value was found 0.83 and 0.74 for the pre-test and post-test respectively which was acceptable (Gay *et al.*, 2011). The reliability and validity of the questionnaire were verified by experts' comments including readability, feasibility, layout, style, and clarity of wording.

The data was jointly analyzed using descriptive statistics (mean, percentage frequency counts) and inferential statistics (independent *t*-test) methods. It was checked whether there was a significant effect

on the students' misconceptions in the two groups. The statistical package for social sciences (SPSS 20) was used for the inferential analysis of the data.

In the study, the researchers attempted to fulfill all acceptable requirements about safeguarding and protecting the rights of all concerned. The researcher did this by requesting permission from the Zone Education Department and respective school principals through letters. The students were also fully aware of their involvement in the study and informed of their rights as participants. The participants' response was coded and their identity was not revealed in the study report.

3 Result

3.1 Baseline equivalency check

After checking the normality of the distribution in the pre-test, an independent *t*-test was computed and showed that there were no statistically significant differences between the experimental group and the control group in studying linear functions because the *p*-value 0.811 is greater than 0.05 indicating that the two groups were of comparable/similar ability in prerequisite knowledge before treatment; as such, any differences in studying quadratic function after treatment could be attributed to the treatment. Figure 4 shows the normality curve of the pre-test result for the two groups.

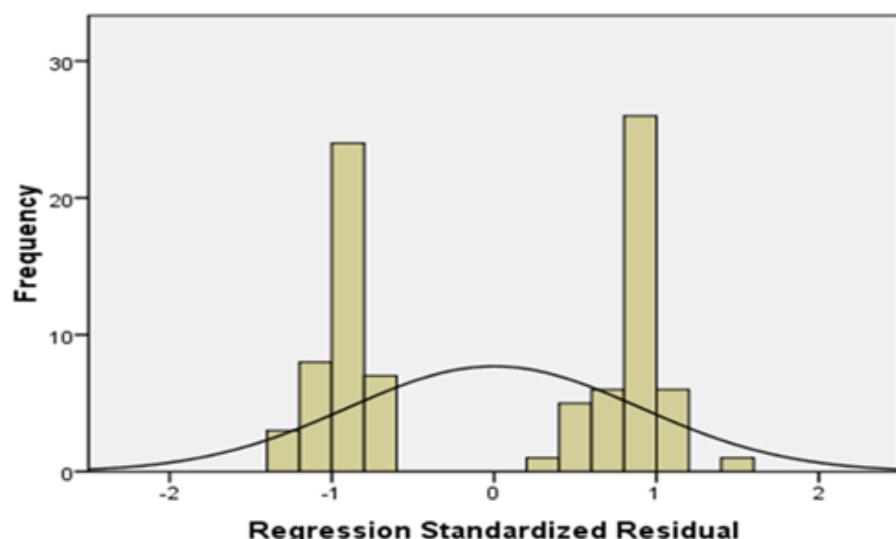


Figure 4: Normality curve of pre-test

3.2 Post-test results

Students Misconceptions

Scores in theme 1: Interpret and use the vertex form of a quadratic function

Table 2: Mean score of students for items in theme one

Theme one item numbers	Respondents Type							
	Control Group (N = 45)				Experimental Group (N = 42)			
	Count	%	Count	%	Count	%	Count	%
1	14	31.11	31	68.89	4	9.53	38	90.47
3	20	44.44	25	55.56	5	11.90	37	88.1
4	22	48.89	23	51.11	2	4.76	42	95.24
6	15	33.33	30	66.67	1	7.14	42	92.86
8	23	55.56	22	44.44	5	11.90	37	88.1
12	14	31.11	31	68.89	12	28.57	30	71.43
13	15	33.33	30	66.67	9	21.43	33	78.57
14	21	46.67	22	53.33	14	33.33	31	66.67
Aggregated mean	40.555				59.445			

As portrayed in Table 2, for the items in this theme, the mean of correct respondents in the control group is 59.44%, and in the experimental group, it is 83.93%. The researchers examined in detail why this had happened while scoring the papers. Figure 5 shows scanned images of some of the students' work.

In Item 1 students were asked to find the vertex of the parabola $f(x) = 9(x + 3)^2 - 10$, and some stu-

dents responded as $(-3, 10)$ and $(3, 10)$, thinking that if the value of x in the bracket (-3) changed, the sign so does the value outside bracket (10) . Similarly in question number three, students were asked about the minimum/maximum value of the graph of the function $y = 5(x - 3)^2 - 2$. Some students think if the value before the bracket in the vertex form equation of quadratic function is positive, then it would have maximum and if negative, then minimum.

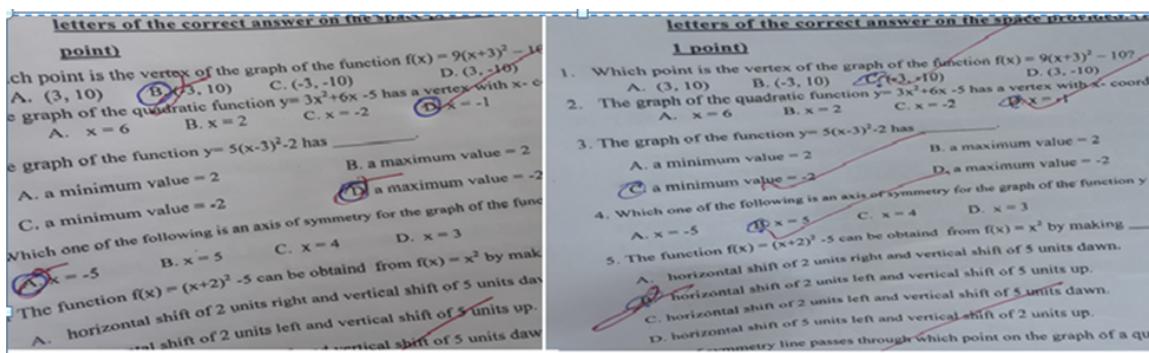


Figure 5: Scanned image of the students' works for items in theme one

To triangulate this issue, after arranging the scores in descending order, some of the respondents' six students (three from each group) were interviewed. Interviewees responded, "Have you missed or got

it right items in theme one? Why or why not?"

Interviewees CG22, CG38, CG44, EG19, EG27 and EG33 (Where Letters CG and EG followed by

the numbers are codes for respondents from the control and the experimental group respectively) replied as follows:

CG22: “*Teacher, I missed most of the items related to vertex. I made my mistakes immediately while we discussed them with classmates after completing the exam. Wrongly I perceived as if it would have been taken opposite of the values in vertex form of equation of quadratic function to find vertex, vertical and horizontal shifts*”. March, 27/2023.

CG38: “*I missed the items you asked, I understood well after the exam referring to my notes and worksheet solutions. In the equation $a(x + b)^2 + c$ which is a vertex form equation, I have taken the signs directly without changing the sign of 'b' as $(-b, c)$ to find the vertex due to this I also missed the direction shifting. In question three $(5(x - 3)^2 - 2)$ since 5 is positive I assume it has maximum and if negative it has minimum*”. March, 27/2023.

EG19: “*I missed some of the questions because I did not attend 2 classes due to a social problem. But I tried to understand the missed portion from one of my classmates I don't know how I missed*”. March, 28/2023

CG44: “*Oh, teacher; I missed items especially concerning vertex, vertical and horizontal shifts, and maximum and minimum values of a parabola in such a way that if b and c in the vertex formula are positive then the parabola shifts horizontally to positive x-direction and vertically to positive y-direction respectively and vice versa and the vertex taking directly as (b, c) considering the sign of 'b' and 'c' as it is*”. March, 27/2023

EG27: “*I answered all the questions except item 14 because GeoGebra software helped me to visualize how the parabola shifts left or right and up or down by moving the slider so I was easily able to connect to the vertex*

formula. But failed to explain the axis of symmetry correctly”. March, 28/2023

EG33: “*Yes, I have answered all the questions, and no trouble was encountered in tackling the questions because the software was very helpful in understanding concepts in graphing quadratic functions. All the exercises and the worksheet questions helped me to exercise the Geeogebra well so that my exam result was also very good*”. March, 28/2023.

From the above interview data in the control group, one can see students' misconceptions occurred due to overgeneralizations. As a result, the aggregated percentage of respondents in the control group for items in theme one is 59.44% whereas for the experimental group is 83.93 % indicating the intervention fevers the experimental group to reduce students' misconceptions. In general, in this part of the questionnaire items, the following misconceptions were observed: overgeneralization, exchanging the sign of the turning points, and failing to identify the terms “at what value of x have minimum/maximum” and “what is the minimum/maximum value”.

Concerning this and as misconception had an inverse relation to the achievement of students the mean score and test of significance as measured in the T-test of items in theme one prevailed that among eight items five items namely 1, 3, 4, 6, and 8 are statistical ($p = 0.008 < 0.05$). Whereas the remaining items 12, 13, and 14 were not statistical since $p = 0.65 > 0.05$ indicating that the two groups have similar understanding in writing vertex form equations of quadratic function, identifying the parameter responsible for shifting the graph of quadratic function vertically up or down and defining the axis of symmetry of a parabola.

Students Score in Theme 2: Interpret and Use the Standard Form of a Quadratic Function

Table 3 shows the cross-tabulation of students' scores of items in the second theme. There were nine items to gauge this theme (items number 2, 7, 9.1, 9.2, 15, 16.2.1, 16.2.2, 16.2.3 & 16.2.4.).

Table 3: Mean score of students for items in theme two

Theme two item numbers	Respondents Type							
	Control Group(N = 45)				Experimental Group(N = 42)			
	Missed the item		Answered the item correctly		Missed the item		Answered the item correctly	
	Count	%	Count	%	Count	%	Count	%
2	15	33.33	30	66.67	5	11.90	37	88.10
7	22	44.89	23	51.11	10	23.81	32	76.19
9.1	19	42.70	26	53.30	9	21.43	33	78.57
9.2	19	42.70	26	53.30	7	16.67	35	83.33
15	9	20	36	80	1	2.38	41	97.62
16.2.1	9	20	36	80	5	11.90	37	88.10
16.2.2	11	24.44	34	75.56	1	2.38	41	97.62
16.2.3	8	17.78	37	82.22	2	4.76	40	95.24
16.2.4	14	31.11	31	68.89	1	2.38	41	97.62
Aggregate mean	30.77		69.23		10.84		89.16	

As portrayed in Table 3, the overall mean percentage of 69.23% from the control group and 89.16% from the experimental group answered theme two items correctly and the experimental group surpassed the control group. But some students from the control group (33.33%, 44.89%, 42.70%, 42.70%, and 31.11%) missed items 2, 7, 9.1, 9.2, & 16.2.4 as compared to the experimental group (11.90%, 23.81%, 21.43%, 16.67%, 2.38 %,) respectively.

The same interview questions were posted for participants from both groups “Have you missed or got it right items of theme two? Why or why not?” Their responses were stated as follows:

CG22: “I missed most of the items for example items 2, 7, 9.1, and 9.2 I made a mistake while converting the general form of the quadratic equation to vertex form to answer domain, rang, maximum height, time taken to reach maximum height, and x-coordinate of the vertex. In Item 15 I correctly answered the upward and downward effect of ‘a’ but interchangeably answered other effects of a—for +a bulged parabola for ‘-a’ narrow parabola”. March, 27/2023.

CG38: “When I attempt 16.2.2 I correctly sketch $f(x) = -x^2$ but missed all the sub-questions of $g(x) = -x^2 - 2x + 3$ except the domain because I did not correctly convert to vertex form”. March, 27/2023.

EG19: “I answered most of the items but in item

16.2.2 the misplaced negative sign to convert vertex form due to this I misplaced the parabola horizontally. I usually left without doing word problem type questions in linear function but now I easily answered items 9.1 and 9.2 because the software helped me to connect the idea graphically while we were doing similar exercises”. March, 28/2023.

CG44: “Sorry, teacher; I missed all the items except the items that request the domain and upward and downward opening effect of ‘a’ of a parabola”. March, 27/2023.

EG27: “I answered all the questions because GeoGebra software helped me to visualize both effects of ‘a’ easily by moving slider ‘a’ how the parabola opens down or opens up, how to compute the maximum height of a parabolic type graph and flight time. Furthermore, how the axis of symmetry of a parabola passes through vertex in animation form and different colors”. March, 28/2023.

EG33: “Thank you, teacher, I am satisfied with my score I have answered all the questions. The software helped me to memorize easily what we had learned in class because it provided an opportunity to correct my work and to visualize the effects of parameters a, b, and c while sketching the parabola by moving

the slider and easily comprehending how maximum value of a parabola linked to real life situation". March, 28/2023.

From the above interviewees' data, one can see misconceptions of students in the control group in two areas, the first one is the effect of 'a' in vertex form of the equation of a parabola *i.e.* $a(x+b)^2+c$ some students in the control group think that if a is positive the parabola open outward and if negative narrowed. The second misconception was in converting the general form equation of parabola to vertex form equation but this was not observed in the experimental group because only one student missed this item. This variation is nothing but attributed to the intervention using the GeoGebra applet.

To check the test of significance independent T-test was computed. Among nine items seven items

namely 2, 7, 9.1, 9.2 15, 16.2.2, and 16.2.4 are statistical for $p = 0.0055 < 0.05$. Whereas the remaining two items were not statistical since $p = 0.5685 > 0.05$.

Students' Overall Score in Theme 3: Interpret and Use the Graph of a Quadratic Function

Eleven questions measured students' performance related to this learning theme and compared their scores in both groups. The items were number 3, 4, 7, 10.1, 10.2, 10.3, 10.4, 11.1, 11.2, 11.3 and 11.4. Table 4 depicts students' score statistics.

As portrayed in the table a number of respondents (46.67 %) from control group missed items of outcome four. Whereas 89.86% of respondents from experimental group answered items of outcome four correctly indicating that experimental group were perform better than the control group.

Table 4: Mean score of students for items in theme three

Theme three Item numbers	Respondents Type							
	Control Group(N = 45)				Experimental Group(N = 42)			
	Missed the item		Answered the item correctly		Missed the item		Answered the item correctly	
	Count	%	Count	%	Count	%	Count	%
3	20	44.44	25	55.55	5	11.90	37	88.10
4	22	48.89	23	51.11	0	0.00	42	100.0
7	22	48.89	23	51.11	10	23.81	22	76.19
10.1	22	48.89	23	51.11	5	11.90	37	88.10
10.2	26	57.78	29	42.22	5	11.90	37	88.10
10.3	15	17.78	30	82.22	5	11.90	37	88.10
10.4	22	48.89	23	51.11	3	2.38	39	97.62
11.1	16	35.56	29	64.44	5	11.90	37	88.10
11.2	30	66.67	15	33.33	5	11.90	37	88.10
11.3	18	40.0	27	60	4	9.52	38	90.48
11.4	25	55.56	20	44.44	2	4.44	40	95.56
Aggregated mean	46.67		43.33		10.14		89.86	

The same form of interview questions was raised "**Have you missed or got it right items of theme three? Why or why not?**" While interviewees CG22, CG38, and CG44 of the control group responded as "Yes, missed majority", "Totally I missed items 10 and 11, I answered the matching items by giving a double answer for question 10 but for question 11, I answered interchangeably wrong answer and I knew my mistake later", and "I missed all the items except item four which requests the axis of

symmetry" respectively, EG33, EG27, and EG19 form the experimental group responded as "Yah, I have had no trouble attempting the entire question", "Yes I answered all the questions" and "I answered most of the items except question seven missed it by committing a minor mistake while hurrying up", respectively.

The following are sample of the scripts from the interviews:

CG22: “Yes, missed majority. For $y = 3(x - 5)^2 + 4$ I have to find the value of x which makes $x - 5 = 0$, but since the value outside bracket is +4 I had taken -5 directly. For item 10 select two answers for a question because I know the fact that if a is positive the parabola opens up if negative opens down so G1 and G2 for 10A & 10C lately I understand the difference”. March, 27/2023.

EG27: “Yes I answered all the questions because GeoGebra software helped me to visualize both effects of ‘ a ’ easily by moving slider ‘ a ’ ‘how the parabola narrows or bulges out for the negative or positive value of ‘ c ’ the parabola moves vertically up or down because repeatedly exercised both in-class exercise and worksheet questions”. March, 28/2023.

One can see students’ misconceptions in three areas. The first one was failing to identify the axis of symmetry in the given vertex form equation. For the equation $y = 3(x - 5)^2 + 4$ many students from the control group unlike the experimental group responded as if $x = -5$ which is wrong. The other

misconception noticed was the inability to identify the effect of ‘ a ’ in items 10.1 – 10.4 of a quadratic function. Many students from the control group responded by giving double answers for a single question missing the narrowing or widening effect of ‘ a ’ as seen in Figure 6. The next misconception that happened was the inability to identify the role of the variable ‘ c ’ clearly in the equation $ax^2 + c$ type in items 11.1 – 11.4. As seen in Figure 6, if ‘ c ’ is positive, they answered the graph shift vertically opposite to ‘ c ’ and vice versa which is true for the effect of ‘ b ’ in a horizontal shift.

To check the test of significance t -test was computed and revealed that there were statistically significant differences between the two groups at an alpha level of 0.05 ($N = 45$, $M = 0.51818$; $N = 42$, $M = 0.8927$; $T(85) = -6.05$, $p = 0.004 < 0.05$). The average mean score of the experimental group was 0.8927, which was greater than the control group ($M = 0.51818$), indicating that the ones who learned using Geogebra outperformed better than their counterparts. In other words, the misconceptions observed in the control group were not problematic in the experimental group, indicating that the intervention greatly reduced misconceptions.

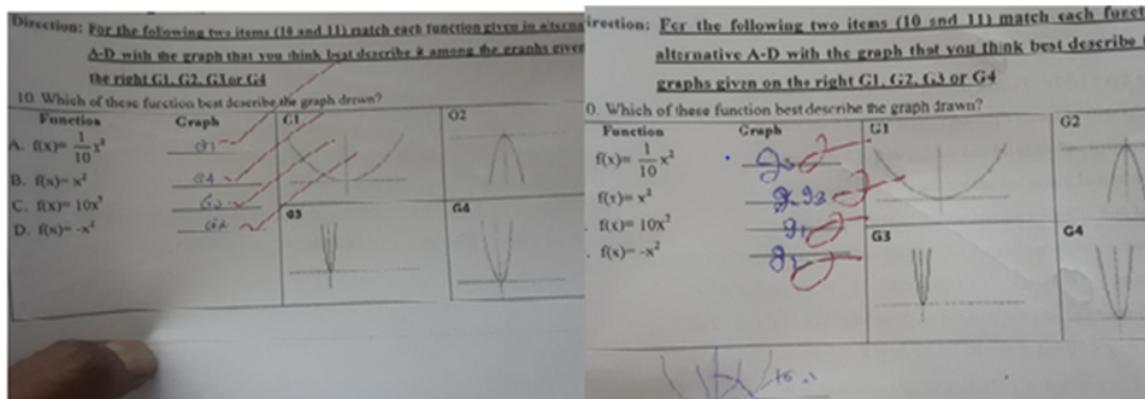


Figure 6: Scanned image of the works of students for items in theme 3

Students Score in Theme 4: Applying the Shifting Rules to Graph Quadratic Functions

In item 16.1.2 of theme four, students were asked to sketch the graph of $g(x) = (x - 3)^2 + 2$ from parent function $f(x) = x^2$ applying a shifting rule. The cross-tabulation is illustrated in Table 5.

As portrayed in Table 5, 35.87% of the control

group missed items of theme four. Whereas 81.97% of respondents from the experimental group answered items of theme four correctly indicating that the experimental group performed better than the control group. Specifically for items 16.1.2, 16.3, and 16.2.2, since they have a different scoring key, they have been analyzed separately. Hence, for item 16.1.2 majority of students, 28(66.67%)

from the experimental group sketched the graph $g(x) = (x - 3)^2 + 2$ without missing both vertical and horizontal shifts correctly whereas 24(53.33%) of the control group respondents failed to sketch

appropriately, only 13(28.89%) of them tried sketching one shift correctly. Only 8(17.78%) of them attempted correctly.

Table 5: Mean score of students for items in theme four

Theme-items	Respondents Type	N	Missed		Attempt partly		Attempt at large		Fully Answered	
			N	%	N	%	N	%	N	%
5	Control Group	45	14	31.11	-	-	-	-	31	68.89
	Experimental Group	42	6	14.29	-	-	-	-	36	85.71
8	Control Group	45	22	48.89	-	-	-	-	23	51.11
	Experimental Group	42	5	11.90	-	-	-	-	37	88.10
16.1.1	Control Group	45	8	17.78					37	82.22
	Experimental Group	42	6	14.29					36	85.71
16.1.2	Control Group	45	24	53.33	13	28.89	-	-	8	17.78
	Experimental Group	42	2	4.76	12	28.57	-	-	28	66.67
16.1.3	Control Group	45	25	55.56	11	24.44			9	20.0
	Experimental Group	42	2	4.76	12	28.89			28	66.67
16.2.1	Control Group	45	6	13.33	-	-	-	-	39	86.67
	Experimental Group	42	2	4.76	-	-	-	-	40	95.24
16.2.2	Control Group	45	14	31.11	19	42.22	5	11.11	7	15.56
	Experimental Group	42	1	2.38	1	2.38	4	9.52	36	85.71
Aggregate mean	Control Group			35.87						48.89
	Experimental Group			8.16						81.97

Similarly, in item 16.1.3 students were asked to sketch the graph of $h(x) = (x + 3)^2 - 2$ from parent function $f(x) = x^2$ applying the shifting rule and hence 28(66.67%) participants from the experimental group sketched the graph without missing both vertical and horizontal shifts correctly whereas 25(55.56%) of control group respondents failed to sketch appropriately, only 11(24.40%) of them tried sketching one side shift correctly and only 9(20.0%) of them attempted correctly.

In the same way, it was asked to sketch the graph of a quadratic function in general form rather than vertex form in item 16.2.2 to be sure students were not answering some related preceding objective items by chance. The question was asked to sketch the $f(x) = -x^2 - 2x + 3$ graph from parent function $f(x) = -x^2$ using the shifting rule. Thus, the majority of students (36 or 85.71%) from the experimental group sketched the graph without missing both vertical and horizontal shifts correctly, whereas only 7(15.56%) of the control

group respondents sketched the graph appropriately. Some of them were missed, and 42.22% correctly converted general form into vertex form equation of quadratic function but failed to appropriately shift the graph. Concerning this, some scanned images of the works of students from exam papers were taken and illustrated as in Figure 7.

The images show students' misconceptions of the control group in two areas of quadratic function. The first one was overgeneralizing during shifting the graph $g(x) = (x - 3)^2 + 2$. Some of them shift horizontally three units to a positive direction (opposite to -3) and incorrectly shift vertically two units to a negative direction (opposite to $+2$). The same procedure was followed for $h(x) = (x + 3)^2 - 2$. Some others were shifted horizontally three units to the negative direction and two units vertically to the positive direction for $g(x) = (x - 3)^2 + 2$ taking directly " -3 " and " $+2$ " So does for $h(x) = (x + 3)^2 - 2$. The second misconception occurred in item 16.2.2

while converting $g(x) = -x^2 - 2x + 3$ into vertex form to identify the shifting direction. Some of them wrote $g(x)$ as $-(x^2 - 2x + 1 - 1) + 3 = -(x - 2x + 1) - 1 + 3 = -(x - 1)^2 + 2$ and

some others wrote it as $-(x^2 + 2x + 1 - 1) + 3 = -(x + 2x + 1) - 1 + 3 = -(x + 1)^2 + 2$ but both of them were wrong. However, this was not a problem for the experimental group.

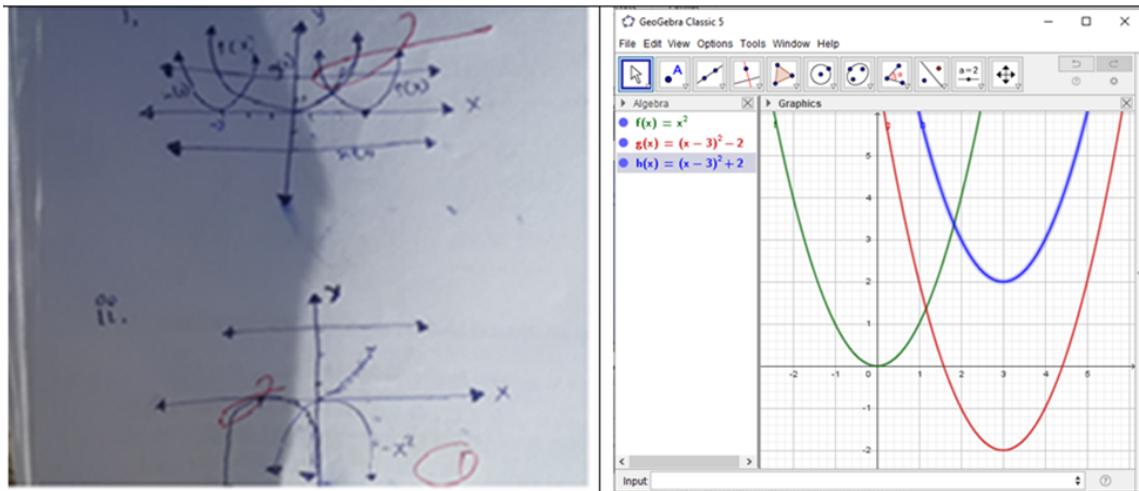


Figure 7: Scanned image of the works of students for items in theme 4

The researcher was eager to know the interviewees' reaction to items in theme four and posed the question "Have you missed or got it right items in theme four? Why or why not?" While the interviewees CG22, CG38, and CG44 from the control group responded as "*I missed almost the majority*", "*Missed items 16i and 16ii except for the domain and graphing $f(x) = x^2$ and $f(x) = x^2$* ", and "*I missed some and replied some others correctly*" respectively, EG19, EG27, and EG33 from the experimental group responded "*I answered most of the items*", "*Yes I answered all the questions*", and "*Yah, I have had no trouble attempting the entire question*" respectively.

The following were sample of the scripts from the interviewees'

CG22: "*Sorry teacher I missed almost the majority especially failed to sketch the graphs correctly. For items of 16i mistakenly misplaced the graph of $g(x) = (x - 3)^2 + 2$ and $h(x) = (x - 3)^2 - 2$ in both direction. I interchanged horizontal shift for vertical shift and vertical shift for horizontal shift only I answered their domain. In the second part of item 16, I made a mistake while converting $g(x) = -x^2 - 2x + 3$ to vertex*

form". March, 27/2023.

EG27: "*Yes I answered all the questions because GeoGebra software gives an opportunity to identify my mistakes during exercising in class and out of class in e-learning lab. By moving the parameters it enables me to understand the shape and behavior of the graph so I easily completed the exam even before elapse of time*". March, 28/2023.

Concerning the test of significance among seven items 4 items namely 8, 16.1.2, 16.1.3, and 16.2.2 were statistical ($T(85) = -6.5605$; $p = 0.000 < 0.05$). On the other hand, in the remaining items (5, 16.1.1, & 16.2.1) there were no statistically significant differences between the two groups ($T(85) = -1.233$; $p = 0.491 > 0.05$). It seems that statistically there was no difference in sketching $f(x) = \pm x^2$ between the two groups.

3.3 Student's perceptions towards GeoGebra Software

The student's perception of GeoGebra software was determined using a questionnaire based on a five-point Likert scale. Table 6 summarizes students' responses to the questionnaire items.

From the data in Table 6, 283.4% agreed GeoGebra software creates an interesting environment in the classroom and 83.6 % mentioned they liked GeoGebra software to use in learning the quadratic

functions. About 78.6 % of students believed GeoGebra software helps to reduce misconceptions while learning quadratic functions.

Table 6: Students' perception towards GeoGebra in teaching quadratic function

Attitude attribute items	Responses (%)				
	SA*	A*	Und.*	DA*	SD*
GeoGebra software creates an interesting environment in the classroom	7.1	76.3	7.1	9.5	0
I like GeoGebra software to use in learning quadratic function concepts	6.4	77.2	10.9	4.1	3.8
GeoGebra software helps to reduce misconceptions while learning quadratic function	2.4	76.2	4.7	11.9	4.8
GeoGebra software helps to increase mathematics achievement	14.8	73.8	4.8	6.6	0
GeoGebra software helps students to improve quadratic function knowledge	4.8	81.8	6.9	5.1	1.4
GeoGebra software helps to visualizes quadratic function with its graph	4.8	76.2	9.5	7.1	2.4
Mathematics classroom becomes more interesting if a teacher uses GeoGebra	7.1	73.8	2.4	16.7	0
GeoGebra based learning helps students to remember for a long time about quadratic function & its graphs than the traditional method	4.8	79.2	8.9	4.8	2.4
Aggregated percentage mean	6.525	76.812	6.9	8.225	1.85
	83.337				
	10.075				

*SA = strongly agree, A= agree, Und = undecided, DA= Disagree and SD = strongly disagree.

The table also shows that about 88.6 % mentioned GeoGebra software helps to increase mathematics achievement and 86.6 % of students believed it helps students to improve their knowledge in quadratic function. Furthermore, 81% of them agree it enables them to visualize quadratic functions with its graph. Finally, 80.9% and 84 % found GeoGebra software more interesting if the teacher used GeoGebra and enabled them to remember quadratic functions and their graphs for a long time.

4 Discussions

According to the results, GeoGebra allowed the students to experience many scenarios of looking at quadratic functions, which raised the likelihood that they would grasp the intended learning objectives and hence increase the success rate and interest to learn. Due to the time-saving and interactive features of GeoGebra (Misini & Kabashi, 2021), students were able to graph more appropriate quadratic functions. It was clear that the time and effort students had saved allowed them to experience more situations and activities, which enhanced their learning. Another student-related feature revealed that students had a high level of collaboration since they frequently assisted one another. Working in groups and the level of inter-

action between students are two major advantages of using technology. Students were eager to show off their abilities and share what they had learned recently with their peers. Sometimes, students may be better teachers than teachers because they can interact with one another and actively help to clarify unclear or vague concepts. With this regard, the study (Praveen & Leong, 2013) aimed to examine the impact of GeoGebra on students' understanding of concepts in geometry and concluded that the software not only raised student test scores but also energized the classroom environment and emphasized the importance of cooperation and collaboration among students. The post-test result that shows the experimental group performs better than the control group in terms of achievement scores agrees with the results of studies in different contexts (for instance, Septian *et al.* (2020) in Indonesia and Övez (2018) in Turkey).

Thus, GeoGebra software is important in reducing students' misconceptions while teaching quadratic functions. In line with this, a study conducted by Gningue *et al.* (2014) compared the effects of teaching the concepts of pre-algebra and algebra using virtual manipulation and traditional methods and concluded that virtual manipulation can help students overcome misconceptions about algebra

and pre-algebra concepts. Another study by Ojose (2015) examined whether the use of the GeoGebra application allows students to determine and solve misconceptions in calculus classes and suggested that students who were taught using GeoGebra can draw function graphs better than those who did not. Besides, the study in calculus conducted in Ethiopia by Baye *et al.* (2021) concluded that the use of the GeoGebra applet enhanced students' visualization and improved their conceptual understanding of the limit. The same result is also observed in Bekene (2020), Saha *et al.* (2010), and Takači *et al.* (2015). Most of these studies are at higher education and the current study confirmed that a similar result is observed at the secondary school level.

Overall, the results of the post-test and data from the students' perception questionnaire revealed that GeoGebra-based teaching is more useful in teaching mathematics in secondary schools. During the lesson delivery, it was observed that students were more active and participated regularly in the experimental group. According to the students' view, GeoGebra was a new area of study in mathematics teaching at secondary schools. It visualizes quadratic function graphs easily with its algebraic form. Students in the experimental group overtook their peers in the control group.

This research also proved that students had positive attitudes toward the GeoGebra integrated instruction. In line with this Celen (2020) research on the topic "student opinions on the use of Geogebra software in mathematics teaching" found that students have a positive perception of using GeoGebra as it makes learning "fun and enjoyable". Similarly, Tamam and Dasari (2021) investigated "The use of Geogebra software in teaching mathematics". The purpose of the study was to synthesize the impact of using GeoGebra as a medium of teaching mathematics, and the study found that student's attitudes toward learning mathematics through technology improved, as well. Kim and Md-Ali (2017) also found that the GeoGebra integrated instruction of teaching shape and space concepts positively influenced students' engagement and desire to learn.

5 Conclusion

GeoGebra is an effective tool for teaching quadratic functions and enables to visualization effects of changing parameters and helps students to make connections with visual representation in learning quadratic functions and encourages them to solve mathematical problems related to course content at secondary schools. The results in this study have some implications for mathematics teaching and learning. Using technology such as GeoGebra changes the roles of both teachers and students in the teaching and learning process. When students use GeoGebra to learn quadratic functions, they assume active roles of receiving information from the teacher or textbooks. They actively make independent choices about how to move forward and are in a position to define their own goals, make their own decisions, and evaluate their own progress. Equivalently, GeoGebra could represent mathematics in ways that help students to understand concepts. When combined, these characteristics would allow teachers to enhance both what and how students learn. According to Bransford *et al.* (2000), when technology makes abstract ideas tangible, teachers can more easily build upon students' prior knowledge and skills, emphasizing connections among mathematical concepts, connecting abstractions to real-world settings, addressing common misunderstandings, and introducing more advanced ideas.

The findings of this study support the need for teachers to use blended teaching and learning strategies, which combine the use of talk and chalk instruction with computer technology (such as GeoGebra). The study further suggests that training teachers to utilize practical applications in teaching mathematics is an essential task that precedes using this software. Besides its desktop applications, its tablet and smartphone applications for Android, iPad, and Windows is an opportunity both for teachers and students to apply or practice based on their own style. This study and other studies in this area have shown the positive influence of mediating artifacts like GeoGebra to enhance the performance and attitude of students.

Limitation of the study

Due to financial constraints, this study has faced many limitations including the scope of the content, sample size, and duration of the intervention. Thus, future studies on the effect of integration of GeoGebra to reduce students' misconceptions and assess their attitude toward GeoGebra would demand comprehensive studies for longer periods, using far larger randomized sample sizes, at different schools of different composition and socio-economic status, which reflect the entire zone, region, or country level. This study further recommends in-depth research to investigate the root causes of misconceptions described in this study. In addition, future research should extend this study to other mathematics topics and grades to see if similar results are obtainable. Such studies' findings might help improve the quality of mathematics teaching and learning in Ethiopia.

Statements and Declarations

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Albusaidi, S. (2019). Using activity theory to explain how a student learns -in an internationalized classroom -from a sociocultural perspective. *Journal of Language Teaching and Research*, 10(6), 1142-1149. <https://doi.org/10.17507/jltr.1006.02>

Aslam, M., & Kingdon, G. (2011). What can teachers do to raise pupil achievement? *Economics of Education Review*, 30(3), 559–574. <https://doi.org/10.1016/j.econedurev.2011.01.001>

Baye, M. G., Ayele, M. A., & Wondimuneh, T. E. (2021). Implementing GeoGebra integrated with multi-teaching approaches guided by the APOS theory to enhance students' conceptual understanding of limit in Ethiopian Universities. *Heliyon*, 7(5), e07012. <https://doi.org/10.1016/j.heliyon.2021.e07012>

Bekene, T. (2020). Implementation of GeoGebra a Dynamic Mathematical Software for Teaching and Learning of Calculus in Ethiopia. *International Journal of Scientific & Engineering Research*, 11(9), 838–860. <https://doi.org/10.14299/ijser.2020.09.01>

Bransford, J., Brown, A. L., Anderson, J. R., Gelman, R., Glaser, R., & Greenough, W. (2000). *How People Learn Brain, Mind, Experience, and School: Expanded Edition* (M. S. Donovan, J. D. Bransford, & J. W. Pellegrino (eds.)). National Academies Press. <https://doi.org/10.17226/9853>

Carlson, M., & Oehrtman, M. (2005). Key aspects of knowing and learning the concept of function. *The Mathematical Association of America Research Sampler*, 1–15.

Celen, Y. (2020). Student Opinions on the Use of Geogebra Software in Mathematics Teaching. *The Turkish Online Journal of Educational Technology*, 19(4), 84–88. <https://orcid.org/0000-0002-7991-4790>

Clement, J. (1993). Using Bridging Analogies and Anchoring Intuitions to Deal with Student' Pre-conceptions in Physics. *Journal of Research in Science Teaching*, 30(10), 1241–1257. <https://doi.org/0022-4308/93/10.124.1-17>

Diković, L. (2009). Applications geogebra into teaching some topics of mathematics at the college level. *Computer Science and Information Systems*, 6(2), 191–203. <https://doi.org/10.2298/CSIS0902191D>

Dockendorff, M., & Solar, H. (2018). ICT integration in mathematics initial teacher training and its impact on visualization: the case of GeoGebra. *Journal of Mathematical Education in Science and Technology*, 49(1), 66–84. <https://doi.org/10.1080/0020739X>

Elia, I., Panaoura, A., Eracleous, A., & Gagatsis, A. (2007). Relations between secondary pupils' conceptions about functions and problem solving in different representations. *International Journal of Science and Mathematics Education*, 5(3), 533–556. <https://doi.org/10.1007/s10763-006-9054-7>

Federal Democratic Republic of Ethiopia Ministry of Education. (2020). *General Education Curriculum Framework* (Issue December). Addis Ababa.

Gagatsis, A., & Shiakalli, M. (2004). Ability to translate from one representation of the concept of function to another and mathematical problem solving. *Educational Psychology*, 24(5), 645–657. <https://doi.org/10.1080/0144341042000262953>

Gay, L. R., Miles, G. E., & Airasian, P. (2011). *Educational Research: Competencies for Analysis and Applications* (10th ed.). Pearson Education International.

Gebremeskel, H. H., Ahmed, A. Y., Getahun, D. A., Debele, M. L., Tibebu, D., & Wondem, D. T. (2018). Revisiting Teacher Educators' Training in Ethiopia: Implications for a New Approach to Curriculum Development. *Bahir Dar Journal of Education*, 17(2), 89–105.

Gningue, S. M., Park, B., West, B., & Fuchs, E. (2014). Applying Bruner's Theory of Representation to Teach Pre-Algebra and Algebra Concepts to Community College Students Using Virtual Manipulatives. *The Electronic Journal of Mathematics and Technology*, 8(3), 159.178.

Guseva, L. G., & Solomonovich, M. (2017). Implementing the zone of proximal development: From the pedagogical experiment to the developmental education system of Leonid Zankov. *International Electronic Journal of Elementary Education*, 9(4), 775–786.

Hohenwarter, M., & Jones, K. (2007). Ways of linking geometry and algebra: the case of GeoGebra. In Kucheman D (Ed.), *Proceedings of the British Society for Research into Learning Mathematics*, 27(3), 126–131. <http://eprints.soton.ac.uk/50742/>

Kim, K. M., & Md-Ali, R. (2017). Geogebra: Towards realizing 21st century learning in mathematics education. *Malaysian Journal of Learning and Instruction, Special Issue*, 93–115. <https://doi.org/10.32890/mjli.2017.7799>

Leont, A. N., & Laureate, L. P. (1978). *Activity, Consciousness, and Personality*. Prentice-Hall.

Majerek, D. (2014). Advances in Science and Technology. *Research Journal*, 8(24), 51–54.

Melissa, M. M., Redianto, A., Venta, A., & Maturbongs, L. M. (2023). Student s ' Learning Interest in Quadratic Function Topics Using Geogebra Learning Media. *EDUMATIKA: Jurnal Riset Pendidikan Matematika*, 6(1), 30–40. <https://doi.org/10.32939/ejrpm.v6i1.1716>

Michael, J. (2002). Misconceptions - What students think they know. *American Journal of Physiology - Advances in Physiology Education*, 26(1–4), 5–6. <https://doi.org/10.1152/advan.00047.2001>

Misini, N., & Kabashi, F. (2021). *The impact of GeoGebra on learning the concept of quadratic function*. UBT International Conference.

Mudaly, D. V., & Uddin, R. S. (2016). Technology in Mathematics: Use of Geogebra Applets. *PONTE International Scientific Researchs Journal*, 72(9), 190–212. <https://doi.org/10.21506/j.ponte.2016.9.14>

Murray, T., Schultz, K., Brown, D., & Clement, J. (1990). An Analogy-Based Computer Tutor for Remediating Physics Misconceptions. *Interactive Learning Environments*, 1(2), 79–101. <https://doi.org/10.1080/104948290010201>

Ojose, B. (2015). Students' Misconceptions in Mathematics: Analysis of Remedies and What Research Says. *Ohio Journal of School Mathematics*, 72, 30–34.

Övez, F. T. D. (2018). The Impact of Instructing Quadratic Functions with the Use of Geogebra Software on Students ' Achievement and Level of Reaching Acquisitions. *International Education Studies*, 11(7), 1–11. <https://doi.org/10.5539/ies.v11n7p1>

Praveen, S., & Leong, K. E. (2013). Effectiveness of Using Geogebra on Students ' Understanding in Learning Circles. *The Malaysian Online Journal of Educational Technology*, 1(4), 1–11.

Saha, R. A., Ayub, A. F. M., & Tarmizi, R. A. (2010). The effects of GeoGebra on mathematics achievement: Enlightening Coordinate Geometry learning. *Procedia - Social and Behavioral Sciences*, 8(2010), 686–693. <https://doi.org/10.1016/j.sbspro.2010.12.095>

Sebsibe, A. S., Argaw, A. S., Bedada, T. B., & Mohammed, A. A. (2023). Swaying pedagogy: A new paradigm for mathematics teachers education in Ethiopia. *Social Sciences and Humanities Open*, 8(1). <https://doi.org/10.1016/j.ssaho.2023.100630>

Septian, A., Sugiarni, R., & Monariska, E. (2020). The application of android-based geogebra on quadratic equations material toward mathematical creative thinking ability. *Al-Jabar: Jurnal Pendidikan Matematika*, 11(2), 261–272.

Siyepu, S. (2013). The zone of proximal development of mathematics. *South African Journal of Education*, 33(2), 1–13.

Smith, J. P., diSessa, A. A., & Roschelle, J. (1994). Misconceptions Reconceived: A Constructivist Analysis of Knowledge in Transition. *Journal of the Learning Sciences*, 3(2), 115–163. https://doi.org/10.1207/s15327809jls0302_1

Suzanne, J., Parent, S., Suzanne, J., & Parent, S. (2015). *Students' Understanding of Quadratic Functions: Learning From Students'* Voices (University of Vermont Follow). <https://scholarworks.uvm.edu/graddis/376>

Takači, D., Stankov, G., & Milanovic, I. (2015). Efficiency of learning environment using GeoGebra when calculus contents are learned in collaborative groups. *Computers and Education*, 82(2015), 421–431. <https://doi.org/10.1016/j.compedu.2014.12.002>

Tamam, B., & Dasari, D. (2021). The use of Geogebra software in teaching mathematics. *Journal of Physics: Conference Series*, 1882(1), 1–6. <https://doi.org/10.1088/1742-6596/1882/1/012042>

Tinungki, G. M. (2019). Zone Proximal Development Gives a New Meaning To the Students' Intelligence in Statistical Method Lesson. *Journal of Honai Math*, 2(2), 129–142. <https://doi.org/10.30862/jhm.v2i2.69>

Walelign, T. (2014). Assessment of students' mathematical competency, a case study in Dire-Dawa University. *Ethiopian Journal of Education and Sciences*, 9(2), 1–15.

Zengin, Y., Furkan, H., & Kutluca, T. (2012). The effect of dynamic mathematics software geogebra on student achievement in teaching of trigonometry. *Procedia - Social and Behavioral Sciences*, 31(May 2014), 183–187. <https://doi.org/10.1016/j.sbspro.2011.12.038>



Assessment of Community Service Practices in Ethiopia Universities: a case Study in Some selected Government Universities

Asnake Muluye^{1,*}, Simeneh Mola², Dejene Girma¹, Getasew Alemayehu³, and Mesay Mahabera⁴

¹Department of Mathematics, Dilla University, Ethiopia;

²Department of Anesthesiology, Dilla University, Ethiopia;

³Department of Construction Technology and Management, Dilla University, Ethiopia;

⁴Department of Curriculum and Instructional Supervision, Dilla University, Ethiopia.

Received: 22 June 2023

Accepted: 27 September 2023

Published: 15 October 2023

ARTICLE INFO.

Key words/phrases:

Keywords: Challenges, Community Service, Instructors, Public University, Research

Abstract

The current study aimed to assess the status of community service practices and the possible barriers to instructors' involvement in community service activities at four selected government universities in Ethiopia. A quantitative descriptive survey design was employed, involving 322 instructors selected from the four universities using a stratified random sampling technique. A questionnaire was used as the instrument to collect data from the participants. Validity and reliability tests were conducted during the pilot study to ensure the questionnaire's suitability before it was used for the actual sample. Descriptive statistics such as the mean, standard deviation, and percentage, along with inferential statistics, including a one-sample t-test, were utilized in the data analysis using SPSS version 24. The results indicated that instructors' participation in community service activities is remarkably low. Several factors were identified that challenge instructors' participation in community service activities, including a lack of self-interest, lack of incentives, poor community service atmosphere, excessive administrative tasks, lack of institutional support, insufficient equipment, and lack of willingness from stakeholders. The study concluded that university-community connections in the sampled public universities in Ethiopia are minimal. This is an alarming finding, urging universities to reconsider their policies and their implementation in a way that encourages instructors to engage in community service activities.

1 Introduction

Community service is the collaboration between higher education institutions and their larger communities (Driscoll, 2009). Moreover, Sandmann (2008) described community service as a process that entails the creation, integration, application, and transmission of knowledge for the benefit of external audiences and the university. Community service includes all forms of community engagement, such as engaged scholarship, service-learning, civic engagement, and voluntarism (Johnson, 2020). Due to many factors, universities are not engaging in community service activities. Kezar (2018) de-

scribed the pressures and challenges within the modern academic workplace that potentially affect community service involvement. These challenges include both extrinsic and intrinsic factors. Extrinsic factors relate to the environment and working conditions, such as workload, reward systems, policies, and opportunity structures. Intrinsic factors focus on the nature of the work, its impact on faculty members, how the work is carried out, the activities associated with the work, and the amount of feedback individuals receive about their engagement (Kezar, 2018).

Motivation is a key component for academic staff

to engage in community service activities. Adekalu *et al.* (2017) and Colbeck and Michael (2006) acknowledged that academics need to be motivated by certain factors to be involved in community services. A poor reward system is one reason why it is difficult for most academics to engage in community service (Vogelgesang *et al.*, 2010). If community engagement is not regarded as a requirement for promotion, it becomes difficult to expect more engagement in such activities (Gorski & Mehta, 2016). On the other hand, many institutions give little attention to community engagement, resulting in reduced staff involvement (Adekalu *et al.*, 2017; Adekalu *et al.*, 2018). Weerts and Sandmann (2010) noted that in higher education institutions, community service is often viewed as an impediment to promotion because it is time-consuming and prevents those who participate from engaging in other meaningful work. According to Gappa *et al.* (2010), community service does not align with teaching and research activities in universities, which is why instructors dedicate less time to it. However, if universities have strong community service policies, instructors are more likely to be motivated to participate (Colbeck & Weaver, 2008).

Statement of the Problem

Community service is one of the core functions of higher education, alongside teaching and research. It is key for academic and research staff in promoting the economic, environmental, and socio-cultural development of communities (Adekalu *et al.*, 2018). Furthermore, universities' community service activities are a tool for national development through knowledge sharing and creation. In the Ethiopian context, delivering community service is a major objective of higher education institutions (HEIs), along with research and teaching-learning activities (Damons *et al.*, 2018). As noted by Nasir and Diah (2016), community service is a vital component of university-community relations that requires attention. However, several factors make community engagement a challenging task for many academic staff, such as work-related responsibilities, teaching, student supervision, advising, and other professional duties (Adekalu *et al.*, 2017; Terosky *et al.*, 2014; Ziker, 2014).

The current study investigated the challenges of community service and identified the status of instructors' engagement. This study aims to fill gaps not fully covered in previous research, such as:

- **Instructors' Motivation and Burnout:**

There is limited research on the psychological aspects of instructors' engagement, including motivation, satisfaction, and burnout related to community service. Exploring these could uncover personal and institutional factors that either promote or discourage sustained involvement.

- **Comparative Analysis Across Institutions:**

A gap exists in comparing the challenges and engagement levels across different types of institutions. This could reveal unique challenges and engagement patterns not addressed in current literature.

- **Longitudinal Impact:**

There is limited research on the long-term impact of instructors' engagement in community service on both professional development and community benefits. Investigating this could provide insights into sustained engagement and outcomes.

- **Policy and Institutional Support:**

Another gap lies in understanding the role of institutional policies and support systems in either facilitating or hindering instructors' community service engagement. This research highlights what types of support structures are most effective.

Since this study focuses on these areas, it addresses existing gaps and contributes to a deeper understanding of the challenges and dynamics of community service engagement among instructors. For this purpose, four universities—Dilla, Hawassa, Wachamo, and Wolayita Sodo—were selected for the study. Two universities were chosen from the first generation and two from the second generation, all located in the former southern regional state of Ethiopia.

General Objective

The general objective of the current study was to investigate the status of community service practices in some selected public universities in Ethiopia.

Specific Objectives

Specifically, the study aimed:

- to examine the status of university instructors' participation in community service activities.
- to identify barriers that hinder instructors from participating in community service activities.

Research Questions

The current study is guided by the following research questions:

- To what extent do university instructors participate in community service activities?
- What challenges (if any) do instructors face as barriers to participating in community service activities?

2 Research Method

2.1 Research Design

The study utilizes a quantitative descriptive survey research approach to achieve its objectives. One of the main topics of the questionnaire focused on the community service practices of the instructors. In addition, a survey was employed to gather data regarding how educators have addressed community issues. The questionnaire included questions related to the community service activities instructors had undertaken and any potential challenges they faced.

2.2 Sampling Technique and Sample

The primary purpose of stratified random sampling is to ensure that different subgroups (strata) within a population are adequately represented in the sample, improving the precision and accuracy of the results. By dividing the population into strata based

on specific characteristics and then randomly sampling from each stratum, researchers can obtain a sample that reflects the diversity of the entire population (Lohr, 2019). This technique is particularly useful when the population is heterogeneous. In the current study, universities were taken as strata. The study population consisted of instructors actively involved in research at four selected universities: Dilla University, Hawassa University, Wachemo University, and Wolayta Sodo University. Based on our initial investigation, there were 1,652 instructors across these four universities familiar with research and community service activities.

2.3 Sample Size Determination

A sample is a portion of a larger population, specially selected to represent the whole. A well-chosen sample is less time-consuming, less costly, less cumbersome, and more practical to administer than conducting a census of the entire target population. Yamane (1967) provides a simplified formula to calculate sample sizes. This formula assumes a sample size, n , for a 95% confidence level and $p = 0.5$. In the current study, with a population $N = 1,652$ and a 5% precision level, this formula was used to determine the appropriate sample size.

Yamane's formula: Sample size

$$n = \frac{N}{1+N(e^2)}$$

Where: n = sample size; N = population size and e = level of precision or sampling error which is $\pm 5\%$ at 95% confidence level.

$$n = \frac{1652}{1+1652(0.05)^2}, n = \frac{1652}{1+1652(0.0025)}, n = \frac{1652}{1+4.13}$$

$$n = \frac{1652}{5.13} = 322.02$$

The sample fraction is $\frac{322}{1652} = 0.19$

Therefore, the stratified sampling technique was followed, and based on this, the sample proportion was calculated as shown in Table 1 below.

Table 1: Sample Proportion in each university

S.No.	Participant University	Instructors who are Actively Involved in Research	Sample Proportion
1	Dilla University	452	88
2	Wolaita University	320	62
3	Hawassa University	516	101
4	Wachemo University	364	71
	Total	1652	322

2.4 Data Collection Instrument

The study utilized a questionnaire as the primary data collection instrument. The purpose of the questionnaire was to assess instructors' community service practices and investigate the challenges encountered in these practices. The questionnaire was thematically designed: the first part explored the instructors' participation in community services, while the second part assessed possible barriers to participation in community service activities. In the section on barriers, a five-point Likert scale was used, with the following ratings: 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Not Sure (NS), 4 = Agree (A), and 5 = Strongly Agree (SA).

2.5 Validity and Reliability of the Questionnaire

The quality of the questionnaire was assured before being applied to the sample respondents. The con-

sistency and accuracy of the survey were ensured through both reliability and validity checks. Validity refers to the extent to which an instrument measures what it is intended to measure—essentially, its accuracy. Content validity was assessed by two experts in the field. Corrections, including the inclusion and exclusion of certain content, were made during the pilot study before the questionnaire was administered to the sample.

Similarly, the consistency of the questionnaire items was measured statistically using Cronbach's alpha. The possible barriers to conducting research consisted of 12 items, and the barriers to publication practices included 10 items—these were the two themes considered. Cronbach's alpha was used to measure the internal consistency (reliability) of the survey items in these two themes. The results of Cronbach's alpha coefficient are presented in Table 2.

Table 2: Reliability Statistics for Thematic Questionnaires

S.No.	Themes	N of Items	Cronbach's Alpha
1	Instructors' Participation in Community Service Activity	2	.714
2	Possible Barriers to Participate in Community Service	10	.800

Table 2, indicated in both themes the Cronbach's alpha greater than the threshold 0.7 which is acceptable.

2.6 Data Collection Procedure

After identifying the sample instructors, the questionnaire was distributed to collect information about their opinions regarding their participation in community service. Data collectors, mainly co-investigators, traveled to the four sample universities and, together with collaborator teams at

the universities, distributed the questionnaire. The process took two days to complete and return the questionnaires.

2.7 Method of Data Analysis

Inferential statistics (one-sample t-test) and descriptive statistics (mean, percentage, standard deviation, mean deviation) were used in the data analysis process, employing the SPSS 24 package. Before applying the one-sample t-test, it was necessary to check whether the data set met the assumptions

required for the test. All the necessary assumptions were tested, and the data set fulfilled the requirements for the one-sample t-test. Therefore, this test was used to examine the hypotheses.

A one-sample t-test is commonly used when the test statistic, like other forms of t-tests, meets the assumption of normal distribution if the value of a scaling term in the test statistic is known. The test requires that the dependent variable follows a normal distribution. According to the central limit theorem (CLT), normal distribution can be assumed when sample means approximate a normal distribution. Sample sizes equal to or greater than 30 are often sufficient for the CLT to hold. In this case, the sample size meets the CLT assumption, making it appropriate to use a one-sample t-test.

Mean scores, particularly for theme two (possible barriers to participating in community service), were computed based on the Likert scale ratings. The mean score for any individual item was expected to fall between 1 and 5. Consequently, the means were interpreted against a neutral point of 3, which represents the middle of the rating scale. According to Creswell and Creswell (2018), mean scores above 3 were considered favorable opinions, while mean scores below 3 were regarded as unfavorable for the given item. Therefore, the estimated value for testing the hypotheses in this study was 3, which represents a neutral or no-response position.

2.8 Hypothesis Testing

The hypotheses in this research aimed to determine whether there were significant differences in the barriers affecting instructors' ability to engage in community service. Accordingly, 10 null hypotheses were tested using a one-sample t-test. These are:

- **Hypothesis 1:** *There is no significant difference for instructors between lack of self-interest in carrying out community service and having self-interest in carrying out community service.*
- **Hypothesis 2:** *There is no significant difference for instructors between lack of time to carry out community service and lack of*

time not being an obstacle to carrying out community service.

- **Hypothesis 3:** *There is no significant difference for instructors between lack of financial incentives as an obstacle to carrying out community service and lack of financial incentives not being an obstacle.*
- **Hypothesis 4:** *There is no significant difference for instructors between environmental fears or concerns about doing community service as an obstacle and environmental fears or concerns not being an obstacle.*
- **Hypothesis 5:** *There is no significant difference for instructors between poor community service atmosphere as an obstacle and poor community service atmosphere not being an obstacle.*
- **Hypothesis 6:** *There is no significant difference for instructors between having a heavy teaching load as an obstacle and a heavy teaching load not being an obstacle.*
- **Hypothesis 7:** *There is no significant difference for instructors between investing much time in administrative work as an obstacle and investing time in administrative work not being an obstacle.*
- **Hypothesis 8:** *There is no significant difference for instructors between lack of institutional support for community service as an obstacle and lack of institutional support not being an obstacle.*
- **Hypothesis 9:** *There is no significant difference for instructors between insufficient equipment/facilities for community service as an obstacle and insufficient equipment/facilities not being an obstacle.*
- **Hypothesis 10:** *There is no significant difference for instructors between willingness from stakeholders as an obstacle and willingness from stakeholders not being an obstacle.*

3 Results

3.1 Instructors Demographic Characteristics

Table 3: Respondents Background Information

S.No.	Variable	Response	N	%
1	Age	Below 25	8	2.5
		26-35	183	56.8
		35-45	114	35.4
		45-55	17	5.3
		Above 55	0	0
2	Gender	Male	263	81.7
		Female	59	18.3
3	Educational level	MSc	259	80.5
		PhD	59	18.3
		Post Doc	1	0.3
		Others	3	0.9
3	Academic experience (in Year)	2.48 ±1.233		
4	Involvement in Administration	Yes	181	56.2
		No	141	43.8
5	Academic Rank	Lecturer	223	69.3
		Asst. professor	82	25.5
		Associate Prof.	17	5.3
		Professor	0	0

From the output shown in Table 3, 183 respondents (56.8%) are between the ages of 25-35, indicating that over half of university instructors are of working age. The sample includes 263 males (81.7%) and 59 females (18.3%), for a total of 322 respondents. Regarding academic rank, 223 respondents (69.3%) are Lecturers, 82 (25.5%) are Assistant Professors, and 17 (5.3%) are Associate Profes-

sors. The average university experience among the respondents is 2.48 ± 1.233 years.

3.2 *Participation in Community Service Activity*

Instructors' participation in community service was assessed based on two major question items. Their perceived responses are summarized in Table 4.

Table 4: Descriptive analysis for Instructors' Participation in Community Service activity

S.No.	Item questions	N	Response in %	
			Yes	No
1	Have you ever utilized your research output for community service	322	30.1	69.9
2	Provided training/ awareness creation measures	322	34.5	65.5

Table 4 revealed that the majority of participant instructors confirmed there is no effective utilization of research output for community service, with 69.9% providing no response to item 1. Similarly, in item 2, instructors indicated low participation in providing training, with 65.5% providing no response.

3.3 *Possible Barriers to Participating in Community Service*

Both descriptive statistics, including mean (M), standard deviation (Std. D), and percentage (%), as well as inferential statistics (one-sample *t*-test), were conducted to identify perceived barriers to participating in community service. The analysis focused on how significantly each factor contributed to these barriers.

Table 5: Descriptive analysis for Barriers to Participate in Community Service

S.No.	Possible factor Items	Response in Percent					M	Std. D.
		SD	D	NS	A	SA		
1	Lack of self-interest in carrying out community service	31.1	32.0	12.1	14.9	9.9	2.41	1.33
2	Lack of time in carrying out community service	19.88	35.09	17.70	13.04	14.29	2.79	2.01
3	Lack of financial incentives to carry out community service	8.39	18.94	11.18	31.68	29.81	3.56	1.32
4	There are/is env'tal fears or concerns about doing comm. service	18.01	23.29	31.06	17.08	10.56	2.79	1.23
5	Poor community service atmosphere	8.39	20.81	20.19	33.23	17.39	3.30	1.22
6	Heavy teaching load and schedule	14.91	26.09	18.32	23.91	16.77	3.02	1.33
7	Investing much time in administrative works	22.98	26.09	12.73	23.60	14.60	2.81	1.40
8	Lack of institutional support for community service	9.94	15.53	13.98	35.09	25.47	3.50	1.29
9	Insufficient equipment/ facilities for community service	6.52	16.15	10.25	45.03	22.05	3.60	1.18
10	Because of its charitably /willingness from stakeholders	9.63	18.01	21.74	34.16	16.46	3.30	1.22

N=322, SD=Strongly Disagree, D=Disagree, NS=Not Sure, A=Agree, SA=Strongly Agree

The possible barriers perceived by instructors as factors affecting participation in community service were identified through the descriptive analysis shown in Table 5, based on the majority (50% or more) of respondents' agreement (A + SA) or disagreement (D + SD) across 10-factor question items.

Respondents' Agreement (A + SA):

- Lack of financial incentives to carry out community service (item-3, 61.49%).
- Poor community service atmosphere (item-5, 50.62%).
- Lack of institutional support for community service (item-8, 60.56%).
- Insufficient equipment/facilities for community service (item-9, 67.08%).

- Charitability or willingness from stakeholders (item-10, 50.62%).

Respondents' Disagreement (D + SD):

- Lack of self-interest in carrying out community service (item-1, 63.1%) was not perceived as a barrier by instructors.
- Lack of time to carry out community service (item-2, 54.97%) was also not perceived as a barrier by instructors.

Additionally, a one-sample *t*-test was conducted to assess the significance of each factor as a barrier to participating in community service. The results of the one-sample *t*-test are presented in Table 6, which corresponds to the testing of the 10 null hypotheses outlined in Section 2.8.

Table 6: One-sample *t*-test regarding barriers to participate in community service

S. No.	Variables	Test Value = 3			
		Mean Diff	t	df	Sig. (2-tailed)
1	Lack of self-interest in carrying out community service	-0.59	-8.02	321	0.00
2	Lack of time in carrying out community service	-0.21	-1.86	321	0.07
3	Lack of financial incentives to carrying out community service	0.56	7.58	321	0.00
4	Environmental fears or concerns about doing community service	-0.21	-3.09	321	0.00
5	Poor community service atmosphere	0.30	4.48	321	0.00
6	Heavy teaching load and schedule	0.02	0.21	321	0.83
7	Investing much time in administrative works	-0.19	-2.46	321	0.01
8	Lack of institutional support for community service	0.51	6.99	321	0.00
9	Insufficient equipment/ facilities for community service	0.60	9.09	321	0.00
10	Because of its charitably /willingness from stakeholders	0.30	4.40	321	0.00

The one-sample *t*-test results reject eight null hypotheses regarding barriers to participating in community service:

Item 1: Lack of self-interest in carrying out community service ($M = 2.41$, Std. $D = 1.33$, $t(321) = -8.02$, $p = 0.00 < .05$).

Item 3: Lack of financial incentives for carrying out community service ($M = 3.56$, Std. $D = 1.32$, $t(321) = 7.58$, $p = 0.00 < .05$).

Item 4: Environmental fears or concerns about doing community service ($M = 2.79$, Std. $D = 1.23$, $t(321) = -3.09$, $p = 0.00 < .05$).

Item 5: Poor community service atmosphere ($M = 3.30$, Std. $D = 1.22$, $t(321) = 4.48$, $p = 0.00 < .05$).

Item 7: Spending too much time on administrative work ($M = 2.81$, Std. $D = 1.40$, $t(321) = -2.46$, $p = 0.01 < .05$).

Item 8: Lack of institutional support for community service ($M = 3.50$, Std. $D = 1.29$, $t(321) = 6.99$, $p = 0.00 < .05$).

Item 9: Insufficient equipment/facilities for community service ($M = 3.60$, Std. $D = 1.18$, $t(321) = 9.09$, $p = 0.00 < .05$).

Item 10: Lack of charitable willingness from stakeholders ($M = 3.30$, Std. $D = 1.22$, $t(321) = 4.40$, $p = 0.00 < .05$).

All eight variables are significant factors viewed by the instructors as barriers to participating in community service. However, the relative importance of these variables is determined using the mean differences compared to the test value of 3 (the neutral or no response position).

Based on this, the results indicate five variables with positive mean differences: **Item 3** (lack of financial incentives for carrying out community service), **Item 5** (poor community service atmosphere), **Item 8** (lack of institutional support for community service), **Item 9** (insufficient equipment/facilities for community service), and **Item 10** (lack of charitable willingness from stakeholders). This suggests that instructors view these five variables as more important barriers to participating in community service.

4 Discussions

This discussion is guided by two major research questions.

RQ1: To what extent do university instructors participate in community service activities?

To answer this research question, the findings in Table 4 are used. Instructors' participation in community service activities is remarkably low, indicating that universities are not effectively engaging in one of the key pillars of activities: community service. However, university engagement in community service activities is mandatory, as noted by Damons *et al.* (2018). In Ethiopian higher education institutions (HEIs), community service is one of the major objectives. More importantly, as noted in Adekalu *et al.* (2018), promoting the economic, environmental, and socio-cultural development of communities in one's country is challenged in the absence of community service practices.

RQ2: What are the challenges (if any) instructors face as barriers to participating in community service activities?

To answer this important question, both the descriptive results in Table 5 and hypothesis testing are utilized to see how significantly each factor contributes to the low engagement of instructors in community service activities. From Table 5, we can list the following factors perceived by instructors as more significant than others: lack of financial incentives, poor community service atmosphere, lack of institutional support, insufficient equipment/facilities, and lack of willingness from stakeholders.

Moreover, the one-sample *t*-test identified significant factors that challenge community service practices. Referring to the results in Table 6 from hypothesis testing, the lack of self-interest, lack of financial incentives, environmental fears or concerns, poor community service atmosphere, excessive time spent on administrative tasks, lack of institutional support, insufficient equipment, and lack of willingness from stakeholders are significant barriers challenging instructors to participate in community service activities. These findings are consistent with the literature, which highlights

a lack of interest and motivation (Adekalu *et al.*, 2017; Colbeck and Michael, 2006) and a poor reward system (Gorski and Mehta, 2016) as challenging factors for instructors to engage in community service. A lack of institutional attention to community service activities has been identified as a challenge for academics (Adekalu *et al.*, 2017; Adekalu *et al.*, 2018). Additionally, administrative involvement or extra responsibilities are also challenges, as indicated in Adekalu *et al.* (2017), Terosky *et al.* (2014), and Ziker (2014).

5 Conclusion

Based on the results of this study, we have determined that community service programs are somewhat limited among the Ethiopian public colleges we studied. The current study identified several variables that prevent instructors from participating in community service projects. Significant obstacles include inadequate equipment, a lack of interest on the part of instructors, a lack of institutional support, a lack of willingness from stakeholders, a poor environment for community service (including policies), and a significant time commitment to administrative duties. According to the current study, one of the mainstays of university community service programs needs to be reformed. If the relationship between the community and the university does not improve, then one of the universities' missions is not being met.

Recommendations

Based on the results of the current study, the following recommendations are made:

- Universities need to improve the existing reward system to attract instructors to community service activities.
- Continuous institutional support for instructors involved in community service activities can promote these practices.
- Strong community service policies should be established, similar to research and teaching policies, to make participation in community service mandatory for instructors.
- Improving the quality and quantity of equipment important for community service activi-

ties will enhance the effectiveness of these activities.

- Ongoing awareness creation for stakeholders and communities is required to improve the community-university connection.
- To minimize the time instructors spend on administrative tasks, a guiding policy should be implemented that delineates the proportion of tasks for community service alongside their administrative responsibilities.

References

Adekalu, S.O., Krauss, S.E., Ismail, I.A., & Suandi, T. (2018). Teaching Professors' Challenges about Community Engagement Outreach and Intervention in Nigerian Universities. *International Journal of Academic Research in Business and Social Sciences*, 8(8):191-204.

Adekalu, S.O., Shitu, M.B., Turiman, S., Olohung-bebe, L.O. & Adio, A.A. (2017). Facilitating Community Development through Institutional Engagements: Reflections from 2016 Nigeria IACD Conference. *Journal of Resources Development and Management*, 30:132-140.

Colbeck, C. & P. Michael (2006). Individual and organizational influences on faculty members' engagement in public scholarship. In *Public scholarship*, ed. R.A. Eberly and J.R. Cohen, 17–26. New Directions for Teaching and Learning. San Francisco, CA: Jossey-Bass.

Colbeck, C.L. & Weaver, L.D. (2008). Faculty Engagement in Public Scholarship: A Motivation Systems Theory Perspective. *Journal of Higher Education Outreach and Engagement*, 12(2):7-32.

Creswell, J.W., & Creswell, J.D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). SAGE Publications.

Damons B., Sathorar H., Geduld D. (2018). University Community Engagement: Living the Contradiction. Volume 6. Portugal: Siner-gias Diálogos Educativos Para a Transformação Social, Janeiro.

Driscoll, A. (2009). Carnegie's new community engagement classification: Affirming higher education's role in community. *New Directions for Higher Education*, 147:5-12.

Edgar, T., & Manz, D. (2017). *Research methods for cyber security*. Syngress.

Gappa, J.M., Austin, A.E., & Trice, A.G. (2010). *Rethinking Faculty Work: Higher Education's Strategic Imperative*. San Francisco: Jossey-Bass.

Gorski, I. & Metha, K. (2016). Engaging Faculty across the Community Engagement Continuum. *Journal of Public Scholarship in Higher Education*, (6):108-123.

Johnson B.J. (2020). Community Engagement: Barriers and Drivers in South African Higher Education. *South African Journal of Higher Education*, 34(6):87–105. <https://dx.doi.org/10.20853/34-6-4116>.

Johnson B.J. (2020) Community engagement:Barriers and drivers in south African higher education. *South African Journal of Higher Education*, 34(6):87-105. <https://doi.org/10.20853/34-6-4116>.

Kezar, A. (2018). *How Colleges Change: Understanding, Leading, and Enacting Change*. (2nd ed.). Routledge.

Lighthelm, A.A. & Koekemoer, E.M. (2009). Academic publishing: Lessons learnt from the Southern African Business Review. *Southern African Business Review*, 13(3):28-50.

Lohr, S.L. (2019). *Sampling Design and Analysis* (2nd ed.). Chapman and Hall/CRC. <https://www.doi.org/10.1201/9780429296284>.

Nasir NFM, Diah NM. (2016). Trends and Challenges of Community Service Participation among Postgraduate Students in IIUM: A Case Study. *Man in India*. 2(96), India: Serials Publications; pp.469-475.

Sandmann, L.R. (2008). Conceptualization of the scholarship of engagement in higher education: A strategic review, 1996–2006. *Journal of Higher Education Outreach and Engagement*, pp.91–104.

Siba, N., Chuene Kgole, J., Stellenberg, E., & Seekoe, E. (2013). Community Engagement by University Nursing Schools: Survey and Case Studies. *Trends in Nursing*, 1(1):1-24.

Terosky, A.L., O'Meara, K. & Campbell C.M. (2014). Enabling possibility: Women associate professors' sense of agency in career advancement. *Journal of Diversity in Higher Education*, 7(1):58-76.

Vogelgesang, L.J., Denson, N. & Jayakumar, U.M. (2010). What determines faculty-engaged scholarship. *The Review of Higher Education*, 33(4):437-472.

Weerts, D., & Sandmann, L. (2010). Community engagement and boundary-spanning roles at research universities. *The Journal of Higher Education*, pp.702-727.

Yamane, Taro (1967). *Statistics, An Introductory Analysis*, 2nd ed., New York: Harper and Row.

Ziker, J. (2014). The Long, Lonely Job of Homo Academicus. *The Blue Review*.



Determinants of Job Satisfaction among Teacher Educators in Ethiopia

Almaz Asharge¹, Alemayehu Bishaw², and Berhanu Mekonnen^{3,*}

¹Institute of Education and Behavioral Sciences, Dilla University, Ethiopia

²Department of Teacher Education and Curriculum Studies, Bahir Dar University, Ethiopia

³Department of Curriculum and Instructional Supervision, Dilla University, Ethiopia

Received: 28 June 2023

Accepted: 09 October 2023

Published: 27 October 2023

ARTICLE INFO.

Key words/phrases:

Correlational research, Determinants, Human resource policies, Job satisfaction, Teacher educators

Abstract

This study investigated the factors influencing job satisfaction among teacher educators. A quantitative correlational research design was employed to identify key determinants, examine demographic characteristics, and propose strategies for enhancement. Seventy-four teacher educators participated, providing data through questionnaires. Findings revealed that salary, incentives, work-life balance, and interpersonal relations were significant determinants of job satisfaction. Academic qualifications and work experience exhibited negative correlations with organizational policies, autonomy, and promotion-related factors. The study underscores the need for tailored interventions to address the unique concerns of mid-career educators, particularly regarding compensation, career advancement, and work-life balance. It suggests the development of personalized professional development programs and human resource policies that consider educators' career stages and specific needs. Further research in this area is recommended.

1 Introduction

In the realm of education, the role of teacher educators is pivotal, as they mold the future of teaching by preparing prospective educators. Literature underscores the significance of job satisfaction among teacher educators, highlighting its profound influence on motivation, commitment, overall well-being, and direct implications for the quality of teacher education and subsequent student outcomes (Johnson & Birkeland, 2023). Notably, factors contributing to job satisfaction include autonomy, collegiality, recognition, and opportunities for professional growth (Atmaca *et al.*, 2020). Additionally, the alignment between expectations and experiences, perceived job benefits, self-efficacy, and supportive working conditions are key determinants (Abdullah *et al.*, 2022).

Research indicates a direct correlation between teacher educators' job satisfaction and their commitment to teaching, with heightened job satisfac-

tion fostering increased dedication and enthusiasm in instructional practices (Adebomi *et al.*, 2012). The interplay of gender and qualifications is also an influential factor in shaping job satisfaction among teacher educators (Srivastava & Chabra, 2012). Furthermore, Pérez Fuentes *et al.* (2023) found empirical evidence supporting a positive correlation between job satisfaction and teacher education, emphasizing the need for further exploration of this relationship.

Research reviews underscore the nature of job satisfaction determinants among teacher educators, encompassing individual characteristics such as gender and experience, organizational factors like teacher-student relations and school climate, and broader considerations like economic income and life satisfaction (Raiany *et al.*, 2022). The organizational culture and perceived teacher competency are identified as indirect influencers on job satisfaction through their impact on self-efficacy (Tria, 2023).

Educational leaders are urged to consider these multifaceted factors to create and sustain conducive working conditions for teacher job satisfaction. This, in turn, contributes to teacher retention and holds promise for improving the quality of teacher education and student outcomes (João & Célia, 2020). However, recent studies challenge conventional views regarding high job satisfaction among educators, pointing to decreased psychological well-being, heightened burnout, and reduced job satisfaction among higher education institution teaching staff (Hansen *et al.*, 2015).

Furthermore, studies suggest that teachers' perceptions of their college environment, teaching efficacy, and teacher stress play pivotal roles in shaping job satisfaction, with observed gender differences (Tran, 2015). Retirement benefits, although not explicitly explored in relation to job satisfaction, form part of teachers' overall compensation preferences, potentially impacting their satisfaction and overall well-being (O'Shea, 2021).

In Ethiopia, Abraham (2018) found a medium level of job satisfaction among teacher educators in teacher education institutions. Among the variables, he identified promotion and supervision as the main driving forces in determining job satisfaction and suggested that further studies should be conducted on the determinants of different facets of job satisfaction.

Literature and prior studies on teacher educators' job satisfaction show the need for an in-depth study that considers individual, institutional, and contextual factors. Understanding and addressing these determinants are critical for fostering positive working environments, enhancing teacher retention, and ultimately elevating the quality of teacher education and student outcomes. Hence, the purpose of this study was to examine the determinants of teacher educators' job satisfaction.

Research Questions

1. What are the key factors influencing job satisfaction among teacher educators?
2. How do demographic characteristics such as gender, experience, and academic qualifications correlate with the job satisfaction of

teacher educators?

3. What strategies can be implemented within the CTE to enhance job satisfaction among teacher educators?

2 Review of Related Literature

Job satisfaction is a crucial aspect of employee well-being and organizational success. Several factors play a role in influencing job satisfaction levels among employees. Compensation and motivation are two key factors that significantly impact job satisfaction (Ananda, 2023). Fair compensation, including salaries, benefits, and incentives, contributes positively to employees' satisfaction with their work. When employees perceive that their rewards align with their contributions, they are more likely to be content in their roles. Additionally, high motivation levels enhance job satisfaction by creating a positive work environment where employees feel engaged and valued.

Moreover, research indicates that approximately 18.4% of the variation in employee job satisfaction is influenced by other unexplored factors (Ananda, 2023). This highlights the complexity of job satisfaction and suggests that organizations need to consider various aspects beyond compensation and motivation to fully understand and address employee satisfaction levels. Therefore, while compensation plays a significant role in driving job satisfaction, it is essential for organizations to adopt holistic approaches that consider multiple factors impacting employee well-being.

Job satisfaction plays a crucial role in determining employee performance and organizational success. When employees are content with their work, they tend to be more engaged, motivated, and committed to their tasks, ultimately leading to higher job performance and overall success for the organization (Alzen & Ismi, 2023). High levels of job satisfaction are often associated with factors such as fair compensation, recognition, opportunities for growth, and a positive work environment. These elements significantly contribute to how satisfied employees feel with their roles (Ananda, 2023).

While compensation is a key factor influencing job satisfaction by aligning rewards with contri-

butions made by employees (Ananda, 2023), it is important to recognize that other unexplored factors contribute to around 18.4% of the variation in employee job satisfaction. This indicates the complexity of job satisfaction and underscores the need for organizations to adopt holistic approaches that consider multiple factors impacting employee well-being (Ananda, 2023).

In summary, organizations should focus not only on providing competitive compensation but also on creating a work environment that fosters motivation and addresses various aspects beyond monetary rewards. By prioritizing strategies that promote job satisfaction among employees comprehensively, organizations can enhance individual performance and achieve their objectives more effectively.

Role of Teacher Educators

Teacher educators play a crucial role in shaping the next generation of educators by preparing pre-service teachers for the complexities of the classroom. Their responsibilities encompass several key areas:

- 1. Modeling Effective Teaching Practices:** Teacher educators demonstrate strategies such as student-centered learning, differentiated instruction, and reflective practice. By showcasing these methods, they inspire pre-service teachers to adopt similar approaches, thereby bridging the gap between theory and practice (Sotardi & Brogt, 2023).
- 2. Mentorship and Counseling:** Acting as mentors and counselors, teacher educators guide their students through the emotional and psychological aspects of teaching. They provide support and encouragement, helping pre-service teachers develop the resilience and self-awareness needed for successful teaching careers (West *et al.*, 2023).
- 3. Fostering Understanding of Educational Theory:** Teacher educators equip pre-service teachers with a deep understanding of educational theory and research. By exposing them to developments in learning science, curriculum design, and educational policy, they enable future educators to make informed

decisions and adapt to changing educational landscapes (Sa'ban, 2020).

Ultimately, teacher educators aim to cultivate reflective, adaptable, and committed teachers who are dedicated to improving the education system. Through modeling excellence, providing mentorship, and promoting intellectual growth, they play a vital role in shaping the future of the teaching profession.

Factors Influencing Teacher Educators' Job Satisfaction

Job satisfaction among teacher educators is essential for their performance and, subsequently, the academic achievements of their students. Several key factors influence job satisfaction:

- 1. Compensation and Promotion:** Research indicates that salary, opportunities for promotion, and recognition significantly affect job satisfaction (Yousaf *et al.*, 2024; Quarstein *et al.*, 1992). Adequate compensation ensures that educators feel valued, while opportunities for career advancement provide a sense of progression.
- 2. Working Conditions:** The work environment plays a critical role in job satisfaction. Positive conditions, such as additional vacation time and a supportive atmosphere, enhance satisfaction levels. Conversely, negative factors like faulty equipment and lack of support can lead to dissatisfaction and hinder educators' effectiveness (Cerci & Dumladag, 2019; Karmakar, Saha, & Adhikari, 2023).
- 3. Emotional and Psychological Factors:** The responsibility of preparing future teachers contributes to job satisfaction. When teacher educators feel content in their roles, they are more effective in imparting knowledge and skills, leading to greater productivity and commitment to their work (Yousaf *et al.*, 2024).

Challenges Faced by Teacher Educators

Despite their critical role, teacher educators face unique challenges that impact their job satisfaction:

- **Salary and Job Security:** Inadequate compensation and job security concerns can lead to dissatisfaction and exhaustion (Jabbar & Naveed, 2024).
- **Work Pressure:** High work demands without adequate support can hinder performance and well-being, affecting their ability to prepare future educators effectively (Karmakar *et al.*, 2023).

Theoretical Framework

To understand the factors influencing job satisfaction among teacher educators, various theoretical frameworks have been employed:

1. **Job Characteristics Model (JCM):** Developed by Hackman and Oldham (1976), the JCM examines how job design impacts psychological states and job satisfaction. It highlights five key job characteristics—skill variety, task identity, task significance, autonomy, and feedback—that can enhance job satisfaction when effectively integrated into educators' roles (Omar *et al.*, 2022).
2. **Job Demands-Resources Model (JD-R):** This model suggests that balancing job demands with available resources can improve job satisfaction and performance (Barba-Sánchez *et al.*, 2022).
3. **Phenomenological Approach:** This research approach focuses on understanding educators' lived experiences and perceptions of job satisfaction, revealing deeper insights into their motivations and challenges (Yüksel & Yıldırım, 2015).
4. **Organizational Climate and Culture:** Studies indicate that organizational factors such as leadership, communication, and opportunities for professional growth significantly influence job satisfaction (Ghosh & Joshi, 2016).
5. **Self-Efficacy:** Higher self-efficacy correlates with greater job satisfaction, as educators who feel competent in their roles are more likely to report positive job attitudes (Tria, 2023).

Conclusion

Understanding the determinants of job satisfaction among teacher educators is critical for fostering positive working environments, enhancing teacher retention, and ultimately improving the quality of teacher education and student outcomes. By addressing the various individual, institutional, and contextual factors influencing job satisfaction, educational institutions can support teacher educators more effectively and contribute to the development of a robust education system.

3 Research Method

3.1 Research Design

The study adopted a **correlational research design**, focusing on the analysis of quantitative data collected through structured questionnaires administered to teacher educators. This design incorporated both descriptive and inferential statistical analyses:

- **Descriptive Statistics:** This component provided a detailed summary of key variables, offering insights into the factors influencing job satisfaction among teacher educators.
- **Inferential Statistics:** Specifically, Pearson correlation was utilized to examine the relationships among variables. This analysis aligned with the research questions and objectives, aiming to quantify primary factors influencing job satisfaction, explore demographic correlates, and propose strategies for enhancing job satisfaction.

This research design enabled a comprehensive examination of numerical data, yielding nuanced insights into the complexities of teacher educators' job satisfaction in the context of Continuing Teacher Education (CTE).

3.2 Sampling Techniques

The participants in the study consisted of seventy-four teacher educators, categorized into three ranks: lecturer, assistant lecturer, and graduate assistant. To ensure representation across these ranks, stratified sampling was employed.

The sample included:

- Fifty-one lecturers
- Seven assistant lecturers
- Sixteen graduate assistants

3.3 Data Analysis

Data analysis involved both descriptive and inferential statistical methods:

- **Descriptive Statistics:** Measures such as mean, standard deviations, and percentages were calculated to summarize the data.
- **Inferential Statistics:** Pearson r correlation was used to analyze the data, specifically assessing the correlation between teacher educators' job satisfaction and demographic characteristics, including academic qualifications and work experience.

4 Results

This section presents the major findings of the study, which include:

1. **Demographic Characteristics:** A summary of the participants' demographic information.
2. **Factors Influencing Job Satisfaction:** An overview of the identified factors affecting job satisfaction among teacher educators.
3. **Distribution of Factors:** Insights into how these factors are distributed among the participants.
4. **Pearson r Test of Correlation:** Results from the Pearson r test, which examined the degrees of correlation between teacher educators' job satisfaction and two key demographic characteristics: qualifications and work experience.

4.1 Demographic Characteristics

Table 1 presents data regarding teacher educators' work experience and academic rank. Notably, most respondents (62.2%) reported having 11 to 20 years of teaching experience, indicating a significant presence of educators in the mid-career level. In terms of academic rank, most respondents (68.9%) were lecturers.

Table 1: Work Experience and Academic Rank of Teacher Educators

Work Experience	Frequency	Percentage	Academic Rank	Frequency	Percentage
< 10 years	22	29.2	Graduate Assistants	16	21.6
11-20 years	46	62.2	Assistant Lecturers	7	9.5
>18 years	6	8.1	Lecturers	51	68.9
Total	74	100	74	74	100

4.2 Major Contributing Factors for Job Dis-satisfaction

Table 2 provides a frequency distribution illustrating the factors influencing teacher educators' job

satisfaction. This analysis aims to quantify the mean values derived from respondents' ratings, offering a comprehensive understanding of their collective agreement on various aspects contributing to job satisfaction.

Table 2: Mean Distribution of Factors

Determinant factors	Mean	Std. Deviation
Leadership, Supervision and Recognition	9.46	2.985
Salary, incentives, fringe benefit and work life balance	23.01	8.945
Promotion and Advancement Related	12.27	3.345
Organization Policies and Autonomy	8.89	3.342
Interpersonal/Social Relations	11.07	.984
Work Conditions	16.77	4.787

4.3 Analysis of Determinants of Teacher Educators' Satisfaction

The analysis of the determinants of teacher educators' satisfaction, as presented in Table 2, provides valuable insights into various factors influencing educators' contentment in their professional roles. The mean scores and standard deviations help in understanding the level of consensus and variability among teacher educators regarding different aspects of their work environment.

1. *Salary, Incentives, Fringe Benefits, and Work-Life Balance:* This factor recorded the highest mean score ($M = 23.01$, $SD = 8.945$), indicating its significant importance to educators. However, the relatively high standard deviation suggests a diverse range of perspectives within this category, emphasizing the need for tailored strategies to address individual preferences and concerns related to compensation and work-life balance.
2. *Leadership, Supervision, and Recognition:* This area exhibited a moderate level of satisfaction among teachers, with a mean score of 9.46 and a lower standard deviation of 2.985. This finding suggests a more uniform agree-

ment among educators on the importance of effective leadership, supervision, and recognition within the educational setting.

3. *Interpersonal/Social Relations:* This factor received a high mean score of 11.07, underscoring the importance of positive social interactions among teachers. The remarkably low standard deviation of 0.984 indicates a high consensus on the significance of fostering a supportive social environment, highlighting a shared sentiment among teachers in this regard.
4. *Promotion, Organizational Policies, and Autonomy:* These factors demonstrated moderate levels of satisfaction, with mean scores of 12.27 and 8.89, respectively. However, the corresponding standard deviations of 3.345 and 3.342 suggest varying opinions among teacher educators regarding promotion opportunities, organizational policies, and autonomy. These findings emphasize the need for genuine approaches to address concerns related to career advancement and organizational policies to enhance overall satisfaction among teacher educators.

Table 3: Distribution of Determinants

Factors	Total Score Ranges in Percent		
	Low (%)	Moderate (%)	High (%)
Leadership, Supervision and Recognition ¹	87.8	8.1	4.1
Salary, incentives, fringe benefit and work life balance ²	62.2	37.8	0
Promotion and Advancement Related ³	10.8	24.3	64.9
Organization Policies and Autonomy ⁴	75.7	21.6	2.7
Interpersonal/Social Relations ⁵	0	97.3	2.7
Work Conditions ⁶	86.5	13.5	0

¹=Low (6-12), Moderate (13-17) and High (18-24); ²=Low (12-24), Moderate (25-38) and High (39-48);

³=Low (4-8), Moderate (9-12) and High (13-16); ⁴=Low (5-10), Moderate (11-15) and High (16-20);

⁵=Low (4-8), Moderate (9-12) and High (13-16); ⁶=Low (10-20), Moderate (21-31) and High (32-40)

4.4 Distribution of Determinants of Teacher Educators' Satisfaction

The distribution of determinants in Table 3 offers a comprehensive overview of teacher educators' satisfaction based on total score ranges. Notably, most respondents indicated high levels of satisfaction with interpersonal/social relations, with 97.30% highlighting the significance of positive social interactions in contributing to overall job satisfaction.

Conversely, factors related to promotion and advancement revealed a more diverse distribution, with 64.90% of respondents falling within the high satisfaction range. This indicates varying perspectives on career advancement, emphasizing the necessity for personalized approaches to address individual concerns related to promotion and career development within the teaching profession.

Additionally, the determinants of salary, incentives, fringe benefits, and work-life balance displayed a bimodal distribution. Specifically, 62.20% of re-

spondents reported low satisfaction, while 37.80% indicated moderate satisfaction. This divided sentiment underscores the need for targeted interventions to address the diverse perspectives on compensation and work-life balance.

Overall, this analysis provides valuable insights into the varying degrees of satisfaction across different determinant factors. It highlights areas where educators express higher consensus, such as interpersonal/social relations, and identifies those that require more authentic strategies to enhance overall satisfaction among teacher educators.

4.5 Determinant Factors, Academic Qualification, and Work Experience Relationship

To assess whether there is a significant relationship between teacher educators' demographic characteristics and the determinants of job dissatisfaction, a Pearson Correlation analysis was computed. Table 5 presents the correlation matrix, offering insights into the relationships between these demographic factors and job dissatisfaction determinants.

Table 4: Correlation Result

	1	2	3	4
Academic Qualification			-.495*	-.372*
Work Experience		-.237*	-.549*	

The correlation matrix in Table 5 depicts the relationships between academic qualifications, work experience, and various factors influencing teacher educators' job satisfaction. Remarkably, a significant negative correlation was observed between academic qualifications and organizational policies and autonomy ($r = -0.372, p = 0.001$) and between promotion and advancement ($r = -0.495, p = 0.001$). This suggests that as academic qualifications increase, there is a tendency for educators to report lower levels of satisfaction with organizational policies and autonomy, as well as issues related to promotion and advancement. These findings underscore the importance of recognizing the nuanced impact of academic qualifications on specific aspects of job satisfaction within educational institutions.

Furthermore, work experience exhibited a significant negative correlation with promotion and advancement issues ($r = -0.237, p = 0.042$) and with salary, incentives, fringe benefits, and work-life balance ($r = -0.237, p < 0.042$). The negative correlation with promotion and advancement implies that as work experience increases, educators may perceive a diminishing level of satisfaction in these areas. Similarly, the negative correlation with salary, incentives, fringe benefits, and work-life balance suggests that more experienced educators may have lower satisfaction levels regarding compensation and work-life balance. These findings underscore the complex interplay between work experience and specific facets of job satisfaction among teacher educators.

It is crucial to emphasize that all reported significance levels were below the threshold of 0.05, underscoring the statistical significance of these correlations. The correlation analysis elucidated the intricate dynamics between academic qualifications, work experience, and various factors contributing to teacher educators' job satisfaction, emphasizing the need for targeted strategies in human resource management and professional development initiatives.

5 Discussion

This study examined the determinants of job satisfaction among teacher educators, aiming to identify

influential factors, examine correlations with demographic characteristics, and propose strategies for improvement. It was found that the majority of teacher educators were at the mid-career level and held the rank of lecturer. Recognizing this demographic composition is essential for tailoring interventions that address the unique needs of mid-career professionals in the teaching domain.

Regarding the factors affecting teacher educators' job satisfaction, salary, incentives, fringe benefits, and work-life balance emerged as the most significant factors. This aligns with the literature that highlights the pivotal role of compensation in educators' satisfaction (Huang *et al.*, 2019). Leadership, supervision, and recognition demonstrated a moderate satisfaction level, consistent with studies emphasizing the importance of supportive leadership in educational settings (Klassen *et al.*, 2018). The high mean score for interpersonal/social relations underlined the significance of positive social interactions in the workplace (Breaugh, 2020).

Furthermore, the study explored the distribution of determinants. It identified high satisfaction with interpersonal/social relations and diverse perspectives on promotion and advancement. The bimodal distribution in salary, incentives, fringe benefits, and work-life balance suggested a divided sentiment among respondents, emphasizing the need for nuanced interventions. These findings align with previous research indicating that satisfaction with promotion opportunities significantly impacts overall job satisfaction (Chiang & Birtch, 2019). The results have implications for crafting tailored strategies that address the unique concerns associated with promotion, compensation, and work-life balance.

Regarding the correlation analysis of the demographic characteristics of teacher educators and job satisfaction, the study found significant negative correlations between academic qualifications and organizational policies, autonomy, and promotion and advancement. These results highlighted the intricate relationship between academic qualifications and specific job satisfaction factors, emphasizing the need for targeted interventions. Work experience showed negative correlations with promotion and advancement and salary-related factors. These

findings align with the literature that shows the evolving nature of job satisfaction throughout an educator's career trajectory (Ingersoll & Strong, 2011).

Understanding the nuanced relationship between demographic characteristics and job satisfaction is crucial for educational institutions. The findings emphasized the need for personalized strategies that consider educators' career stages and specific concerns related to compensation, promotion, and work-life balance (Brewster *et al.*, 2021). Institutions should leverage this information to tailor professional development programs and human resource policies that address the unique needs of mid-career educators, thereby enhancing overall job satisfaction.

In light of the findings, it is imperative to formulate targeted strategies for enhancing job satisfaction among teacher educators. Initiatives focusing on improving compensation structures, recognizing the importance of leadership and social interactions, and addressing concerns related to promotion and work-life balance can significantly contribute to educators' contentment and overall well-being (Skaalvik & Skaalvik, 2017).

6 Conclusion

In conclusion, this research unraveled the intricate dynamics that shape job satisfaction among teacher educators, offering nuanced insights into the factors influencing their professional contentment. Its emphasis on demographic characteristics shed light on the unique challenges faced by mid-career educators, with a majority falling within the 11-20 years of work experience category and lecturers constituting the predominant academic rank. This demographic composition underscores the need for tailored strategies that acknowledge and address the distinct needs and expectations of educators at this career stage. Understanding the demographic landscape provides a solid foundation for institutions to craft interventions that resonate with the diverse experiences of their teacher educators.

Moving beyond demographic profiles, the exploration of factors influencing job satisfaction highlighted the multifaceted nature of educators' con-

tentment. Salary, incentives, fringe benefits, and work-life balance emerged as paramount concerns, aligning with existing literature that emphasizes the central role of compensation in educators' overall satisfaction. The findings also shed light on the significance of leadership, supervision, and recognition in fostering a positive work environment. The high mean score for interpersonal relations further accentuates the importance of cultivating supportive social interactions among educators. These factors collectively point toward the need for a holistic approach in designing strategies that encompass the diverse aspects of educators' professional lives.

The distribution of determinants offered a detailed glimpse into teacher educators' satisfaction across various dimensions. The majority expressing high satisfaction with interpersonal relations underscores the pivotal role of positive social interactions in contributing to overall job satisfaction. Conversely, the distribution of promotion and advancement-related factors reveals diverse perspectives, emphasizing the need for personalized approaches that consider individual concerns and aspirations related to career progression. The bimodal distribution in salary, incentives, fringe benefits, and work-life balance signifies a divided sentiment among respondents, calling for targeted interventions to address the spectrum of viewpoints on compensation and work-life balance. These findings provide institutions with a roadmap to design interventions that resonate with the varying needs and preferences of their educator workforce, fostering an environment conducive to sustained professional fulfillment.

Limitations and Future Research

In the realm of future research, acknowledging the study's limitations is crucial, and exploring additional factors such as organizational culture and workload is warranted (Meyer & Morin, 2016). A longitudinal approach could provide a comprehensive understanding of the dynamic nature of educators' satisfaction over time. Understanding the interplay of these factors could yield a more comprehensive picture of teacher educators' job satisfaction dynamics.

References

Abdullah, M. M. B., & Lin, L. H. (2019). Perceived task characteristics and its effect on employee engagement at private colleges in sarawak. *International Journal*, 2(10), 22-34.

Abdullah, A. M., Neamah, N. R., Kadhim, A. J., Hasan, A. A., Hassan, A. Y., Sabit, S. H., & Hrejha, N. I. (2022). The effect of teacher self-efficacy, workplace stress, workplace environment, and teacher engagement to improve the teacher's job satisfaction: A study on public and private sector universities of Iraq. *Educational Sciences: Theory & Practice*, 22(2), 260-274.

Abrahim, A. (2018). Exploring teacher-educators' job satisfaction using job descriptive index. *Horn of African Journal of Business and Economics (HAJBE)*, 2(1), 126-129.

Adebomi, O., Olufunke, I. H., & Bamidele, S. O. (2012). Job satisfaction and self-efficacy as correlates of job commitment of special education teachers in Oyo State. *Journal of Education and Practice*, 3(9), 95-103.

Alzen, A., & Ismi, N. (2023). The Role of Employee Performance: The Influence of Organizational Culture and Organizational Commitment. In Proceeding Medan International Conference on Economic and Business (Vol. 1, pp. 2354-2366).

Ananda, D. (2023). Optimizing Compensation and Motivation in Increasing Job Satisfaction and Employee Performance. *PRODUKTIF: Jurnal Kepegawaian dan Organisasi*, 2(2), 145-153.

Atmaca, Ç., Rızaoglu, F., Türkdoğan, T., & Yaylı, D. (2020). An emotion focused approach in predicting teacher burnout and job satisfaction. *Teaching and Teacher Education*, 90, 103025.

Ayandele, I. A. (2014). Hackman and Oldham Job Characteristics Model (JCM): A Review. *Canadian Social Science*, 10(2), 89-97. <https://doi.org/10.3968/4272>.

Bala, H., & Venkatesh, V. (2013). Changes in Employees' Job Characteristics During an Enterprise System Implementation: A Latent Growth Modeling Perspective. *MIS Q.*, 37, 1113-1140.

Barba-Sánchez, V., Gouveia-Rodrigues, R., & Meseguer-Martínez, Á. (2022). Information and communication technology (ICT) skills and job satisfaction of primary education teachers in the context of Covid-19. Theoretical model. *El Profesional de la información*.

Breaugh, J. A. (2020). Employee recruitment: Current knowledge and important areas for future research. *Annual Review of Organizational Psychology and Organizational Behavior*, 7, 171-193. <https://doi.org/10.1146/annurev-orgpsych-032119-114853>.

Brewster, C., Huettinger, M., & Rasmussen, T. (2021). Performance management: The neglected characteristics of effective performance feedback. *Journal of Organizational Behavior*, 42(1), 92-110. <https://doi.org/10.1002/job.2428>.

Cerci, P. A., & Dumluđag, D. (2019). Life satisfaction and job satisfaction among university faculty: The impact of working conditions, academic performance and relative income. *Social Indicators Research*, 144, 785-806.

Chiang, F. F., & Birtch, T. A. (2019). Predicting turnover and turnover intention: The role of personality, affective commitment, and job satisfaction. *Managing Global Transitions*, 17(2), 93-109.

Ghosh, M.S., & Joshi, D. (2016). How Organizational Climate Influences Job Satisfaction in Educational Sector – A Theoretical Perspective.

Hansen, A., Buitendach, J. H., & Kanengoni, H. (2015). Psychological capital, subjective well-being, burnout and job satisfaction amongst educators in the Umlazi region in South Africa. *SA Journal of Human Resource Management*, 13(1), 1-9.

Huang, L., Zhao, N., & Zhang, Z. (2019). Job satisfaction and turnover intention: A structural equation modeling approach. *Frontiers in Psychology*, 10, 1022.

Ingersoll, R. M., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of

the research. *Review of Educational Research*, 81(2), 201–233. <https://doi.org/10.3102/0034654311403323>.

Jabbar, S., & Naveed, Z. (2024). A study of the factors affecting job performance of university teachers in Islamabad and Rawalpindi. *Harf-o-Sukhan*, 8(2), 764-779.

João, Lopes., Célia, Oliveira. (2020). Teacher and School Determinants of Teacher Job Satisfaction: A Multilevel Analysis. *School Effectiveness and School Improvement*, 31(4), 641-659.

Johnson, S. M., Birkeland, S. E. (2003). Pursuing a sense of success: New teachers explain their career decisions. *American Educational Research Journal*, 40(3), 581-617.

Karmakar, P., Saha, B., & Adhikari, S. (2023). To Explore the Job Satisfaction of School Teachers of Purulia District. *IJFMR-International Journal For Multidisciplinary Research*, 5(1).

Khalid Salaudin, A., Ahmad Kamal, A., & Mohammad, M. (2022). The Job Characteristics Model: An Extension to Physical Education Teachers Motivation. *Online Submission*, 1(2), 198-205.

Klassen, R. M., Perry, N. E., & Frenzel, A. C. (2018). Teachers' relatedness with students: An underemphasized component of teachers' basic psychological needs. *Journal of Educational Psychology*, 110(3), 397–409. <https://doi.org/10.1037/edu0000225>

Meyer, J. P., & Morin, A. J. (2016). A person-centered approach to commitment research: Theory, research, and methodology. *Journal of Organizational Behavior*, 37(4), 584-612. <https://doi.org/10.1002/job.2056>

Oldham, G. R., Hackman, J. R., & Pearce, J. L. (1976). Conditions under which employees respond positively to enriched work. *Journal of applied psychology*, 61(4), 395.

Omar, E. N., Hassan, N., Demong, N. A. R., Hassan, L. F. A., & Alwi, A. (2022). The Influence of Job Characteristics towards Job Outcomes among the Employees. *Global Business and Management Research*, 14(4s), 50-57. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(11), 6499-6506.

O'Shea, C. (2021). How Relationships Impact Teacher Job Satisfaction. *International Journal of Modern Education Studies*, 5(2), 280-298

Pérez Fuentes, C. A., Alvarez Maestre, A. J., Cardona Rivas, A. M., Aguilar Barreto, A. J., & Sanabria Alarcón, R. K. (2023). Job satisfaction and teacher education: Correlational study in postgraduate graduates in education. *Education Sciences*, 13(2), 198.

PIKL, L. (2023, May). The relationship between organizational pride, job characteristics and job satisfaction: A literature review. In *7th FEB International Scientific Conference* (p. 329).

Quarstein, V. A., McAfee, R. B., & Glassman, M. (1992). The situational occurrences theory of job satisfaction. *Human relations*, 45(8), 859-873.

Raiany, Stefane, Saué, Poloni., João, Arémio, Lamego, Lopes., Célia, Regina, de, Ávila, Oliveira. (2022). Satisfação profissional do professor: uma análise multinível de características individuais do professor e de características organizacionais da escola. *Psique*, 18(1) <https://www.doi.org/10.26619/2183-4806.xviii.1.2>.

Sa'ban, D. T. (2020). The Role of Educators in Improving Children's Spiritual Intelligence through Role Playing Learning Methods. *SPEKTRUM: Jurnal Pendidikan Luar Sekolah (PLS)*, 8(2), 207-211.

Singh, A., Singh, S.K., & Khan, S. (2016). Job characteristics model (JCM): utility and impact on working professionals in the UAE. *International Journal of Organizational Analysis*, 24, 692-705.

Skaalvik, E. M., & Skaalvik, S. (2017). Still motivated to teach? A study of school context variables, stress and job satisfaction among teachers in senior high school. *Social Psychology of Education*, 20(1), 15–37. <https://doi.org/10.1007/s11218-016-9369-7>

Sotardi, V.A., & Brogt, E. (2023). Supporting Tertiary Educators: Insights from the COVID-19 Shift to Online Teaching and Learning and the Role of Senior Management. *New Zealand Journal of Educational Studies*, 58, 417-439.

Srivastava, S., & Chabra, S. (2012). Job satisfaction among teacher educators: interplay of gender and qualification. *Researcher*, 4(8), 25-29.

Tran, V. D. (2015). Effects of Gender on Teachers' Perceptions of School Environment, Teaching Efficacy, Stress and Job Satisfaction. *International Journal of Higher Education*, 4(4), 147-157.

Tria, J. Z. (2023). Job satisfaction among educators: A systematic review. *International Journal of Professional Development, Learners and Learning*, 5(2), ep2310.

Tsigilis, N., & Koustelios, A. (2020). Development and validation of an instrument measuring core job characteristics. *International Journal of Educational Management*, 34(2), 373-385.

West, J.L., Gasman, M., Ginsberg, A.C., & Samayoa, A.C. (2023). The Perspectives of Teacher Education Candidates on Their Teacher Education Programs: The Case of Jackson State University. *Journal of Negro Education*, 91, 500 - 512.

Yüksel, P., & Yıldırım, S. (2015). Theoretical Frameworks, Methods, and Procedures for Conducting Phenomenological Studies in Educational Settings. *Turkish Online Journal of Qualitative Inquiry*, 6, 1-20.

Yousaf, M., Quershi, A. A., & Shaheen, A. K. (2024). Effect of Wellbeing on Turnover Intentions of University Teachers. *Human Nature Journal of Social Sciences*, 5(2), 248-260.

Zare, R., & Abbasi, N. (2010). Relation Between Job Characteristics Model (JCM) and Learning Organization (LO).



DILLA JOURNAL OF EDUCATION (DJE)
© 2023 Dilla University