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Editorial

In today's world, which is prone to emergencies, the resilience of an education system — often conceptualised as its capacity to absorb, resist and adapt to disturbances while ensuring the continuity of its vital functions (Cameron et al., 2024) — has become a key topic of discussion in the field of education. Shocks and stressors, including intense conflicts, climatic hazards, natural disasters such as flooding, earthquakes and landslides, and pandemics, have a huge impact on education in general and on schooling in particular. These shocks and stressors result in significant physical losses, including the destruction of schools and facilities, the displacement of children and teachers, and the death or disability of educators and caregivers. According to UNICEF (2025), at least 242 million students in 85 countries or territories experienced disruption to their schooling due to extreme climate events, including heatwaves, tropical cyclones, storms, floods and droughts, in 2024. This has exacerbated an existing learning crisis. According to the report, 74% of these children are from low- and lower-middle-income countries. Another source (Amani Africa, 2025) estimated that 80 million children were affected by armed conflicts across Africa. Regarding Ethiopia, the source stated the following:

... an estimated 9 million children remain out of school due to the combined impact of conflict, climate-related disasters, and displacement. Around 18% of educational institutions have been damaged or destroyed, particularly in regions affected by conflict. This has further aggravated school dropout rates, particularly affecting female students in rural and border areas (p. 1).

The Education Sector Analysis (MoE 2025) report and reports from several development partners (e.g. UNICEF) paint a similar picture of a dire situation, although the reported numbers may vary slightly.

At an individual level, the psychosocial losses experienced by students, teachers, school leaders and other stakeholders can be considered equally, if not more, devastating. Children are exposed to stressors and hazards that can lead to traumatic experiences, which are often difficult to recover from and can have a significant impact on education (Maynard et al., 2019). Losing loved ones or caregivers, being forced to leave one's home, and experiencing the horror of war or natural disasters can have traumatic consequences for children and adults alike. These consequences can directly impact education.

Shocks and stressors affect not only individuals or groups, but also the system as a whole. If we consider a system to be a unified, interdependent whole comprising people, norms, and infrastructure that work together for a common purpose (Arnold & Wade, 2015), then shocks and stressors will disrupt its functioning and result in an educational crisis. Therefore, when we talk about the resilience of an educational system, we are referring to its multiple dimensions, which extend beyond recovery to a previous state or achieving a new equilibrium to include continuous adaptation and proactive anticipation of changing circumstances. This conception differs greatly from the view that the educational response after a crisis is purely an emergency response, limiting the transformative role of the resilience approach (Shah, Paulson & Couch, 2019).

Although the papers included in the current issues of the Ethiopian Journal of Teacher Education and Leadership (EJTEL) do not directly address the resilience of educational systems or matters of resilience in education, we would like to emphasise that this topic should be the subject of academic debate, educational research and policy dialogue. Explaining what keeps educational actors (teachers, school leaders, etc.) going despite the challenges they face in times of crisis is an important academic endeavour. We encourage researchers to consider this area for their research. With this in mind, we would like to briefly introduce the articles included in the current issue of EJTEL.

The article 'Factors Affecting Women's Participation in Educational Leadership Positions at Elbethel Private Academy', by Befekadu Zeleke and Biniyam Asfawossen, argues that female representation in school leadership is a strategic necessity for creating diverse, inclusive and high-performing educational environments that reflect the communities they serve. The study found that females are often underrepresented in school leadership positions. Focusing on factors affecting women's participation in leadership positions at Elbethel Private Academy in Addis Ababa, the study used a descriptive survey design to collect data from teachers, school principals and human resource managers via a questionnaire. The results revealed that organisational factors, family responsibilities, economic factors, and women's self-perceptions are among the factors impacting women's participation in educational leadership. The researchers emphasised that understanding and addressing these factors is essential for promoting gender equality and empowering women in educational leadership.

The paper by Ethiopia Ergogo Gunjebo and Dawit Mekonnen Mihiretie, which compared primary education in Ethiopia and Singapore in terms of educational purposes, structures, governance and curricular practices, aimed to identify potential lessons for improving education in Ethiopia. Employing Bereday's four-step comparative analysis model, the study adopted a qualitative methodological approach. Data were sourced from recent policy documents, academic literature and international reports. Overall, this comparative analysis highlights the influence of socio-economic, cultural and political factors on educational purposes and practices. The study offers valuable insights for policymakers and educators seeking to enhance primary education outcomes in various contexts.

The article, titled 'Research on Education in Emergencies: Current Status and Dilemmas', Ambissa Kenea Boru argues that sound, ethical and rigorous reflective research practices are essential for developing education in emergencies as a strong, respected field of study. This review examines the current state of research in this area and the associated challenges. Relevant articles published in peer-reviewed journals since the mid-1990s were consulted for the review, as well as grey literature, particularly with regard to the status of research conducted on education in emergencies. The results of the scoping review indicated that studies focusing on conflict, qualitative research and practical applications dominate research in this area. Researchers and research funding are predominantly from the Global North. The study also identified dilemmas in research on education in emergencies. Implications were deduced for the graduate-level training of personnel specialising in education in emergencies.

Woldie Belachew's article, which focused on 'Conceptual Change (CC) for Improving Chemistry Education in Ethiopia', was based on a review of the literature on the topic. The paper indicates that research on CC has demonstrated that students often struggle when learning involves substantial modifications to their existing knowledge. Despite the extensive and sophisticated discourse surrounding CC theories and strategies in science education, the paper

argued that there is a notable failure to translate these well-researched frameworks into substantive conceptual understanding among learners. It also highlights empirical research showing improved learning outcomes through CC approaches. The article uncovers the complexities and best practices for facilitating CC in chemistry, with the aim of enhancing teaching methods and student comprehension. The author provides a set of informed conclusions and actionable recommendations.

The article, titled ‘Curriculum Alignment with Labour Market Demand and National Development Goals’, explores the issue using the case of the Civil Engineering Undergraduate Programme at Addis Ababa University (AAU), as authored by Adinew Ereballo Atesso. This qualitative study collected primary data from senior faculty members, Ministry of Education officials and experts, private company representatives (employers), and senior engineering students. Relevant policy and curricular documents were also analysed. The study's findings revealed significant gaps in the AAU civil engineering curriculum, including a lack of alignment with national development goals and labour market demands. Several institutional and instructional challenges were also identified. With a focus on theoretical knowledge, the curricular and pedagogical processes lacked practical skill training, contributing to a mismatch between the skills of graduates and those required by employers. The paper concluded that institutional barriers and a lack of organised feedback from stakeholder involvement exacerbate these problems further.

The EJTEL editorial team would like to invite our esteemed audience to read the articles included in the current issue.

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Editor-in-Chief, EJTEL.

Factors Affecting Women's Participation in Educational Leadership**Positions at Elbethel Private Academy**Befekadu Zeleke^{1*} and Biniyam Asfawossen²

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Abstract:

Female representation in school leadership is not just a matter of demographic parity; it is believed to be a strategic necessity for creating diverse, inclusive, and high-performing educational environments that reflect the communities they serve. Unfortunately, females are often underrepresented in school leadership. This Study explores factors that affect women's participation in leadership positions at Elbethel Private Academy in Addis Ababa. A descriptive survey design was used to carry out the Study. Data was collected from teachers, school principals, and human resource managers using questionnaire. Descriptive and inferential statistics were used to analyze the data. The findings of the Study indicate that organizational factors, such as a lack of support from senior management and limited recruitment practices for attracting female candidates hinder women's participation in leadership positions. Family responsibilities, including marriage and parenting, also affect women's ability to engage fully in educational leadership roles. Economic factors, such as financial barriers and disparities, pose challenges to women's representation. Women's self-perceptions, fear of success, and attitudes toward work-family balance influence their leadership participation. Additionally, success in higher education plays a crucial role in encouraging women to apply for top leadership positions, while addressing historical inequalities in educational opportunities is necessary. Understanding and addressing these factors are essential for promoting gender equality and empowering women in educational leadership.

Keywords: *Gender, Leadership, Sex stereotypes, Women empowerment,*

Background of the Study

Historically, leadership position has been considered as a sole province of masculine concept. Until very recently, women have not been given opportunities to become leaders, such conceptualization of leadership as a masculine province has been concretized because of the nature of the workplaces and organizational atmospheres that reflect traditionally masculine

values of competition, aggression, and achievement (Heilman et al., 2024). According to Nater et al. (2024) the activities of leadership becomes traditionally associated with masculinity. In this regard, women's possibility of assuming leadership and managerial positions seemed to be confounded by sex case stereotypes. Gender imbalances in workplaces are global truth even though the depth varies between the developed and developing countries. The global picture is evidence of men outnumbering women about 20:1 ratio in senior management levels (ILO, 2018). The reason would be either equal opportunity goes unnoticed by decision makers, or is not an issue of concern. Women bear almost all responsibility for meeting basic needs of their family, yet are systematically denied the resources, information and freedom of action they need to fulfill these responsibilities. The vast majority of the world's poor are women. Two-thirds of the world's illiterates are female. Of the millions of school age children not in school, the majority are girls.

Despite their significant contributions in productive, reproductive, and managerial roles, women continue to be underrepresented in public life, particularly in positions of leadership and decision-making. Recent studies indicate that entrenched gender norms and institutional biases still limit women's visibility and participation in governance and leadership structures (Heilman et al., 2024; UN Women, 2023; World Bank, 2022). Contemporary research further shows that societal expectations continue to position men as primary actors in the public sphere, while women's leadership remains undervalued or questioned, leading to their exclusion from key decision-making bodies (Eagly & Nater, 2020; United Nations Development Programme [UNDP], 2023). As a result, both structural barriers and persistent cultural attitudes contribute to the limited representation of women in policy-making and governance institutions.

Most research shows that the exclusion of women from power positions is associated with traditional stereotypes that link leadership to masculinity. Empirical studies demonstrate that women leaders are often evaluated through biased lenses and portrayed as less suitable for leadership roles, reinforcing their underrepresentation in political and decision-making spaces (Brugnoli et al., 2022; Leavy, 2020; Nater et al., 2025). Consequently, women are frequently excluded or overlooked in policy reforms and democratic governance initiatives.

Review of Related Literature

Several factors account for women under representation in leadership positions including women in educational leadership positions. Although there are different ways of classifying these factors, the following are considered in this Study.

Socio-cultural barriers

One of the major challenges limiting women's access to leadership positions in schools is rooted in socio-cultural structures that reinforce gender divisions. Contemporary research indicates that deeply embedded cultural norms in many societies continue to assign distinct roles and responsibilities to men and women, often positioning leadership as a masculine domain (Heilman et al., 2024; Eagly & Nater, 2020). These gendered expectations are particularly evident in many developing countries, where social institutions and cultural traditions prescribe

appropriate behaviors based on gender, thereby constraining women's leadership aspirations and opportunities. As a result, leadership roles are more frequently associated with men, while women who pursue such positions may face social resistance, including negative judgments, reduced social acceptance, and pressures related to family and marital expectations (UN Women, 2023; World Bank, 2022). Such socio-cultural barriers continue to marginalize women and limit their participation in educational leadership and decision-making processes.

Individual-level factors continue to play a significant role in limiting women's participation in educational leadership and management. Recent research shows that internalized gender stereotypes often shape women's self-perceptions, leading to lower self-confidence, reduced leadership aspirations, and heightened fear of criticism or failure (Eagly & Nater, 2020; Heilman et al., 2024). Many women may underestimate their leadership capabilities or hesitate to pursue leadership roles due to the anticipation of bias, negative evaluation, or social backlash. This phenomenon is reinforced by what scholars describe as the "confidence gap," where women are less likely than men to put themselves forward for leadership opportunities even when equally qualified (Heilman et al., 2024).

In addition, socio-cultural conditioning plays a critical role in shaping these individual attitudes. In contexts such as Ethiopia, particularly in rural areas, traditional norms and religious influences continue to define gender roles in ways that discourage women's public leadership (UN Women, 2023; World Bank, 2022). These cultural expectations often lead women to prioritize domestic responsibilities over professional advancement and may create internal conflicts when pursuing leadership roles. As a result, women may self-select out of leadership pathways or limit their ambitions, further reinforcing their underrepresentation in decision-making positions. Overall, the interaction between internal psychological barriers and external cultural expectations continues to constrain women's active engagement in educational leadership.

Socialization and Sex Role Stereotyping

Gender-based socialization and sex-role stereotyping continue to influence perceptions of leadership ability and constrain women's access to administrative positions. Contemporary research indicates that women are often associated with communal traits such as warmth, empathy, helpfulness, and kindness—qualities that are culturally valued but do not align with traditional conceptions of leadership as assertive and agentic (Heilman et al., 2024; Eagly & Nater, 2020). While these stereotypes may appear positive, they frequently undermine perceptions of women's competence, authority, and suitability for leadership roles, contributing to biased evaluations in professional settings (Heilman et al., 2024; Ely et al., 2022).

Sex-role stereotyping also shapes organizational practices by normalizing male dominance in decision-making positions and discouraging women from seeking leadership roles. Studies show that both men and women internalize these cultural expectations, often reinforcing the status quo and perpetuating discriminatory practices against women in leadership (Heilman et al., 2024; UN Women, 2023). These biases influence how leadership qualities are evaluated:

assertiveness, risk-taking, and decisiveness are typically seen as male characteristics, while communal behaviors in women may be interpreted as a lack of authority or competence (Eagly & Carli, 2023).

However, research on transformational leadership suggests a partial challenge to these stereotypes. Women often exhibit higher transformational leadership behaviors than men, emphasizing collaboration, inspiration, and mentorship, which can positively impact organizational outcomes (Diehl & Dzubinski, 2019; Eagly & Carli, 2023). Despite this, prevailing sex-role stereotypes still depict men as inherently more suited to leadership because masculine traits such as assertiveness, competitiveness, and courage are culturally associated with authority and the respect required to manage subordinates effectively (Heilman et al., 2024; Eagly & Nater, 2020). In short, socialization and entrenched sex-role stereotyping create both psychological and structural barriers that limit women's leadership participation. These stereotypes not only affect how women are perceived but also shape organizational norms, expectations, and selection processes, perpetuating gender inequality in leadership positions across multiple sectors.

Work Life Balance

The different personal and professional responsibilities, especially the demanding family and home responsibilities, do not align well to the personal and organizational goals, and therefore, this impact on the progress or growth of women leaders since women have to adjust and accommodate various needs and commitments (Shakeshaft, 2009). Especially in Africa including in Ethiopia, women besides carrying out the role of an administrator or leader, they perform social or family roles and responsibilities of being a mother, sister, wife and student, and this hinders in their leadership involvement and performance.

Women's Educational Level

There is adequate evidence that educating women is beneficial at the national, community, family and individual levels. Research indicates that achieving equitable representation of women in educational administration requires targeted education and professional development programs for women teachers (Heilman et al., 2024; UN Women, 2023). Even basic education enables women to engage more effectively in economic activities, contributing to increased national productivity and economic growth. At the family level, educated women are associated with lower fertility rates, improved child health and education outcomes, and reduced maternal and infant mortality (World Bank, 2022; UN Women, 2023). At the societal level, women with education are more likely to participate in development initiatives and engage in political and economic decision-making processes. In male-dominated contexts, however, women's lack of confidence is often compounded by structural barriers such as limited access to education, inadequate professional infrastructure, and the low social status of women, which together restrict their opportunities to pursue leadership positions (Eagly & Nater, 2020; Heilman et al., 2024).

Women's lack of self-confidence or Women's Perception

Lack of confidence has consistently been identified as a key barrier limiting women's aspirations for educational leadership positions in secondary schools (Heilman et al., 2024; Coleman, 2003). Historically, women have been observed to experience heightened anxiety regarding achievement, not because they desire failure, but because of anticipated negative consequences associated with success, which can diminish their motivation to pursue leadership roles (Horner, 1972; Eagly & Nater, 2020). In the education sector, female principals are less likely than their male counterparts to seek positions beyond the principalship, reflecting both structural and psychological constraints (Liu, 2000; UN Women, 2023). Traditional cultural values and societal expectations continue to reinforce feelings of inadequacy and inferiority among women teachers, further undermining their confidence to assume leadership responsibilities (Archer & Lloyd, 2002; World Bank, 2022). These findings unpack the interplay between individual, social, and institutional factors in shaping women's self-efficacy and leadership trajectories in education.

Institutional Factors

According to the study of Folmar, (1989), stereotypes of women by superintendents and school board members are a major barrier for their principalship success. The study of Lihamba *et al.* (2006) show that in many school board members, search consultants, search committee members, practicing administrators, and private citizens continue to believe old myths that have prevented women from becoming educational leaders in the past. Most research studies conclude that the biggest barriers to career advancement among women are beyond their personal control. The Glass Ceiling Commission indicts Organizational and structural barriers as the most predominant barriers toward women's upward climb in the career ladder. Recent research indicates that institutional structures, including job assignments, continue to reinforce gendered divisions of labor that hinder women's advancement into top administrative positions. Women are still disproportionately associated with teaching roles, while leadership positions such as school principals are often culturally aligned with men, reflecting persistent gender stereotypes in education systems (Gunter, 2016; Datnow & Park, 2018). Furthermore, studies reveal that female school leaders frequently experience limited institutional support, including inadequate mentoring, restricted access to resources, and insufficient time for effective implementation of policies, which can contribute to feelings of frustration and professional isolation (Fuller, 2017; Grogan & Shakeshaft, 2011). In the context of Ethiopia, the Government has demonstrated a commitment to reducing gender-based stereotypes and promoting women's participation across all sectors. This commitment is reflected through engagement in national, regional, and international initiatives aimed at addressing structural and cultural barriers to gender equality. Key measures include the establishment of dedicated institutional bodies such as the Ministry of Women's Affairs, the development and implementation of gender mainstreaming policies, and the integration of affirmative action strategies in education, employment, and public administration (UN Women, 2023; World Bank, 2022). Furthermore, the Government has aligned its strategies with the **Sustainable Development Goals (SDGs)**, particularly **Goal 5: Achieve gender equality and empower women and girls**, as well as other

gender-responsive development frameworks such as the African Union Gender Strategy and the United Nations Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). These initiatives collectively aim to create enabling environments where women can participate equally in decision-making, leadership roles, and socio-economic development, while simultaneously challenging entrenched gender norms and reducing systemic disparities (UN Women, 2023; World Bank, 2022). In the area of education sectors, the school leadership systems of Ethiopia have passed through a series of policy reforms in the last three decades. Key reform areas ranged from improving quality and relevance of programs to promoting equality in access to and success in Education. Ethiopia has demonstrated a commitment to advancing gender equality by aligning its national policies with global frameworks such as the Sustainable Development Goals (SDGs), particularly Goal 5: Achieve gender equality and empower all women and girls, and regional initiatives like the African Union Gender Strategy 2018–2028 (UN Women, 2023; African Union, 2020). These frameworks emphasize the elimination of gender disparities in education, leadership, and decision-making, with benchmarks that aim to empower women across all sectors by 2030. Despite these efforts, Ethiopian women remain underrepresented in both education and leadership positions, mirroring global patterns of gender inequality.

The present Study focuses on investigating the factors that constrain women's participation in educational leadership, specifically within private education institutions in Addis Ababa. The Study is based on ten branches of Elbethel Private Academy and aims to critically examine the persistent underrepresentation of women in management positions. Data from the Addis Ababa City Education Bureau indicate that women occupy only a small fraction of educational leadership roles; for instance, recent reports show that approximately 14% of leadership positions in secondary schools are held by women, compared to 86% by men (Addis Ababa City Education Bureau, 2004). This stark disparity highlights the continuing challenges faced by women aspiring leadership roles in education, despite national and international policy commitments. Consequently, this Study seeks to identify the individual, socio-cultural, and institutional factors that hinder women's full participation in educational leadership at Elbethel Private Academy.

Statement of the Problem

Women in managerial or administrative, technical and scientific positions are under represented. Different authors reported that it is a global fact that women's proportion in leadership positions is insignificant in comparison with their number in the world's population, (Jayaweera, 1997, Abebayehu, 1995 and Yalew 1997). Some African countries like Zambia have been implementing the policy of balancing leadership position in school following the rules of selection of school leadership in such a way that when there is a male school director, the deputy must be a female. Besides, when there is a female school director, the deputy must be male. This means that school leadership is now less gender biased (MoE, 2006). In practice, however, it has been observed that women are marginalized in the leadership positions within the education system (MoE, 2010).

Although there has been progress in increasing the number of women in leadership roles, gender inequality and discrimination continue to persist, particularly in developing countries like Ethiopia. Because of traditional thinking the perception of women in leadership is still very low (Aretha, 1993). Despite the government's efforts to improve gender equality and increase women's participation in leadership positions, women still lag behind in leadership positions in education. The problem is particularly evident in the Ethiopia's private education system, where there seems to be a lack of women in leadership positions. According to the Ethiopian Ministry of Education, at the country level women hold only 12.5% of principal positions in secondary schools, while men hold the remaining 87.5% (MoE, 2010).

The issue of gender inequality in leadership positions is a persistent problem in Ethiopia, particularly in private schools. Hence, women's participation in leadership positions is an essential issue to address. Despite the importance of this issue, there is a limited research that has been conducted on the participation of women in leadership positions in private schools in Ethiopia. According to a report by the Ethiopian Private Schools Association (EPSA), only 10% of private schools in Ethiopia are owned and led by women. The under-representation of women in leadership positions in private schools has significant implications for the quality of education and the development of future leaders in Ethiopia.

Therefore, the current Study attempts to address factors that might have limited the representation of women in leadership positions in private schools. The Study aims to explore the challenges that women face to assume leadership positions in Elbethel private academy as one of the private schools.

Research questions

1. What are the different social factors affecting women's participation in leadership positions in Elbethel private academy?
2. What are the different personal factors that affect women's in participating in leadership positions in Elbethel private academy?
3. What are the different institutional factors affecting women's participation in leadership positions in Elbethel private academy?
4. Are there statistically significant relationships between respondents' perceptions of the socio-cultural, personal, and institutional factors and women's participation in leadership positions in Elbethel private academy?

Conceptual Frame work of the Study

Based on different theories and empirical evidence discussed in this chapter the factors (social and personal) which hinder or affect the representation and participation of women's in private schools leadership positions are conceptualized by the following diagram.

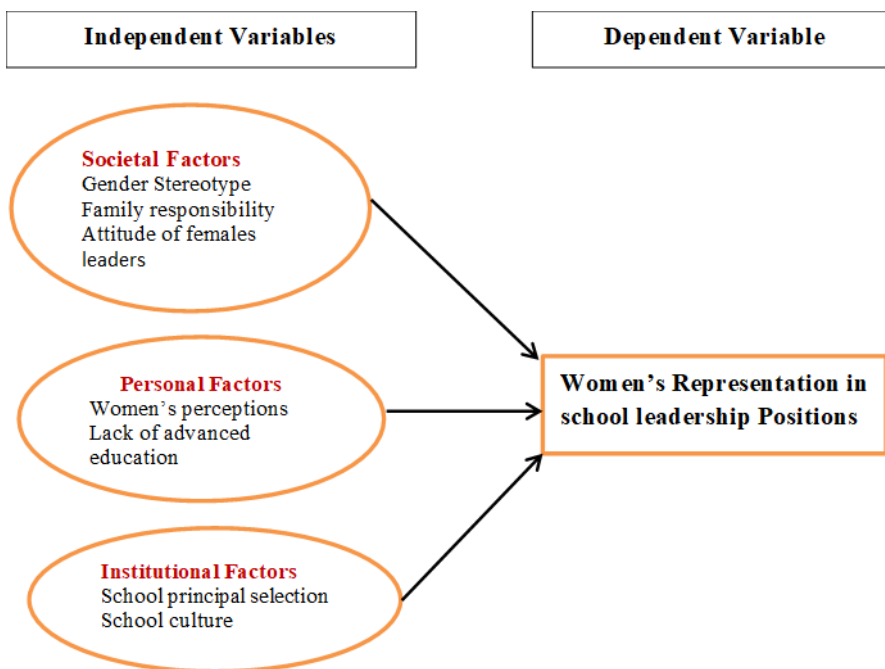


Figure 1: *Conceptual frame work of the study Source?*

Methodology

Study Design

This Study was aimed to study factors affecting women's participations in educational leadership positions at Elbethel Private Academy in Addis Ababa. A descriptive survey design was used to conduct the Study since it is important to describe and interpret both qualitative and quantitative data as well as to get information on the current situation of the Study problems (Best & Kahn, 2008) and (Creswell, 2003).

Population and Sampling Techniques

The targeted populations of this study were teachers, department heads, school principal, vice principals and human resource management of Elbethel Academy. The selected Academy or School has ten branches in Addis Ababa. The total population of the Academy in the ten branches in Addis Ababa was 300 (168 Male and 132 Female). Among this target population a sample of 171 respondents were selected using simple random sampling technique. Purposive sampling technique was employed to select the principals or focal persons of the organizations because they have better knowledge about the issue under study. The following formula was used to determine the sample size of the population. A representative sample size with known confidence level which is 95% was selected, based on the formula of (Yamane, 1967). Therefore, considering the above given points the sample size for this study was calculated as follows:

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

Where, n = sample size required = 171, N = Population Size = 300 i.e. in the ten schools in Addis Ababa, e = 0.05. As a result, 171 respondents were randomly selected for the Study. The number of respondents in each branch of Elbethel Academy was determined using proportional methods. This means after the sample size determination, the sample respondents from each sample School were determined proportionately and selected using simple random or a lottery method.

Data Collecting Instruments

The intended information for the Study was gathered by using questionnaires, a structured and semi-structured interview, and document analysis.

The questionnaire was comprised of both closed and open-ended items. It had two parts; the first part consisting background information of respondents while the second part constituted items on factors affecting female's participation in educational leadership positions. In this part, each item was prepared in the form of a five-point Likert scale ranging from strongly agree to strongly disagree.

To check the reliability of internal consistency of the independent variable Alpha Cronbach technique was employed. The Cronbach Alpha values of social factors, organizational factors, educational factors, personal factors, family factors, and current leadership status of women were 0.987, 0.985, 0.933, 0.980, 0.937, and 0.976 respectively. Thus, it can be concluded that the measurement item or statement can be trusted (reliable) and the data is feasible to be used in the subsequent analysis.

Table 1: Reliability test results

Variables	Cronbach Alpha
1. Social factors	0.99
2. Institutional factors	0.98
3. Educational factors	0.93
4. Personal factors	0.98
5. Family factors	0.94
6. Women's leadership status	0.98

Source: Result of SPSS reliability output, 2024

Method of Data Analysis

For quantitative data analysis, the data from the questionnaire were coded into a computer using Statistical Package for Social Science (SPSS) version 24 computer programs for data analysis and quantitatively analyzed by using descriptive statistics such as percentage, frequency, and mean. To measure the strength of the relationship between independent and dependent variables Pearson correlation (r) was employed.

Results and Discussions

Demographic Characteristics of the Respondent

Out of the total respondents, 87.7% were female and the remaining 12.3% were male. In terms of age distribution, the majority of respondents fell within the 26-35 age range, comprising 36% of the participants. Regarding educational background, the majority of respondents (66%) held a BA/BSc degree. Around 17% possessed an MA degree, while 16% had a diploma. In terms of work experiences, the largest proportion of respondents had 1-5 years of experience (31%), followed closely by those with 6-10 years (28%). In the marital status category, the majority of respondents were married (56%), while 37% were single. Among the total respondents, about 50% were teachers, followed by department heads (22%), vice principals/principals (17%), and unit leaders/supervisors (6% each).

Social Factors

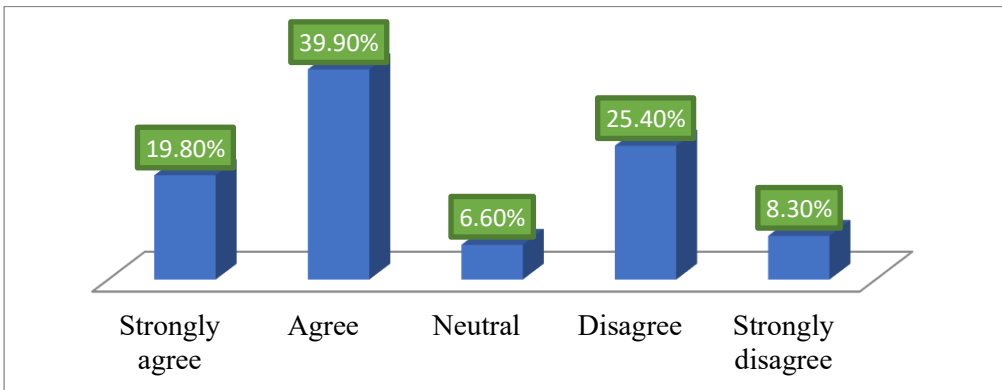


Figure 2: *Respondents' Perception of the Effects of Gender Stereotypes on women's leadership participation*

Above, Figure 2 shows that about 19.8%, 39.9%, 6.6%, 25.4%, and 8.3% of the respondents said strongly agree, agree, neutral, disagree, and strongly disagree respectively. The findings suggest that a significant proportion of respondents (59.8%) agreed on the influence of gender stereotypes on women's leadership participation or representation at private schools in Addis Ababa. This indicates that a considerable number of respondents believe that gender stereotypes act as a barrier to women's ability to participate and hold leadership positions in Elbethel Academy. These findings align with recent literature on gender stereotypes and leadership. Multiple contemporary studies indicate that gender stereotypes continue to shape biases and prejudice, creating structural and perceptual barriers that limit women's access to leadership positions (Heilman et al., 2024; Eagly & Nater, 2020; UN Women, 2023). Stereotypes that link leadership with traditionally masculine traits influence perceptions of women's competence, confidence, and suitability for leadership, ultimately constraining their opportunities for career advancement and leadership participation.

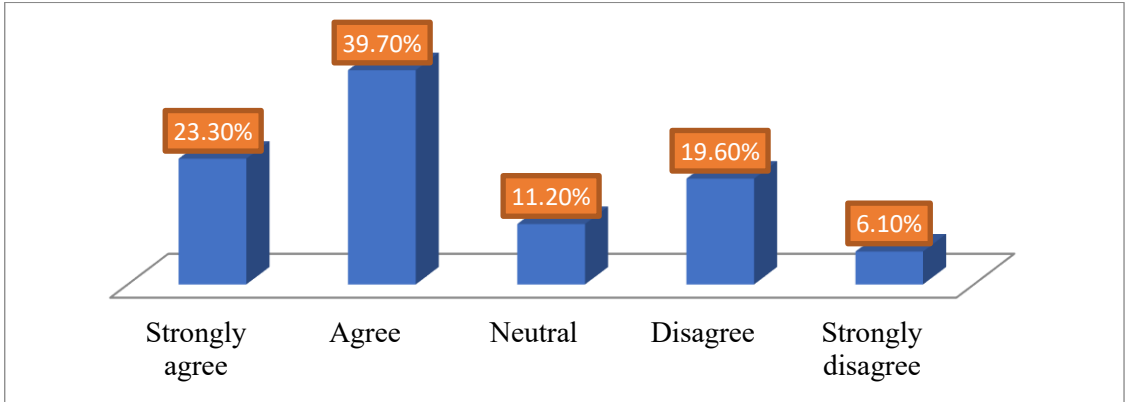


Figure 3: Responses on Societal Attitudes Towards Women's Participation in Leadership Positions

As indicated in Figure 3 above, about 23.3% of the respondents strongly agree, 39.7% agree, 11.2% neutral, 19.6% disagree, and 6.1% strongly disagree on the effects of social attitude on women's leadership participation. The findings indicate that a significant proportion of respondents 63% i.e. (23.3% + 39.7%) agreed on the influence of social attitudes on women's leadership participation or representation. This suggests that a significant proportion of respondents believe that societal attitudes act as a barrier to women's ability to participate and hold leadership positions in Elbethel Academy. These findings are consistent with the broader literature on gender equality and women's empowerment in Ethiopia. The Ethiopian context is characterized by deeply ingrained cultural norms and social expectations that often restrict women's access to leadership positions and perpetuate gender-based stereotypes (Bogale *et al.*, 2017; Geleta, 2018). Traditional gender roles, biased perceptions of women's capabilities, and unequal power dynamics can hinder women's progress and representation in educational leadership roles.

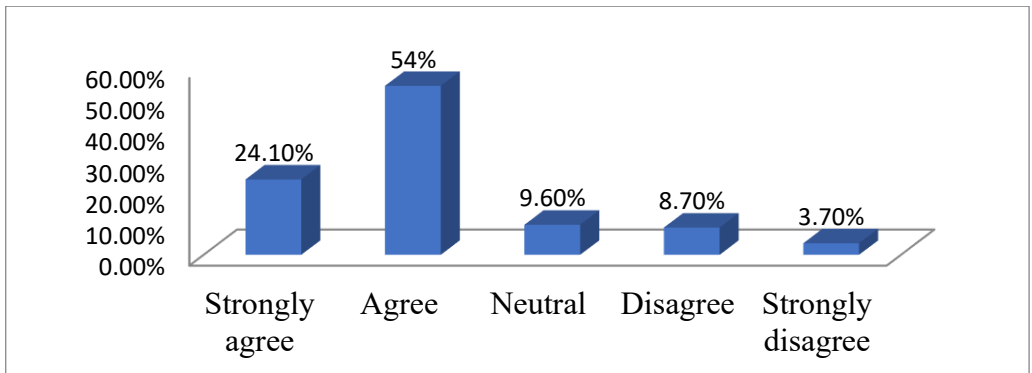


Figure 3: Institutional factors affecting women's participation in leadership positions

As shown in Figure 3 above, the highest percentage of respondents (54%) agreed that organizational factors have an impact on women's leadership participation. This finding suggests that the participants recognize the effects of organizational factors in shaping women's

involvement in leadership positions. Furthermore, (24.10%) of the respondents strongly agreed with the notion that organizational factors influence women's leadership participation, this indicates a significant portion of the participants strongly believe that factors within the organization directly affect women's ability to take on leadership roles. These individuals likely perceive the presence of barriers or opportunities within the organization that can hinder or support women's leadership aspirations. On the other hand, 12.4% of the respondents disagreed and strongly disagreed with the idea that organizational factors affect women's leadership participation. Organizational factors, such as inclusive policies, supportive work environments, equal opportunities, and mentorship programs, have been identified as crucial in promoting women's leadership participation (African Union, 2010; Girma *et al.*, 2020). When organizations prioritize gender equity, create a conducive culture, and provide resources and support, women are more likely to thrive in leadership positions.

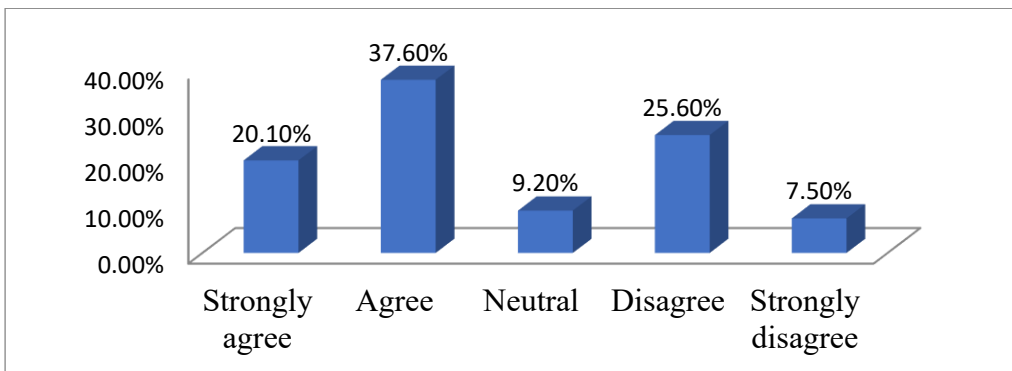


Figure 4: *Respondents' perceptions on family responsibility as a factor for women's participation in leadership*

As depicted in Figure 4 above, about 20.1% of respondents strongly agree, 37.6% agree, 9.2% are neutral, 25.6% disagree, and 7.5% strongly disagree. The findings suggest that a significant proportion of respondents (57.7%) agreed on the influence of family responsibility on women's leadership participation or representation. This indicates that a considerable number of respondents believe that family responsibilities have a hindering effect on women's ability to participate and take up leadership positions including in Elbethel Academy. The high percentage of respondents who agree or strongly agree suggests that there is a prevailing perception that family responsibilities act as a barrier to women's advancement in educational leadership roles. These findings align with previous research conducted on the topic of women's leadership participation. Studies have consistently shown that women face numerous challenges and barriers, including family responsibilities that hinder their progress and representation in leadership positions (e.g., Eagly and Carli, 2023; Eagly & Karu., 2002). Family responsibilities, such as caregiving and household duties, often disproportionately burden women, limiting their time, energy, and availability to engage in leadership roles.

Personal Factors on Women's Leadership Participation

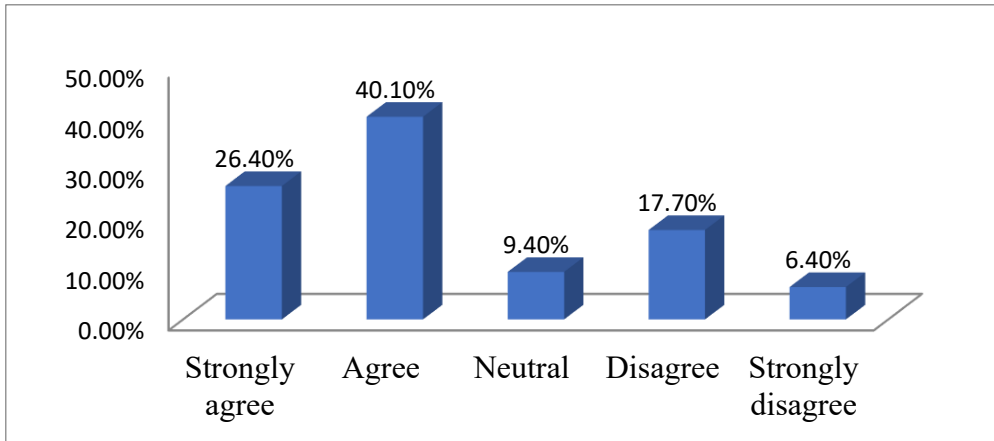


Figure 5: *Respondents' ratings of Women's self-perceptions*

As shown in Figure 5 above, 26.4% of the study participants strongly agree, 40.1% agree, 9.4% neutral, 18% disagree, and 6.4% strongly disagree on the effects of women's self-perceptions for leadership positions. The findings reveal that a significant majority of respondents (66.5%) agreed on the influence of women's self-image or perception on leadership participation or representation. This suggests that many respondents recognize the impact of women's self-perception on their ability to participate and hold leadership positions in Elbethel Academy. These findings align with the existing literature on women's self-perception and its impact on their leadership aspirations. Studies have shown that woman's beliefs about themselves, their skills, and their ability to balance multiple roles can influence their confidence and willingness to pursue leadership positions (Fentahun and Alemu, 2020; Girma and Emebet, 2018). Perceptions of the world as masculine, self-perception of being less skillful in leadership, fear of success, fear of balancing work and family responsibilities, and attitudes towards encountering jealousy and lack of support from other female subordinates are factors that can shape women's self-image and affect their leadership participation.

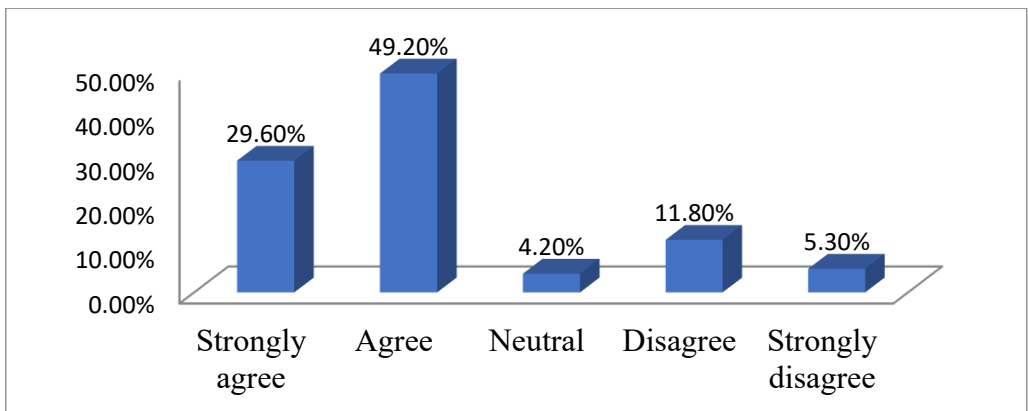


Figure 6: Respondent's perception of women's education as a hindrance to their participation in educational leadership

The majority of respondents agreed regarding the influence of advanced education on women's leadership participation. This indicates that many respondents recognize the impact of advanced education in encouraging women to apply for jobs with top management positions and believe that academic qualifications, coupled with experience, are key to the appointment, recruitment, and promotion of women into senior management positions. These findings align with the existing literature on the importance of education in women's empowerment and leadership development (African Union, 2017; Hailemariam and Birhanu, 2018). The high agreement and strong agreement percentages reflect the recognition of the role of education in narrowing the gender gap and addressing historical inequalities. The perception that women have lower levels of educational qualifications than men due to unequal opportunities in the past indicates an acknowledgment of the need to address past educational disparities. It also highlights the importance of providing equal educational opportunities to both genders to foster women's leadership participation.

The Results of the Inferential Statistics

Correlation Analysis

Table 2: Correlation of each factor variable on dependent variables (WC)

		Pearson Product Moment Correlations					
		SF	OF	FF	PF	EAE	WCLS
SF	Correlation Coefficient	1.000					.
	Sig. (2-tailed)	.					
OF	Correlation Coefficient	.561**	1.000				
	Sig. (2-tailed)	.000	.				
FF	Correlation Coefficient	.492**	.580**	1.000			
	Sig. (2-tailed)	.000	.000	.			
PF	Correlation Coefficient	.594**	.683**	.690**	1.000		
	Sig. (2-tailed)	.000	.000	.000	.		
EA	Correlation Coefficient	.689**	.683**	.688**	.690**	1.000	
	Sig. (2-tailed)	.000	.000	.000	.000	.	
WC	Correlation Coefficient	.860**	.861**	.651**	.758**	.657**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.

** Correlation is significant at the 0.01 level (2-tailed).N=163

SF= Social factors, OF= organizational factors, FF= family factors, PE= personal factors, EA=effect of advanced educations and WC= women's current leadership status

As depicted in Table 2 above, the strongest positive correlations were found between WC and OF ($r = 0.861^{**}$), indicating that organizational factors have a high relations with women's school leadership representation. This result aligns with the study of Skrla, Reyes, and Scheurich (2000) who described that organizations used intimidation and silence to discourage women.

Additionally, WC showed strong positive correlations with social factors (SF) ($r = 0.860^{**}$), family factors (FF) ($r = 0.651$), PF ($r = 0.758^{**}$), and educational factors (EAE) ($r = 0.657^{**}$), suggesting that social, family, personal, and educational factors also play important roles in shaping women's participation in educational leadership positions. This suggests that these factors collectively contribute to the lower representation of women in educational leadership positions at Elbethel Academy. The Study is in agreement with Sadie (2005), and Gumbi (2006), who found that patriarchal structure, socialization of the girl child, and cultural attitudes hinder women's participation in leadership. The Study findings are also in agreement with Tripp (2001) who found out that some cultures prohibit women from speaking in public. Livingstone (2004) also portrayed that domestic duties that women are still expected to do for their families take significantly more time and energy than those that most men are expected to do. So what? How is this connected with the current Study?

Regression Analysis

Table 3: Regression Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change	Durbin-Watson
				R Square Change	F Change	df1	df2		
.983 ^a	.967	.966	.19230	.967	910.983	5	157	.000	1.216

a. Predictors: (Constant), EF, OF, FF, PF, SF

b. Dependent Variable: WCL:

As shown above, the regression analysis results show that the model has a high degree of goodness-of-fit. The R-squared value of 0.966 indicates that 96.6% of the variance in women's leadership status (WLS) can be explained by the predictors in the model, which include social factors (SF), organizational factors (OF), personal factors (PF), family factors and educational factors (EF). Overall, the regression analysis suggests that the combination of social factors, organizational factors, personal factors, and educational factors have a strong influence on women's participation in educational leadership positions at Elbethel Academy. Towards this, research over the previous century has largely been male-dominated thereby perpetuating the myth that management and leadership are essentially male phenomena (Enomoto, 2000). Besides, the cultural and social assumption that women are less strong than men and therefore cannot hold managerial positions is common in many developing countries (Calvert and Calvert, 1996).

Conclusions

The findings of this Study reveal that women's participation in leadership positions is shaped by a complex interplay of societal, institutional, personal, and economic factors. Societal influences play a critical role, as entrenched gender stereotypes, cultural expectations, and biases continue to affect both how women perceive their own leadership potential and how they are

evaluated by others. These societal pressures can undermine confidence, limit aspirations, and restrict opportunities for women to advance into leadership roles.

Institutional factors were also found to significantly affect women's leadership representation. Policies, organizational practices, and support systems within schools including promotion criteria, mentoring opportunities, and gender-responsive management either facilitate or hinder women's progression into administrative positions. Institutions that fail to implement equitable policies inadvertently reinforce gender disparities in leadership.

At the personal level, variables such as self-confidence, perception of skills, fear of criticism, and challenges in balancing professional and family responsibilities emerged as key determinants of women's participation in leadership. Women who experience lower self-perception or perceive leadership roles as incompatible with their personal circumstances are less likely to pursue or sustain positions of authority. The Conclusion does not show the scenario at the Academy under study. How many women are there? How many have assumed the leadership position? How many are expected to be leaders? Why?

Finally, economic factors were identified as significant barriers to women's leadership advancement. Addressing economic constraints is essential for creating an environment where women can fully participate in decision-making and leadership positions. Overall, the study underscores that enhancing women's representation in leadership requires holistic interventions that address societal norms, institutional policies, personal empowerment, and economic equity simultaneously. Only through coordinated efforts across these domains can persistent gender disparities in educational leadership be effectively reduced.

Recommendations

In order to overcome the social factors, personal and institutional factors the following recommendations are forwarded:

To minimize social factors that hinder women's leadership, collaborative efforts should be developed among teachers, administrators, students, and parents to provide strong support for women in leadership roles. Educational institutions should also create a supportive and inclusive culture that values, recognizes, and respects the contributions of women leaders. In addition, schools and organizations should foster environments that encourage open dialogue about gender-related issues, challenge prevailing gender stereotypes, and actively address discriminatory practices and biases that may limit women's leadership opportunities.

To reduce personal factors that may hinder women's advancement into leadership positions, institutions should offer workshops and training programs designed to build self-confidence and help women overcome self-perceived limitations. Women should also be actively encouraged to participate in decision-making processes, with opportunities and platforms provided to ensure that their perspectives and contributions are heard and valued. Furthermore, organizations should promote a culture that supports work-life balance, helping to alleviate concerns related to managing professional responsibilities alongside family obligations.

To reduce institutional factors that limit women's leadership opportunities, private schools should take proactive measures to promote gender equality and ensure equal opportunities for career advancement. Institutions should develop and implement policies and practices that prioritize fair representation and career progression regardless of gender. In addition, both government and private institutions should effectively apply affirmative action measures to strengthen the competence, professional development, and leadership opportunities of female educators.

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A Comparative Analysis of the Primary Education in Ethiopia and Singapore: Purposes, Governance, and Curricular Practices

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Abstract

The main purpose of the study was to conduct a comprehensive comparative analysis of primary education systems in Ethiopia and Singapore, two nations with markedly contrasting educational outcomes and socio-cultural contexts, focusing on educational purposes, governance, curricular practices, and to identify potential lessons for educational improvement in Ethiopia. The study employs a qualitative methodological framework based on Bereday's four-step comparative analysis Model. Data was sourced from recent policy documents, academic literature, and international reports, and was analyzed thematically to identify similarities, differences, and contextual influences shaping each system. Findings reveal that Ethiopia's primary education emphasizes foundational literacy, numeracy, moral, and civic education within a decentralized governance framework, facing challenges related to resource constraints, standardization, and quality disparities. Conversely, Singapore's system demonstrates centralized governance, a rigorous, holistic curriculum, ability-based streaming, and innovative pedagogical approaches that underpin its top rankings in global assessments. The study discusses lessons Ethiopia can learn from Singapore's strategic planning, resource optimization, technology integration, and curriculum reform to enhance its educational quality and relevance. Overall, this comparative analysis underscores how socio-economic, cultural, and political factors influence educational purposes and practices, offering insights for policymakers and educators aiming to elevate primary education outcomes in diverse contexts.

Keywords: Primary education, Ethiopia, Singapore, comparative analysis.
Introduction

Background of the Study

Education serves as a vital benchmark for determining the progress and advancement of a nation. Through this process, a society cultivates human resources characterized by spiritual depth, intellectual capacity, and technical proficiency, effectively shaping the path for the next generation (Marsella *et al.*, 2023). The fundamental hope of any country is rooted in the

appropriate education of its children and youth. For a nation to achieve meaningful progress, it must provide quality education that actively influences and sustains national development (Siska *et al.*, 2022).

The education system, through the school system, is an important element for a country in its efforts towards developing society from an economic, political, and social perspective (sources). Primary education is a very important and critical level in a child's educational journey that underlies and lays the foundation for future learning in secondary and higher education and development (Marsella *et al.*, 2023). Therefore, primary education helps students develop intellectual, social, personal, and spiritual aspects according to their developmental characteristics so that they can continue further education. In several countries, primary education is mandatory for all citizens. The same is true of Ethiopia, where the government's policy is for every child aged seven and over to attend primary school, as set out in the Ministry of Education's (MoE) universal and compulsory education provision (MoE, 2023).

From a comparative perspective, analyzing Ethiopia and Singapore is to examine two opposites in the global educational landscape. Singapore consistently ranks at the top of international assessments like the Program for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS). In both assessments, it is hailed as a model of efficiency and high achievement (OECD, 2019). In stark contrast, despite showing significant progress in access, Ethiopia grapples with a severe "learning poverty" crisis; a large proportion of its children cannot read or understand a simple text by the end of primary school (World Bank, 2022). This divergence is not accidental but is deeply rooted in each nation's historical trajectory, economic development, and political priorities. Singapore, a small city-state with no natural resources, has treated education as the foundational engine for its economic survival and global competitiveness since its independence. Ethiopia, by contrast, a vast nation with a complex history of conflict, famine, and poverty, has focused on the monumental task of expanding educational access to its massive youth population, often at the expense of quality. This comparison underscores how purpose, governance, and pedagogy coverage produce vastly different outcomes.

The primary education landscapes in Ethiopia and Singapore are deeply influenced by their respective diversities in religion, ethnicity, language, and socioeconomic background (Latchanna *et al.*, 2019; Marsella *et al.*, 2023). Recognizing these varied backgrounds, this study compares the primary education frameworks of both nations with a focus on their specific objectives, educational structures, governance, curricula, and pedagogy. By examining these core components, the study seeks to identify significant similarities and differences that define each country. Ultimately, this analysis aims to illustrate how unique contextual factors influence educational practices while exploring how the exchange of successful strategies can enhance primary education outcomes in both nations.

Statement of the Problem

Educational systems are not monolithic entities but are deeply reflective of a nation's historical path, socio-cultural values, economic aspirations, and political ideologies (Wiseman & Baker, 2021). Consequently, the design, development, implementation, and evaluation of curriculum, the very backbone of an education system, vary significantly across global contexts (Bărnăuțiu-Sârca & Ciascai, 2022). These variations manifest in the fundamental purposes of education, the structures that deliver it, the governance structures, and the pedagogical practices that move it within classrooms.

Existing literature provides invaluable information for such a comparative inquiry. For instance, Research conducted by Marsella *et al.* (2023) has produced an overview of comparative character education in the elementary school curriculum in Malaysia, India, and Indonesia. Likewise, Tesfamicael & Lundebj (2019) conducted a comparative study of Norwegian and Ethiopian textbooks and adequately identified and explained the similarities and differences of textbooks, both within homogeneous and heterogeneous cultures, in a way that the results contribute to the improvement of the intended curriculum. Moreover, Latchanna *et al.* (2019) explored the professional development of teachers in the case of Ethiopia, Finland, India, and Singapore, and explained the paramount importance of initial teacher education, induction, and continuing professional development to enhance the content and pedagogy mastery of teachers to develop 21st-century learners' competencies.

However, no prior study has made a comparative study on primary education in Ethiopia and Singapore. This gap is particularly consequential given the two nations' starkly contrasting profiles. Singapore represents a paradigmatic case of a centralized, high-performing system explicitly engineered to fuel a knowledge-based economy and foster social cohesion in a multicultural city-state (OECD, 2023). Its students consistently top international assessments like PISA and TIMSS, making its policies a frequent subject of borrowing by global policy. In contrast, Ethiopia embodies the challenges and aspirations of a rapidly expanding, decentralized system in a low-income, historically agrarian nation. Its primary education system is tasked with monumental goals: achieving universal access, reconciling ethnic and linguistic diversity within a federal structure, and overcoming a legacy of limited resources (MoE, 2021). Therefore, this study seeks to conduct a comparative analysis of primary education in Ethiopia and Singapore. By rigorously analyzing their educational purposes, structures, governance, curriculum, and pedagogical practices, the study is expected to generate nuanced knowledge that can inform systemic improvements, foster cross-contextual learning, and contribute to a more global and contextual understanding of educational effectiveness.

Research Objectives

The main objective of the study is to conduct a comprehensive comparative analysis of primary education systems in Ethiopia and Singapore, focusing on purposes, governance, curricular practices, and identifying potential lessons for educational improvement in Ethiopia. Specifically, the Study aims to:

1. compare the primary educational purposes and structure in Ethiopia and Singapore.
2. analyze the similarities and differences in primary educational governance of the nations.
3. examine the curriculum and pedagogical practices employed in primary education in Ethiopia and Singapore.
4. identify lessons Ethiopia can learn from Singapore's primary education model to enhance educational governance, curriculum, and pedagogical practices.

Significance of the Study

In terms of advantages, the study's findings may stimulate other academics, prompting them to dig more into the topic using this study as a springboard. Furthermore, practitioners in educational institutions in both countries will have simple access to an overview of the system's most pressing concerns. It may also assist people who are in touch with policy developments in determining key elements to be addressed in the text.

Scope of the Study

Primary Education systems of two distinct countries from diverse continents i.e., Ethiopia from East Africa, and Singapore from Southeast Asia, are thought to be analyzed. Even if the parameters for comparative analysis are different and diverse, the study is delimited to focus on the major educational issues at primary levels of education linked with educational purpose and structures, governance, curriculum, and pedagogical practices that exist in the primary educational systems.

Definitions of Key Concepts and Phrases

Primary Education: The formal educational stage designed for children typically aged 6-12 years, comprising grades 1 through 6, focusing on foundational literacy, numeracy, moral, and social skills as outlined in each country's curriculum framework (OECD, 2023).

Purpose of Education: intended goals and objectives of primary education articulated in national curricula and policy documents, including fostering moral character, communication skills, civic responsibility, lifelong learning, health awareness, and cultural understanding (OECD, 2023).

Educational Structure: The formal grade levels, duration, and subdivision of primary education, including the curriculum framework (e.g., grades 1-6, 4-4-2 structure), and the inclusion of foundational and orientation stages (MoE, 2020; Kelly *et al.*, 2020).

Governance of Education: The system of authority, decision-making, and management of primary education, characterized by decentralization vs. centralization, stakeholder involvement, and policy formulation mechanisms (Kwek *et al.*, 2023; Latchanna *et al.*, 2019).

Curriculum: The set of subjects, language of instruction, and cultural inclusivity embedded in the curriculum, including the emphasis on multilingualism or bilingualism (Vicente *et al.*, 2024).

Pedagogical Approaches: The instructional strategies employed, ranging from traditional teacher-centered methods to participatory, student-centered, and holistic approaches, including the philosophy underpinning pedagogical practices (Kelly *et al.*, 2020).

Literature Reviews

Global Education Landscape

The global education landscape is characterized by rapid transformation driven by technological advances, globalization, and shifting socio-economic demands. The adoption of innovative pedagogical practices, integration of digital technologies, and emphasis on 21st-century skills are reshaping traditional education systems worldwide (UN Department of Economic and Social Affairs, Statistics Division, 2025). Many countries are striving to achieve equitable access to quality education through reforms aligned with Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive and equitable quality education and lifelong learning opportunities for all (United Nations, 2022). As nations seek to balance educational excellence with equity, there is a growing emphasis on competency-based education, personalized learning, and student-centered pedagogies (OECD, 2022; UNESCO, 2024). These global trends reflect an overarching shift from rote learning to fostering critical thinking, creativity, and adaptability skills deemed essential for success in an increasingly interconnected and dynamic world (World Bank, 2022).

Background of Education in Ethiopia

Ethiopia's primary education system has prioritized expanding access to its vast and diverse population amid resource constraints and infrastructural deficits. Despite progress in enrollment, the Country struggles with issues of quality, resource allocation, and curriculum standardization (MoE, 2021; Fufa & Ensene, 2023). The historical legacy of linguistic diversity, political upheavals, and economic limitations has shaped a largely decentralized education system, with regional adaptation often leading to disparities in quality and resource distribution (Latchanna *et al.*, 2019). As a result, Ethiopia remains below international benchmarks of learning, with many children unable to attain basic literacy skills, which is an issue underscored by the World Bank's 2022 report on learning poverty.

Ethiopia's modern education has an almost one-century-old history, since the opening of the first school at the beginning of the 20th century in 1908 (Wondimu, 2019). Till the Italian occupation (1936), the major purpose of education was limited to mastering foreign language courses such as French, Italian, and Arabic; besides Geez and Amharic. Additionally, some courses in religion, mathematics, law, and calligraphy were offered (Abie *et al.*, 2023). During this time, the Ethiopian education system and its curricular components were principally influenced by the French education system (MoE, 2020).

Italian occupation brought down the creeping education system totally through strategies of persecution of the elites and changing educational institutions into military camps. Moreover, catholic mission schools were mandated to emphasize religion and the Italian language to subordinate people to the Mussolini regime. In general, the major goal of education was to create

citizens who would be loyal to Italy (Tamiru & Lasser, 2019). The content of education focused mainly on basic skills (restricted to grade 4) and semi-vocational skill training, and internalizing fascist values to promote fidelity to the regime. Furthermore, the mother tongue was taken as a medium of instruction for major ethnic groups even if (as many agree) the purpose was not pedagogical (Wondimu, 2019; Tamiru & Lasser, 2019). The curricula and assessments, during this time, were neither uniform nor standardized in the schools.

The planned and coordinated expansion of modern education began after the expulsion of Italians in 1941, when Haile Selassie I was the emperor of the Country (Wondemetegn, 2016; Fufa & Ensene, 2023). Thus, the period from 1942 to 1952 in Ethiopian education history was known as the era of British influence, where the support in liberating Ethiopia from Italian aggression was taken as a pretext to manipulate the education system of the Country. Hence, with the extreme support of British experts, the Ethiopian Ministry of Education and Fine Arts was established for the first time in 1942. The primary school syllabus, textbooks, reference materials, and teachers were imported from Britain. The medium of instruction was primarily English starting from grade three. Amharic was the medium of instruction in grades one and two. The subjects selected to include in the curriculum were such as English, Mathematics, Science, Geography, History, Art, Handicraft, and Physical Education (, *et al.*, 2023).

According to the research results of Tamiru & Lasser (2019) and Fufa & Ensene (2023), the period from 1953-1974 was the time of American influence. As a result, a significant change made during the time of American influence was the promotion of Amharic as the medium of instruction at the primary school level. The English language was used as a medium of instruction from grade seven, and since then, it has remained the dominant language of instruction in the education system of Ethiopia. The major subjects included in the Curriculum were English, Mathematics, Science, Social Science, and Physical Education. These subjects were emphasized to align with Western educational models promoted by the U.S. (Abie *et al.*, 2023).

The Derg, a military Regime, came to power in 1974, chanting socialism as the cardinal political philosophy and slogan of the Government. Marxist-Leninist philosophy overwhelmed and guided the overall aspect of the Country. As a result, Ethiopian education introduced a new grade structure 6+2+4. This meant that primary school students had to go through six years to complete the primary level education, and a national examination was set for evaluating the achievements of primary school students in grade 6. However, the Policy and Curriculum devices were like those of Eastern Europe, particularly the then United Socialist Soviet Republic (USSR), and German-oriented curricula (Wondimu, 2019). In this period, Amharic was determined to be used as a medium of instruction in primary school (grades 1- 6) whereby it had created difficulties for students whose mother tongue was not Amharic (Fufa & Ensene, 2023).

According to the Education and Training Policy documents of Ethiopia, the primary education curriculum and its implementation were guided by written strategies and principles. The Transitional Government of Ethiopia which started to lead the Country in 1991 changed the

education and training policy (ETP) of the country in 1994. The Education Sector Development Program (ESDPI-VI) was designed and implemented to support the Education Training Policy. ESDPI-VI has given more emphasis to educational quality, relevance, equity, and access to schools with special emphasis on rural and marginalized areas, to enrollment of girls at primary and above levels in rural areas, and to achieving Universal Primary Education in 2015 (Wondimu, 2019). According to the Education and Development Roadmap, despite achievements in various areas, many gaps and challenges were observed at the primary school level (MoE, 2018).

Background of Education in Singapore

Singapore's education system is characterized by a centralized governance structure, rigorous curriculum, innovative pedagogical practices, and a strategic focus on holistic development (Kwek *et al.*, 2023). These features have contributed to its sustained top rankings in international assessments, reflecting high levels of student achievement across cognitive and socio-emotional domains (OECD, 2019). The nation's emphasis on ability-based streaming, continuous teacher professional development, and a curriculum that balances academic mastery with socio-emotional skills underpins its success (Tan, 2018). The "Learn for Life" reform (2020 to date) exemplifies Singapore's commitment to preparing students not just for exams but for resilient, adaptable lifelong learning, a paradigm that other countries aspire to emulate.

In Singapore's education history, various phases of reform have been introduced. A Survival-Driven Phase of education reform was introduced in 1965 and stayed until 1978, when there was an urgent need to educate and prepare children for an emerging economy that was transitioning from an entrepot economy to an open, export-based one. A national curriculum was implemented with a focus on languages, science, and mathematics to support the needs of the economy (OECD, 2019).

The second phase of education reform in the country is commonly known as the Efficiency-Driven Phase which was between 1979-1997 (Kwek *et al.*, 2023). During this Phase of reform, Singapore became a newly industrializing economy, and the education system was unable to supply the new skills needed. There was widespread student attrition as the "one-size-fits-all" education system, implemented in the Survival-driven Phase, disengaged students. Low levels of literacy and ineffective bilingualism were evident because a large population of children (85 percent) did not speak English at home. Consequently, major structural reforms were implemented, including "streaming," a form of ability tracking (Marsella *et al.*, 2023), which enabled students with different abilities and aptitudes to learn at their own pace. Streaming was implemented at the primary (grades 1-6) level, and increasing school differentiation formed independent and autonomous schools, designed to cater to high-ability students (Kwek *et al.*, 2023).

The third phase called the Ability-Based, Aspiration-Driven Phase (1997-2011) continued structural reforms through further school deregulation and differentiation, such as the start of North Light School in 2007 to cater to less academically inclined students who failed their

primary school leaving examination (PSLE). The overall structural reform provided multiple pathways to academic success and increased curriculum customization that recognizes students' abilities and strengths (Tan, 2018). Importantly, this phase was signaled by a shift in policy rhetoric from focusing on educational structures to pedagogy and instructional quality.

The next phase of reform was the student-centric, Values-Driven Phase (2011-2019), which further shifted the focus toward the holistic development of the child. The emphasis on holistic education is to expand educational parameters beyond cognitive abilities and academic performance to other growth areas, such as physical, socio-emotional, and artistic achievements. (Kwek *et al.*, 2023; Huang, 2024). In 2021, a new scoring system for PSLE, using broad bands that are criterion-referenced and standards-based, was implemented to reduce the exam-centric and competitive schooling environment. Previously, absolute numeric PSLE scores enabled comparison of scores and drove competition among students (Kwek *et al.*, 2023).

The fifth and last curriculum reform is Learn for Life (2020 to Present), which is coined by the MOE as "Learn for Life" (began in 2020), the shift away from an over-emphasis on academic achievements continues, with a focus on preparing Singapore students to connect, collaborate, create, and be resilient to changing circumstances. The attention on pedagogy and instructional quality continues, with teachers encouraged to deepen their pedagogical skills, with emphasis on the teaching of values and socio-emotional competencies. Schools and teachers are encouraged to be change agents to innovate and prepare students for life, not just the next examination (Kwek *et al.*, 2023).

In summary, this literature attempts to examine the education systems of Ethiopia and Singapore, with markedly different outcomes. Ethiopia's system focuses on expanding access amid resource constraints, with decentralized governance, multilingual policies, and challenges in quality and standardization. Historically influenced by foreign models, Ethiopia faces issues of resource disparity and low learning outcomes. Conversely, Singapore's highly centralized system emphasizes a rigorous, innovative curriculum, ability-based streaming, continuous teacher development, and holistic development, which have contributed to its top international rankings. The reform phases in Singapore reflect a progression from survival to efficiency, then to holistic, learner-centered education. In addition, the review underscores how contextual factors shape each country's educational priorities and practices, offering lessons for improving primary education outcomes globally.

Materials and Methods

This study utilizes Qualitative Comparative Analysis (QCA) to systematically evaluate and compare the primary educational systems of Ethiopia and Singapore. The analytical framework of this study is Bereday's Four-Stage Model of Comparative Analysis, which provides a structured trajectory for cross-national inquiry through four distinct phases including, (a) Description: This initial phase involves gathering and documenting extensive data regarding the primary education systems of both nations, focusing on formal policy directives, educational purposes, structures, governance, curriculum, and pedagogical practices. (b) Interpretation: In

this stage, the collected data were analyzed within the context of each country's unique socio-economic, cultural, historical, and political background. (c) Juxtaposition: In this phase, interpreted data from both countries were placed side-by-side to establish preliminary similarity and divergence, identifying "comparable" units of analysis. (d) Comparison: A final integrated, simultaneous analysis was conducted to draw conclusions and identify transferable lessons (Adick, 2018).

The data involved secondary sources, including the recent Education and Training Policy (ETP) documents of both countries, academic journal articles, and reports from reputable international organizations such as UNESCO, PISA, and the World Bank. A comprehensive search was conducted across multiple scholarly databases such as Google Scholar, JSTOR, ERIC, and Scopus, using targeted keywords such as primary education, education system, education in Ethiopia, and education in Singapore. To ensure the relevance, credibility, and currency of the data, strict inclusion and exclusion criteria were applied. Literature was included if it was peer-reviewed, published within the last 10 years (from 2016 onward), and directly addressed the primary education systems of Ethiopia and Singapore. Sources were excluded if they were non-peer-reviewed, outdated (published before 2016), lacked empirical evidence, or focused exclusively on secondary or higher education levels.

Following the identification of relevant literature, a thorough reading was conducted to extract pertinent data and key themes. Data extraction was performed using a standardized format, taking the author(s), year of publication, study objectives, findings related to primary education, policy implications, and conclusions. The data extracted were then organized into thematic categories: a) Objectives and structures, b) governance of primary education, and c) Curriculum and pedagogical practices. Recognizing the importance of comparability in cross-national studies, the study first established parameters to ensure the units of analysis were comparable. Then, a thematic analysis was conducted by coding the data according to emerging themes related to the research questions. To enhance the clarity and accessibility of the findings, the study employed data visualization techniques such as tables to present the disparities and similarities between the two countries.

Results and Discussion

Educational Purposes and Structures

This section provides a comparative overview of the primary education systems in Ethiopia and Singapore, highlighting their core objectives and structural features. By examining these aspects, it is possible to better understand how each country's unique socio-cultural, economic, and developmental contexts influence its educational priorities and practices. Table 1 below shows the key similarities and differences in the objectives and structural features of primary education in both nations.

Table 1: *The core objectives and structure features of primary education*

No	Aspect	Ethiopia	Singapore
1	Moral and ethical education	Develop the moral and ethical character of a citizen	Possess a good sense of self-awareness & a sound moral compass
2	Communication Skills	Use oral and literacy skills	Able to communicate effectively
3	Interpersonal Relationships	Develop harmonious interpersonal and social relationships	Be able to cooperate, share, and care for others
4	Civic Responsibility	Appreciate national unity, diversity, and cultural heritages	Be a concerned citizen with a strong civic consciousness
5	Lifelong Learning	Acquire knowledge useful for learning in middle school	Self-directed learners committed to lifelong learning
6	Health and Physical Education	Apply basic rules of hygiene, sanitation, and safety skills for health	Have healthy habits and awareness of the arts
7	Cultural Awareness	Appreciate national unity, diversity	Know and love Singapore
8	Educational Structure	Comprises grades 1-6. Total duration: 6 years	Comprises grades 1-6. Total duration: 6 years

Ethiopia: As shown in Table 1, the primary education system in Ethiopia is fundamentally designed to lay the groundwork for a child's moral, social, and cognitive development. The objectives emphasize cultivating moral and ethical character, fostering communication skills, encouraging interpersonal relationships, instilling civic responsibility, promoting lifelong learning, and ensuring health and cultural awareness (MoE, 2020). The Curriculum aims to produce well-rounded citizens who can contribute positively to society and continue their education in subsequent levels. Structurally, Ethiopia's primary education comprises grades 1 through 6, with a total duration of six years, aligning with the global standard for primary schooling (MoE, 2023). The Curriculum focuses on foundational literacy and numeracy skills, alongside social and moral education, with the medium of instruction predominantly Amharic language, although regional languages are also employed in certain areas (Fufa & Ensene, 2023). The structure is decentralized, with regional governments playing significant roles in Curriculum adaptation and implementation, which reflects Ethiopia's federal and diverse socio-cultural context (MoE, 2021).

Singapore: Singapore's primary education system is characterized by a clear focus on developing effective communicators, responsible citizens, and lifelong learners. Its objectives include fostering self-awareness and sound morals, effective communication skills, social

harmony through cooperation and sharing, civic consciousness, and a commitment to lifelong learning—aligning with the nation’s broader developmental goals (Kwek *et al.*, 2023). The Curriculum emphasizes holistic development, integrating academic proficiency with socio-emotional competencies, and promotes bilingualism, cultural awareness, and moral education (Kelly *et al.*, 2020). Structurally, Singapore’s primary education spans six years (grades 1 to 6), with a highly centralized governance system managed by the Ministry of Education (Marsella *et al.*, 2023). The system incorporates streaming and ability tracking from the early grades to cater to diverse student abilities, and it emphasizes pedagogical innovation to prepare students for a competitive, globalized economy (Kwek *et al.*, 2023). The Curriculum is designed with a focus on inquiry-based learning, digital literacy, and character education, reflecting Singapore’s strategic priorities for sustainable development and social cohesion (OECD, 2023) (see Table 1).

To compare, both Ethiopia and Singapore organize their primary education systems across six years, reflecting a common international standard aimed at providing foundational skills (Table 1). However, their core objectives diverge, shaped by their distinct socio-economic and cultural contexts. Ethiopia’s emphasis on moral, civic, and health education seeks to address its developmental challenges and promote social cohesion within a diverse and often resource-constrained environment (MoE, 2021). Conversely, Singapore’s objectives focus more on holistic development, bilingual competencies, and preparing students for a competitive global economy, consistent with its strategic development plans (Kwek *et al.*, 2023).

Structurally, both countries adopt a grade-based system spanning six years, yet their governance and curriculum implementation differ markedly. Ethiopia’s decentralized approach allows regional adaptation, accommodating linguistic and ethnic diversity, but faces challenges related to resource variability and standardization (Fufa & Ensene, 2023). Singapore’s centralized governance ensures uniformity and high standards across schools, supporting its reputation for exceptional educational performance (OECD, 2023).

In terms of curriculum content, Ethiopia’s focus remains on literacy, numeracy, and socio-moral values, with medium of instruction primarily in Amharic and regional languages, emphasizing national cohesion (MoE, 2020). Singapore’s curriculum integrates academic excellence with socio-emotional skills, bilingualism (English and Mother Tongue), and digital literacy, reflecting its economic and social ambitions Kelly *et al.*, (2020). The pedagogical approaches also differ, with Ethiopia grappling with issues of resource constraints and teacher training, while Singapore emphasizes pedagogical innovation, student-centered learning, and continuous professional development (Latchanna *et al.*, 2019; Kwek *et al.*, 2023).

In conclusion, the primary education systems in Ethiopia and Singapore both share a common structural framework of six years. However, their educational purposes diverge significantly, reflecting their unique socio-cultural and developmental priorities. Ethiopia emphasizes moral, civic, health, trilingual, and cultural education to foster social cohesion within its diverse context, with a decentralized approach to curriculum implementation. In contrast, Singapore

focuses on holistic development, bilingualism, socio-emotional skills, and preparing students for a competitive global economy through a highly centralized and innovative pedagogical system. These differences reflect each country's unique priorities: Ethiopia's focus on social and moral values within a decentralized framework, and Singapore's emphasis on academic excellence and socio-emotional skills within a highly centralized, standardized system.

Governance of Primary Education

This Section provides a comparative analysis of the governance structures, policy frameworks, and management practices that underpin primary education in Ethiopia and Singapore. Despite sharing the common goal of delivering quality education to all children, the two countries adopt markedly different approaches shaped by their unique socio-political contexts and developmental priorities. Table 2 below summarizes the key aspects of primary education governance in Ethiopia and Singapore.

Table 2: Primary Education Governance of Ethiopia and Singapore

	Aspects	Ethiopia	Singapore
No	Governing Structure	Decentralized governance through regional and city administrations; each region has its own Bureau of Education	Centralized policy control with decentralized implementation at the school level
1	Policy Setting	The Ministry of Education (MoE) sets the ETP, the curriculum framework, and syllabi	MOE centrally sets policy, the Curriculum, and provides approved curriculum materials
2	Curriculum development	Regions develop curriculum materials based on the directives of the central Ministry, reflecting local culture and needs (MoE, 2020, 2023).	Clusters/schools implement autonomously within the framework (Al-Thani, 2024).
3	Teacher Management	Regions train, employ, manage, and fire teachers, with some delegations for zones and woredas.	The Ministry centrally manages all credentialing; clusters support teacher deployment (Kwek <i>et al.</i> , 2023)
4	Resource Allocation	Resources for building, maintaining, and equipping schools are managed at the regional level with local input.	Funding is centrally allocated by the Ministry to ensure equitable resource distribution; local clusters share resources as needed
5	Community Role	Formal Education and Training Boards facilitate community direction and management at the Woreda level.	Cluster Superintendents provide professional, collaborative support and best practice sharing (Al-Thani, 2024).

Ethiopia adopts a decentralized governance model for primary education, characterized by significant authority being delegated to regional and local levels. Each regional Bureau of Education plays a pivotal role in implementing national policies, developing curriculum materials, managing teachers, and overseeing resource allocation within its jurisdiction. This

approach is rooted in Ethiopia's federal system, which accommodates its ethnic, linguistic, and cultural diversity. The regional education bureaus are empowered to adapt policies and curricula to local contexts, which can enhance relevance and community participation but may lead to variability in quality and resource distribution across regions (Fufa & Ensene, 2023). The policy setting primarily resides with the Ministry of Education (MoE), which issues directives, curriculum frameworks, and syllabi, but the actual development and implementation are regionally driven (MoE, 2020). Teacher management is also regionally administered, with local authorities responsible for recruitment, employment, and firing, often facing challenges related to capacity and resource constraints (Latchanna *et al.*, 2019). Resource allocation is managed at the regional level, with local input, leading to disparities in infrastructure and instructional materials depending on regional wealth and priorities (MoE, 2023). The community's role is facilitated through formal Education and Training Boards at the woreda (district) level, which influences local decision-making and mobilizes community support.

Singapore, conversely, employs a centrally controlled but locally implemented governance system. The Ministry of Education (MOE) centrally formulates policies, sets curriculum standards, and approves curriculum materials to ensure uniformity and high standards across all schools (Kwek *et al.*, 2023). While policy directives are centrally issued, the actual implementation occurs at the cluster or school level, which enjoys a degree of autonomy in pedagogical practices and resource management, within the framework of national policies (Al-Thani, 2024). The MOE manages teacher credentialing and deployment centrally, ensuring consistent quality and standards in teacher recruitment, training, and professional development (Kwek *et al.*, 2023). Resource allocation is managed centrally by the MOE to promote equitable distribution of funding, infrastructure, and instructional materials across schools, regardless of location, thus minimizing disparities (OECD, 2023). Community involvement is facilitated through Cluster Superintendents, who support schools, promote best practices, and ensure alignment with national goals while fostering a collaborative relationship with local communities (Kwek *et al.*, 2023).

Regarding the simultaneous comparison of both nations' primary education systems, both Ethiopia and Singapore recognize the importance of effective governance in primary education but employ markedly different approaches. Ethiopia's decentralized model emphasizes regional autonomy, which allows for local adaptation and cultural relevance but risks variability in quality and resource distribution. This system is designed to reflect Ethiopia's diverse demographic makeup but faces challenges in maintaining consistent standards nationwide (Fufa & Ensene, 2023). Singapore's centralized model ensures uniformity, high standards, and quality control across all schools, which has been instrumental in its consistent top performance in international assessments (Kwek *et al.*, 2023; OECD, 2023). The centralized policy setting allows Singapore to implement reforms swiftly and uniformly, fostering high accountability and standardization (Al-Thani, 2024).

In Ethiopian primary education, teacher management, including recruitment, employment, and firing, is predominantly regional, which can lead to disparities in teacher quality and availability,

especially between urban and rural areas (Latchanna *et al.*, 2019). Resource management is also regional, and disparities are often linked to regional wealth, affecting infrastructure and instructional materials quality (MoE, 2020, 2023). Conversely, Singapore's centralized management of teachers and resources ensures that all schools adhere to uniform standards. The MOE centrally manages teacher credentialing, deployment, and professional development, which contributes to a highly qualified teaching workforce (Kwek *et al.*, 2023). Funding and resource distribution are also centrally managed to promote equity, reducing disparities among schools (OECD, 2023). This centralization underpins Singapore's ability to maintain high standards uniformly across its primary schools.

In summary, the comparative analysis reveals that Ethiopia and Singapore adopt fundamentally different governance models for primary education. Ethiopia's decentralized system empowers regional and local authorities to manage curriculum, teachers, and resources, reflecting its diverse socio-cultural landscape, but leading to variability in quality and resource allocation. In contrast, Singapore's centralized governance ensures uniform policy implementation, standardized teacher management, and equitable resource distribution, contributing to consistently high educational standards. While Ethiopia's approach allows for local relevance and community participation, Singapore's centralized model promotes high accountability, standardization, and excellence across all primary schools.

Curriculum and Pedagogical Practices

This Section provides a comparative analysis of the primary education systems of Ethiopia and Singapore, focusing on their curriculum content, pedagogical approaches, and assessment strategies. Table 3 below summarizes the key differences and similarities across these aspects in the two countries, highlighting how their unique socio-cultural, political, and economic contexts shape their educational practices.

As depicted in Table 3, the primary education systems of Ethiopia and Singapore differ markedly in their curricula, pedagogical approaches, and assessment strategies, each reflecting their unique socio-cultural and developmental contexts.

Ethiopia's primary education curriculum is designed to promote literacy, numeracy, social, and moral development through a comprehensive set of subjects. The curriculum involves eight core subjects, including Mother Tongue, Federal Working Language, English, Mathematics, Environmental Science, Moral Education, Performing and Visual Arts, and Health and Physical Education (MoE, 2020). The medium of instruction is primarily in the regional languages, supporting Ethiopia's multilingual and multiethnic composition, which reflects an emphasis on cultural preservation and national cohesion (Fufa & Ensene, 2023). Pedagogically, Ethiopia faces challenges related to resource constraints, inadequate teacher training, and infrastructural deficits, which influence the implementation of student-centered or inquiry-based learning (Latchanna *et al.*, 2019). Assessments at the regional level involve regional exams, and certification is granted based on performance, with less emphasis on standardized national examinations at the primary level (Wondemetegn, 2016).

Table 3: *A Comparative Analysis of the Primary Education Curriculum Pedagogical Practices*

	Aspects	Ethiopian Primary Education	Singaporean Primary Education
No	Subjects taught	Eight subjects, including Mother Tongue, Federal Language, English, Mathematics, Env. Science, Moral Education, Performing and Visual Arts, HPE	Subjects include Mother Tongue (Chinese, Malay, or Tamil), English, Mathematics, Science (starting from G-3), Arts, Music, Moral Education, and Social Studies.
1	Language and Education	Trilingual focus: Mother Tongue, Federal language, and English. Mother tongue as medium of instruction; English as a subject from grade 1	Bilingual policy: English (medium of instruction) and mother tongue (Malay, Mandarin, or Tamil). Subjects taught in both languages
2	Curricular Emphasis	Focus on core competencies, co-curricular activities, and Extra-curricular activities to enhance learning	Emphasis on holistic development and lifelong learning principles, Character building, and values education
3	Assessment & Certification	Regions administer regional exams, grant certificates, and license private schools	Examinations and Assessment Board oversees national assessments; cluster superintendents facilitate collaboration on assessment implementation

Singapore's curriculum is characterized by its emphasis on holistic development, integrating academic mastery with socio-emotional, moral, and digital competencies. It includes subjects like Mother Tongue (Chinese, Malay, or Tamil), English, Mathematics, Science (from Grade 3 onwards), Arts, Music, Moral Education, and Social Studies (Kelly *et al.*, 2020). The bilingual policy involves instruction in English and the respective mother tongue, fostering bilingualism as a strategic national goal (Kwek *et al.*, 2023). Pedagogically, Singapore employs student-centered, inquiry-based, and differentiated instruction approaches, supported by continuous professional development for teachers to enhance pedagogical quality (Latchanna *et al.*, 2019). The assessment system is nationally standardized, with examinations overseen by the Examinations and Assessment Board, and cluster superintendents facilitate assessment implementation and moderation (Kwek *et al.*, 2023).

Regarding the simultaneous comparison of Ethiopia and Singapore's Curriculum and Pedagogical Practices, both countries incorporate multiple subjects aimed at fostering core competencies; Ethiopia emphasizes foundational literacy, numeracy, and moral education, while

Singapore's Curriculum emphasizes holistic development, including socio-emotional and digital literacy skills (Table 3).

Language instruction reflects their socio-cultural contexts: Ethiopia employs a trilingual approach, using regional languages and English, which aligns with its multilingual diversity and federal structure (Fufa & Ensene, 2023). Singapore follows a bilingual policy with English as the medium of instruction, and mother tongue languages taught as subjects, supporting national identity and bilingual proficiency (Kwek *et al.*, 2023).

Curricular emphasis diverges significantly: Ethiopia's focus is on core competencies, literacy, and moral values within resource-limited settings, often with regional adaptations (Latchanna *et al.*, 2019). Conversely, Singapore's curriculum prioritizes inquiry, creativity, and socio-emotional skills, supported by systemic reforms and teacher professional development (Kwek *et al.*, 2023).

Examinations also differ: Ethiopia relies on regional exams, which may vary in standardization and scope, partly due to resource limitations and decentralization (Fufa & Ensene, 2023). Singapore employs a centralized, standardized assessment system, emphasizing continuous moderation, reliability, and comparability to maintain high standards (Kwek *et al.*, 2023).

In conclusion, the comparative analysis reveals that Ethiopia and Singapore exhibit distinct approaches to primary education curriculum content, pedagogical approaches, and assessment strategies, shaped by their socio-cultural and developmental contexts. Ethiopia's primary school curriculum emphasizes foundational literacy, numeracy, and moral education through a trilingual curriculum and resource-limited settings, with regional assessments reflecting decentralization. In contrast, Singapore prioritizes holistic development, inquiry-based learning, and socio-emotional skills within a centralized, standardized assessment framework. These differences illustrate how each Country's unique socio-economic, cultural, and political factors influence their approaches to primary education, with Ethiopia focusing on basic competencies and cultural preservation, while Singapore emphasizes holistic, skills-based learning and systemic quality assurance.

Lessons Ethiopia Can Learn from Singapore's Primary Education Model

The success of Singapore's primary education system offers a compelling framework for Ethiopia to enhance its own educational system. By analyzing Singapore's trajectory, four central lessons appear, including the necessity of long-term strategic planning, the adoption of differentiated instructional models, the optimization of limited resources, and the strategic integration of technology. These pillars provide a roadmap for Ethiopia to move toward a more resilient, high-performing, and equitable primary school system.

Long-term Strategic Planning: Singapore's successive reform phases, from survival-driven to holistic education, exemplify a sustained commitment to strategic, long-term educational development. Ethiopia can enhance its educational system by establishing cohesive and forward-looking policies with clearly defined milestones and implementation timelines. Such

long-term planning should prioritize stability and continuity, minimizing disruptions caused by changes in government or ideological shifts.

Adoption of Differentiated Instruction: Singapore's early implementation of ability tracking (streaming) enables tailored, differentiated instruction that aligns with students' individual abilities, thereby enhancing engagement, academic achievement, and overall learning effectiveness (Marsella *et al.*, 2023). Ethiopia can practically commit to adopting a structured approach to ability grouping and differentiated pedagogical strategies, as outlined in its education policy frameworks. By doing so, the country can better address the diverse learning needs within its student population, providing appropriate academic challenges and targeted support.

Resource Optimization: While resource constraints pose challenges, Ethiopia can learn from Singapore's efficient use of resources through targeted investments in teacher training, curriculum materials, and digital technologies to maximize impact.

Integration of Technology and Innovation: Singapore's integration of digital technologies into teaching and learning enhances engagement and prepares students for a digital economy. Ethiopia can gradually incorporate ICT tools into classrooms in both urban and rural schools, provide digital literacy training for teachers, and develop e-learning platforms to improve access and quality, especially in remote areas.

In summary, Ethiopia can learn from Singapore's primary education model by adopting long-term, strategic planning that ensures policy stability and continuity, free from political interventions. Emphasizing ability-based streaming and differentiated instruction can address diverse learner needs effectively. Additionally, optimizing resources through targeted investments and integrating technology into both urban and rural school classrooms will enhance pedagogical practices and prepare students for a digital future. These lessons highlight sustainable, evidence-based approaches to improve educational governance, curriculum, and pedagogy in Ethiopia's primary education system.

Conclusions

The comparative analysis of primary education systems in Ethiopia and Singapore highlights both shared structural characteristics and profound differences rooted in their socio-cultural and developmental contexts. While both countries employ a six-year primary education framework, their educational purposes diverge significantly, Ethiopia emphasizing moral, civic, health, and cultural education to foster social cohesion amid its diverse society, and Singapore prioritizing holistic development, bilingualism, and skills geared towards global competitiveness through a highly centralized and innovative pedagogical approach. Governance models further distinguish these systems; Ethiopia's decentralized framework promotes local relevance and community participation but can result in variability in quality and resource distribution, whereas Singapore's centralized governance ensures uniform standards, accountability, and high performance across schools. Curriculum content and pedagogical practices reflect these

priorities, with Ethiopia focusing on foundational literacy, numeracy, and moral education within resource-limited settings, and Singapore emphasizing inquiry-based, holistic, and socio-emotional learning within a standardized assessment environment. From this analysis, Ethiopia can learn valuable lessons from Singapore's strategic planning, resource optimization, and integration of technology—elements crucial for enhancing pedagogical practices, ensuring policy stability, and addressing diverse learner needs. Adopting such evidence-based approaches can support Ethiopia's goal of improving educational quality, equity, and relevance in its primary education system.

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Research on Education in Emergencies: Current Status and Dilemmas

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Abstract:

Sound, ethical, and rigorous reflective research practices are essential for the development of education in emergencies as a strong and respected field of study. This review examines the current state of research in this area and its related challenges. It analyzes the main research themes, the most commonly studied topics, and the research methods used. It also considers the key features of education in emergencies that affect how research is conducted. The review was conducted based on relevant articles published in peer-reviewed journals since the mid-1990s. Grey literature was also consulted, particularly regarding the status of research conducted on education in emergencies. The results of the scoping review indicated that studies focusing on conflict, qualitative research, and practical applications dominate research on education in emergencies. It was also found that a large proportion of the studies were conducted with the participation of researchers from the Global North, with fewer than a fifth of the studies being conducted by researchers from the Global South alone.¹ Review of the accessible literature also disclosed that research on education in emergencies is characterized by multiple dilemmas which need to be resolved in the development process of the field as an established field of inquiry. These and many other findings of the review are helpful inputs as education in emergencies is being recognized as an area for academic research and graduate-level training in Ethiopian universities and beyond.

Key terms: *displacement, education in emergency, humanitarian response, research on education in emergency*

Introduction

Education in emergency refers to the provision of quality learning opportunities for individuals of all ages during crises (Inter-agency Network for Education in Emergencies /INEE, 2012). It is an education provided in situations where children lack access to their national education systems, due to man-made crises or natural disasters. Its precise interpretation varies, from a

1. Even though there is no universal agreement on what the global north and global south represent, they are economic and political classifications of countries rather than geographic regions. The global north typically includes countries with stronger economies, such as the United States, Canada, England, nations of the European Union, as well as Singapore, Japan, South Korea, and even some countries in the southern hemisphere: Australia and New Zealand. The Global South is home to the majority of the world's population, but that population is generally young and resource-poor, living in economically dependent nations. This group includes formerly colonized countries in Africa and Latin America, as well as the Middle East, Brazil, India, and parts of Asia. (Lara Braff and Katie Nelson, 2022). The Global North: Introducing the Region. In Fernandez, Nadine T., and Katie Nelson, eds. *Gendered Lives: Global Issues*.

concern with emergency education during the first few months after a crisis, to the years taken to restore normal education systems after a “complex humanitarian emergency”. Even though there are fundamental international treaties and conventions (e.g., the 1948 human rights convention and the 1951 refugee conventions), the emergence of the discourse on education in emergency in its present form coincided with the end of the Cold War (i.e., during the 1990s), and the expansion of intrastate violent conflicts after that. There are conditions which are central to the coming into being of the discourse on education in emergencies during this time amid the interstate conflicts. Among these are the ratification of The Convention on Children’s Rights (1989), The Education for All global initiative (Jomtien 1990), and the 2000 Dakar Framework on Education for All within the agenda of the Millennium Development Goal. The post 2015 sustainable development goals, with focus on equity, among others, gave further impetus for the continued concern about education in emergencies.

Humanitarian relief entailed the provision of food, shelter, water, and sanitation and health care until very recently (INEE, 2012). In that sense, education was seen as part of longer-term development work rather than as a necessary response to emergencies. However, with the growing conception of humanitarianism (Davey et al., 2013), which gradually brought about a concern not only with individuals’ basic needs but also with fulfilling their rights to a certain standard of life has contributed to the development of education in emergencies. Besides, the fact that people came to realize that education cannot wait (Tomasevski, 2003) made it an issue of humanitarian response. Today, education in emergencies is a right for children affected by shocks and stressors due to one or the other reason. It is one of the pillars of humanitarian response with the aim to provide protection, provision of safe space for children, maintenance of a sense of normality during emergencies, and a means towards sustainable development, including post-conflict recovery. It is also today considered as an academic discipline (an area of academic research) even though, as Kagawa (2005) alluded, it is at its infancy.

Even though the concept of education in emergencies has been part of humanitarian discourse for over three decades, persistent dissatisfaction remains regarding the performance of systems in delivering effective educational responses during crises (Taka 2023). Among others, there are still problems of access and quality. Institutionalized support systems are lacking and, in most cases, it is based on project-based initiatives from various humanitarian organizations. This is primarily due to the severe shortage of funding for education in emergencies. For example, the EU (2017) report indicated that only 3% of global humanitarian aid was allocated to education in emergencies. Consequently, Taka (2023, citing the UNHCR) stated that over half of refugee children (i.e., individuals forced to flee their country due to persecution, war, violence, or a lack of governmental protection [UNHCR, 2025]) aged between five and seventeen missed school in 2016. The author indicated that this problem is exacerbated at the post-primary level due to donors' focus on primary education. Therefore, it is fair to say that the performance of education in crisis settings is unsatisfactory.

There is also weak commitment of host governments (Crisp, 2003), often the country’s laws limit the rights of the refugees. Sometimes, the host states are not on good terms with the home

states; the host governments feel that they have enough of their own problems, and those governments use aids to the refugees simply as sources of foreign currency. Hence, genuine commitment towards ensuring the rights of refugee children to education is often lacking.

Despite all the dissatisfaction and failures there is a quest to identify what educational practice works in emergency settings. This calls for scientific research, which is a pillar for evidence-based decision-making, a source for knowledge construction in this growing field of study, a mechanism for objective understanding, and a tool for its continuity. According to Islam (2023), one way a discipline of study guarantees its own continued existence and development is through research. In the field of education in emergencies, research plays a critical role in bridging evidence gaps and establishing pathways for the effective translation of findings into policy and practice. It is also through research that a field of study strengthens the literature in the field since a field of study is expected to have its own literature. Research is also a strategic means for the collection, curation, and dissemination of knowledge and evidence in the sphere of education in emergencies. With this background, the paper intends to appraise the current state of research in the area of education in emergencies (EiE), identify major challenges to research on EiE, and sort out some dilemmas connected to research on EiE based on a scoping review of the literature. The practical value of this study is evident. It sheds light on pressing issues in the field of Education in Emergencies (EiE) and offers insights that may inform practitioners and policymakers. The theoretical contribution of the study lies in its ability to unravel conceptual understandings of the unique feature of doing research on education in emergency settings.

Methods

This study aimed to examine two key issues in education research in emergencies: its current status and related challenges. To examine the current status of research in this field, I conducted a scoping review, a type of study designed to map existing literature on a specific topic or research area (Arksey & O'Malley, 2005). To examine the dilemmas and related challenges, I conducted a thorough review of the available literature and drew on my personal experience as a researcher. **Scoping review:** Five interrelated stages were applied in conducting the scoping review:

Stage 1: identifying the research question or issues: the key issues identified for the study were (i) the main focuses of research on education in emergencies; (ii) the areas of education in emergencies that have been commonly addressed in published research; (iii) the dominant research methods commonly used in these studies; and (iv) the inherent characteristics of education in emergencies that influence the pursuit of academic research on the subject.

Stage 2: identifying relevant studies – two broad databases were considered, namely, Google Scholar and ERIC. One hundred fifty-two (152) published articles were identified for examination using such search terms as ‘the state of research in education in emergency’, ‘research and teaching-learning process in emergency settings’, ‘challenges to research on

education in emergency as humanitarian aid', and 'partnership on research on education in emergencies.'

Stage 3: study selection – The review is delimited to emergencies or crises resulting from armed conflict and education provided in settlement camps/sites. The research considered encompasses both theoretical analyses and intervention-based studies. The reviewed research works included those targeting general education in schools, mainly in Sub-Saharan Africa and other host countries in the Global South. Taking these as selection criteria, articles published in peer-reviewed English-language journals since the mid-1990s were identified from two broad databases: Google Scholar and ERIC. Of the 152 published articles identified, 22 satisfied the selection criteria. While the grey literature far outnumbers the body of literature on education in emergencies (Wright, 2012). However, for the present purpose, only 11 articles that appeared as grey literature which satisfy the selection criteria were considered for the review. These were obtained mainly via 'Google Search Free' rather than from Google Scholar and ERIC.

Stage 4: Charting the data – this stage involved reading and re-reading of the 22 selected scholarly articles and the 11 articles in the grey literature to identify which of the issues identified for the review study were addressed, and how they were addressed. Notes were taken based on insights obtained from the close examination.

Stage 5: Collating, summarizing, and reporting the results: Once the review concluded, the results obtained have been reported using five sub-thematic areas: type of emergency studied, methods used, participating researchers' origin (global north or south), sources of fund and major foci of the studies.

A comprehensive review of the related literature was conducted to identify the challenges in educational research in emergencies: I believe that dilemmas are not just what we specifically identify in articles or what we physically count therefrom. Rather, they are what we deduce or induce based on our understanding developed through studying the available literature. Therefore, I decided to read widely and note down the main dilemmas that the field is experiencing today. Reflecting on my experience of researching in the field of education in emergencies in Ethiopia has helped me to apply understandings obtained from the literature review to situations in the Global South.

Results

The results of the review have been organized under the following key headings: types of research on education in emergencies, dilemmas, challenges, and promises. At the Implications for the future of research on education in emergencies have been outlined.

Types of Research

Five thematic areas were used to examine the identified scholarly articles: the type of emergency studied; the major focus of the studies, the methods used in the studies (qualitative, quantitative or mixed); the researchers involved (Northern, Southern or joint research) and the sources of

funding (from the North, from the South or a contribution from both). Table 1 summarizes the results from the content analysis.

Table 1: *Summary of the content analysis of the scholarly articles*

Thematic Area	Theme	Frequency	%
<i>Type of emergency studied</i>	<i>Conflict</i>	6	27.3
	<i>Non-conflict – other hazards (e.g., flooding)</i>	1	4.5
	<i>Non-conflict – COVID-19</i>	4	18.2
	<i>Emergency in general*</i>	11	50
Total		22	100
<i>Major focus</i>	<i>Practical problems</i>	22	73.33
	<i>Theoretical understanding/conceptions</i>	3	10
	<i>Both</i>	5	16.67
Total		30**	100
<i>Method</i>	<i>Qualitative</i>	20	90.9
	<i>Quantitative</i>	-	-
	<i>Mixed</i>	2	9.1
Total		22	100
<i>Researchers</i>	<i>Southern scholars</i>	4	18.18
	<i>Northern scholars</i>	8	36.36
	<i>Co-researched (North & South Scholars)</i>	10	45.45
Total		22	100
<i>Sources of fund</i>	<i>Global South</i>	2	9.1
	<i>Global North</i>	5	22.72
	<i>Shared – North & South</i>	0	00
	<i>Unidentified</i>	15	68.18
Total		22	100

* *The articles do not specify the type of emergency.*

** *Possibility for double rating.*

It is widely conceded that research on conflict-based emergencies dominate the types of emergencies researched (Wright (2012) & Montjouridès & Liu (2019). Studies focusing on natural disasters tended to be geographically biased. For instance, the few available disaster-based emergency studies are dominantly from Southern Asia (Samada, Arifina and Abas, 2025). The fact is that such non-conflict emergencies have been written about by organizations (e.g. INGOs) in the form of grey literature. In recent years, COVID-19-related works dominate available reports around non-conflict-induced emergencies in general. The results reported above tend to comply with these points. While 50% of the reviewed works talk about education in emergency in general (conflict-induced or otherwise), 27% of the results talk about education of population displaced by conflict. Studies related to emergencies due to COVID-19 make up about a fifth of the studies. This aligns with Durrani and Ozawa's (2024) assertion that studies

focusing on COVID-19 contagion tended to be the most popular of all the non-conflict-induced emergencies.

The sources indicated that majority of educational research conducted in emergency settings is based on problem-solving and is not as such critical (Wright, 2012; Durrani & Ozawa, 2024; Shah, 2024). As reported in Table 1, 73% of the studies reviewed target practical problems of the sub-sector, where theoretical work alone makes up only 10% of the studies. Studies targeting problem-solving risk existing only to serve the purpose of immediate action (Tilley, 2019) and sometimes tended to be confirmatory, attempting to confirm experts' hypotheses. If well thought out, the scope of research in the field of education in emergencies can expand from conceptual clarification through introducing theories of education transfer to critically examine issues in the field, such as policy borrowing and education model transfer. This may include critical analysis of the implications of new education models and/or development of pre-existing models when examined in emergency settings.

The current status of research on education in emergencies can also be examined in terms of researchers and situation of the research funds. As observed from the published works, most of the lead researchers of studies conducted on education in emergencies in the global south are foreign to the contexts in which they work (Shah, 2024; Wright, 2012). As reported in Table 1, most of the studies are either joint researches or conducted by northern scholars. It was only 18% of the studies that were conducted solely by researchers from the global south. One risk of such a situation is that exotic researchers often lack lived experiences of the situation in which their research is conducted.

Another concern is research funding. This is important because it affects the autonomy of researchers. As reported in the reviewed literature (Shah, 2024; Bolat & Karakuş, 2023; ElAsad, 2025), research funds for education in emergencies in the Global South (SSA) often come from Northern institutions. As shown in Table 1, about 23% of the studies clearly indicate that they received funding from northern institutions, while approximately 68% did not identify any source of funding. However, given the scarcity of research funding in the Global South (Chankselian, 2023), and the fact that most humanitarian aid, including education in emergencies, is left to international organizations (ALNAP, 2025), it is reasonable to assume that the sources of research funding in which Northern scholars participated (over 81% of the reviewed studies) were from the Global North. This situation puts experts from northern institutions in a position to dictate the design and implementation of research projects (Menashy & Zakharia, 2022). For instance, it is not uncommon that researchers from global south often serve as data collectors, even though they are sometimes as senior as the lead researchers from global north. In such a situation, researchers from the South lack a say in interpreting the data from their home perspectives. And, for Shah (2024) this can be a cause for concern regarding the positionality of the researchers. Northern researchers often lack the Southern perspectives and also lack awareness of the context of the research and the researched. Related to this situation are two important factors: extreme shortage of research fund at home (i.e., Global South) and Southern researchers search for fund is limited (Wright, 2012) – partly due to

preoccupation with routines at their home institutions or due to lack of skills in grant writing or even due to ontological gap between the North and the South – which often limit the acceptability of grant proposals from southern scholars.

The type of research methodology employed can also be used to talk about the status of research on education in emergencies. Historically, the qualitative approach tends to dominate research in the field of education in emergency (Wright, 2012). The purpose of such studies tends to be to understand, make sense of, or interpret phenomena; with the aim of dealing with practical problems. The results reported in Table 1 indicate that about 91% of the studies reviewed were conducted using the qualitative approach. Nonetheless, Wright stressed that there is a growing number of quantitative studies in recent years, including intervention/ evaluative research, which tend to have a clear and quantifiable starting point. Globally, this may be a prevailing recent trend. Yet, the result reported above does not prove that.

While much data is frequently collected in situations of emergency, very little of that has been utilized for further critical analysis (Montjouridès and Liu, 2019; Martin & Umubyeyi, 2019; Wright, 2012; Tilley, 2019). In fact, the collection of statistical data tended to be an everyday experience of most field workers in emergency or settlement camps (Wright, 2012; Montjouridès and Liu, 2019). Therefore, it is not uncommon to experience data wastage in emergency situation.

While longitudinal studies can be immensely important to learn about long-term impacts of interventions, it is difficult to do because of (i) lack of long-term funding commitment due to instability and expensive nature of such research, and (ii) mobility of the clients (displaced people), which makes tracking of clients difficult. Hence, most of the studies tend to be cross-sectional, though, as Matutes *et al* (2021) noted, there are rare cases where ex post facto studies are conducted.

Finally, 'grey literature', i.e., information produced outside of traditional publishing and distribution channels (McKenzie, 2023), dominates the field of education in emergencies today. As it does not undergo a peer review process, the quality of grey literature can vary considerably. Such literature is often criticized for glorifying project successes without providing a balanced or unbiased analysis of their genuine strengths and weaknesses (Wright, 2012). In this writer's view, much of this literature is based on advocacy research, where researchers set out to 'prove' their claims. Consequently, their methods and design lack rigour (Corlett, 2011). And hence, there are limited opportunities for academics and practitioners to compare competing hypotheses and collect valuable data (Montjouridès & Liu, 2019). There is also limited theorization on 'what works' in emergency settings.

Dilemma

One of the dilemmas around education in emergencies is the problem with its academic location: there is a push-pull. Inherently, education in emergencies is an interdisciplinary subject crossing the traditional subject boundary. It draws upon principles and practices from various academic and practical domains to ensure the continuity of education during and after crises. It integrates

aspects of emergency management, public health, child protection, psychology, sociology, political science, and, centrally, humanitarianism (UNICEF, 2024; INEE, 2024, Tarricone, Mestan, & Teo, 2021). Thus, it takes from education proper, sociology, psychology, social work, and many others. So, its academic location is complex to that extent. Unfortunately, interdisciplinary approaches are not so well developed, at least in institutions of Sub-Saharan Africa, if I take the case of Ethiopian universities.

Another dilemma is the incompatibility of 'the idea of research' with emergencies, which is related to the tension between service orientation and knowledge creation (EnterCulturas, 2020). Research is about the future: knowledge for the future, improving future practice, and so on. The observation that most writings on education in emergencies are organisational reports developed from the perspectives of interest organisations themselves is one indicator of this incompatibility. Emergency, on the other hand, is about responding to the crisis prevailing today. Reconciliation of these concepts in people's minds (and in the allocation of resources) is a very important issue.

Another sort of dilemma connected to research on education in emergency is the need to learn from elsewhere or from others' experiences versus the critical importance of context (in emergency settings). We must learn from others' track records. On the other hand, every emergency setting has its own unique features (Smiley, 2020), which sets it apart from other settings. Therefore, balancing these two would constitute an important dilemma.

Conducting ethical research in emergency settings involves dilemmas. For example, researchers may need to follow ethical standards but cannot always obtain informed consent. This problem is linked to low literacy levels among participants, mistrust of signing documents (common in parts of sub-Saharan Africa), and the absence of primary caregivers for minors due to sudden conflict (Smiley, 2020; Wright, 2012). As a result, many researchers rely on oral assent or seek consent from camp authorities as a temporary solution.

Given these and other dilemmas as well as the challenges of doing research in emergency settings (to be discussed below), it is essential that research on education in emergencies is tightly connected to educational practices. For that, an important step could be creating a mechanism through which practitioners and university-based researchers collaborate and co-engage.

Challenges

One of the challenges is the misconception that synonymises issues of educational reform in Sub-Saharan Africa (SSA) (Kobeissi *et al*, 2022; Montjouridès & Liu, 2019) – that all educational failures/problems can be explained using the same theoretical framework. People holding such a misconception often say a separate set of research may not be important for education in emergencies because research on other forms of education may give an adequate explanation. The other challenge is the security situation because most of the settlement camps where displaced populations settle is in relatively insecure areas in most of the countries of the Global South. Related to this is the fact that academics are often not prepared to take risks to get

evidence, a look for safer ground. Difficulty of entry to the research site is the other obstacle due to excessive permission or approval requirements. Once entered, the language of communication tends to be the other problem. As mentioned above, limited funding opportunities at home and weak grant writing skills are equally important factors that constrain research in emergency settings.

Research fatigue can also be the other constraint as the refugees are literally a captive (Martin & Umubyeyi, 2019) – i.e., the audience is over researched. As mentioned elsewhere in this report, several data points are collected both internally and in response to donor requirements. National governments also ask for data in their effort to oversee what goes on within their jurisdiction.

Research sometimes tends to be erroneously perceived as benefiting the researcher. This could partly result from the research fatigue mentioned above – that multiple bodies collect data (Montjouridès and Liu, 2019) and nothing comes out that improves the situation of the researched. Therefore, there is no way that the researched sense any value of the research and take it as purely done for the interest of the researcher. Thus, no value attached to it, no commitment displayed. In a highly deprived situation (e.g., limited funding cut for education in emergencies), research sometimes tends to be perceived as a luxury because what matters most for the researched is their basic needs. At the same time, researchers may be targeted by warring parties because they are seen as collaborating with ‘occupiers.’

Missing and/or poor-quality data in conflict-affected areas (Taka, 2023; Martin & Umubyeyi, 2019; Montjouridès and Liu, 2019) – in a situation where there is active conflict, it is very difficult to get quality data with the required quantity. Other constraints to research on education in emergencies may include problems with building rapport with interviewees (e.g., language/cultural gap); self-reporting bias, analytic bias, funders' pressure; problems with the physical safety of researchers and participants; and the complexities of getting research approvals.

One of the truisms of humanitarian work is that every context is different, and therefore generalizations across contexts are of limited utility (Smiley, Moussa & Smith-Sreen, 2020). Therefore, researchers need to take caution in talking about and using research findings from one context to another.

Given these challenges, research on the impact of education in the prevention of, response to, and recovery from disaster risks and complex emergencies are limited.

Promises

There are important opportunities that can be utilized to promote research on education in emergency, including, the INEE-initiated minimum standards for education in emergency and the contextualization guideline; the INEE agenda for research; UN member states commitment to the sustainable development goals (SDG, especially Goal 4); growing recognition of research to address the puzzlement with failure of educational reform initiatives – e.g., in many SSA

countries; and growing technological infrastructure that may be mobilized to support data matters. The recognition of Education in Emergencies as a field of study by several universities in SSA—such as Addis Ababa University and Kotebe University of Education in Ethiopia, and the University of Nairobi in Kenya—alongside the establishment of peer-reviewed journals including the Journal on Education in Emergencies (JEiE), the Journal of Internal Displacement (JID), and the Journal of Refugee Studies, as well as other education journals with an interest in this area, represents significant opportunities for advancing scholarship and research in Education in Emergencies.

Implications

There is a need for consensus within the education in emergencies community on the role of research in identifying effective practices in emergency education in specific contexts. This process should begin with an acknowledgement of the unique characteristics of research in emergency education. It is also essential to consider incorporating educational theories into the research design process to gain a critical understanding of educational problems. Therefore, there is a need for long-term, critical, and ethically sound university-based research projects, moving away from the quick-fix approach.

Since issues in emergency education are generally interdisciplinary, it is commendable that interdisciplinary research is being promoted in this field. I was unable to determine the disciplinary backgrounds of the researchers who conducted the reviewed studies. However, I noted a general tendency to conduct research within the field of education rather than conceptualizing the matter as an interdisciplinary issue.

Another facet of emergency education research is collaboration. As presented, there were research projects in which scholars from the Global North and the Global South have collaborated. However, the agency of scholars from the fund-receiving country is open to question. Therefore, it is crucial to carefully check the balance of power regarding the design of the research and the role of those undertaking it. Furthermore, genuine partnerships must be promoted among academics, practitioners, and policymakers in the field of education in emergencies research.

Efforts need to be made to develop local capacities in terms of the contextual understanding of international research agendas in education in emergencies, grant-writing skills, and data management. For example, the INEE research agenda may need to be interpreted in the local context to serve as a local research agenda. It is also essential to evaluate the usability of data before collecting it.

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Conceptual Change for Improving Chemistry Education in Ethiopia: A Conceptual Literature Review

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Abstract:

Research on conceptual change (CC) has demonstrated that students often struggle when learning involves substantial modifications to their existing knowledge. Despite the extensive and sophisticated discourse surrounding CC theories and strategies in science education, a notable failure persists in translating these well-researched frameworks into substantive conceptual understanding among learners. Numerous studies indicate that conventional teaching methods are inadequate to support these cognitive shifts. Drawing on a conceptual literature review, this article presents a comprehensive examination of the foundations of CC, CC theory, and its application within science and chemistry education. The discussion spans the meaning of CC, theoretical frameworks, instructional strategies like conceptual change texts, analogies, and demonstrations, and limitations of conventional instructional approaches. It highlights empirical research evidencing improved learning outcomes through CC approaches. The article uncovers the complexities and best practices for facilitating CC in chemistry, aiming to enhance both teaching methods and student comprehension in chemistry. This review has led to a set of informed conclusions and actionable recommendations.

Keywords: *Conceptual change, Cognitive conflict, Concept cartoons, Chemistry education*

1. Introduction

Chemistry is widely regarded as a challenging subject (Tutorition, 2025). More than 52% of high school students surveyed by the American Chemical Society ranked chemistry as the hardest science subject, even above biology and physics (Tutorition, 2025). Only a small percentage of students achieve the highest grades in chemistry compared to other subjects, as it demands a unique blend of abstract reasoning, memorization, and experimental interpretation (ChemTribe, n.d). In 2022, only **13.6%** of A-Level Chemistry students in England achieved an A*, compared to **22.8%** in Mathematics and **16.4%** in Physics, highlighting chemistry's relative grading difficulty (Department for Education, 2022). Based on official data from Cambridge International, the grade thresholds and results statistics confirm that fewer students achieve top grades in Chemistry compared to Mathematics and Physics across many exam series, including those taken in African countries. In particular, in 2025, grade thresholds for Chemistry are often

set lower than those for Mathematics, reflecting the subject's relative difficulty and the lower proportion of candidates achieving top marks (Cambridge International, 2025). Despite the extensive discourse surrounding conceptual change (CC) theories and strategies in science education, many efforts fall short of fostering genuine conceptual understanding among learners due to a persistent gap between theory and practice. Researchers often emphasize diagnosing misconceptions or modeling mental processes without translating these insights into accessible, classroom-ready strategies—instruction that promotes CC with understanding matters in solving problems of the sort indicated here. For instance, a study indicated that inquiry-based instruction and problem-solving approaches significantly improve students' understanding and retention in chemistry, especially when adapted to local contexts (Sibomana et al., 2021). Another review work indicated that the use of improvised materials offers a cost-effective alternative to standard laboratory materials, promoting deeper learning and motivation in chemistry (Berhe et al., 2024). Moreover, innovative approaches such as inductive, Socratic, and student-centered methods are essential for improving chemistry instruction in classrooms (Ngendabanga et al., 2025). Yet misconceptions or understanding problems in chemistry remain prevalent due to persistent reliance on the conventional approach used (Sibomana et al., 2021). This review gives attention to CC literature and approaches associated with CC.

2. Objectives

This conceptual review aims to illuminate innovative instructional practices grounded in conceptual change (CC) approaches, particularly within the domain of chemistry education. The specific objectives are to:

- explore how Conceptual Change (CC) is defined and how its theoretical frameworks inform innovative pedagogical strategies in science education.
- examine the application of CC approaches in enhancing teaching and learning within chemistry classrooms.
- identify and synthesize instructional practices that promote meaningful conceptual restructuring among learners.

3. Methodology

3.1. Conceptual Orientation

This study employs a conceptual review methodology (Heinonen & Gruen, 2024) to conduct a wider exploration of conceptual change (CC) as a transformative lens for enhancing instructional practices in chemistry education. Rather merely summarizing empirical findings, a conceptual literature review constructs a semantic network of ideas, elucidates relationships among theoretical perspectives, and identifies enduring gaps in scholarly understanding (Heinonen & Gruen, 2024). Such papers/reviews are particularly valuable in domains characterized by theoretical diversity or where empirical consensus remains emerging. This conceptual review adopts a deeply reflective stance, prioritizing interpretive depth over rigid methodological constraints. Conceptual review embraces a flexible and critical engagement with literature. As Ayala (2018) argues, conceptual reviews are distinguished by their emphasis

on interpretation, theoretical synthesis, and intellectual openness. In such endeavors, conceptual scholarship demands rigorous argumentation and a robust theoretical foundation. Its intellectual merit hinges not only on the originality of thought but also on the coherence, depth, and scholarly articulation of the concepts advanced. Conceptual reviews trace the evolution, refinement, and interrelation of theoretical constructs, thereby illuminating the intellectual architecture of a field. For this study, conceptual review is best suited for this work, as it maps the emergence, divergence, and convergence of ideas over time (Webster & Watson, 2002).

3.2. Literature Selection Criteria

The review draws upon both seminal (Kuhn, 1962; Posner et al., 1982) and contemporary literature (Potvin & Bélanger, 2024) within the domain of CC theory, with particular emphasis on its pedagogical implications for chemistry education. Sources were carefully selected based on their theoretical importance, disciplinary relevance, and publication status in peer-reviewed academic journals. Priority was given to works that substantively contributed to discourses on epistemological development, cognitive restructuring, and culturally responsive pedagogy.

3.3. Steps involved

3.3.1. Identifying the Central Concept

Identifying the central concept or phenomenon is the foundational step in conducting a conceptual literature review. It required selecting a topic that is both theoretically rich and contextually relevant to the field of inquiry. The chosen concept (Conceptual change) was broad enough to accommodate diverse theoretical perspectives yet sufficiently focused to provide a coherent analytical path. This clarity enabled the reviewer to trace conceptual developments, interrogate underlying assumptions, and synthesize theoretical contributions meaningfully. As Torracco (2005) underscores, a conceptual review must begin with a well-defined phenomenon or concept that justifies theoretical synthesis and invites intellectual exploration.

3.3.2. Conducting a Broad and Inclusive Literature Search

Conducting a broad literature search is essential for a robust conceptual review. This process involved exploring academic databases (Scopus, ERIC, and Google Scholar) to identify sources that examined the central concept (conceptual change) from diverse theoretical vantage points. Unlike systematic reviews, which adhere to rigid methodological criteria, conceptual reviews embrace flexibility in source selection, incorporating theoretical articles, book chapters, and policy documents that enrich the conceptual landscape. As Snyder (2019) emphasizes, the guiding principle in conceptual reviews is theoretical relevance rather than methodological uniformity, allowing for a more expansive synthesis of ideas. This approach enables a more expansive and interpretive synthesis of ideas, allowing scholars to engage critically with diverse sources and frameworks. Accordingly, the literature search in this review was guided by conceptual significance and thematic resonance, rather than by rigid inclusion criteria or indexing protocols.

3.3.3. Organizing the Literature Thematically

Organizing literature thematically or chronologically is a critical step in conceptual review methodology, as it enables the researcher to trace the intellectual evolution of a concept with clarity and coherence. Grouping sources by themes, schools of thought, or historical progression

reveals how theoretical constructs have developed over time, where scholarly debates persist, and which frameworks have gained prominence. This structured synthesis not only highlighted converging and diverging perspectives but also exposed conceptual gaps that warrant further inquiry. As Webster and Watson (2002) advocate, thematic organization is particularly effective in uncovering patterns and deficiencies in conceptual understanding, thereby enriching the analytical depth of the review. Through clustering insights around emergent themes rather than chronologies or methodologies, this approach deepens interpretive clarity and enhances the conceptual coherence of the review. Accordingly, the present review adopted a thematic framework to structure its analysis, allowing for a synthesis of ideas related to conceptual change and instructional practices in chemistry education.

3.3.4. Critically Analyzing and Synthesizing Theoretical Perspectives

Critically analyzing and synthesizing theoretical perspectives is the intellectual core of a conceptual literature review. This step moved the reviewer beyond descriptive summary to engage with the literature interpretively comparing definitions, models, and underlying assumptions across sources. It involved identifying contradictions, overlaps, and areas of conceptual ambiguity, thereby revealing tensions and convergences within the CC literature. Through this process, the reviewer constructed a clear understanding of the CC concept's theoretical landscape. As Torraco (2005) emphasizes, synthesis is not merely additive; it is generative, enabling scholars to advance theory by integrating disparate strands of thought into a coherent and enriched framework. This review adopted such an integrative approach, aiming to construct a nuanced perspective on conceptual change and its implications for instructional practice in chemistry education.

3.3.5. Developing a Conceptual Framework

Developing a conceptual framework is the terminating step in a conceptual literature review, translating interpretive synthesis into a structured representation of interrelated ideas. This framework serves as a visual and intellectual map, illustrating how key concepts connect, influence, and inform one another within the theoretical landscape. It should reflect the touches uncovered during analysis—highlighting foundational constructs, mediating variables, and contextual factors—and offer a coherent guide for future research, policy formulation, or pedagogical practice. As Jabareen (2009) articulates, conceptual frameworks emerge from interpretive synthesis and function as dynamic tools for theorizing complex phenomena, enabling scholars to scaffold inquiry and advance disciplinary understanding. This review translated interpretive synthesis into a coherent and structured representation of interrelated concepts, enabling the articulation of theoretical linkages that illuminate patterns and pedagogical implications within the literature on conceptual change.

3.3.6. Reflecting on Gaps and Future Directions

Reflecting on gaps and future directions is a vital concluding step in a conceptual literature review, as it transforms synthesis into a springboard for scholarly advancement. In this review, this step involved identifying unresolved theoretical tensions, underexplored dimensions, and blind spots that persist across the literature. Through articulating these areas of ambiguity or neglect, the reviewer not only clarified the boundaries of current understanding but also signaled where future inquiry might be most fruitful. Such reflection positions the review as a generative

platform—one that invites continued dialogue, challenges prevailing assumptions, and proposes new trajectories for research, policy, or practice. As Snyder (2019) affirms, conceptual reviews should not merely consolidate knowledge but actively stimulate intellectual discourse and shape future research agendas.

3.4. Analytical Procedures

A thematic synthesis approach guided the analytical process (as discussed in section 3.3.3 above), enabling a structured yet interpretive engagement with the literature. This method facilitated the identification and categorization of recurring constructs, theoretical tensions, and paradigmatic shifts across diverse sources. Through conceptual clustering, the review traced how core ideas surrounding conceptual change (CC) theory have evolved, intersected, and diverged over time. Emphasis was placed on mapping the trajectory of CC theory within the broader science education discourse, with a focus on its uptake, adaptation, and critique in chemistry education. This contextual anchoring has contributed towards a better understanding of how CC theory has been used to address domain-specific challenges, revealing both its explanatory power and its limitations. The synthesis thus not only illuminated the intellectual architecture of CC theory but also positioned the review to contribute meaningfully to ongoing theoretical refinement and pedagogical innovation in the field.

3.5. Researcher Positionality

As Holmes (2020) argues, researcher positionality is not a limitation but a lens through which a deeper understanding can be gained, especially in qualitative and conceptual inquiries. Similarly, Zembylas (2025) advocates for reframing positionality statements as acts of solidarity and reflexive engagement, rather than mere declarations of identity. The synthesis presented in this review is deeply informed by the author's interpretive lens, cultivated through more than three decades of sustained professional engagement in chemistry instruction, curriculum development, and teacher education. This extensive experience has not only shaped the author's epistemological orientation but also provided a rich reservoir of pedagogical insight and disciplinary familiarity. Such a background enabled the reviewer to approach the literature with a practice-informed sensibility—attuned to both the theoretical underpinnings and the pragmatic realities of science education. This positionality enriched the conceptual analysis by grounding abstract constructs in lived instructional contexts, allowing for a more meaningful interpretation of how CC theory operates within the specific contours of chemistry education. Rather than striving for detached neutrality, the review embraced this standpoint as a source of analytical depth, reflexivity, and contextual authenticity.

4. Review of Related Literature

4.1. Foundations, Definitions, and Role of Conceptual Change in Chemistry Learning

Conceptual change (CC) is conceived by and an offspring of cognitive psychology (Gorodetsky & Keiny, 2002). It was introduced by Thomas Kuhn (1962) to designate that the concepts well-established in a scientific theory change their meaning when the paradigm changes. The meaning of CC has changed since its inception, and it is an evolving arena even today. Clement (2008) describes a range of types of CC like modifying an existing model by adding, removing, or changing elements; creating a new model; or replacing a concept with an ontologically

different concept. Also, Mayer views it as the means underlying meaningful learning (Mayer, 2002). CC is a learning process in which students' alternative conceptions change or develop into the intended scientific conceptions (Vosniadou, 2007). It is an outgrowth of constructivist epistemology in which knowledge acquisition is viewed as a constructive process that involves actively generating and testing alternative propositions (Tyson et al., 1997). CC is all about the process by which learners restructure existing knowledge frameworks in response to new, conflicting information—often modifying or replacing naïve or intuitive understandings with scientifically accurate conceptions. Rooted in the work of Posner et al. (1982), CC theory posits four conditions for meaningful learning: dissatisfaction with prior conceptions, intelligibility, plausibility, and fruitfulness of the new concept. While early models emphasized cognitive conflict and individual mental restructuring, contemporary views—especially sociocultural and metacognitive perspectives—highlight the role of discourse, identity, and context in shaping conceptual development. In chemistry education, this shift is particularly relevant, as students often struggle with abstract representations and symbolic reasoning that challenge their everyday experiences (Alqadri & Munawwarah, 2025). Recent studies, such as Pacaci et al. (2024), validate the effectiveness of strategies like cognitive conflict and ontological shift while Potvin and Bélanger (2024) advocate for representational pluralism in science communication. Nehm and Kampourakis (2016) further highlight the parallels between students' conceptual development and historical scientific revolutions, reinforcing the relevance of CC in chemistry instruction and curriculum reform.

Studies highlight the pivotal role of CC in fostering deep learning in chemistry, especially in topics like chemical equilibrium, redox reactions, and quantitative stoichiometry. Alqadri and Munawwarah (2025) conducted a systematic literature review analyzing students' mental models and persistent misconceptions, revealing that synthetic models—blending correct and incorrect conceptions—dominate learners' understanding. Instructional strategies such as inquiry-based learning, model-based reasoning, and augmented reality have shown promise in promoting CC by engaging students in multi-representational thinking. Similarly, Ginyigazi et al. (2024) demonstrated that a well-structured CC approach significantly improved learners' grasp of quantitative chemistry concepts, suggesting that targeted interventions can bridge the gap between surface-level memorization and deep conceptual understanding. These findings affirm the necessity of integrating CC frameworks into curriculum design and teacher education to enhance scientific literacy and critical thinking. Conceptual change (CC) research in science education has evolved from early “cold” cognitive models—focused on rational, conflict-driven thinking—to more comprehensive “hot” models that incorporate affective, motivational, and social dimensions. These approaches recognize that revising deeply held misconceptions involves not only intellectual dissatisfaction and plausibility judgments but also emotions, epistemic beliefs, motivation, and collaborative argumentation. Practical interventions and meta-analyses have strengthened the understanding of effective strategies for fostering CC. Moreover, the field increasingly applies CC research beyond classroom science learning to areas like public understanding of science and digital education contexts (Dole & Sinatra, 1998; Kural & Kocakulah, 2016; Hewson et al., 1998; Sinatra & Pintrich, 2003; Vosniadou, 2013).

The early CC theory, inspired by Thomas Kuhn's paradigm shifts, began with cognitive conflict models that emphasized dissatisfaction with prior knowledge and the logical assimilation of

new, scientifically accurate ideas. Posner et al. (1982) proposed such a cognitive model that dominated early research and practice. However, by the 1990s and 2000s, researchers introduced affective and motivational factors leading to "hot" CC models. These include students' emotions (anxiety, confidence), epistemic cognition (beliefs about knowledge and knowing), and social interaction, particularly through collaborative argumentation and discourse. The "Teaching Model for Hot CC" highlights motivation and metacognitive strategies alongside cognitive conflict to create a more holistic CC experience (Kural & Kocakulah, 2016; Pintrich et al., 1993).

Contemporary CC research emphasizes instructional strategies that actively engage students' existing misconceptions while supporting new scientific conceptual understanding. Techniques include cognitive conflict induction, cognitive bridging, and ontological category shifts, allowing students to rethink their conceptual categories (Chi, 2008; Vosniadou, 2013; Limón, 2001). Effective interventions foster motivation, provide multiple representations, allow students to test and reflect on ideas, and promote collaborative argumentation. Meta-analyses validate that such strategies significantly enhance science learning outcomes (Pacaci et al., 2024).

Through time, CC research in science education has transitioned from cold, purely cognitive accounts to integrative hot models incorporating affective and social factors, underpinned by practical and empirically supported teaching strategies and expanding into wider educational and societal domains (Hewson et al., 1998; Kural & Kocakulah, 2016; Pintrich et al., 1993; Vosniadou, 2013). As chemistry is full of abstract, counterintuitive ideas (atoms, molecules, reactions, equilibrium, etc.) that often clash with students' everyday experiences, CC approaches are foundational to meaningful chemistry learning (Alqadri & Munawwarah, 2025).

4.2. Theoretical Frameworks of Conceptual Change to Enhance Learning

Conceptual change stands for the cognitive process by which learners transition from a state of misunderstanding or incomplete understanding to a more accurate and scientifically accepted conception (Mayer, 2002). However, this linear view has been critically examined by researchers who emphasize the **coexistence of multiple conceptual frameworks**, particularly in young learners. The intuitive knowledge structures—formed to formal instruction—often persist alongside newly acquired scientific concepts, resulting in hybrid or synthetic models rather than wholesale replacement (Vosniadou, 2007; Vosniadou & Skopeliti, 2014).

About a decade ago, the very notion of "CC" was challenged. Potvin (2013) proposed the **conceptual prevalence model**, which suggests that competing conceptions may coexist, with one becoming more dominant depending on context and instructional support. Empirical evidence supporting this model has been presented by researchers (Potvin et al., 2015) who demonstrated its explanatory power in classroom settings. It is essential to underscore that these theoretical perspectives are deeply intertwined with instructional practices. CC theorists differ in how they interpret learners' naïve conceptions and the mechanisms by which these are reorganized in response to new information. These differences reflect distinct **epistemological assumptions** and carry significant **pedagogical implications**—particularly in designing interventions that foster meaningful restructuring of prior knowledge. The following subsections

explore these conceptual change (CC) theories in greater depth, highlighting their relevance to classroom teaching strategies and learners' cognitive development.

4.2.1. The 'Classical Approach' to Conceptual Change

Posner et al. (1982) proposed the most prominent model of CC. This model, which was mainly inspired by the Piagetian (Piaget, 1964) concept of accommodation and by the Khunian (Khun, 1970) concept of scientific revolution, addresses the problem of making learners modify the "misconceptions" they hold about how the physical world works (Potvin, 2013). Among the models that belong to the classical tradition, Nussbaum and Novick's (1982) model of CC is worth mentioning, together with the model of Posner et al. (1982). The classical model suggests that teachers should expose alternative frameworks, create a conceptual conflict, and encourage accommodation. According to Posner et al. (1982), four essential conditions must be satisfied for CC to occur. Their model emphasizes that learners must first experience *dissatisfaction* with their existing conceptions, recognizing limitations or inconsistencies in their prior understanding. Second, the new concept introduced by the teacher must be *intelligible*—clearly articulated and comprehensible to the learner. Third, the proposed idea must be *plausible*, meaning it should align with the learner's existing knowledge and appear logically sound. Finally, the new concept must demonstrate *fruitfulness*, offering explanatory power and the potential to generate further inquiry or problem-solving. These conditions collectively underscore the cognitive and pedagogical dynamics required to facilitate meaningful shifts in students' scientific understanding.

The theoretical framework, also called the 'classical approach' to CC, became the leading paradigm that guided research and instructional practices in science education for many years. Although there are amendments made today, various early participants in CC research were influenced by this approach to CC.

4.2.2. Framework Theory of Conceptual Change

Learning science requires fundamental ontological, epistemological, and representational changes (Vosniadou & Skopeliti, 2014). CCs are gradual affairs rather than sudden shifts (Vosniadou, 1999). These CCs require extended time to be achieved, giving rise to fragmentation and synthetic conceptions, which result from the assimilation of scientific information (Vosniadou & Skopeliti, 2014). The framework theory view (Vosniadou et al., 2008) argues that young children's experiences are organized into coherent structures that serve to provide explanations of their world. It is these frameworks that later undergo considerable restructuring (Vosniadou et al., 2008). The framework theory approach to CC envisages that a new idea, which fails to corroborate with what is already in the student's mind, is more complex and time-consuming to understand than the idea that supports the existing mental structure of students. Moreover, it explains the formation of 'synthetic models' resulting from learners' efforts to merely append the new information to existing but unsuited knowledge structures, which are known as alternative conceptions or misconceptions. Students create such a synthetic model to be effective in reconciling the conflicting information. As proposed by Vosniadou (1994), students do this when they learn about something that contradicts a piece of information that has already been integrated into the existing knowledge structure.

4.2.3. Knowledge in Pieces Theory

In the domain of conceptual change (CC) research, there remains a notable lack of precision in defining what constitutes a concept (diSessa, 2002). Effecting change without a clear understanding of what needs to be changed poses a fundamental challenge. This ambiguity complicates the selection of appropriate empirical methods and the development of effective instructional strategies to support CC (diSessa & Sherin, 1998). According to diSessa's framework, novice knowledge comprises elemental units referred to as "phenomenological primitives" or "p-prims," which emerge from learners' direct interactions with the physical world (diSessa, 2008, p. 40). CC, in this view, involves the integration of these pre-conceptual "knowledge pieces" into more sophisticated and coherent knowledge structures. Crucially, these emergent structures must be anchored in scientific concepts, distinguishing them from naïve or intuitive understandings.

diSessa and colleagues argue that knowledge cannot be adequately represented by a single type of mental entity, as traditionally assumed in concept-based models (diSessa et al., 2002). What is commonly referred to as a scientific concept should instead be understood as a dynamic system composed of numerous interacting elements of diverse types (diSessa, 2002). From this perspective, CC entails the modification, reorganization, and recombination of various mental entities in complex and context-sensitive ways. Given this theoretical stance, research in CC should prioritize the identification and characterization of the different types of mental entities involved in learning.

4.2.4. Ontological Category View of Conceptual Change

Chi et al. (1994) conceptualize conceptual change (CC) through an ontological lens, emphasizing that learners must reconceptualize how they categorize concepts. From this perspective, non-scientific conceptions are not merely incorrect—they belong to fundamentally different ontological categories. Effective learning thus requires a shift from these non-scientific categories to scientifically endorsed ones. Building on this framework, Chi and Roscoe (2002) argue that learners strive to construct accurate mental models of how phenomena operate. When these models are grounded in misconceptions, the erroneous conceptions must be replaced rather than refined. In their view, CC is a radical process involving the removal of misconceptions and the construction of scientifically valid conceptions to support deep understanding.

A misconception, in this context, is defined as a miscategorized concept—an idea placed within an inappropriate ontological category. Consequently, CC entails reassigning the concept to its correct category, thereby transforming the learner's mental model from one that is internally inconsistent to one that is coherent and scientifically adequate. This ontological approach underscores the importance of identifying and addressing the categorical nature of learners' conceptions. It suggests that instructional strategies should not only correct surface-level misunderstandings but also facilitate deeper reclassification of concepts within appropriate scientific frameworks.

4.2.5. Sociocultural View of Conceptual Change

The sociocultural approach to conceptual change (CC) is rooted in the premise that human cognition is inherently mediated and inseparable from the social, cultural, and historical contexts

in which it unfolds (Wertsch, 1991). Central to this tradition is the notion of mediation—particularly through cultural tools and tool-mediated actions—which shape both the process and content of learning. From this perspective, CC involves the transformation of individual cognitive understandings (intramental processes) as well as the evolution of shared, socially mediated conceptual practices within a learning community (intermental processes) (Hall & Jurow, 2015). Sociocultural theory, when applied to science education, emphasizes that learning is situated within the specific social and cultural contexts accessible to the learner (Murphy, 2012). As Vygotsky (1978) posits, learning initially occurs between individuals and is subsequently internalized, with language serving as a primary mediational tool for organizing intellectual activity.

This outlook necessitates multi-layered analysis to understand how concepts are enacted in practical activity and how conceptual practices shift over time. CC, in this view, is closely tied to the development of tool-using practices that are embedded in the cultural routines of a community (Ivarsson et al., 2002). Shared social practices particularly discourse practices that function as cultural tools—play a pivotal role in shaping conceptual understanding (Kelly & Green, 1998). Thus, CC is not confined to the internal cognitive restructuring of individual learners. Rather, it emerges through dynamic interactions among learners, cultural tools, and social agents within educational communities. What evolves is not only the learner’s internal understanding but also how cultural tools are appropriated and reconfigured across diverse learning environments.

4.2.6. Conceptual Prevalence Model

The conceptual prevalence model challenges traditional views of CC by proposing that multiple conceptions can coexist within learners, with one becoming dominant depending on context and instructional cues (Potvin, 2013). The conceptual prevalence model is best described as a theoretical framework, rather than a fully formalized theory in the classical scientific sense. It is a theoretical refinement of existing CC models, particularly to address limitations in how traditional models treat misconceptions and cognitive conflict (Potvin, 2013). It builds on empirical findings and neuro-educational insights to propose that multiple conceptions can coexist, with one prevailing depending on context rather than being replaced outright. Unlike classical models that emphasize cognitive conflict and replacement of misconceptions, the prevalence model embraces representational pluralism, acknowledging that learners may flexibly shift between intuitive and scientific ideas without necessarily discarding the former. An empirical study (Potvin et al, 2015) demonstrated the model’s superiority in real classroom settings, showing that sequencing instruction to allow conceptual coexistence—rather than forcing early conflict—can lead to more effective learning outcomes. This approach reframes CC as a dynamic process of conceptual negotiation and contextual activation, offering valuable implications for science education and curriculum design (Potvin, 2023). This model is a pedagogically significant theoretical orientation that encourages tolerance for cognitive diversity and strategic instructional design.

These frameworks collectively reveal conceptual change (CC) as a multifaceted and dynamic process, with each offering distinct insights into how learners restructure their understanding. The Classical Approach (Posner et al., 1982) foregrounds cognitive conflict and the necessity

Table-1: *Comparative Overview of Conceptual Change Theories*

Theory/perspective	Core Assumption	Mechanism of Change	Pedagogical Implications
Classical Approach	Misconceptions are replaced through cognitive conflict (Posner et al., 1982).	Learners experience dissatisfaction with prior conceptions and adopt new ones that are intelligible, plausible, and fruitful.	Design instructions to provoke cognitive conflict, present scientifically robust alternatives, and emphasize their explanatory power.
Framework Theory	Learners possess intuitive frameworks that are gradually restructured (Vosniadou, 1994).	Conceptual change occurs via assimilation and restructuring, often involving ontological shifts.	Scaffold learning to address deep-seated presuppositions over time, allowing gradual conceptual reorganization.
Knowledge in Pieces	Knowledge consists of fragmented p-prims that can be integrated into coherent systems (diSessa, 2002).	Change involves reorganizing elemental knowledge units into scientifically coherent structures.	Use context-sensitive tasks to foster coherence and support the integration of fragmented ideas.
Ontological Category View	Misconceptions arise from assigning concepts to incorrect ontological categories (Chi et al., 1994).	Conceptual change requires re-categorizing ideas into appropriate scientific ontologies.	Employ analogies, metaphors, and explicit instruction to guide learners through ontological reclassification.
Sociocultural View	Learning is mediated by social interaction and cultural tools (Vygotsky, 1978).	Concepts are internalized through discourse, collaboration, and engagement with cultural artifacts.	Facilitate collaborative learning environments and leverage culturally relevant tools and practices.
Conceptual Prevalence Model	Multiple conceptions coexist; dominance is context-dependent (Potvin, 2013).	Scientific conceptions are activated by contextual cues without necessarily displacing intuitive ones.	Sequence instruction to support conceptual coexistence, minimize early conflict, and promote flexible reasoning.

of structured conditions for conceptual replacement. In contrast, Framework Theory (Vosniadou et al., 2008) emphasizes the gradual reorganization of coherent, intuitive belief systems. Knowledge in Pieces (diSessa, 2002) conceptualizes learning as the integration of fragmented,

context-sensitive knowledge elements, while the Ontological Category View (Chi et al., 1994) focuses on the reclassification of concepts into fundamentally different ontological categories. The Sociocultural View (Vygotsky, 1978) situates conceptual change within socially mediated interactions and cultural tools, and the Conceptual Prevalence Model (Potvin, 2013) advocates for representational pluralism, acknowledging the coexistence of competing conceptual frameworks. Pedagogically, these theories suggest differentiated strategies: inducing cognitive conflict (Classical), scaffolding long-term restructuring (Framework), fostering coherence among knowledge elements (Knowledge in Pieces), facilitating ontological shifts (Ontological), leveraging collaborative discourse and cultural mediation (Sociocultural), and sequencing instruction to support conceptual coexistence (Prevalence). Despite their contributions, significant gaps remain in synthesizing these perspectives into an integrative model and in addressing the role of cultural diversity and contextual variability in CC processes. Also, the summary table above on theories puts ideas concisely.

4.3. Misconceptions in Chemistry and the Promise of Conceptual Change Approaches

Students' misconceptions in chemistry remain a prevalent impediment to deep scientific understanding, often rooted in intuitive reasoning, prior knowledge, and fragmented conceptual frameworks. Contemporary research affirms that conceptual change approaches—grounded in constructivist pedagogy—offer a potent remedy to these cognitive distortions. Ginyigazi et al. (2024) demonstrated that implementing a conceptual change strategy markedly enhanced learners' grasp of quantitative chemistry domains such as stoichiometry and chemical equations, with post-intervention assessments revealing substantial gains in scientific accuracy. Sarwar et al. (2024) further validated the efficacy of the conceptual change approach using concept mapping and conceptual change texts in nanoscale science, showing how these strategies catalyze cognitive restructuring and foster coherent mental models. A meta-analysis by Pacaci and Ustun (2024) corroborated these findings, reporting a robust effect size ($g = 1.10$) for conceptual change strategies—particularly those invoking cognitive conflict, bridging analogies, and ontological shifts—underscoring their transformative impact across science education. Meanwhile, Suparman et al. (2024) identified persistent misconceptions in chemical equilibrium, covalent bonding, acid-base theory, and material classification, advocating for targeted instructional interventions. Kayima (2025) emphasized the role of learners' interpretive frames and prior beliefs in shaping their conceptual trajectories, urging educators to leverage these cognitive anchors to facilitate meaningful change. Iter (2024), through empirical analysis at Palestine Technical University, revealed alarming rates of misconception—ranging from 53.9% to 84.6%—in topics such as specific heat versus temperature and solution saturation, reinforcing the imperative for diagnostic teaching and responsive curriculum design.

4.4. Pedagogical Pathways for Advancing Conceptual Understanding in Chemistry Classrooms

Pedagogical pathways or instructional strategies for promoting CC in chemistry classrooms focus on helping students revise or replace their misconceptions with scientifically accurate concepts by engaging them in active cognitive processes through the theoretical lenses discussed in the previous section. The strategies help students distinguish between prior conceptions and

new scientific concepts, leading to cognitive restructuring. The approaches emphasize different conditions, like those reflected in the classical model. Studies show that CC strategies improve student learning outcomes compared to conventional methods (Swafiyah et al., 2023). In this sub-section, some CC strategies are discussed.

4.4.1. Conceptual Change Texts and Conceptual Change

Conceptual Change Texts (CCTs) are deliberately crafted to challenge learners' entrenched misconceptions and facilitate their transition toward scientifically validated understandings. In contrast to conventional instructional texts (traditional texts), which typically convey content in a neutral, expository format devoid of engagement with learners' prior cognitive frameworks, CCTs strategically introduce conceptual conflict. Traditional texts are mainly expository and focus on presenting scientific information for students to memorize and reproduce, often without explicitly addressing students' prior misconceptions. Traditional texts usually deliver content in a one-way manner, emphasizing facts and procedures without engaging students in reflecting on or challenging their pre-existing ideas. Traditional textbooks have been criticized for their expository nature, their difficult lexical structure, and for their lack of evidence to support claims (Bars, 2014). Recent frameworks for science education in the United States emphasise the need for students to engage with texts that better reflect the scientific enterprise. Specially designed CC texts that explicitly address students' misconceptions by confronting them with scientific explanations and evidence, helping students restructure their understanding. Different studies indicate that CC texts are effective in improving the understanding of chemistry concepts compared to conventional instruction (Özmen, 2007; Ültay, 2015; Sendur, 2013). For instance, Özmen (2007) demonstrated that CC texts significantly enhanced students' grasp of the particulate nature of matter by addressing misconceptions through targeted refutation strategies. Ditto, Sendur (2013) also reported that CC texts helped students restructure their prior knowledge and achieve more scientifically accurate conceptions in thermodynamics.

4.4.2. Laboratory Activities and Conceptual Change

Laboratory activities play a pivotal role in fostering CC in science education by bridging abstract theories with tangible experiences. Rooted in constructivist and CC models (Posner et al., 1982), hands-on experiments allow learners to confront and revise misconceptions through direct observation, manipulation, and reflection. Studies show that when students engage in inquiry-based laboratory work—such as testing chemical reactions or modeling atomic structures—they are more likely to restructure naïve conceptions and adopt scientifically accurate frameworks (Westbrook & Rogers, 1996). However, challenges such as limited resources, inadequate infrastructure, and insufficient teacher training—particularly in developing contexts (Like Ethiopia) can hinder the effectiveness of laboratory instruction (Alema et al., 2024). To maximize impact, laboratory activities must be strategically integrated with conceptual scaffolding, diagnostic assessment, and reflective dialogue, ensuring that practical work serves not just as demonstration but as a catalyst for deep cognitive transformation.

4.4.3. Concept Cartoons and Conceptual Change

Concept cartoons have emerged as an effective pedagogical tool for promoting CC, particularly in science education. These visual prompts present conflicting viewpoints on scientific phenomena in a cartoon format, encouraging learners to confront their own misconceptions and engage in reflective dialogue. Research by Kumi-Manu (2021) in Ghanaian junior high schools demonstrated that concept cartoons helped students identify and revise erroneous ideas through peer discussion and comparison with scientifically accurate explanations. Similarly, Taşlıdere (2021) found that CC texts enriched with concept cartoons significantly improved pre-service teachers' understanding of mechanical waves, outperforming simulation-based instruction. Through fostering cognitive conflict in a non-threatening, engaging manner, concept cartoons align well with constructivist principles and offer a low-cost, high-impact strategy for facilitating conceptual restructuring in diverse educational contexts.

4.4.4. Concept Mapping and Conceptual Change

Concept mapping is a powerful metacognitive strategy that supports CC by helping learners visualize relationships among scientific ideas and restructure their understanding. Rooted in constructivist theory, concept maps allow students to externalize their prior knowledge, identify misconceptions, and integrate new information into coherent frameworks. Gravett and Swart (1997) demonstrated that concept mapping can be used before instruction to elicit learners' existing conceptions, during instruction to guide knowledge construction, and after instruction to assess CC and monitor cognitive development. More recently, Sarwar et al. (2024) applied concept mapping alongside CC texts to address misconceptions in nanoscale science, showing that this dual approach fosters critical reflection, peer dialogue, and deeper understanding of complex phenomena. Through making learners' thinking visible and promoting active engagement, concept mapping serves as both a diagnostic and transformative tool in science education.

4.4.5. Demonstrations and Conceptual Change

Demonstrations serve as a vital instructional strategy for facilitating CC, particularly in science education, where learners often hold persistent misconceptions. By visually and experientially presenting scientific phenomena, demonstrations create cognitive conflict that challenges students' intuitive beliefs and prompts re-evaluation. Neo and Yap (2009) developed the PORE model—Predict, Observe, Resolve, Extendas a framework for demonstration-based CC instruction, showing its effectiveness in improving students' understanding of electromagnetism and electromagnetic induction. Their study revealed that structured demonstrations, when paired with guided inquiry and reflection, significantly enhance learners' ability to reconcile prior misconceptions with scientific explanations. Moreover, the use of cognitive conflict level tests provided insights into how demonstrations trigger conceptual restructuring. When strategically designed, demonstrations not only clarify abstract concepts but also act as catalysts for deeper cognitive engagement and long-term conceptual transformation.

4.4.6. Analogies and Conceptual Change

Analogies serve as powerful cognitive tools in science education, particularly in facilitating CC within chemistry classrooms. They enable students to relate unfamiliar scientific concepts to familiar, everyday experiences, thereby making abstract or complex ideas more intelligible and accessible. This relational mapping between a known domain (the analog) and an unknown domain (the target) helps bridge cognitive gaps and supports the restructuring of prior knowledge. As Hanson and Seheri-Jele (2018) demonstrated, analogies—when paired with concept maps—can significantly enhance students' understanding of acid-base strengths by guiding them from naïve conceptions toward scientifically accurate frameworks. Their study revealed that CC-oriented instruction, enriched with analogical reasoning, led to improved learning outcomes compared to traditional methods.

Orgill and Bodner (2004) further emphasize that analogies, when used effectively, can promote meaningful learning by activating students' prior knowledge and encouraging deeper engagement with scientific content. However, they caution that poorly constructed or misaligned analogies may reinforce misconceptions rather than resolve them, underscoring the need for deliberate instructional design. Lalami (2024) adds that the effectiveness of analogies depends on the degree of structural similarity between the analog and target domains. In chemistry, where abstract concepts such as molecular interactions, reaction mechanisms, and atomic structure often challenge learners, analogies can demystify content by anchoring it in familiar cognitive schemas. For example, likening electron movement to traffic flow or comparing chemical bonding to interpersonal relationships can foster intuitive understanding and stimulate CC. Moreover, analogies align well with constructivist pedagogies, which advocate for learner-centered approaches that build upon existing mental models. Through facilitating the transition from intuitive, experience-based reasoning to formal scientific understanding, analogies play a pivotal role in transforming misconceptions into meaningful learning. Also, the summary table below on the strategies puts ideas succinctly.

Table-2: *Conceptual Change Strategies in Science/Chemistry Education*

Strategy	Core Purpose	Mechanism of Conceptual Change	Key Studies / Evidence
Conceptual Change Texts (CCTs)	Dislodge entrenched misconceptions through structured refutation and explanatory narratives.	Introduce conceptual conflict by explicitly confronting alternative conceptions, followed by scientifically grounded explanations to foster dissatisfaction and cognitive accommodation.	Özmen (2007) on particulate nature; Ültay et al. (2015) on REACT strategy for solutions; Sendur & Toprak (2013) on alkenes; Beerenwinkel et al. (2011) on particle models; Özmen et al. (2009) on chemical bonding; Alparslan et al. (2003) on solutions, Bealchew et al. (2018) on hydrocarbon

Strategy	Core Purpose	Mechanism of Conceptual Change	Key Studies / Evidence
			concepts achievement, Belachew et al. (2019) on hydrocarbon concepts motivation, Bealchew (2020) on hydrocarbon concepts understanding
Laboratory Activities	Translate abstract theories into experiential learning to revise naïve conceptions.	Facilitate direct manipulation and observation, generating cognitive dissonance through empirical contradictions that prompt model refinement.	Cobern (1996) on worldview; Brhane et al. (2025) on Ethiopian classrooms; Adadan (2013) on particle theory; Barthlow & Watson (2014) on reducing misconceptions.
Concept Cartoons	Stimulate dialogue and reflection through visual, low-threat provocations.	Present divergent viewpoints via cartoon characters to elicit peer discussion, exposing and challenging misconceptions in a socially safe format.	Kumi-Manu (2021) in Ghanaian schools; Taşlıdere (2021) on mechanical waves; Balim et al. (2008) on pressure; Gafoor & Shilna (2013) on chemistry engagement.
Concept Mapping	Foster metacognitive restructuring by visualizing conceptual relationships.	Externalize prior knowledge into hierarchical frameworks, revealing gaps and enabling integration of new ideas for ontological coherence.	Gravett & Swart (1997); Sarwar et al. (2024); Kaya (2008); Talbert et al. (2020)
Demonstrations	Visually disrupt intuitive beliefs and scaffold inquiry-based reasoning.	Create immediate cognitive conflict through observable phenomena, followed by structured reflection (e.g., PORE model) to reconcile discrepancies and build explanatory models.	Neo & Neo (2009) on PORE; Syuhendri (2023) on attitudes; Domin (2007) on lab perceptions.
Analogies	Bridge abstract concepts with familiar experiences to enhance relational understanding.	Map familiar source domains onto abstract targets, enabling structural alignment and relational reasoning to restructure misconceptions.	Hanson & Seheri-Jele (2018); Orgill & Bodner (2004); Lalami (2024); Çalik et al. (2009); Sarantopoulos & Tsaparlis (2004).

4.5. Limitations of Conventional Teaching Methods and Importance of Pedagogical Innovation

Conventional pedagogical approaches—predominantly characterized by teacher-centered delivery, rote memorization, and passive student engagement—have long prevailed in educational settings. While such methods may offer structural clarity and facilitate content transmission, they frequently fall short in cultivating deep conceptual understanding, critical inquiry, and sustained learner engagement. These approaches tend to position students as passive recipients rather than active constructors of knowledge, thereby impeding cognitive development and the possibility of meaningful CC (Falasi, 2024). Furthermore, they often neglect the diverse cognitive profiles, motivational dispositions, and cultural backgrounds of learners, resulting in pedagogical misalignment and diminished inclusivity (Alessa & Hussein, 2023). The rigidity of standardized curricula and inflexible instructional formats further exacerbates this disconnect, particularly in multicultural contexts such as Ethiopia, where contextual relevance is paramount. Additionally, the absence of timely formative feedback and dialogic interaction undermines opportunities for diagnostic assessment and the correction of entrenched misconceptions. These limitations underscore the urgent imperative for pedagogical innovation—embracing learner-centered, constructivist, and culturally responsive approaches—to meet the evolving epistemological needs of diverse learners (Awang et al., 2025).

Pedagogical innovation has emerged as a necessary response to the limitations of traditional teaching methods, offering transformative potential through learner-centered, constructivist, and technology-enhanced approaches. By prioritizing active learning and conceptual engagement—through strategies such as problem-based learning, flipped classrooms, and analogical reasoning—innovative pedagogy fosters deeper cognitive restructuring and meaningful understanding (Singh & Goyal, 2024). It also embraces culturally responsive instruction, integrating indigenous knowledge systems, linguistic diversity, and contextual relevance, which is particularly vital in Ethiopian classrooms where educational equity and cultural resonance are paramount (Bekmanova, 2019). Furthermore, flexible and adaptive learning environments, supported by blended modalities and digital tools, empower students to navigate personalized learning trajectories that align with their pace, style, and needs. Empirical research consistently affirms that such innovations lead to improved retention, enhanced conceptual clarity, and heightened learner motivation, positioning educators not merely as transmitters of knowledge but as facilitators of transformative learning experiences (Herodotou et al., 2019).

4.6. Advantages of the conceptual change perspective

In response to the limitations of conventional teaching methods, the CC perspective offers a transformative approach to science education, particularly in chemistry, by prioritizing the restructuring of students' prior knowledge. Rather than treating misconceptions as errors to be corrected, CC pedagogy views them as starting points for deeper cognitive engagement. This approach encourages learners to confront and reflect on their existing mental models, fostering

metacognitive awareness and epistemological growth. Instructional strategies such as CC texts, analogies, and guided inquiry are designed to provoke cognitive conflict and facilitate the transition from naïve to scientifically accurate understanding. As Posner et al. (1982), and Duit and Treagust (2003) argue, meaningful learning occurs when students actively reorganize their conceptual frameworks in response to compelling evidence and reasoning.

Moreover, CC pedagogy aligns seamlessly with constructivist and culturally responsive teaching practices. In diverse educational contexts, such as Ethiopia, where learners bring rich experiential knowledge shaped by local languages, traditions, and worldviews, CC strategies can bridge the gap between global scientific paradigms and indigenous understandings. By integrating familiar analogies, contextually relevant demonstrations, and dialogic learning environments, educators can make abstract chemical concepts more accessible and resonant. Empirical studies have shown that such approaches not only improve conceptual clarity but also enhance student motivation and long-term retention (Hanson & Seheri-Jele, 2018; Orgill & Bodner, 2004). Thus, embracing CC as a pedagogical foundation is not merely an instructional choice; it is a strategic imperative for cultivating scientifically literate, critically reflective learners.

4.7. Challenges in Implementing the Conceptual Change Approach

The Conceptual Change (CC) approach heralds the potential for profound cognitive transformation, yet it is frequently diminished to mere rhetorical ornamentation. While educators speak earnestly of “dislodging misconceptions,” the reality of classrooms governed by rote assessments and inflexible curricular structures leaves little room for genuine epistemological engagement. In the absence of systemic reform—spanning teacher preparation, curriculum design, and assessment Conceptual Change risks devolving into a pedagogical mirage (failing to deliver meaningful impact): extolled in scholarly discourse, but conspicuously absent from the lived realities of instructional practice. The remedy for this is understanding the challenges, and addressing them. The implementation of the CC approach in education—particularly within science and mathematics domains—poses profound pedagogical and epistemological challenges (Nadelson et al., 2018). Foremost among these is the persistence of deeply entrenched misconceptions that learners acquire through everyday experiences and linguistic conventions. Such intuitive beliefs, like the notion that heavier objects fall faster than lighter ones, often remain impervious to correction even when confronted with empirically validated scientific explanations. Effective conceptual change necessitates more than the transmission of accurate information; it requires the deliberate induction of cognitive dissonance, the facilitation of metacognitive reflection, and the cultivation of epistemological awareness (Chi & Roscoe, 2002). Teachers must be adept at diagnosing misconceptions, orchestrating inquiry-driven discourse, and scaffolding learners’ transitions from naïve frameworks to scientifically coherent understandings, a process that is both cognitively demanding and pedagogically intricate.

Compounding these challenges are systemic constraints embedded within traditional curricula and assessment regimes, which tend to valorize rote memorization and procedural fluency over

deep conceptual restructuring. Standardized evaluations seldom capture the nuanced evolution of learners' cognitive schemas, thereby undermining the diagnostic and formative potential of CC-based instruction. Furthermore, many educators lack formal exposure to conceptual change theory and its associated pedagogical strategies, such as ontological category shifts and analogical reasoning (Taşdere, 2023). The absence of institutional support—manifested in limited professional development, rigid curricular frameworks, and inadequate assessment tools—risks relegating the CC approach to the periphery of educational practice. Addressing these impediments demands a concerted effort across policy, research, and instructional design to embed conceptual change as a foundational principle of science education reform (Ashwin, 2018; Duit & Treagust, 2011; Grillo, 2024; Nadelson et al., 2018).

5. Conclusion

The scholarship on conceptual change (CC) has evolved from a revolutionary metaphor—borrowed from Kuhn—into empirically grounded and theoretically rich constructs in science education. What began as a cognitive narrative of rational replacement (Posner et al., 1982) has expanded into a multidimensional framework where dissatisfaction intertwines with desire, conflicting ideas coexist in the coexistence model, and individual cognition is inseparable from the cultural tools and social voices that mediate it. The evidence is unequivocal. Chemistry misconceptions are not mere errors but systematically adaptive knowledge structures. They persist because they once served a purpose. Only when instruction renders them intelligibly unsatisfactory, plausibly replaceable, and fruitfully extendable—or, under prevalence models, contextually suppressible—do learners willingly renegotiate their conceptual allegiance.

Meta-analytic findings leave little room for doubt. CC-oriented pedagogies yield effect sizes that far exceed those of traditional exposition (Pacaci & Ustun, 2024). Whether through the refutational clarity of Conceptual Change Texts, the gentle provocation of concept cartoons, the visceral dissonance of PORE demonstrations, or the structural resonance of well-chosen analogies, effective strategies share a common mark—they treat the learner not as a passive recipient, but as an active author of meaning. Yet the horizon remains open. We still lack a truly integrative model that synthesizes the six major theoretical strands (Classical Approach, Framework Theory, Knowledge in Pieces, Ontological Category View, Sociocultural View, and Conceptual Prevalence Model). Classrooms that honor both voices, allow them to engage in epistemic dialogue, and teach learners when and how to let the scientific voice speak loudest, will complete the conceptual change revolution that began in 1962. Until then, each lingering misconception reflects not a learner's failure, but the distance our pedagogical imagination has yet to travel.

6. Recommendations

Embed Conceptual Change Strategies in Curriculum Design

Curriculum frameworks for teacher education and chemistry instruction should be deliberately structured around CC principles. This involves identifying common misconceptions, sequencing content to provoke cognitive conflict, and embedding opportunities for epistemological reflection. Curriculum designers must integrate constructivist scaffolding, inquiry-based tasks,

and diagnostic assessments that reveal students' prior conceptions. In the Ethiopian context and other contexts, aligning these strategies with national curriculum reform priorities ensures both pedagogical relevance and systemic coherence. CC should not be an add-on but a foundational lens through which curriculum goals, content organization, and instructional outcomes are defined.

Promote Reflective Teaching Practices

Reflective teaching is essential for fostering CC, as it enables educators to monitor students' cognitive progress and adapt instruction accordingly. Teachers should be trained to use formative assessments, student interviews, and classroom discourse to identify persistent misconceptions and respond with targeted interventions in chemistry. Reflective practice also involves examining one's own instructional assumptions and biases, particularly in culturally diverse settings. In Ethiopia and other contexts, embedding reflective protocols carefully into teacher education programs—such as lesson study, peer observation, and action research—can cultivate a professional culture of inquiry and responsiveness, ultimately improving instructional quality and student outcomes.

Design Meaningful Professional Development for Teachers

Professional development is critical for equipping chemistry teachers and educators with both theoretical knowledge and practical tools. These are needed to implement CC pedagogy effectively. Workshops, mentoring programs, and training sessions should focus on diagnostic strategies, concept mapping, and culturally responsive instruction. Training should be ongoing and built into school systems. This allows teachers to experiment, reflect, and improve their practice over time. Collaboration between universities, teacher training colleges, and regional education bureaus is also important. It helps ensure that professional development is meaningful, context-sensitive, and aligned with national education goals.

Encourage Research-Practice Integration

Bridging the gap between CC theories/strategies and classroom practice requires robust research that examines how these strategies function in diverse educational contexts. Action research, case studies, and classroom-based experiments can generate insights into the effectiveness, challenges, and adaptations of CC pedagogy. Educators should be empowered to participate in research as co-investigators, contributing local knowledge and classroom experience. Findings should inform policy, curriculum design, and teacher training, creating a feedback loop between theory and practice.

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Curriculum Alignment with Labor Market Demand and National Development Goals: The Case of Civil Engineering Undergraduate Program at Addis Ababa University

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Abstract:

The purpose of this study was to explore the alignment of curriculum with labor market demand and national development goals, with particular focus on the civil engineering undergraduate program at Addis Ababa University (AAU). For this study, a qualitative research method was employed, particularly a single case study design. Purposive sampling technique was employed in order to collect the data from the target population. The primary data were collected through semi-structured interviews from four senior faculty members who served for more than 10 years of experience, one alumnus, one MOE official, one curriculum expert, one official acting as a client at MOE, and two project managers from construction companies through person-to-person interviews. Also, a focus group discussion was conducted with 4th and 5th year students. Besides, document analysis was also used as a secondary data source, such as published journal articles, books, and reports. The researcher systematically processed the interview data by transcribing, coding key words, grouping them into categories and themes, and summarizing the findings to prepare the research report. The findings of the study revealed that significant gaps in the AAU civil engineering curriculum leads to disconnect from national development goals and labor market demands, institutional and instructional challenges. The curriculum emphasizes theoretical knowledge but lacks practical skill training, which contributes to graduate skill mismatch with labor market demands. Institutional barriers and lack of organized feedback from stakeholders' involvement further exacerbate the problems.

Keywords: Addis Ababa University, Civil Engineering, Curriculum Alignment, Labor Market Demand, National Development Goals

1. Introduction

The term *curriculum* originates from the Latin *currere* (“to run” or “to proceed”) and refers to the course of experiences through which learners develop into mature adults (Hlebowitsh, 2004). Like any other educational concept, curriculum lacks a universally accepted definition; different scholars define the word curriculum differently depending on their philosophical, cultural contexts, experience, perspectives, and contextual setting. Curriculum can be viewed in both broad and narrow ways. In the narrow sense of the popular notion, curriculum is a set of subjects

or content taught to the students in school, college, or university. In a broad sense, curriculum consists of all experiences a learner gains in school, colleges, or the university (Sarkar, 2019). Despite variations in perceiving the term “curriculum,” according to Brady (1995, p.75) and Nunan (1988, p.4), the curriculum development process generally entails four elements: objectives, content, methods, and evaluation. Reynolds & Halpin (1982) have extended this view by considering “outcomes” as a fifth element of any curriculum by some educator.

In Ethiopia, engineering education began in 1953 with two years of intermediate program that prepared students for the degree completion abroad. In 1955, a four-year degree program was introduced, and the first B.Sc. degrees were awarded in civil and industrial engineering in 1958 (Mesfin, 2016). In developing countries like Ethiopia, civil engineering plays a vital role in national infrastructure development, which contributes to the economic development and improvement of the living standard of the people through improved livelihood and ways of investment attractions and tourism is very crucial (AAU, 2024).

Education and Training Policy (ETP, 1994) mandates curricula responsive to satisfy the country's need for skilled manpower by providing training in various skills and at different levels to meet market and development needs. This directly supports civil engineering alignment with infrastructure demands. Following this, the government adopted a new higher education policy in 2009 called the 70:30 program mix ratio, wherein 70% of the total undergraduate students enrolled in public universities join natural science fields and the remaining 30% the social science streams. Based on the policy, 40% of the students from the natural science realm must go to the engineering field (Kibrom, 2015). It has produced relatively more graduates than the current labor market can absorb. In response to challenges of homogeneity and duplication of academic programs and to improve focus and quality, it has become imperative to assess the status of higher education and design mechanisms for introducing the concept of differentiation in the Ethiopian higher education system (MOE, 2020).

National employment policy strategy (2016) coordinating education and skill development programs with contemporary labor market needs; establishing and strengthening links between higher education and training institutions and the industry human resource development workforce goals (FDRE, 2021). Similarly, based on the education and training roadmap study recommendations, MOE formulated the revised education and training policy, which mandates that higher education programs shall be launched based on national and international development needs, human resource demands of the labor market, and the needs of the sectors and industry, taking quality and relevance into account (MOE, 2023). Ethiopia's Ten-year Development Plan (2021-2030), which sets a long-term vision of making Ethiopia an “African Beacon of Prosperity”, by diversifying sources of economic growth, particularly focusing on agricultural, manufacturing, mineral, tourism, and the ICT sectors as sources of growth (FDRE, Plan Commission, 2021). These sectors require a skilled workforce, particularly in civil engineering to sustain infrastructure development.

Curriculum development requires strong collaboration among higher education institutions, industries, and professional associations to enhance curriculum relevance and graduate employability. In this regard, recent curriculum reform initiatives in Ethiopia seek to incorporate 21st-century skills such as critical thinking, creativity, communication, digital literacy, problem-solving, teamwork, and leadership (MOE, 2020). Employers consistently report a high demand for competencies, including the application of scientific and engineering principles, technical design, planning, construction, safety, and operational technologies (Shivoro et al., 2019). However, whether these essential skills are inadequately addressed in current programs remains an empirical question.

According to this study, curriculum alignment refers to the process of making sure learning objectives, activities or content match with competencies (knowledge, skill, and attitude) required by the labor market and national development goals. It is crucial to ensure graduates are equipped with the necessary competencies required in dynamic industries. However, employers frequently express doubts that university education does indeed lead to professional competence, claiming that it fails to provide students with the skills they require in the workforce (Lowden, 2011). In the same way, another study found a wider mismatch between levels of higher education supply and labor market needs for indicators of academic, technical, interpersonal, and generic skills (Teshome & Oumer, 2024). This implies that there was a persistent skill mismatch between institutional supply engineering graduates and labor market demand regarding academic, technical, interpersonal, and generic skills of the engineering graduates.

Therefore, investigating the extent to which civil engineering curriculum aligns with market demand and national development goals is essential, particularly as such alignment will ensure graduates are not only technically competent but also capable to contribute Ethiopian infrastructure planning, construction, and sustainability, which equips graduates with the required competencies to drive national long-term development

1.1 Statement of the Problem

Higher education institutions have not fully embedded curriculum alignment with market demand into curricular and extracurricular tasks, despite the growing graduate population and rising unemployment rates. In this context, the World Bank (2020) emphasizes the persistent global challenge of misalignment between university curricula and the rapidly evolving demands of the labor market. There are various policies and strategies in place to address employability both in higher education and in the labor market. However, there is a lack of coordination and integration between the education system and the labor market as well as poor actions (Shimekit & Oumer, 2021). In developing countries like Ethiopia, public sector investment is dominant because the contribution of the private sector investment in economic growth is found to be limited. Yet the Ethiopian construction industry has contributed much to reducing poverty (Federal democratic Republic of Ethiopia [FDRE], 2016), for instance, through increasing employment expansion through small- and medium-enterprise development

and job creation through the construction of low-cost houses (Tefera, 2013). The motivation behind conducting investigations on civil engineering, other than other engineering programs stem from the fact that although all engineering programs are important, civil engineering stands out due to its direct impact on national infrastructure, multidisciplinary complexity, and high societal concern and relevance of the program.

As far as I know, the existing studies have focused on harmonized civil engineering curriculum, Curriculum auditing, gaps and skill mismatch in the labor market, employability, and related areas, including curriculum auditing: Embedment of graduate capitals in Ethiopian undergraduate engineering programs' harmonized Curricula (Shimekit & Oumer, , 2021). Similarly, studies have examined employment status and education–job alignment among engineering graduates in Ethiopia, including Tamiru (2017) on policy implications, Teshome and Oumer (2024) on STEM education and labor needs, and Berhe and Tsegay (2018) on the state, determinants, and consequences of skills mismatch in the Ethiopian labor market. Moreover, other researchers have investigated employability among statistics graduates, including Ashanfi (2019) on graduates' attributes, competence, and quality of education; Herut et al. (2025) on governing higher education systems as consumable goods to enhance employability; and Haile (2019) on supply-side factors influencing employability through a tracer study of Bahir Dar University graduates. Other scholars have emphasized the practices and prospects of enhancing the employability of Addis Ababa University engineering graduates, including Jerusalem (2016) on skills gaps and mismatches in relation to private sector expectations; Teshome (2024) on the alignment between higher education skill supply and employers' skill needs in Ethiopia; and Henok (2022) on evaluating practical teaching approaches in civil engineering training among public universities from the perspective of students. This implies that these studies provide significant insight in the academic arena for knowledge generation, policy formulation, and practical indications for curriculum improvement.

Although these studies provide valuable insights into employability trends and skill mismatches, and highlight areas for improvement, they rely exclusively on qualitative approaches with small samples and lack supporting quantitative data. Methodologically, in most studies, sampling participants primarily rely on employed graduates (alumni) rather than currently enrolled university students. The studies may lack the diverse students' perspective on-the-ground, but only a few studies used students as respondents to collect data. For example (Henok, 2022). Therefore, this study seeks to fill significant gaps by incorporating lived experience and diverse perspectives of students within the education system. As there remains a notable absence of bottom-up evidence regarding student experiences on the ground, this research distinguishes itself through a methodological departure, employing Focus Group Discussion (FGD) to extract nuanced and multiple-dimensional perspectives from the students. In doing so, it investigates the practical alignment of the civil engineering curriculum at Addis Ababa University.

1.2 Objective of the Study

The overall objective of the study is to explore how key stakeholders (officials, experts, employers, alumni, faculty members, students) understand and experience the alignment of the civil engineering undergraduate curriculum at AAU with labor market demands and national development goals to identify areas of gaps in Ethiopia. Accordingly, the study addresses the following specific objectives:

- To examine how key stakeholders perceive the alignment of the AAU civil engineering curriculum with the labour market's required competencies (knowledge, skills, and attitudes) and national development goals.
- To explore how labour market demands influence the civil engineering undergraduate curriculum at AAU, based on the experiences and perspectives of key stakeholders.
- To investigate the reason behind civil engineering graduates', get difficulties in securing employment in Ethiopia.

2. Theoretical and Conceptual Framework of the Study

2.1 Theoretical Framework of the Study

A theoretical framework outlines the assumptions that guide a study and serves as the lens through which the research is developed. It grounds the research focus in established theory and provides a basis for data analysis and interpretation. In traditional research, theory is used to understand, explain, and predict phenomena (Swanson, 2013). Selecting an appropriate theoretical framework requires the researcher to consider the study's guiding principles and align the research problem accordingly. The research questions and purpose must reflect key elements of the chosen theory and be consistent with its core assumptions (Maxwell, 2004; LoBiondo-Wood, 2010). In this study, selected theories are used to examine the alignment between the undergraduate civil engineering curriculum, labor market demands, and national development goals at Addis Ababa University, providing a framework to understand the relationship among these factors.

2.1.1 System Theory

System theory emphasizes the interaction and interconnection of different parts within a system, emphasizing that educational goals can only be understood by examining how parts interact and influence one another rather than isolation. In the case of this study, as depicted in the conceptual framework, different parts, such as input, process, output, and outcome interact to produce a competent graduate. A system is composed of a whole made up of interacting parts, and therefore, systems scientists in both the natural and social sciences study the interaction between parts to better understand the complexities of reality (Lalande & Baumeister, 2015). The systems theory is analogous to the education production function. According to John (2010), education has a high-priority function in the production of human resources, and the production function is a relationship between the amount of input and intervening factors to produce a certain good, with consideration to its quality. Thus, it provides how various educational components,

including input, process, output, and outcome components, interact within a context of AAU undergraduate civil engineering curriculum alignment with market demand and national development goals to enhance program relevance and effectiveness.

2.1.2 Human Capital Theory

It is defined as the relation between the individuals' abilities, education, training, and the outcomes obtained in the labor market, in terms of wages and employment (Becker, 1993). Governments and individuals alike devote resources to education and training until the return on the most recent investment in human capital exceeds the return on investment in any other market. Besides, human capital theorists argue extensively that any resources voluntarily committed for enhancement of human capital have a definite productivity aspect (McMahon, 1999). The view of these theorists has been that schooling or training raises labor productivity through its function in increasing the abilities of workers. The outlook that elevated labor productivity is a positive function of the amount of training obtained is the main premise of human capital theory (Colcough, 1982).

The human capital theory was also articulated by Becker in 1964, who, following Adam Smith 's footsteps, saw job seekers pursuing education to increase their capability to produce and, in turn, receive higher profits. It emphasizes individuals' skills, knowledge, and experiences as a form of capital for enhancing productivity and economic performance. This theory suggests that investments in education and training enhance individuals' skills, knowledge, and abilities, consequently increasing their productivity and economic value. It emphasizes the importance of aligning educational outcomes with labor market demand. It can provide a valuable theoretical framework as a lens for exploring how undergraduate engineering curricula in Ethiopian public universities align with labor market demands and national development goals.

2.1.3 The Synthesis of Human Capital and System Theories

Human Capital theory and system theory are two distinct approaches to understand education and workforce skill development. Human capital theory focuses on the value of education in driving economic growth and productivity, and the social returns of investing in education, skills and health. On the other hand, system theory views organizations as complex systems with interconnected parts like inputs, processes, outputs, and outcomes, where a change in one part can affect the entire system. In this connection, the relationships between the parts themselves and the events they produce through their interaction become much more important, with the result that "system elements are rationally connected" (Luhmann, 1990). The integration of both theories provides a comprehensive understanding of how input-output linkage in education functions, how individuals contribute to organizational success, and how organizational structures and processes impact individual development and performance to achieve intended educational goals. They promote evidence-based planning that supports systemic alignment, coordination, and continuous improvement or responsiveness to maximize developmental outcomes. The synthesis of these theories provides useful foundation for civil engineering undergraduate curriculum alignment with labor market demand and national development goals. Therefore, this study was guided by the above-mentioned two theories, and then, system theory

was applied to understand how curriculum components (input, process, output, and outcomes) interact to cultivate required qualified and competent human capital, and capital theory used to examine how graduate productivity aligns with the labor market in the civil engineering undergraduate program at Addis Ababa University.

2.2 Conceptual Framework of the Study

According to Jabareen (2009) conceptual framework is a network, or “a plane,” of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena. It serves to understand research problems, guides the development and analysis of the research process from beginning to end to address research questions and provides recommendations based on the findings. It indicates the relationship among various variables of the problem under study. Based on the above definitions, the researcher developed a simplified visual representation of the key variables in the conceptual framework at the initial stage of the exploratory study by considering the understanding of the research problem, objectives, and methods of data collection and analysis. Thus, the following diagram describes the conceptual framework of the study.

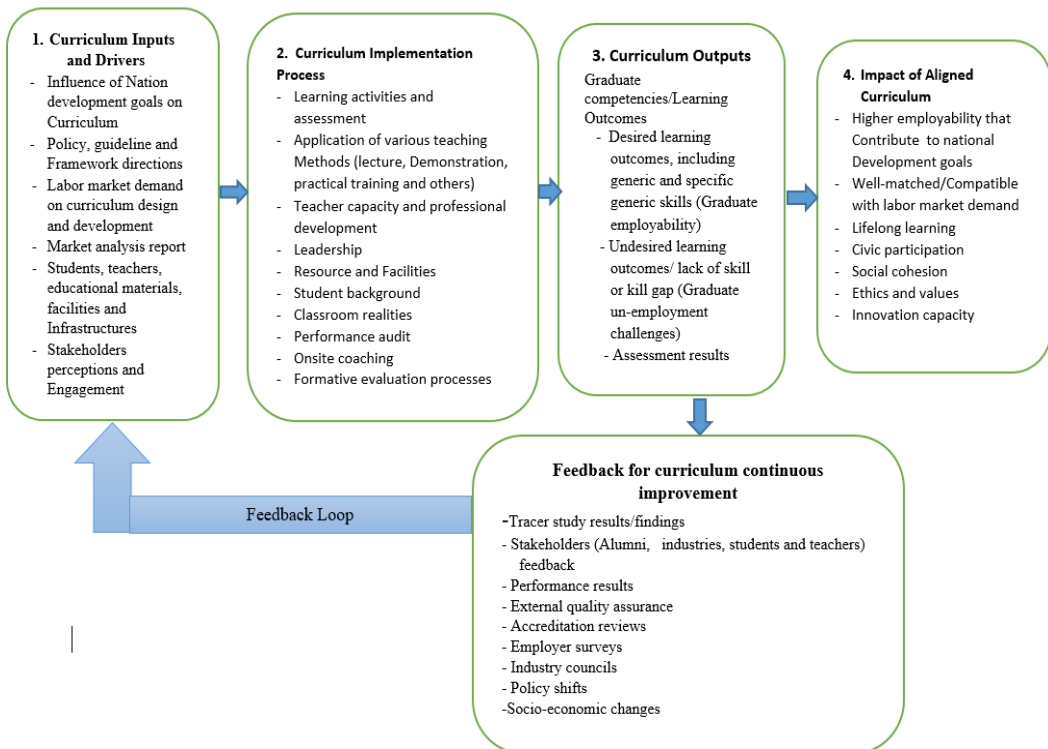


Figure 1: Conceptual Framework of Study

This conceptual framework is a mapping of the system, aligning civil engineering undergraduate curriculum with labor market demands and national development goals at AAU University,

Ethiopia. The arrows represent the flows of shared influence and relationship from the respective boxes. The expected influence indicated by each arrow shows a flow of input to each component in charge of the research problem.

3. Research Paradigm and Methods

For this research study, a social constructivist or interpretivist philosophical worldview was used as a direction to guide the research, which seeks to understand how individuals construct meaning through their lived experiences and interactions. These meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas (Creswell, 2018, P.46). This study adopts a qualitative single-case study design that enables an in-depth exploration of curriculum alignment with market demands and national development goals, focusing on the civil engineering undergraduate program at Addis Ababa University. Single-case study design is ideal for studying unique, accessible cases in revealing complexities that broader methods may overlook.

3.1. Sampling, Data Collection Procedures, Demographic Background and Data Analysis

3.1.1. Sampling Method

This study adopted a purposive sampling method, which allowed the researchers to gain as much insight from as many angles as possible, in-depth insight from information-rich cases (Nyimbili & Nyimbili, 2024; Patton, 2015). Participants were selected based on their roles and expertise in curriculum design, graduate performance, and labor market needs. Focus group discussion (FGD) was conducted with senior students (4th and 5th year students), which is used to gather diverse perspectives to enhance understanding of curriculum relevance and challenges as a primary data source.

3.1.2. Data Collection Procedures

The school dean and the academic unit head of the school facilitated the selection of sample teachers. Interviews were conducted with participants at their preferred venues, which were primarily in their offices. Besides, the academic unit head and eight students' representatives have been selected, mobilized and arranged sample students to participate in the FGD. Both interviews and FGD were managed by researchers. Moreover, a participant with international education experience, who previously served as Director General of the universities' construction project office and head of the schools' building project office at the Ministry of Education, and who oversees the recruitment and management of civil engineers, contributed critical stakeholder perspectives on practical alignment. Thus, that's why they were included as participants in the study. The interview was conducted deliberately to get in-depth insight from participants into the problem under study.

Semi-structured, in-depth interview questions focused on stakeholders' perceptions of graduate-required competencies, the extent of industry participation, the reasons for civil engineering graduates' employment challenges, and curriculum alignment with market demand and national development.

3.1.3. Demographic Characteristics of Participants

The demographic characteristics of respondents (MOE officials and experts, employers, teachers, instructors, and students) by sex, age, work experience, educational background, field of specialization, and responsibilities were analyzed. The study involved 10 participants, of whom 90.9% were male and 9.1% female, representing diverse professional backgrounds. Their ages ranged from below 30 to over 60 years, ensuring a mature cohort capable of providing thoughtful insights. Notably, the majority (70%) possessed more than 11 years of professional experience, contributing substantial expertise to the study. Half of the participants held PhDs and half MSc/MA degrees, which implies strong academic qualifications and professional expertise of participants in curriculum design and implementation. Although 50% specialized in civil engineering, others came from special needs education, animal production, the history of international education, and related fields, which implies a multidisciplinary perspective. Finally, responsibilities of participants included university instructors (40%), construction project managers (20%), and individual representatives from the MOE official, expert and alumnus (each 10%). This mix of academic, industry, and government perspectives is crucial for a comprehensive understanding of how curriculum aligns with market demand and national development goals.

In addition to the in-depth interview, a focus group discussion was conducted with eight AAU civil engineering undergraduate students, consisting of both 4th year and 5th year students. Of these, three of the five were males, and three were females.

Primary data sources included semi-structured interviews targeting experts with relevant roles and experience. Semi-structured interview guides questions were developed in English separately for participants such as teachers, experts, officials, employers, and alumni, depending on the nature of the roles and experiences of the participants. Primary data were collected through semi-structured interviews with 4 senior faculty members, 1 alumnus from the school of civil engineering at AAU, 1 curriculum desk head and 1 expert at MOE, and 2 project managers in the construction companies, including Ethiopian Construction Works Corporation (ECWC) and Sunshine Construction Pvt. Ltd. Co; they were large companies and major employers in absorbing civil engineering graduate in the construction sector and absorb or recruit graduate from this program regularly. In addition to the in-depth interview, a focus group discussion was conducted with 8 undergraduate Civil Engineering students, consisting of both 4th-year and 5th-year students. Of these, 5 were males, and 3 were females.

To complement the interview and focus group discussion (FGD) data, document analysis was used to explore the research problem qualitatively, focusing on social events such as data records, reports, compositions, academic work, books, periodicals, bulletins or catalogs, syllabi, films, and cartoons (Best & Khan, 2003).

3.1.4. Method of Data Analysis

For this study, the thematic analysis method was adopted to organize and analyze complex data sets systematically. It is a search for themes that can capture the narratives available in the accounts of data sets. It involves the identification of themes through careful reading and re-reading of the transcribed data (King, 2004). The process of data analysis involved coding, categorizing, and developing themes based on research questions. Finally, the data analysis process continued in a cyclical manner with reviewing data repeatedly; arranging codes, categories, and the themes, confirming relationships were identified between the themes to draw conclusions and recommendations of the study. The nature of the natural flow/process of this qualitative data analysis process was indicated in the following figure as follows.



Figure 2: *Qualitative data Reduction Process (Adapted from Arthur and Clark, 2023)*

3.2 Trustworthiness of the Study

In qualitative research, truthfulness describes the authenticity and accuracy of the data collected, the interpretations made, and the representation of participants' voices. This includes elements such as credibility, transferability, dependability, and confirmability (Ahmed, 2024). To maintain credibility of research finding, the researcher used triangulation by using multiple sources such as interview, focus group discussion, and document analysis, prolonged engagement by spending adequate time in the field to collect data, and member checking by sending back interview transcript document to collect feedback from participants, while transferability is facilitated by providing thick description and purposeful to allow for contextual comparison (Shenton, 2004). And then, by documenting the unique cultural and social factors of the civil engineering program at Addis Ababa University, the researchers provided the evidence necessary for others to assess the applicability of the findings to a similar educational setting. Besides, dependability was maintained through audit trail and the use of a dairy recording or field notes by increasing self-awareness before, during, and following data collection and analysis to minimize researcher bias, which implies the findings of the study are impartial, objective, and remain unaffected by any biases or preferences of the researcher. The researcher used direct quotations from interview transcription data to eliminate any bias, and the conclusions are supported by the data to ensure the confirmability of the research. Moreover, the researchers were committed to a continual process of examining and documenting personal diaries to prevent their own biases and preconceptions throughout the research process to confirm the reflexivity of the research. To sum up, all the above-mentioned quality assurance criteria, measures together strengthened the trustworthiness of the research, ensuring robust qualitative rigor.

4. Results

4.1. Participants' Experiences and perspectives on curriculum Alignment with labor Market Demand and National Development Goals

In this section, to ensure participants' anonymity, each participant was assigned a code identifier. The codes reflect stakeholder category and participant number. Accordingly, Stu-FD stands for student participants, FAM to Faculty members, EMP to employers, Client to CLI, ALU to Alumni, EXP to expert, and official at MOE. Besides, numbers distinguish individual participants in the data collection, and the final number depicts the year of data collection (e.g., Stu-FD-01, 2025, EMP-02, 2025) to make clear the application of codes by the researchers.

4.1.1 Theme 1: Stakeholders' Perception of Curriculum-Industry Competency Misalignment

The stakeholders' perceptions constantly indicate a significant curriculum-industry competency misalignment, which requires collaborative efforts among concerned stakeholders such as educators, industry partners, policy makers, and students to ensure that curricula are relevant, practical, aligned with the evolving needs of the labor market.

Sub-theme 1: Curriculum Design and Structure

The curriculum design and structure in Ethiopian higher education, especially for civil engineering (CEP), is a multifaceted topic influenced by national development goals, international standards, and the need to address graduate employability.

Curriculum Design Strengths and Challenges

The AAU Civil Engineering undergraduate curriculum offers a comprehensive and well-structured education that combines theoretical foundations with practical application, which includes core subjects like structural analysis, fluid mechanics, soil mechanics, and transportation engineering. This curriculum was revised in accordance with the university autonomy granted recently by the government to align with market demands and technological advancements to ensure students acquire relevant skills. In this regard, one instructor stated that *"After Addis Ababa University decided to continue as an autonomous institution, I was one of the people who participated in the curriculum review."* (FAM-02, 2025). In the same way, one instructor from AAU explained that *"I do believe that the curriculum is well designed to give the basic knowledge and skill that a graduate should have."* (FAM-04, 2025). Moreover, one interviewed employer also pointed out that *"AAU civil engineering graduates are very good at translating theory into practice."* (EMP-01, 2025).

On the other hand, the AAU civil engineering curriculum faces several challenges, including overemphasis on theory teaching over practical application, competency mismatch with labor market demand, a heavy course load, a focus on quantity over quality, and a lack of continuity. On this issue, one employer emphasized that:

Addis Ababa University has a number of courses offered with a lack of consistency in scheduling; some are delivered in the 2nd semester, others in the 3rd year, without a clear pattern. Hence, 1) Courses have no consistency, 2)

Curriculum focused on theory; in the future, it should be more focused on practical hands-on and properly organized laboratories, adequate budget, and supply of materials to be pay attention to it. (EMP-02, 2025)

On top of this, one student further explained that “*There was an inadequacy of PhD holder teachers.*” (Stu5-FD, 2025). Another student added that “*The course load in the curriculum was very heavy, with students taking 7 or 8 courses in a semester, leading to high pressure and limited time for project work. This overload affects course completion and compromises quality.*” (Stu-FD-01, 2025).

Similarly, another student added that “*Due to the abundance of courses, we are not acquiring sufficient competence but rather collecting information. For us, taking too many courses is making us weak in our practice/skills.*” (Stu-FD-02, 2025). One instructor also explained the irrelevance of curriculum courses associated with common courses that put workload pressure on students:

Sometimes the curriculum comes from the MOE, like common courses. As a result, some semesters exceed 18 credit hours, reaching up to 21 credit hours, which creates unnecessary pressure on students. To manage the load, e.g., we merged Hydraulic 1 and 2 into a single core course. We also removed hydraulic structures 1 and 2 after much debate, even though they had value for devastating students. (FAM-02, 2025)

MoE curriculum expert added that “*The curriculum might not always keep pace with the latest advancements, technologies, and methodologies used in the rapidly evolving civil engineering field.*” (EXP-01, 2025).

In conclusion, although the AAU civil engineering undergraduate curriculum is acknowledged by instructors for its solid theoretical foundation and recent revision aimed to align with market needs following the university's autonomy, it faces challenges like excessive theory focus, limited industry skills alignment, heavy course loads, outdated labs, weak course continuity, and limited practical engagement that hinder students' competences and education quality.

Sub-theme 2: Teaching-Learning Processes

The AAU Civil Engineering undergraduate program teaching-learning is perceived as heavily theory-packed, with limited practical application and access to industry-standard equipment, which resulted in students with strong conceptual understanding but lacking hands-on skills required by the civil engineering industry.

Laboratory Facilities and Practical Skill Training Gaps in CEUGP at AAU

The AAU Civil Engineering undergraduate program teaching-learning is perceived as heavily theory-packed, with limited practical application and access to industry-standard equipment, which resulted in students with strong conceptual understanding but lacking hands-on skills required by the civil engineering industry. In this context, one interviewed employer noted that “*The equipment that graduates get when they join the world of work should be made available*

in the university laboratories, but they are limited.” (EMP-02, 2025). The AAU civil engineering program at AAU faces significant challenges in delivering effective hands-on learning due to outdated laboratory facilities and poorly coordinated practical training. Although workshop training and internships are included, resource constraints and inadequate integration with theory reduce their effectiveness. Concerning this, one of the interviewed instructors emphasized that:

Most of the laboratories were old and not updated, which were established by the Germans dating back to 1972. For example, if we want to make a hydraulic model, we cannot do it because there is no budget, which affects curriculum implementation. Students do not get software and soft skills. I think teaching students without changing a single item would be a joke on students. An adequate budget should be allocated to upgrade laboratories in the future. (FAM-02, 2025)

In the same way, another instructor emphasized that “*Addis Ababa University has laboratories for undergraduate teaching at the curriculum level. Although they need to be upgraded from time to time, the laboratories are old and outdated.*” (FAM-01, 2025). Graduates often demonstrate weak construction skills due to limited exposure to actual construction processes and quality control practices. This gap affects their competence in managing construction activities and ensuring project standards on-site. On this matter, the employer participant explained that:

Technically, an internship or apprenticeship is designed to help bridge students’ practical gaps. However, these programs are neither adequately followed nor supported properly. As a result, students fail to understand purpose, and the skills gap among graduates is very wide. (EMP-02, 2025)

In this university, the civil engineering program combines laboratory and practical education across core areas such as construction materials, highway engineering, hydraulics, geotechnical, and environmental engineering, alongside various specialized labs and computer labs. It includes workshop training and internships to equip students with hands-on experience in the construction sector. However, challenges like limited equipment and space hinder the effectiveness of hands-on learning. On this issue, most students who took part in the FGDs emphasized that the university let students search for and practice on their own with no appropriate supervision, and no connection with the industries for the students (Stu-FD-08, 2025). One instructor depicted that Practical skill training in the university was hindered by broader national challenges, including low economic growth, which limits the number of construction projects, regional insecurity, which restricts access to stable training environments, free movement, and consistent industry engagement (FAM-002, 2025). In relation to this, one employer suggested that “*The curriculum is mostly focused on theory, it should be focus on the future, 50% theory and 50% practice.*” (EMP-02, 2025). Besides, one interviewed instructor noted that:

Although the curriculum was properly designed to teach students, taking students' field for visits to do practical exercises, there were obstacles, including budget constraints and security concerns. Now, if I take students to show them Tandaho Dam, it is very risky due to security problems in crossing many areas. (FAM-02, 2025)

Lack of Transferable or Soft Skills in the Curriculum

Concerning the incorporation of courses that develop soft skills such as communication, teamwork, leadership, and ethical responsibility program and curriculum expert at MOE confirmed that “Employers often seek graduates with strong communication, teamwork, problem-solving, and project management skills, which may not be sufficiently developed within the academic curriculum.” (EXP-01, 2025). These gaps limit students' ability to apply theoretical knowledge in real-world experience in construction jobs and site operations engineering contexts. The curriculum highlights the Ethiopian Building Code of Standards (EBCS), but its coverage is limited and restricts students' familiarity with local standards, potentially affecting their readiness to apply national codes effectively in professional practice. As noted, a student who participated in FGD said:

The Ethiopian building code standards (BBCS) contains 200 pages and has a lot of useful information in it but only a few contents are taught. Since EBCS is very useful for civil engineering students, it is better to make students familiar with it in the courses that are being offered in the future. (Stu-FD-04, 2025)

Moreover, another student from the FGD added that:

Civil engineering programs in the university require software, such as CADA, Open Channel, HECRAMS, PETABS, CIVIL BD, AutoCAD, MATLAB, SAFE, and CADAM, but limited exposure is given to these soft wares to improve design accuracy that enables pre-construction modeling, supports data-driven decisions, and bridges the gap between theory and practice, enhancing graduate readiness for industry demands. (Stu-FD-03, 2025)

On the other hand, one employer depicted that “the interest of students in education is very low. Students want to attend the class to maintain their attendance. Nowadays, most of the students are busy on social media.” (EMP-02, 2025).

In sum, the teaching-learning process is criticized for being overly theory-packed content with insufficient practical training, which is attributed to outdated laboratory equipment and budget constraints, insecurity and lack of coordination with industry. Most of the Participants emphasized the urgent need for modernized laboratories, increased practical learning time, and a balanced curriculum, suggesting (50% theory and 50% practice) to better prepare students for industry demand and national development

Sub-theme 3: Graduate Employability and Market Relevance***Employers' Preference for Experienced Non-qualified Individuals over New Graduates***

Currently, in Ethiopia, many employers tend to prefer field engineers with long years of practical experience over formally qualified engineers. In this connection, one student in the FGD participant indicated that *“Currently, many job advertisements are issued in Ethiopia for people who have jobs but do not consider fresh graduates who require more than 5/6 years of work experience”*. However, this trend can undermine the value of formal education and may contribute to skill gaps in technical knowledge and adherence to professional standards, which tend to lead to graduate unemployment. In relation to this, one participant noted that:

In Ethiopia, most of the construction jobs require 2-4 years of experience rather than newly qualified graduates, preferring experienced workers, even without qualifications assumed to perform better with lower salaries. This raises concerns about the value of formal education versus practical skills. (EMP-01, 2025)

Similarly, one instructor emphasized that *“the challenges graduates face when seeking employment in Ethiopia’s civil engineering sector are that job posts are more for experienced individuals, opportunities should be given for fresh graduates too.”* (FAM-04, 2025).

Graduate communication deficit

AAU civil engineering graduates face a communication deficit, hindering effective project execution and stakeholder engagement upon graduation. In the eyes of one employer:

The challenges that graduates face during the first start work is communication gaps: confusion about not knowing which department to contact for the issue they want, not knowing what they want, not knowing who to get the work plan/schedule from, (e.g., from the planning department), and not knowing who to communicate with. (EMP-02, 2025)

Limited knowledge of construction material names and quality standards among civil engineering students remains a critical challenge. Another employer also emphasized that *“The main problems of graduates that I observed are communication deficit and failure to understand the names of construction materials they know, like sponda, the side can be closed, there are things called tumbi, etc.”* (EMP-01, 2025).

In short, the study findings depict that in Ethiopia, many employers prefer experienced non-qualified workers over new civil engineering graduates with low salaries, referring to practical gaps despite academic qualifications. Moreover, fresh graduates face communication deficits and a lack of familiarity with construction and field on-site terminologies that hinder graduate work effectiveness and employability in the construction industry.

Sub-theme 4: Institutional Limitation

The civil engineering curriculum at Addis Ababa University (AAU) was not periodically revised, limiting stakeholder engagement and giving less attention to transferable skills. In this

connection, one curriculum official at MoE emphasized that “Universities use various mechanisms to gather feedback, including industry surveys, alumni opinions through tracer study, students’ input, and professional consultations to improve civil engineering curriculum design and revision effectiveness.” (EXP-02, 2025). Contrary to this, one teacher explained that “I didn’t have the opportunity to receive feedback from alumni or employers.” (FAM-04, 2025).

Therefore, the AAU Civil Engineering program faces several challenges, such as a shortage of qualified PhD-level staff, limited involvement of stakeholders, budget constraints, and obsolete laboratory equipment. This reduces per-student budget allocations, limiting the ability to provide adequate resources and modern equipment, which affects education quality and hinders progress through public-private partnerships.

4.1.2 Theme 2: AAU CEUGP Curriculum Alignment with National Development Goals

The AAU Undergraduate Civil Engineering curriculum is designed to align with Ethiopia's national development goals, particularly strategic pillars of the ten-year development plan priority areas, like quality and efficient infrastructure development. It emphasizes strengthening the domestic construction industry to increase its contribution to the country’s rapid economic and social development. It emphasizes skills in sustainable infrastructure design, construction management, and urban planning, supporting economic growth and improved living standards. The curriculum also integrates courses on environmental engineering and sustainable construction practices to promote resource efficiency and minimize environmental impact. By aligning the civil engineering curriculum with Ethiopia's development goals, AAU seems to ensure graduates are well-equipped to contribute to the nation's growth and advancement.

Sub-theme 1: AAU CEUGP Curriculum Relevance to National Priorities and Industry Needs

The AAU Civil Engineering undergraduate curriculum faces criticism for its insufficient responsiveness to national development goals and evolving industry needs. The curriculum, which includes technical subjects like structural analysis and construction management, lacks alignment with national priorities such as infrastructure expansion, housing shortages, and road development projects over the next 10 years at the expected level. Students also express concerns about the curriculum's relevance to real-world construction standards and tools, such as the Ethiopian Building Code Standards (EBCS), which are only partially covered in coursework (Stu-FD-03, 2025). This implies that the AAU civil engineering curriculum lacks structured employer engagement, insufficient integration of national policy priorities, and weak implementation of practical learning components further undermining the curriculum's relevance and effectiveness.

Sub-theme 2: AAU Civil Engineering Graduate Preparedness and Employability

AAU’s civil engineering program faces gaps in practical skills, workplace readiness, and labor market adaptability. Graduates struggle with site supervision, material selection, and project execution, highlighting a skill mismatch between university training and employer requirements like soft skills, professional communication, and teamwork, which are underdeveloped; addressing such issues is crucial for job readiness and labor market integration. In this

connection, one instructor elaborated on the issue that “*Students do not get software and soft skills. I think that the current laboratories were installed 30/40 years ago, and teaching students without changing a single item would be a joke on the students that hinders workplace readiness*” (FAM-02, 2025). Another FGD participant noted:

Currently, when job advertisements are issued in Ethiopia, they target people who already have jobs, but not for fresh graduates. Many advertisements require more than 5/6 years of work experience due to the practical experience of employees. Then I think, it would be better if university professors taught students more practical, hands-on education rather than theory-focused to enhance graduate readiness for employability (Stu-FD-08, 2025).

Furthermore, another instructor added “*There was a lack of sufficient budget for practical education and the fact that the lab equipment were old that, which caused a skill gap in the graduates. Therefore, the student should not be blamed for having a skill gap.*” (FAM-01, 2025). In this respect, one alumnus added that “*Major challenges that I faced when entering the job market as a Civil Engineering graduate in Ethiopia was lack of practical skill was the major problem that I faced while entering the market*” (ALU-01, 2025). Similarly, one employer depicted that:

We have failed due to not focusing on practical education; the quality of education is related to the knowledge we have given to students. If the education provided by universities is not supported by practical education with laboratories, it can't bring the change that we expected and graduate readiness for employability. "The food a child eats is what is seen on his/her face!" (EMP-02, 2025).

Thus, AAU civil engineering graduates lacked practical skills, software proficiency, and workplace readiness. Stakeholders, including instructors, employers, and teachers, consistently highlight outdated laboratories and facilities, insufficient hands-on training, and weak soft skills, which create a skill mismatch between university training and market demands. These, worsened by budget constraints, undermine graduate readiness and employability.

4.1.3 Theme 3: Labor Market Influence on AAU Engineering Curriculum Design and Revision

The AAU university civil engineering curriculum was revised due to the university's autonomy, aiming to align with labor market demands, incorporating employer feedback, tracer studies, and limited stakeholder consultations. However, industry influence remains limited, and curriculum revision often lags behind evolving market demands. Strengthening collaboration with employers is essential to ensure graduate relevance and employability in the labor market.

Sub-theme 1: Curriculum Responsiveness and Relevance

The AAU Civil Engineering curriculum is designed to be responsive to market demand and national development priorities, which incorporates core technical courses, stakeholder

feedback, and revision due to university autonomy to maintain relevance. Nevertheless, gaps remain in translating curriculum design into practical application due to limited industry engagement, obsolete laboratory facilities, and insufficient alignment with evolving market demands. In relation to this, one construction site client emphasized that *“My organization has ever been involved in providing feedback to AAU regarding curriculum development, including engagement through curriculum review panels, employer surveys, or professional forums”* (CLI-01, 2025). This implies that AAU is not inviting stakeholders in the civil engineering curriculum revision process to get feedback to align the curriculum with market demand.

Sub-theme 2: AAU Civil Engineering Institutional and Instructional Capacity

The AAU civil engineering academic program faces challenges in institutional and instructional capacity problems, including outdated laboratory equipment, limited practical training resources, and an insufficient budget. In this connection, one instructor explained that *“The curriculum alone is nothing without properly equipped laboratories to implement the curriculum.”* (FAM--01, 2025). Similarly, another instructor emphasized that:

The laboratories are obsolete, which limits practical experiences to change theory into practice effectively. There is also a lack of budget, so that students can't practice what they have learned in theory during their stay at the university. If there is a budget, cement is purchased for practical education, and there is a need to set up a pump and take students out to demonstrate the field, but it has been a long time since the budget for such issues has been cut (FAM-02, 2025).

In the same way, one employer suggested that:

It is good to pay attention to teaching in a balanced manner without excessive theoretical education. Besides, it is good to work in strengthening the capacity of teachers. It is also necessary to bring better-qualified teachers from foreign countries to transfer practical and technological knowledge. In the university laboratories, equipment are limited to practical education, which require sufficient budget for practical education to make education effective. (EMP-02, 2025)

One Alumnus added that *“The Instructors have less experience in practical activities and there is a gap between academic preparation and actual work in the market.”* (ALU-01, 2025). Hence, the AAU civil engineering program faces critical instructional and practical challenges due to outdated laboratory facilities, limited practical training, and an insufficient budget. Despite having qualified instructors, the lack of modern equipment and teaching materials hampers effective skill training, which hinders graduate readiness for employability

Sub-theme 3: Stakeholder Engagement and Integration of Feedback Mechanisms

The AAU Civil Engineering program appears to solicit feedback from alumni, employers, and other stakeholders through periodic surveys, industry forums, and stakeholder workshops. In relation to this point, stakeholder engagement is a crucial factor that significantly influences the

implementation of the curriculum. It is a two-way process involving consultation, empowerment, involvement, and collaboration between organizations and various stakeholders, including faculty members, administrators, students, military personnel, external agencies, and industry partners, to achieve organizational goals and objectives (Letlatsa, 2018). This mechanism helps to evaluate graduate workplace performance, identify skill gaps, and inform curriculum updates to enhance program and curriculum relevance. On this issue, one of the instructors interviewed explained that *“Yes, we get feedback from industries and professionals involved in the sector concerning students' lack of work discipline and commitment gaps; they tend to move from place to place and are not hardworking, which relates to work ethics.”* (FAM-03, 2025). Another instructor also added that *“We have now conducted a curriculum review from undergraduate up to the PhD degree. So, we get feedback through different mechanisms, such telegram channel, to get alumni and other stakeholders who will be useful for the curriculum review.”* (FAM-02, 2025). An Official from the MoE curriculum desk indicated that *“The mechanisms that are used to gather feedback from industry professionals to inform the design and revision of the civil engineering curriculum are alumni opinions, feedback from active students of the program, and consultations with professional associations.”* Further elaborating on the feedback system program and curriculum, expert MoE explained that *“Tracer studies often include gathering feedback directly from employers on the performance and preparedness of recent civil engineering graduates. This provides crucial insights into any gap between the curriculum and industry expectations.”*

However, one employer emphasized the issue that:

It would be good if the feedback mechanism were practiced and strengthened, but I have not seen it so far. Universities, by inviting industries in the form of seminars to discuss with them and employers provide feedback on graduates' performance, which is good, but that is not taken as the norm (EMP-02, 2025).

Another employer added that *“Since we spend a lot of time in the field, we do not know about the participation to provide feedback for AAU regarding curriculum design engagement through curriculum review panels, employer surveys, or professional forums”* (EMP-01, 2025).

To sum up, while some instructors and one MoE official and expert confirm AAU civil engineering has feedback mechanisms through tracer studies and stakeholder consultations, feedback received mainly highlights graduates' lack of discipline gaps, and employers report limited engagement and not being taken as a norm. In general, feedback mechanisms exist but are not consistently or systematically implemented, and stronger university-industry collaboration is needed in the future.

Sub-theme 1: Skill and Competency Gaps in Graduates

Some AAU civil engineering graduates exhibit gaps in practical skills, software proficiency, and soft skills or work competencies, including communication, project supervision, and management. These deficiencies stem from limited hands-on training due to outdated lab

equipment and insufficient budget allocation for practical education, and inadequate soft or transferable skills within the curriculum. In relation to this, a curriculum expert from MOE explained that *“The design of competencies within the civil engineering undergraduate curriculum in Ethiopia is a direct response to the nation's overarching development goals and the specific demands of its rapidly evolving labor market”* (EXP-01, 2025). On the other hand. One employer argued that: *“Concerning the AAU new graduate lacking key skills, including technical proficiency, software knowledge (e.g., AutoCAD, Civil 3D), or soft skills like communication and teamwork”* (EMP-01, 2025). Moreover, MoE program and curriculum official explained that *“Due to skill gap, civil engineering graduates challenge faces when seeking employment, which is the mismatch between the market demand (vacant positions) and the number of annual graduates from each university”* (EXP-02,2025). In the same way, another employer emphasized that *“There are problems in delivering projects on time; translating what they have learned into practice in the office or field due to a lack of standardized laboratories and budget shortages for practice leads to skill gaps”* (EMP-02, 2025). Likewise, one instructor pointed out that *“Old lab equipment has caused a skill gap in the graduates; thus, students should not be blamed for having a skill gap”* (FAM-01, 2025).

In summary, although an MOE curriculum expert and an instructor emphasized that the civil engineering curriculum is aligned with local, national and international competences, most instructors and employers pointed out that the AAU civil engineering program still exhibits gaps in practical skills, software proficiency, and soft skills or transferable skills, resulting in a significant mismatch between academic preparation and labor market expectations to possess practical skills (e.g., AutoCAD, BIM) project management and application soft skills (e.g., innovation, communication, team work) for quality infrastructure development.

Sub-theme 2: Institutional and External Constraints

The Addis Ababa University (AAU) civil engineering curriculum faces systemic and external constraints, affecting its effectiveness in preparing graduates for the industry. Systemic constraints include a shortage of qualified faculty (PhD), curriculum content overload, a theory-heavy curriculum, and insufficient laboratory facilities. External constraints include industry expectations, political instability, lack of students' interest in favor of social media, and security problems due to low economic growth, budgetary constraints, poor national technological advancements, and quality management challenges in the construction sector. In this connection, one instructor stressed that:

In Ethiopia, in about 50 universities, civil engineering programs are offered, resulting in many graduates entering the labor market that lacks sufficient economic capacity to absorb them, and insecurity. This saturation, combined with the scarcity of national construction projects, has created intense competition for limited job positions, particularly concentrated in Addis Ababa. (FAM-02, 2025).

One employer indicated that:

Construction companies in Ethiopia advertise for jobs for 4 or 5 years of work experience. If they advertise, people with civil engineering qualifications will continue to be overlooked in favour of experienced workers but non-qualified individuals, which discourages recent graduates (EMP-01, 2025).

Another instructor noted that field visits itemized in the curriculum could not be implemented due to security risks and lack of national infrastructure projects (FAM-02, 2025). An employer emphasized that:

We do construction well in Ethiopia, but we have a gap in finishing projects. This is because the laboratories are not well-equipped, and the selection of construction materials is also poor, which leads to a lack of practical training. Not only Addis Ababa University graduates but also graduates from all over universities in the country have a problem with communication skills (EMP-01, 2025).

Additionally, another employer added that “*the existence of inflation, especially the challenge of inflation to achieve project work related to the foreign exchange rate of the dollar. Because of this, the contractor contracts with a devalued currency every day, it will lead to bankruptcy.*”

In conclusion, both employer and instructor argued that AAU civil engineering graduates' unemployment is not merely a curriculum issue, but rather problems related to political instability, due to economic stagnation, limited infrastructure, and unrealistic industry expectations that restrict graduate employment opportunities.

Sub-theme 3: Economic and security Barriers

The AAU civil engineering program curriculum implementation faces insufficient budget allocation, resulting in outdated laboratory equipment and limited practical training that hinders skill development of graduates. In this connection, one instructor emphasized that “*Due to the economic problem, there was lack of projects for civil engineering graduates' employment, but as you know, the number of graduates and our roads are still small, and there is a severe shortage of houses.*” (Dda-Te-02, 2025). In the same way, the same instructor added that:

Students are not receiving the practical exercises that are included in the curriculum. Even when practical lessons are part of the curriculum, students still do not experience them, as they mainly learn through theory-focused instruction. Most of the machines used for practical training are now nonfunctional (Ibid).

Similarly, another instructor emphasized that the curriculum does not need to be linked to the unemployment of civil engineering graduates.

Most of the unemployment problems emanate from insufficient economic growth. for instance, electricity access <50%, poor water supply and sanitation, and road networks lag SDG targets, all of which require civil engineering work across sub-

disciplines. Thus, linking curriculum directly to unemployment proves challenging. (FAM-01, 2025)

Similarly, one employer explained that:

Lack of projects at the national level because of low level of economic growth in the past, there were many projects at the government level, so civil engineering graduates were in demand. However, currently, many civil engineering graduates are studying civil engineering at many Ethiopian universities, but there is a shortage of projects in the country. There is a security problem in moving and work from place to place. (EMP-02, 2025)

Therefore, the implementation of the AAU Civil Engineering curriculum is constrained by economic and security barriers. Shortage of budget and security risks limit practical training and field work, hindering skill development. Stakeholders note that graduate unemployment is more linked to national economic challenges, resulting in a shortage of projects than to curriculum design-related barriers.

5. Discussion of the Study

The findings of this study reveal a complex interaction between curriculum design, labor market demands, and national development priorities in the context of the AAU Civil Engineering undergraduate curriculum.

5.1. AAU Civil Engineering Curriculum Relevance to Labor Market Competences

Curriculum relevance is a very important aspect to fit market demands, competencies that balance theoretical foundation with practical training. In this connection, the findings of the study revealed that stakeholders acknowledged the AAU Civil Engineering undergraduate curriculum that has a strong theoretical foundation; however, this is undermined by a lack of practical skill training due to limited allocation of budget for practical education, outdated laboratory equipment, and insufficient soft skills. These findings agree with those of Mahadik (2024), who argued that universities teach important theoretical concepts crucial for understanding civil engineering principles. Yet, when it comes to applying, the researchers further noted, these theories do prepare many engineers for real-world projects, This mismatch, coupled with under-training in the critical skills of problem-solving, analytical thinking, and communication is blamed, at least in part, for the emerging high graduate unemployment and underemployment in many parts of Africa (Pauw et al., 2008). Though AAU's civil engineering curriculum provides a solid theoretical foundation, there is a pressing need to enhance practical training and skills development to improve graduate employability and better align with labor market competencies.

5.2 Influence of National Development Goals on AAU Civil Engineering Curriculum

According to the findings of the study, although the MOE curriculum expert and instructors argued that the AAU civil engineering curriculum is designed to align with market demand and Ethiopia's national development goals. However, issues like poor university-industry

collaboration, inconsistent feedback mechanisms, practical skills gaps, software proficiency and soft skills, and limited attention on transferable skills, resulted in a mismatch between academic preparation and labor market expectations, which leads to a curriculum unable to align with national development goals. These findings are consistent with those of Rajesh and Murali (2016), who found that civil engineering graduates (final-year students) mainly lack practical knowledge, communication skills, technical knowledge, application knowledge, software skills, and design. This implies that while curriculum content may be conceptually relevant, its implementation and delivery mechanisms will require significant changes to meet the growing and developing demands of the labor market.

5.3 Labor Market Influence on AAU Civil Engineering Curriculum Design

In Ethiopia's civil engineering sector, employers commonly prefer experienced non-qualified individuals over newly graduated engineers due to skill mismatch, based on the belief that practical exposure is more valuable than academic qualifications, which limits job opportunities for fresh graduates, contributing to unemployment, and undermining the role of formal education. Besides, graduates lack knowledge of construction materials, and minimal integration between theoretical learning and real-world application. These findings of the study agree with Tamiru (2017), who describes this phenomenon as an education mismatch where there is a lack of coherence between the required and offered educational level and specialization for a given job; this situation is usually termed as education–job mismatch. This education–job mismatch highlights the poor coordination among stakeholders both on the demand and on the supply sides.

Although university autonomy has enabled curriculum revision, the process lacks stakeholders' participation, which indicates poor industry-university collaboration and inconsistent feedback mechanisms that ultimately hinder graduate employability. This finding directly corresponds with Jerusalem, y. (2016), who argues that the higher education curriculum needs to be responsive to the interests of employers and take planned action to equip graduates with the required and up-to-date employability skills. For the most part, efforts for the development of employability skills and attributes should be integrated within the curriculum. This implies that strengthening stakeholder participation and industry collaboration alongside systematic integration of soft skills (communication, teamwork, problem-solving, critical thinking, adaptability, and technical proficiency, innovation, etc.) in curricula is essential to cultivate graduates who meet employers' expectations and labor market demands effectively.

5.4 Graduates' Employment Challenges

The Findings of the study revealed that Addis Ababa University (AAU) civil engineering graduates face employment challenges, which emanate from both internal and external factors. Internally, factors include shortage of PhD-qualified instructors, outdated laboratory facilities, overloaded curricula, and limited soft skills among graduates. These factors contribute to skill mismatch between university training and labour market demand, often lacking practical and employability skills despite theoretical knowledge. Externally, political instability, economic

stagnation (graduate oversupply and scarcity of national projects), inflation, feedback from key stakeholders, soft skills deficiencies, limited infrastructure, and unrealistic industry expectations further restrict/challenge graduate employment opportunities. Addressing these issues requires revitalizing curriculum content, enhancing industry collaboration, and mitigating external economic and infrastructural barriers to improve graduate readiness and employment outcomes that could align curriculum with market demand. The mismatch between higher education output/graduates and labour market absorption is a persistent problem, aggravated by the system issues in the education system and the broader socio-economic environment. These findings correspond with (Mekonnen, 2024), who described a significant discrepancy between higher education system efficacy (enrolment and graduation) and graduates' career prospects, is a significant problem.

This imbalance is expected to persist, owing in part to the ongoing political upheaval affecting employment rates. Uncertain political environments impede graduate employability and discourage investment that creates excessive unemployment, inequality, and corruption, all of which impact economic growth and job creation. This implies that addressing these challenges require realistic participation and consultation of key stakeholders in curriculum design, revision, or reform initiatives to foster job creation for civil engineering graduates in Ethiopia.

6. Conclusion

It can be concluded that stakeholders perceive AAU's civil engineering curriculum as having a strong theoretical foundation and recent revisions aimed to align with market needs, following the university's autonomy. However, there is a critical lack of practical application or insufficient hands-on training due to outdated laboratory equipment that was established in 1972 by Germans, and weak supervision during the internship. Persistent issues, including limited university-industry linkage, theory-based heavy course loads, and weak course continuity, restrict the employability skills of the graduates. These drawbacks result in a mismatch between graduate competencies to deliver given tasks in the competitive construction sector effectively.

Although the curriculum is intended to align with Ethiopia's national development goals, this alignment is limited in practice by budget constraints, inadequate infrastructure and laboratory facilities, and political instability. Most participants reported that the curriculum does not adequately prepare students to contribute to national development priorities. They attributed this to weak integration of labor market demands, insufficient emphasis on soft or transferable skills, and ineffective feedback mechanisms, all of which hinder proper alignment with national goals. Labor market demands significantly influence the effectiveness and relevance of the civil engineering undergraduate curriculum at AAU. The labor market in Ethiopia favors experienced non-qualified individuals over newly graduated civil engineers, leading to graduate unemployment and a lack of practical knowledge that limits opportunities and undermines the value of formal education. It emphasizes theoretical instruction on construction materials and has limitations due to outdated equipment, limited resources, poor industry coordination, and

inadequate supervision. This results in significant skill gaps among graduates, who struggle to integrate theoretical knowledge with practical demands in the evolving construction industry.

Civil engineering graduates from AAU face considerable employment challenges due to both internal and external barriers. Internally, the curriculum's failure to integrate soft skills and modern tools, insufficient practical training due to outdated laboratory equipment, and a shortage of PhD-level qualified instructors lead to skill mismatch with employer expectations. Externally, economic stagnation, inflation, security instability, and an oversaturated labor market further diminish employment prospects and restrict graduate employment opportunities. While feedback mechanisms such as surveys, tracer studies, and alumni channels exist, they are not consistently or systematically implemented and have minimal employer engagement and limited focus on curriculum-related gaps. Without coordinated interventions, these challenges are likely to persist and deepen graduate unemployment, which resulted in graduate oversaturation and further worsened challenges to job readiness create skill mismatch between university training and market demands that undermine graduate preparedness and employability.

7. Recommendations

- Modernize laboratory facilities and equipment to balance theoretical knowledge (50%) and practical skill (50%) and allocate sufficient budget towards practice-oriented education to minimize skill mismatch and enhance employability.
- Establish structured and institutionalized feedback mechanisms for employers and alumni through curriculum advisory boards, tracer studies, and regular industry forums to guide curriculum updates and teaching practices.
- Promote transferable skills and software (CADA, Open channel, HECRAMS, PETABS, CIVIL BD, AutoCAD, MATLAB, SAFE, and CADAM) training skills to enhance graduate employability by bridging the gap between academic training and labor market demands.
- AAU Establish a coordinating platform with MOE, construction regulators, and employers to ensure that the curriculum reflects the national priorities and regional development strategies.
- Established structured and supervised internship platforms in collaboration with construction sector stakeholders that ensure students' hands-on experience and mentorship during their study.
- AAU established income-generating enterprises and strengthened partnership with donors to address budget constraints for enhancing practical training opportunities.
- Strengthening the internal quality assurance unit and working with external quality regulatory bodies like ETA; assessing the effectiveness of curriculum implementation periodically through various mechanisms; and revising or updating the curriculum in accordance with market demand

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APPENDICES

A. List of Participant Codes, Book, and Abbreviations

S.No	Abbreviations	Full Description	Remark
1	AAU	Addis Ababa University	
2	FDRE	Federal Democratic Republic Ethiopia	
3	CEUGP	Civil Engineering Undergraduate Program	
4	HEIs	Higher Education Institutions	
5	ICT	Information Communication Technology	
6	MOE	Ministry of Education	
7	Pvt. Ltd. Co	Private limited corporation	
8	STEM	Science Technology Engineering Mathematics	

B. Interview Guide Questions for Academic Staff / Faculty Members (Sample)

1. Do you believe the current civil engineering curriculum sufficiently reflects the competencies that employers expect from graduates? Are practical skills, problem-solving abilities, and communication integrated effectively into the curriculum? (Hint: Reflect on how well the curriculum integrates practical experiences, critical thinking, and communication training.)
2. How frequently are industry partners actively involved in curriculum design and revision, and get feedback on graduate performance in the workplace in these industry interactions? (Hint: Describe the frequency and mechanisms of industry collaboration, joint workshops, graduate preparedness, and types of feedback, such as gaps in technical skills, soft skills, or new technologies and areas of training necessary.)
3. Are there any specific areas within the curriculum that you feel need further improvement to better align with labor market demands, either in terms of technical knowledge or soft skills? (Hint: Identifying areas like software tools, modern construction practices, or improved teamwork and leadership training.)
4. How are Ethiopia's national development goals, such as infrastructure expansion, environmental sustainability, and urban development, considered during the design and revision of the Civil Engineering curriculum? (Hint: Focus on integration of national goals into course content and curriculum revisions.)
5. Are there deliberate efforts to align course learning outcomes and teaching content with national priorities like road construction, dam building, housing development, and irrigation projects? (Hint: Discuss how specific projects and national needs shape course design and teaching content.)
6. What role do national plans, sector strategies, or directives from the Ministry of Education play in shaping the curriculum and influencing what you teach in your courses? (Hint: consider how national policies shape the content of specific courses).

7. In your view, does university teaching help students engage with real-world engineering challenges facing Ethiopia, such as rural connectivity, environmental management, and affordable housing? If so, how? (Hint: Provide examples of how teaching links to national challenges and helps students address real-world issues.)
8. How do you identify emerging labor market demands or skill gaps for civil engineering graduates? (Hint: Think about reviewing job postings, consulting with industry professionals, attending conferences, or reading industry reports.)
9. Have recent updates or revisions to the civil engineering curriculum have been influenced by new labor market needs, such as advancements in technology, green construction practices, or project management requirements? (Hint: Reflect on course content modifications or introduction of new modules.)
10. Have you adapted your course content for example, by integrating new technical tools, software, or real-world examples in response to feedback from employers or labor market trends? (Hint: Think about tools like AutoCAD, Revit, or project planning software being introduced in your teaching.)
11. From your experience, what challenges do graduates face when seeking employment in Ethiopia's civil engineering sector? (Hint: consider about skill gaps, lack of practical experience, or a lack of industry connections.)
12. How can the university better support students in finding employment after graduation? (Hint: Consider improvements in curriculum, industry partnerships, or career services.)
13. If any others?

Manuscript Preparation Guideline

Manuscript Presentation

EJTEL accepts submissions and publishes manuscripts written only in **English** (British or American English). A manuscript should be no more than 10000 words including figures, references, and tables.

Layout

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The title page should contain a brief the title, running title (maximum of 7 words), name(s) of author(s), all authors' affiliations, the name of the corresponding author, and telephone (mobile), full postal address and e-mail address.

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A single paragraph not exceed 300 words in length. No references non-standard abbreviations should not be used, if necessary, they should be clearly defined in the abstract, at first use.

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Immediately after the abstract, about 4-6 keywords should be given.

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No tables or figures should be given without discussion or reference inside the text. Table titles with number (Table #: title) should be at the top of the table and figure captions, underneath.

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