CHAPTER ONE

Equity and Social Justice in Mathematics Teacher Preparation: Diving into the Nitty-gritty

Babawande E. Olawale[1]

AFFILIATIONS

[1]Faculty of Education, Walter Sisulu University, Mthatha, South Africa.

CORRESPONDENCE

Email: bolawale@wsu.ac.za*

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Abstract: In contemporary education, the principles of equity and social justice have emerged as critical components that shape the pedagogical landscape, particularly in mathematics teacher preparation programmes. This chapter examines how mathematics teacher education programmes prepare pre-service mathematics teachers for equitable and socially just classrooms. It seeks to understand how these principles are integrated into teacher education programmes and their impact on the development of future educators to address diverse student needs in mathematics classrooms. This study employs a qualitative research design, utilising semi-structured interviews with mathematics teacher educators, pre-service mathematics teachers, and heads of departments. Data were collected from two traditional institutions to capture varied perspectives on the incorporation of equity and social justice within mathematics teacher preparation. Thematic analysis was employed to identify recurring themes and patterns in the data, enabling a comprehensive understanding of the participants' experiences and insights regarding the integration of these critical principles in their training. The findings indicate that integrating culturally relevant teaching, enhancing various field experiences, and developing community engagement can enable teacher preparation programmes to produce a new cohort of educators dedicated to social justice and equity in their classrooms. This comprehensive approach is essential for reforming educational processes and ensuring that all students have access to equitable learning opportunities.

Keywords: Equity, inclusive pedagogy, professional development, reform, social justice.

1. Introduction

The educational environment is widely regarded as a vital domain for addressing equity and social justice challenges, particularly in mathematics teaching and learning. As societies become increasingly diverse, the need for teachers who are knowledgeable in their fields and attuned to their students' varied cultural, social, and economic contexts is essential. Consequently, the requirement for mathematics teacher education programmes to effectively prepare pre-service teachers for equitable and socially just classrooms has emerged as a central theme in research and practice (Ladson-Billings, 1995; Gutstein & Peterson, 2005; Ladson-Billings, 2006; Gutiérrez, 2013; Ladson-Billings, 2021; Ladson-Billings, 2023). The foundation of equitable mathematics instruction is grounded in diverse theoretical frameworks that guide teacher education programmes. Critical pedagogy, as defined by Paulo Freire, emphasises education's role as a vehicle for social reform (Freire, 1970). This perspective is particularly relevant in mathematics education, as conventional approaches often perpetuate structural disparities

(Olawale, Mncube, & Harber, 2021; Olawale, 2022; Ladson-Billings, 2023). Thus, Gutiérrez (2013) builds upon Freire's concepts by advocating for a critical mathematics teaching approach that challenges the status quo and empowers students to use mathematics as a tool for social justice.

Furthermore, the paradigm of culturally responsive pedagogy, established by Ladson-Billings (1995), offers a framework for analysing teacher education. Culturally relevant pedagogy highlights the importance of integrating students' cultural backgrounds into the curriculum, fostering a sense of belonging, and promoting academic success. Studies show that pre-service teachers trained in culturally responsive methodologies are more adept at meeting the diverse needs of their learners (Villegas & Lucas, 2002; Premier & Miller, 2010; Skepple, 2014; Olawale, Mncube, & Harber, 2021; Davis, 2022). Therefore, equity and social justice in education involve recognising and addressing systemic disparities that affect student learning experiences and outcomes (Gutstein, 2007; Ladson-Billings, 2021). In the context of this study, the concept of equity in mathematics education refers to ensuring that all students have access to high-quality mathematical instruction, resources, and support, regardless of their background, identity, or circumstances. This notion encompasses equal access to advanced courses, the provision of appropriate resources, and the adoption of inclusive teaching approaches that address diverse learning needs.

Similarly, social justice is a comprehensive concept that includes equity and seeks to rectify the systemic barriers and injustices preventing many students from achieving mathematical excellence. Consequently, equity primarily focuses on establishing equitable access and opportunities in mathematics education (Gutiérrez, 2013; Civil, Hunter, and Crespo, 2019), while social justice encompasses a broader range of societal concerns within the realm of mathematics education (McGee & Hostetler, 2014; Bartell, 2018). In mathematics education, these ideas challenge conventional teaching methods that often sustain gaps in achievement and engagement among students from diverse backgrounds. Therefore, incorporating equity and social justice into mathematics teacher preparation is essential and aligns with comprehensive educational reforms aimed at promoting inclusive and equitable learning environments.

However, despite an expanding body of literature emphasising the significance of equity and social justice in mathematics education (Gutiérrez, 2011; National Council of Teachers of Mathematics, 2014; McGee & Hostetler, 2014; Leonard, 2018), notable research deficiencies persist regarding the pedagogical practices employed in the preparation of mathematics student teachers for equity and social justice classrooms within teacher training programmes. Moreover, the current literature often overlooks the perspectives of mathematics student teachers, who may provide essential insights into their readiness to foster equitable learning environments. Hence, the need for this chapter.

3.2 The concept of equity in the preparation of mathematics teachers

The training of mathematics teachers has received significant attention in educational research, particularly regarding the notion of equity. Equity in mathematics education refers to the fair allocation of resources, opportunities, and support, ensuring that all students can excel in mathematics, regardless of their backgrounds (National Council of Teachers of Mathematics, 2014). According to Gutiérrez (2011), equity in mathematics education is often contextualised within social justice, emphasising the need to confront institutional inequities that affect students' learning experiences (Gutiérrez, 2009). Gutiérrez (2013) asserts that equity is not merely the allocation of equal resources but also the recognition and appreciation of the diverse cultural and linguistic backgrounds of students. This perspective aligns with Ladson-Billings' (1998) advocacy for culturally relevant teaching, which empowers students by connecting mathematical concepts to their personal experiences. Thus, the notion of equity in mathematics education is grounded in multiple theoretical frameworks. A significant framework is the social justice approach, which posits that education must actively address systemic injustices (Gutiérrez, 2011). This perspective underscores the necessity for mathematics educators to recognise the socio-cultural contexts of their pupils and to adapt their instructional methods accordingly. Gutiérrez (2013) contends that equity in mathematics education transcends mere resource accessibility; it includes the quality of educational experiences provided to students.

Therefore, the culturally relevant pedagogy paradigm emphasises the significance of integrating students' cultural origins into the curriculum (Ladson-Billings, 1995). This approach promotes the establishment of inclusive educational environments that affirm students' identities and experiences. Studies demonstrate that culturally relevant pedagogical methods can markedly improve student engagement and success in mathematics (Tate, 1995; Bonner, 2009; Hodge & Lawson, 2018; Marshall, 2023). Thus, the training of mathematics educators is essential for promoting equitable educational settings within teacher education programmes. The National Council of Teachers of Mathematics (2014) underscores the necessity for teacher educators to equip pre-service teachers to identify and rectify disparities in mathematics education. This entails preparing future educators with the expertise and competencies to implement equitable teaching methodologies that accommodate diverse learners (Villegas & Lucas, 2002; Ladson-Billings, 2006; Gutiérrez, 2013). Consequently, Civil, Hunter, and Crespo (2019) highlight the importance of incorporating equity into the curricula for mathematics teacher preparation. The authors advocate for a holistic strategy that involves education on equity, practical experiences in diverse contexts, and opportunities for critical reflection. This approach enables pre-service teachers to develop a profound understanding of the barriers faced by disadvantaged children and to cultivate the skills necessary to address these challenges in their teaching (Civil, Hunter, & Crespo, 2019; Olawale, Mncube, & Harber, 2021; Olawale, 2024). Therefore, the training of pre-service mathematics teachers is essential for promoting equitable educational settings.

Numerous studies have investigated the integration of equity-focused frameworks within teacher education programmes (Achinstein & Athanases, 2005; Bancroft & Nyirenda, 2020; Grudnoff, Dixon, & Murray, 2021; Liao et al., 2022; Olawale, 2024). This entails preparing future educators with the expertise and competencies to apply equitable teaching methodologies that assist diverse learners (Civil, Hunter, & Crespo, 2019; Grudnoff, Dixon, & Murray, 2021). However, despite the increasing acknowledgment of the significance of equity in mathematics teacher education, numerous problems still exist. A major difficulty is the absence of agreement on the definition of equitable teaching practices. Thus, Leonard (2018) asserts that many teacher preparation programmes struggle to define and execute equity-focused methods effectively. This uncertainty may result in discrepancies in the implementation of equity among various programmes (Ladson-Billings, 1995; Ladson-Billings, 2006; Ladson-Billings, 2021). Similarly, the structural nature of educational disparities presents a challenge for teacher preparation programmes. Ladson-Billings (2014) asserts that mathematics teacher educators must navigate intricate socio-political environments that affect their capacity to implement equitable practices. This entails rectifying biases in the curriculum, tackling institutional obstacles, and promoting governmental reforms that foster equity in mathematical education. In addition, Ladson-Billings (2014) notes that professional development is essential for assisting in-service mathematics educators in their endeavours to foster equity within their classrooms. As such, Liao et al. (2022) highlight the significance of continuous professional development centred on equity-oriented approaches, stating that professional development should offer educators opportunities for collaborative learning, reflection on their instructional methods, and exploration of solutions to meet the varied needs of their students (Ladson-Billings, 2014; Ries et al., 2024).

1.2 The concept of social justice in the preparation of mathematics teachers

The notion of social justice in education, particularly in the training of mathematics teachers, has received significant attention in recent years. Social justice is a complex concept that encompasses multiple elements, including equity, access, participation, and rights (Bell, 2016). In the field of education, social justice highlights the necessity of addressing systematic disparities that affect underrepresented populations. Ladson-Billings (1995) asserts that culturally relevant pedagogy is crucial for advancing social justice in education, as it compels educators to connect content to students' cultural backgrounds and experiences. This approach is especially pertinent in mathematics education, where conventional teaching practices often overlook the diverse cultural backgrounds of students.

Furthermore, the concept of critical pedagogy, as defined by Freire (1970), provides a fundamental framework for understanding social justice in education. Freire advocates for a dialogical method of instruction, in which students are encouraged to interrogate and challenge prevailing norms. In mathematics education, this can take the form of activities that enable students to view mathematics as a means of social transformation, rather than merely a collection of procedures to memorise (Gutstein, 2006; Olawale, 2021).

Thus, incorporating social justice themes into mathematics teaching is essential for preparing future educators to address disparities in the classroom. Research indicates that mathematics is often perceived as a neutral and objective field; however, this perspective may obscure the social and political implications of mathematical knowledge (Skovsmose, 1994; Skovsmose, 2019). If this misconception is not addressed, the practice of mathematics instruction may perpetuate stereotypes and reinforce existing power dynamics, particularly for students from disadvantaged communities (Skovsmose, 2019; Skovsmose, 2020).

Studies such as those by Gutstein (2003), Spielman (2012), McGee & Hostetler (2014), and Bartell (2018) have highlighted the significance of integrating social justice into mathematics education. Gutstein (2007) advocates for the incorporation of real-world issues in mathematics education, allowing students to analyse topics such as poverty, race, and gender using mathematical frameworks. This method not only improves students' understanding of mathematics but also cultivates critical awareness, enabling them to identify and confront social injustices (Gutstein, 2007; Bell, 2016; Olawale, Mncube, & Harber, 2021).

To adequately equip mathematics teachers for socially equitable practice, teacher education programs must integrate pedagogical practices that foster equity and inclusivity. One approach employed is culturally responsive teaching, which recognises and appreciates students' cultural backgrounds while incorporating them into the educational process (Gay, 2015; Gay, 2018). This strategy enables mathematics educators to cultivate a more inclusive classroom atmosphere that acknowledges and leverages students' varied backgrounds. Furthermore, collaborative learning environments can significantly contribute to advancing social justice in mathematics education (Gay, 2018).

Similarly, Vygotsky's (1978) social constructivist theory underscores the significance of social interaction in the learning process, positing that students can collaboratively create knowledge (McLead, 2023). Thus, mathematics educators should promote collaborative problem-solving exercises to allow students to exchange viewpoints and learn from each other, thereby questioning prevailing narratives and cultivating a sense of community (Gay, 2018; Skovsmose, 2019).

Furthermore, the implementation of critical mathematics education (CME) has emerged as a viable method for incorporating social justice into mathematics instruction. CME urges students to rigorously analyse mathematical concepts and their practical applications, enabling them to utilise mathematics as a means for advocacy and social transformation (Skovsmose, 1994). Teacher preparation programmes that integrate CME concepts help prepare future educators with the competencies and knowledge essential for promoting a socially equitable mathematics education. Despite the increasing acknowledgment of the need for social justice in mathematics teacher training, numerous problems persist. A major obstacle is the dominant focus on standardised testing and accountability in education, which may restrict teachers' capacity to

adopt socially equitable practices (Gonzalez, 2010). Furthermore, many teacher education programmes may be deficient in the resources and training required to proficiently incorporate social justice themes into their curricula. Additionally, the reluctance to change within educational institutions can obstruct the implementation of socially equitable practices in mathematics teaching. Educators may also experience a lack of preparation or support in tackling intricate social issues in their classrooms, resulting in hesitance to discuss social justice topics (Cochran-Smith, 2004; Olawale, Mncube, & Harber, 2021). To address these problems, it is imperative for teacher education programmes to offer a comprehensive teacher education programme for pre-service teachers and continuous professional development and support for educators aiming to promote socially equitable practices. Hence, this chapter seeks to examine how mathematics teacher education programmes prepare pre-service mathematics teachers for equitable and socially just classrooms.

2. **Methodology**

This study is grounded in an interpretivist paradigm, indicating that individuals develop an understanding of their environment through interactions with the external world (Ormston, Spencer, Barnard, & Snape, 2014). A qualitative methodology was employed to gain deeper insight into the preparation of pre-service mathematics teachers for equitable and socially just classrooms within mathematics teacher education programmes. A case study research design was utilised. As stated by Yin (2014), case studies are the most appropriate method when the contextual conditions are relevant to the phenomenon under investigation. The application of a multiple case study approach allowed the researcher to select research sites and participants from various backgrounds, reflecting a spectrum of experiences related to equity and social justice in classrooms. Consequently, two traditional South African universities offering theoretically oriented degree programmes were purposively chosen for this investigation. These universities were expected to provide unique and compelling data concerning equity and social justice issues in their pre-service teacher training programmes.

The study primarily focused on mathematics teacher educators, pre-service mathematics teachers, and department heads at the two selected universities. Each university comprised a sample of twelve pre-service mathematics student teachers, two mathematics teacher educators, and one department head. The sample, utilising a purposive sampling technique, consists of twenty-four pre-service mathematics teachers, four mathematics teacher educators, and two department heads, totalling thirty participants. The selection of the study participants was based on the fact that they possess in-depth knowledge and experience relating to equity and social justice within the mathematics teacher education programmes. Data for this study were gathered via semi-structured interviews lasting roughly 12 to 20 minutes per participant. One-on-one interviews were conducted with the study participants at each university; the conversations were framed by informal dialogue and audiotaped. Although the interviews were conducted in English, participants were allowed to use vernacular if they wished to express anything in their

home language. The interviews were held in lecture halls, outside the building, and in any location where the interviewees felt at ease on their respective campuses, ensuring a tranquil environment free from disruptions. The nature and objective of the research were disclosed, and confidentiality and anonymity were guaranteed prior to and after the interviews. Verbal consent was obtained to record the interviews. The semi-structured interview approach provided participants with significant opportunities for self-expression; however, greater emphasis was placed on the predetermined questions to prevent meandering discourse (Datko, 2015; Olawale, 2021).

The data obtained from these participants were subjected to thematic analysis. The thematic data-analysis technique, as delineated by Braun and Clarke (2006), consists of six stages. During the initial step, the collected data were transcribed, systematically categorised, and thoroughly examined to discern relevant themes and categories. In the subsequent step, classifications, themes, and patterns were established. During the third phase, coding was conducted using names, and colours were allocated to participant responses for the systematic management of information. In the fourth step, emergent comprehension was assessed by employing colours to code content according to the subheadings, to evaluate the data's use. In the fifth stage, the content was thoroughly reviewed, quotations were incorporated as needed, and subheadings were substituted with comments highlighting contrasts and similarities. In the final phase, the researcher undertakes the writing of the report, striving to diminish the authorial voice. For data presentation, the two traditional universities that participated in this study were designated with fictitious names: University A and University B. The data obtained from the interviews are organised according to the interview questions and the raw responses provided by the participants associated with those universities. This was conducted to achieve a comprehensive understanding of the participants' responses. The two mathematics teacher educators from each of University A and B were designated as MTE1 and MTE2, while the mathematics student teachers were labelled as PST1 through ST12, and the Head of the Department as HOD, corresponding to their respective universities A or B.

To ensure data trustworthiness, emphasis was placed on the triangulation of the unit of analysis. Triangulation entails utilising diverse data sources, several locations, and various data-gathering methods while examining analogous subjects to enhance the trustworthiness of research outcomes (Cohen et al., 2018). Cohen et al. (2018) assert that researchers who depend solely on a singular method of data collection or unit of analysis exhibit bias in assessing the actuality or truthfulness of the phenomenon being studied. Thus, the utilisation of several units of analysis (pre-service mathematics teachers, mathematics teacher educators, and Heads of Department) enabled the researcher to triangulate data to derive valid results. As such, the research findings were analysed for similarities among the data-gathering sources to enhance the study's validity. Furthermore, the researcher involved participants in member-checking from the initial phases of data processing, including the establishment of codes and categories, the development of

themes, and the analysis of outcomes. To do this, individuals were contacted via telephone and email, while meetings were organised with other participants according to their availability. The researcher solicited feedback from the participants regarding the raw data, codes, themes, and interpretations of the data. This strategy was considered beneficial for maintaining internal validity (Oats, 2014).

3. Presentation of Results

This section presents the findings from the study on how mathematics teacher education programmes prepare pre-service mathematics teachers for equitable and social justice classrooms. The results are organised into two major themes:

- Curriculum design and pedagogical approaches.
- Practical experiences and community engagement.

Each theme is examined in detail to elucidate how these programmes equip future educators with the necessary tools and perspectives for fostering equity and social justice in their teaching practices.

3.1 Curriculum design and pedagogical approaches

To gather stakeholders' perspectives on the preparation of pre-service mathematics teachers for equitable and social justice classrooms, participants were asked, "How do curriculum design and pedagogical approaches enhance the preparation of pre-service teachers for equity and social justice?" Research findings revealed that the integration of an equity and social justice framework and an emphasis on culturally relevant pedagogy are ways teacher education programs promote equity and social justice in classrooms.

3.1.1 Integration of equity and social justice frameworks

To create a fairer and more inclusive classroom, mathematics teacher preparation programs must incorporate a social justice and equity perspective. In today's increasingly varied world, pre-service teachers must possess a deep understanding of the social variables that impact student learning in addition to mathematical prowess and pedagogical knowledge. Improved instructional efficacy, more equitable access to mathematical knowledge, and better-prepared educators to fight for institutional reform are all outcomes of this integration. For instance, a participant stated:

> *Incorporating equity and social justice frameworks into our curriculum has significantly shaped my understanding of the diverse experiences and backgrounds of my future students. By analysing real-world issues related to race, gender, and socio-economic status through mathematical concepts, I feel better equipped to create lessons that resonate with my students' lives. This approach encourages me to use inclusive pedagogy, making sure every voice is heard and valued in my classroom. (MST 9 – University B)*

Similarly, another participant stated:

> *The focus on social justice in my mathematics training has encouraged me to think critically about the societal implications of mathematical practices. It has helped me realize that math is not just abstract numbers but can be used to tackle issues such as income inequality and access to education. This perspective prepares me to guide my students in using math as a tool for social change, promoting critical consciousness about their contexts. (MST 3 – University A)*

Another participant also asserts that:

> *Equity and social justice frameworks have taught me the significance of building relationships and a sense of community within my classroom. Creating a space where all students feel safe to express their thoughts and contribute to discussions is vital. This preparation enables me to foster an environment where students can collaborate on math problems that address social justice issues, helping them to connect mathematical thinking with collective action. (MST 7 – University A)*

The above research findings reflect a thoughtful and systematic integration of equity and social justice in mathematics education, highlighting the importance of relevance, inclusivity, community, critical thinking, and empowerment in preparing future teachers. Similarly, mathematics teacher educators also iterate that:

> *By integrating equity and social justice frameworks, I focus on contextual learning that relates mathematics to real-world issues affecting marginalised communities. This approach encourages future teachers to see mathematics not just as abstract concepts but as tools for social change. During our curriculum design, we incorporate projects that require students to analyse data on social issues, enabling them to recognise the role of math in understanding and addressing disparities. (MTE 2 – University A)*

In addition, another mathematics teacher educator adds:

> *We encourage critical inquiry and self-reflection among our pre-service teachers regarding their biases and assumptions about mathematics and education. Integrating social justice frameworks prompts our students to question the status quo and consider how traditional curricula may perpetuate inequities. Assignments that require them to reflect on their mathematical identity and societal impact foster a mindset geared toward challenging inequitable practices in their future classrooms. (MTE 1 – University B)*

Thus, these responses illustrate the diverse strategies that mathematics teacher educators might use to incorporate equity and social justice into their teaching, preparation, and curriculum design. Integrating these frameworks helps shape future teachers who are mindful of the impact of their teaching on their learners, particularly those from underrepresented groups. Similarly, incorporating equity and social justice frameworks into mathematics curriculum design and pedagogical approaches is essential for preparing students for an equitable world, as noted by a head of department:

……Our curricula incorporate critical mathematics education, which challenges students to explore the social implications of mathematical concepts. We engage students in discussions about data representation, statistical literacy, and how mathematics can be used to both oppress and empower communities. By analysing real-life scenarios such as income inequality through data analysis, students learn to critically assess and use mathematics as a tool for social justice, preparing them to advocate for equitable solutions. (HOD – University B)

The research findings reflect a commitment to equity and social justice in mathematics education, emphasizing the importance of relevance, collaboration, critical thinking, diverse assessment, and community connection in preparing students for a more equitable future. Additionally, the findings revealed that mathematics teacher education programs strive to integrate equity and social justice frameworks into their curricula. These efforts manifest through teachingthat addresses issues of race, class, and gender in mathematics education, providing pre-service teachers with theoretical foundations and practical strategies to recognize and challenge inequities in the classroom.

3.1.2 Emphasis on Culturally Relevant Pedagogy

Achieving educational equality and social justice requires mathematics teacher preparation programsto incorporate culturally relevant pedagogy. To foster inclusive learning environments that empower all learners, it is crucial for mathematics teacher educators to acknowledge and appreciate the cultural backgrounds of pre-service mathematics teachers. In addition to improving classroom instruction, a commitment to culturally relevant pedagogy can drive broader reforms in teacher education programs. Thus, a participant stated:

Culturally relevant pedagogy enables us to highlight diverse mathematicians and their contributions, showcasing role models who reflect the backgrounds of our students. This not only helps break down stereotypes around who can excel in mathematics but also fosters a sense of belonging. By seeing themselves represented in mathematical narratives, students gain the confidence to pursue their interests in math, ultimately supporting an equitable academic environment. (MTE 2 – University of B).

Similarly, a participant added:

By embracing culturally relevant pedagogy, we actively engage with our students' communities, collaborating with families and local organisations to inform our teaching practices. This relationship-building helps us understand the unique challenges and strengths our students face, equipping us to better support their learning needs. Such an approach not only enhances equity but also empowers students to see mathematics as a tool for social change in their communities. (MTE 1 – University A).

The above responses highlight how culturally relevant pedagogy plays a vital role in fostering an equitable and socially just mathematics education. Similarly, mathematics pre-service teachers added:

> *As a future mathematics teacher, I've come to appreciate how culturally relevant pedagogy emphasises the importance of understanding students' backgrounds. By integrating diverse cultural perspectives into math lessons, I feel better equipped to create an inclusive learning environment. This approach allows me to connect mathematical concepts to students' real-world experiences, making math more relatable and empowering for all learners, especially those from marginalised communities. (MST 2 – University B).*

Similarly, another participant added:

> *Having a strong emphasis on culturally relevant pedagogy in my training has highlighted the significance of student voice in the learning process. I've learned to value the mathematical knowledge that students bring from their own cultures. For instance, when teaching geometry, I can include traditional architecture from various cultures. This not only validates students' experiences but also fosters a deeper understanding of mathematical concepts, thereby preparing me to teach in a way that honours diversity. (MST 6 – University A)*

In addition, another participant stated that:

> *The training I've received on culturally relevant pedagogy has taught me the importance of building relationships with my students. Understanding their cultures, interests, and experiences allows me to tailor my teaching approach and create a culturally responsive classroom. By doing so, I can address the varying needs of my students, ensuring that everyone has a fair chance to succeed in mathematics. This preparation is vital for fostering an equitable classroom environment where all voices are heard. (MST 11 – University B)*

The research findings highlight how culturally relevant pedagogy prepares pre-service teachers to create equitable and socially just mathematics classrooms by emphasising inclusivity, critical reflection, student engagement, and community connection. Similarly, the findings reveal that culturally relevant pedagogy stresses the importance of incorporating students' cultural orientations in all aspects of learning. For instance, the head of the department added:

> *In our preparation programs, we emphasise culturally relevant pedagogy and encourage educators to draw connections between mathematical concepts and the cultural practices/experiences of their students. For instance, relating geometry to architecture in various cultural contexts or using statistical analysis to examine local issues allows students to see the relevance of math in their everyday lives. By preparing teachers to implement these connections, we foster a sense* of *belonging and relevance that can motivate all students, especially those from underrepresented backgrounds. (HOD – University A)*

Through the reflections above, it is clear that culturally relevant pedagogy plays a vital role in preparing pre-service mathematics teachers to create equitable and socially just classrooms, ultimately benefiting both teachers and their students. Research findings also revealed that mathematics teacher education programs employed teaching methods that connected mathematical concepts to students' cultural backgrounds and real-world experiences. Additionally, teacher educators utilised culturally relevant examples and problems that resonated with the diverse experiences of their students, making mathematics more accessible and engaging.

3.2 Practical experiences and community engagement

To gather stakeholders' perspectives on the preparation of mathematics teachers for equitable and socially just classrooms, participants were asked, "How do practical experiences and community engagement enhance the preparation of pre-service teachers for equity and social justice?" Research findings revealed that exposure to field experiences in diverse settings, as well as partnerships with community organisations, are ways in which teacher education programmes promote equity and social justice in classrooms.

3.2.1 Field experiences in diverse settings

Field experience in diverse settings plays a critical role in the preparation of pre-service mathematics teachers, particularly in fostering an understanding of equity and social justice in education. As classroom demographics continue to evolve, it becomes increasingly essential for future educators to engage with a variety of cultural, socioeconomic, and linguistic backgrounds. This exposure not only enriches their pedagogical skills but also equips them with the necessary tools to address the complex realities of their students' lives. Thus, a participant adds:

> *Field experiences such as participating in community-based projects in diverse communities and schools enable pre-service teachers to engage with learners from various cultural backgrounds. This exposure helps them understand the importance of culturally relevant pedagogy in mathematics education. By witnessing first-hand how different cultural perspectives influence learners' understanding of mathematical concepts, pre-service teachers can tailor their teaching strategies to be more inclusive and equitable. In my experience, these direct interactions help future teachers recognize the rich mathematical knowledge that students bring from their communities, fostering an environment where all voices are valued. (MTE 2 – University B).*

Similarly, another participant added:

> *Relationships are at the heart of effective teaching, especially in diverse settings. Field experiences such as school experience/school-based placements give pre-service teachers the chance to build relationships with students, families, and communities. This relational approach is fundamental for creating a supportive learning environment where learners feel valued and engaged. By working closely with communities, pre-service teachers can identify the unique needs of their students and*

design mathematics instruction that is not only relevant but also empowering. These experiences highlight the role of trust and connection in promoting equitable learning. (MTE 1 — University A)

The above responses illustrate how mathematics teacher educators perceive the impact of field experiences in diverse settings on the preparation of future teachers for equitable and social justice-oriented practices. Similarly, the head of department added:

…….as a head of the mathematics department, I believe that field experiences in the form of school-based placement, intercultural exchange programmes, and partnerships with NGOs are essential for fostering an understanding of social justice in education among our pre-service teachers. These experiences allow them to recognise the varied backgrounds and lived experiences of their would-be learners. By engaging with communities that face systemic inequalities, they are able to tailor their teaching activities to be more inclusive and culturally relevant. This not only enhances their teaching strategies but also empowers them by connecting mathematical concepts to real-world issues, illustrating how math can be a tool for social change. (HOD – University B)

These responses highlight the transformative potential of field experiences in creating a more equitable and socially just education system within mathematics departments. Thus, given that field experiences in diverse settings are crucial for pre-service teachers, especially in mathematics education, as they provide opportunities to understand and implement equitable and social justice practices in the classroom, a mathematics pre-service teacher iterates:

…… During my school experience, when I was collecting information for my community-based project at a school with diverse learners, I observed first-hand how different cultural backgrounds influence learners' engagement with mathematics. I learned that incorporating culturally relevant pedagogy can help bridge the gap between learners' lived experiences and the mathematics curriculum. This has taught me the importance of recognising each learner's unique perspective, which is essential for creating an equitable learning environment. (MST 12 – University A).

Similarly, another participant added that:

During my school experience, I worked closely with learners from various socioeconomic backgrounds. I found that building strong relationships based on trust and respect was vital in encouraging them to participate in math discussions. I realised that when learners feel valued and understood, they are more willing to share their thoughts and struggles. This has motivated me to prioritise relationship-building in my future classroom to foster an inclusive environment. (MST 5 – University B).

Also, another pre-service mathematics teacher added:

In a setting where community engagement was strong, I learned how to leverage local resources to make math more relevant to students' lives. For instance, using local businesses for real-world math problems helped learners see the value in what they were learning. This experience has

inspired me to seek out partnerships that can enhance my teaching and provide learners with practical applications of math, fostering equity in learning. (MST 8 – University A)

The research findings illustrate how field experiences, such as community-based projects, school-based placements, intercultural exchange programmes, and partnerships with NGOs in diverse educational settings, can profoundly impact pre-service teachers' understanding of equity and social justice. These experiences ultimately shape their approach to teaching mathematics in a more inclusive and responsive manner. Additionally, the findings revealed that the teacher education programmes offered opportunities for field experiences in diverse educational settings and community organisations, which became crucial in helping pre-service teachers apply theoretical knowledge to real-world contexts.

3.2.2 Partnerships with Community Organizations

The partnership between mathematics teacher preparation programmes and community organisations is vital for equipping future educators with the knowledge, skills, and dispositions necessary to promote equity and social justice in their classrooms. By engaging with the community, pre-service teachers can develop a deeper understanding of the challenges faced by their learners, learn to advocate for systemic change and create meaningful connections between mathematics and their learners' lives. For instance, a participant stated that:

As a pre-service teacher, I've learned that engaging with community organisations allows me to understand the diverse backgrounds of my future learners. Partnering with local groups helps me integrate culturally relevant pedagogy into my math instruction. For example, when collaborating with a local cultural centre, I discovered how traditional games could be tied to mathematical concepts. This connection not only makes math more relatable to my learners but also honours their heritage, fostering a sense of belonging in the classroom. (MST 4 – University B)

Similarly, another participant stated:

Community engagement helps me connect mathematical concepts to real-world issues that affect my learners' lives. By working with non-profits focused on social justice, I have gained insights into local issues such as housing inequality and food deserts. Incorporating these topics into my math lessons through statistics allows my learners to see math as a tool for advocacy and change, not just a set of abstract concepts. (MST 1 – University B)

Also, a participant iterates that:

…..my community engagement experiences have encouraged a reflective practice essential to my growth as a pre-service teacher. Participating in community forums has helped me hear voices and perspectives that I might not encounter in a school setting. This reflection allows me to critically assess my own biases and assumptions about teaching math. I believe that being aware of these factors is crucial for creating an equitable classroom, where every learner feels valued and capable of achieving success in mathematics. (MST 10 – University B)

These above responses illustrate how partnerships and community engagement can significantly enrich pre-service teachers' understanding of equity and social justice, ultimately informing their teaching practices and fostering an inclusive classroom environment. Furthermore, a mathematics teacher educator added:

> *By partnering with local schools, we engage in co-planning and co-teaching initiatives that allow us to understand the unique challenges students face in different communities. This first-hand experience informs our approaches to teaching mathematics in ways that are culturally relevant and inclusive. We can draw on the diverse backgrounds of our students to make math more relatable and approachable, encouraging equitable participation. (MTE 1 – University B)*

Similarly, another participant posits that

> *……Engaging our students in community projects allows them to take ownership of their learning while also addressing real-world problems through mathematics. Our pre-service teachers participate in local math tutoring programs where they engage with students from diverse backgrounds. This experience not only enhances their pedagogical skills but also deepens their understanding of the social context in which their future students will learn. It's a way to empower our future educators to advocate for equitable practices in their own schools. (MTE 2 – University A)*

The above research findings illustrate the importance of collaboration and engagement with communities in preparing mathematics teachers to create equitable and socially just learning environments. This was further supported by a head of department who argued that:

> *……as head of the department, I engage with other teacher educators and community stakeholders to participate in professional development workshops focused on equity and social justice in education. These sessions often involve discussions on best practices, case studies, and collaborative learning opportunities. By continually improving our understanding of these vital issues, we can better prepare ourselves and our future teachers to foster environments where every learner feels empowered to succeed in mathematics, regardless of their background. (HOD – University A).*

The above research findings reflect a commitment to creating inclusive and equitable mathematics classrooms through active community engagement and partnerships. These partnerships often involved collaborative projects that addressed local mathematical literacy needs, such as tutoring programmes, after-school initiatives, and community workshops. Such engagements provided pre-service teachers with first-hand experience in applying equitable practices outside of the traditional classroom setting.

4. **Discussion of Findings**

The findings of this study elucidate the critical importance of integrating equity and social justice frameworks within teacher education programmes. As the landscape of education continues to

evolve, it becomes increasingly essential for pre-service teachers to develop a comprehensive understanding of the diverse cultural, social, and economic contexts that influence student learning. Thus, central to this discussion is the notion that teacher education programmes must prioritise equity and social justice as foundational elements of their curricula (Freire, 1970; Ladson-Billings, 1995; Skovsmose, 2019; Ries et al., 2024). The integration of these frameworks is not merely an additive process but rather a transformative approach that shapes the very ethos of teacher preparation. Therefore, teacher educators who are equipped with an understanding of systemic inequities are better positioned to foster inclusive learning environments that recognise and celebrate the diverse identities of their students. This understanding is particularly vital in light of the persistent achievement gaps that disproportionately affect marginalised communities. Thus, by embedding equity and social justice into the fabric of teacher education, we can cultivate a new generation of educators who are not only aware of these disparities but are also committed to enacting change within their classrooms and beyond (Gutstein, 2003; Gay, 2015; Bell, 2016; Ladson-Billings, 2023).

Similarly, culturally relevant pedagogy emerges as a crucial component in the findings of the study. Ladson-Billings (1995) posits that culturally relevant teaching is not merely about incorporating diverse content into the curriculum; rather, it involves creating a learning environment that empowers students by validating their cultural identities. This chapter also reinforces this notion, revealing that pre-service teachers who engage with culturally relevant pedagogical practices are more adept at connecting with their students and fostering a sense of belonging. This connection is particularly important in diverse classrooms where students may feel marginalised or disconnected from the curriculum. By integrating culturally relevant pedagogy into teacher education programmes, teacher education programmes can equip pre-service teachers with the tools necessary to create inclusive and affirming learning spaces that honour the cultural backgrounds of all learners (Ladson-Billings, 2006; Gutstein & Peterson, 2005; Gutiérrez, 2011; Olawale, Mncube, & Harber, 2021).

Moreover, exposure to field experiences in diverse settings is essential for developing culturally responsive educators. The findings indicate that pre-service teachers who participate in practicum experiences within diverse communities demonstrate a greater understanding of the complexities of teaching in multicultural contexts. These experiences allow pre-service teachers to engage directly with the realities of their students' lives, fostering empathy and a deeper appreciation for the challenges faced by marginalised populations (Gutstein, 2003; Hodge & Lawson, 2018). Furthermore, these field experiences provide opportunities for pre-service teachers to practise culturally relevant pedagogy in real-world settings, enabling them to refine their skills and adapt their teaching strategies to meet the needs of diverse learners (Bell, 2016; Bartell, 2018; Bancroft & Nyirenda, 2020). As such, teacher education programmes must prioritise partnerships with schools and communities that reflect the diversity of the student

population, ensuring that candidates are adequately prepared to navigate the complexities of contemporary classrooms.

The role of partnerships with community organisations cannot be overstated in the pursuit of equity and social justice in education. The study highlights the potential for collaboration between teacher education programmes and local organisations to enhance the preparation of future educators. These partnerships can provide valuable resources, support, and insights into the unique challenges faced by students and families in the community. By working alongside community organisations, pre-service teachers can gain a more nuanced understanding of the socio-economic factors that impact student learning and develop strategies to address these challenges within their classrooms (Gutiérrez, 2013; Ladson-Billings, 2021). Additionally, such collaborations can facilitate the development of culturally relevant curricula that reflect the needs and aspirations of the community, thereby fostering a sense of ownership and investment in the educational process.

Furthermore, the integration of equity and social justice frameworks into teacher education programmes necessitates a critical examination of the existing structures and practices within these programmes. Thus, the study findings suggest that traditional approaches to teacher preparation often perpetuate inequities, as they may fail to adequately address the diverse needs of all students. This calls for a reimagining of teacher education that prioritises social justice as a guiding principle. As such, teacher education programmes must critically assess their curricula, pedagogical practices, and assessment methods to ensure that they are aligned with the goals of equity and social justice. This may involve revising course content to include diverse perspectives, employing inclusive teaching strategies, and implementing assessment practices that recognise and value the different ways that students demonstrate learning (Gay, 2015; Civil, Hunter, & Crespo, 2019; Ladson-Billings, 2023). In addition to curricular changes, it is imperative that teacher education programmes engage in ongoing professional development for faculty and staff (Bancroft & Nyirenda, 2020; Ries et al., 2024; Olawale, 2024). Similarly, mathematics teacher educators within these programmes must be equipped with the knowledge and skills necessary to effectively teach about equity and social justice. This includes understanding the historical and contemporary contexts of systemic oppression, as well as the ways in which these issues manifest in educational settings. By fostering a culture of continuous learning and reflection among faculty, teacher education programmes can ensure that they are effectively preparing future educators to confront and challenge inequities in their classrooms.

5. Conclusions and Recommendations

This study explores how mathematics teacher education programs prepare pre-service mathematics teachers for equitable and socially just classrooms. It emphasises the critical importance of curriculum design, pedagogical approaches, practical experiences, and community engagement in preparing pre-service teachers for these classrooms.

Firstly, the incorporation of culturally relevant teaching practices emerged as a critical theme. Educators who adapt their pedagogical approaches to reflect the cultural backgrounds and lived experiences of their students are better equipped to engage learners meaningfully. This alignment not only enhances student motivation but also fosters an inclusive classroom atmosphere where all students feel valued and capable of succeeding in mathematics.

Moreover, the enhancement of field experiences was identified as a crucial component of mathematics teacher preparation. By providing pre-service teachers with opportunities to engage in diverse educational settings, programs can cultivate an understanding of the varied challenges and strengths present in different student populations. These experiences allow pre-service teachers to observe and implement strategies that promote equity in practice, thereby reinforcing their commitment to social justice in their teaching philosophy.

Community engagement also emerged as a significant theme in the findings. Mathematics teacher preparation programs that actively involve local communities in their training initiatives create a more holistic educational experience. Such engagement not only enriches the curriculum but also establishes vital connections between schools and the communities they serve. This synergy is essential for developing educators who are aware of the socio-economic factors influencing their students' learning and are motivated to advocate for systemic change within their educational contexts.

Based on the findings, the chapter concludes that the integration of equity and social justice principles within mathematics teacher education is not merely an additive approach; it is essential for preparing educators who can effectively address the needs of all students. By embedding culturally relevant pedagogy, promoting diverse field experiences, and fostering community partnerships, teacher education programs can cultivate a new generation of educators committed to social justice and equity in their classrooms. This holistic approach is vital for transforming educational practices and ensuring that all students have access to equitable learning opportunities.

The implications of this study call for systemic change in teacher education, advocating for a curriculum that prioritizes social equity and prepares student teachers to be agents of change in their communities. This may encompass modules on culturally sensitive pedagogy, the historical background of mathematics, and the socio-political ramifications of mathematical practices. Mathematics teacher education programs should foster collaborative learning spaces in which pre-service teachers can engage in discussions and reflections on their experiences related to equity and social justice in mathematics teaching. Lastly, these programs should enhance field experience opportunities by partnering with diverse schools that serve marginalised communities and employing reflective evaluation methodologies that necessitate pre-service educators to scrutinise their biases and the effects of their instruction on varied student demographics.

6. Declarations

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References

Achinstein, B., & Athanases, S. Z. (2005). Focusing new teachers on diversity and equity: Toward a knowledge base for mentors. *Teaching and Teacher Education*, *21*(7), 843-862. https://doi.org/10.1016/j.tate.2005.05.017

Bancroft, S. F., & Nyirenda, E. M. (2020). Equity-focused K-12 science teacher professional development: A review of the literature 2001-2017. *Journal of Science Teacher Education*, *31*(2), 151-207. https://doi.org/10.1080/1046560X.2019.1685629

Bartell, T. G. (2018). *Toward equity and social justice in mathematics education*. New York: Springer. https://doi.org/10.1007/978-3-319-92907-1

Bell, L. A. (2016). Theoretical foundations for social justice education. In *Teaching for diversity and social justice*. New York: Routledge.

Bonner, E. P. (2009). Achieving success with African American learners: A framework for culturally responsive mathematics teaching. *Childhood Education*, *86*(1), 2-6. https://doi.org/10.1080/00094056.2009.10523100

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Civil, M., Hunter, R., & Crespo, S. (2019). Mathematics teachers committed to equity: A review of teaching practices. *International Handbook of Mathematics Teacher Education*, *1*(1), 243–273. https://doi.org/10.1163/9789004418875_010

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th edition). New York: Routledge. https://doi.org/10.4324/9781315456539

Datko, J. (2015). On research methodology: Semi-structured interview in language pedagogy research. *Journal of Language and Cultural Education*, *3*(2), 142–156.

Davis, E. A. (2022). Supporting preservice elementary teachers in teaching science for equity and justice: A practical framework. *Innovations in Science Teacher Education*, *7*(4), 1–26.

Freire, P. (1970). Cultural action and conscientisation. *Harvard Educational Review*, *40*(3), 452–477. https://doi.org/10.17763/haer.40.3.h76250x720j43175

Gay, G. (2015). The what, why, and how of culturally responsive teaching: International mandates, challenges, and opportunities. *Multicultural Education Review*, *7*(3), 123–139. https://doi.org/10.1080/2005615X.2015.1072079

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice*. New York: Teachers College Press.

Grudnoff, L., Dixon, H., & Murray, J. (2021). The power of inquiry in equity-oriented teacher education. *Beijing International Review of Education*, 3(3), 368–386. https://doi.org/10.1163/25902539-03030004

Gutiérrez, R. (2013). Why (urban) mathematics teachers need political knowledge. *Journal of Urban Mathematics Education*, *6*(2), 1-13. https://doi.org/10.21423/jume-v6i2a223

Gutiérrez, R. (2011). Context matters: How should we conceptualise equity in mathematics education? In *Equity in discourse for mathematics education: Theories, practices, and policies*. Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-007-2813-4_2

Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, Latino school. *Journal for Research in Mathematics Education*, *34*(1), 37–73. https://doi.org/10.2307/30034699

Gutstein, E. (2007). "And that's just how it starts": Teaching mathematics and developing student agency. *Teachers College Record, 109*(2), 420–448. https://doi.org/10.1177/016146810710900203

Gutstein, E., & Peterson, B. (2005). Rethinking mathematics: Teaching social justice by the numbers. Wisconsin: Rethinking Schools.

Hodge, L. L., & Lawson, M. (2018). Strengthening partnerships through family math nights. *Mathematics Teaching in the Middle School, 23*(5), 284–287. https://doi.org/10.5951/mathteacmiddscho.23.5.0284

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. Theory into Practice, 34(3), 159-165. https://doi.org/10.1080/00405849509543675

Ladson-Billings, G. (2006). "Yes, but how do we do it?": Practicing culturally relevant pedagogy. In *White Teachers, Diverse Classrooms: Creating inclusive schools, building on Students' Diversity, and providing true educational equity* (pp. 33-46). Amsterdam: Stylus. https://doi.org/10.4324/9781003448709-6

Ladson-Billings, G. (2014). Put up or shut up: The challenge of moving from critical theory to critical pedagogy (a formative assessment). In *Democratic Social Education.* Routledge.

Ladson-Billings, G. (2021). Culturally relevant pedagogy: Asking a different question. New York: Teachers College Press.

Ladson-Billings, G. (2023). "Yes, but how do we do it?": Practicing culturally relevant pedagogy. In White Teachers/Diverse Classrooms (pp. 33-46). Oxfordshire, UK: Routledge. https://doi.org/10.4324/9781003448709-6

Leonard, J. (2018). *Culturally specific pedagogy in the mathematics classroom: Strategies for teachers and students.* United Routledge. https://doi.org/10.4324/9781351255837

Liao, W., Wang, C., Zhou, J., Cui, Z., Sun, X., Bo, Y., & Dang, Q. (2022). Effects of equity-oriented teacher education on preservice teachers: A systematic review. *Teaching and Teacher Education, 119*(1), 1-16. https://doi.org/10.1016/j.tate.2022.103844

Marshall, S. (2023). But what does it look like in maths? A framework for culturally sustaining pedagogy in mathematics. *International Journal of Multicultural Education, 25(*1), 1-29. https://doi.org/10.18251/ijme.v25i1.3251

McGee, E. O., & Hostetler, A. L. (2014). Historicizing mathematics and mathematizing social studies for social justice: A call for integration. *Equity & Excellence in Education, 47*(2), 208-229. https://doi.org/10.1080/10665684.2014.900428

McLead, S. (2023, 3 April). Vygotsky's sociocultural theory of cognitive development. Retrieved 4 April 2023, from Simply Psychology: https://www.simplypsychology.org/vygotsky.html

National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematics success for all.* Reston, National Council of Teachers of Mathematics.

Oats, R. (2014). The responsiveness of social studies teacher training curriculum: Towards a democratic citizenship education in Botswana. Unpublished PhD thesis, University of South Africa.

Olawale, B. E. (2021). *Democratic citizenship in mathematics teachers' preparation in South African universities.* [Unpublished PhD thesis submitted to the University of Fort Hare] South Africa.

Olawale, B. E. (2022). Democratic citizenship in mathematics teacher preparation in South African universities: Contradictions in theory and practice. *International Journal of Pedagogy and Teacher Education*, 6(2), 126-139. https://doi.org/10.20961/ijpte.v6i2.61574

Olawale, B. E. (2024). Inclusive innovations: Promoting digital equity and inclusion through technological solutions. In X. Liu (Ed.), *Innovation and evolution in higher education* (pp. 1-16). London, U.K.: Intechopen.

Olawale, B. E., Mncube, V., & Harber, C. (2021). Critical social pedagogy in mathematics teacher education. *International Journal of Higher Education*, *10*(6), 93–104. https://doi.org/10.5430/ijhe.v10n6p93

Ormston, R., Spencer, L., Barnard, M., & Snape, D. (2014). The foundations of qualitative research. In *Qualitative research practice: A guide for social science students and researchers* (2nd ed., pp. 52-55).

Premier, J. A., & Miller, J. (2010). Preparing pre-service teachers for multicultural classrooms. *Australian Journal of Teacher Education*, 35(2), 35-48. https://doi.org/10.14221/ajte.2010v35n2.3

Ries, E., Holyoke, E. S., Dunham, H., Young, M. K., Mosley Wetzel, M., Garcia, C., ... & Trautman, K. (2024). Learning to expand our communities to support coaching for equity: A collaboration of seven university-based teacher preparation programmes. *International Journal of Mentoring and Coaching in Education*, 13(2), 178-194. https://doi.org/10.1108/IJMCE-10-2022-0087

Skepple, R. G. (2014). Preparing culturally responsive pre-service teachers for culturally diverse classrooms. *Kentucky Journal of Excellence in College Teaching and Learning*, 57-69.

Skovsmose, O. (1994). Towards a critical mathematics education. *Educational Studies in Mathematics*, 27(1), 35-57. https://doi.org/10.1007/BF01284527

Skovsmose, O. (2020). *Critical mathematics education*. Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-030-15789-0_34

Skovsmose, O. C. (2019). Crisis, critique, and mathematics. *Philosophy of Mathematics Education Journal*, *1*(1), 1-16.

Spielman, L. J. (2012). Equity in mathematics education: Unions and intersections of feminist and social justice literature. In *Towards equity in mathematics education: Gender, culture, and diversity* (pp. 39-56). https://doi.org/10.1007/978-3-642-27702-3_5

Tate, W. F. (1995). Returning to the root: A culturally relevant approach to mathematics pedagogy. *Theory into Practice*, *34*(3), 166–173. https://doi.org/10.1080/00405849509543676

Villegas, A. M., & Lucas, T. (2002). Preparing culturally responsive teachers: Rethinking the curriculum. *Journal of Teacher Education*, *53*(1), 20-32. https://doi.org/10.1177/0022487102053001003

Yin, R. (2014). *Case study research: Design and methods*. Thousand Oaks: Sage Publications.