

Education, Equity and Equality in Tanzania: The Role of Mathematics Education

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Abstract

The three words of education, equity and equality are different constructs and borrow from each other for one cannot apply the concepts of one without the involvement of the other. Education embraces equity and equality but also equity and equality cannot stand alone without education and therefore these concepts are interwovenly linked. This paper will focus on equity, equality and sparingly on Mathematics education enhancing equity with notion also of Mathematics augmenting equality. Providing every child with a pencil for use in the classroom is an example of promoting equality between students. This paper will provide a conceptual entity for discussion that will stimulate future deliberations on the subject matter. Indeed, the objectives of this inquiry are to: 1) differentiate inter alia what is equity and equality in education 2) explore on what studies on equity for in a few countries in Africa and 3) delve into Mathematics education issues of equity and equality towards making the sense of the education systems. The methodology for the inquiry is documentary analysis. The outcome of the probe will throw heuristic light into ways of raising quality education, developing the full potential of the child and with each student getting the same resources and opportunities. The paper will come out with findings, conclusions and recommendations.

Keywords: *Equity, equality, Mathematics education and opportunities*

Introduction

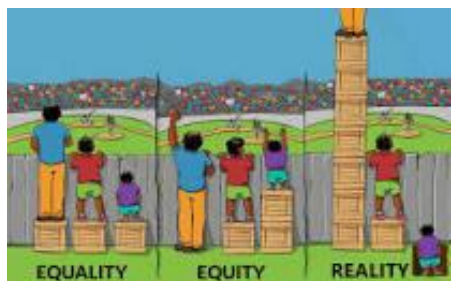
Equity in education refers to the principle of fairness and impartiality in providing all students with the resources, opportunities, and support they need to achieve their full academic potential. It acknowledges that students have different backgrounds, abilities, and needs, and aims to ensure that these differences do not result in unequal educational outcomes. Equity in education goes beyond merely treating all students the same, as it recognizes that some students may require additional resources or support to overcome barriers to learning. The goal of equity is to eliminate disparities in access to quality education and to create an inclusive learning environment where every student has an equal chance to succeed. It makes students feel that they are equally valued and teachers need to make a commitment to transform educational fabric to develop, protect, and

grow potential of their students. For this, they need to create a fair, just, and inclusive educational setting Panthi et al., (2018).

Equality in education refers to the principle that all students should have equal access to educational opportunities and resources, regardless of their background, socio-economic status, gender, race, ethnicity, or abilities. This means that every student should have access to high-quality education, regardless of their circumstances. Equality in education aims to eliminate disparities in the quality of education and ensure that all students have equal opportunities to develop their talents, skills, and knowledge, and achieve their full potential. It is an essential component of social justice and a fundamental right for every individual to have access to an education that helps them to succeed in life. This could refer to the same funding for all schools, the same quality of and abundance of materials and facilities, and/or the same quality of instruction. It is widely accepted that educational opportunities for children ought to be equal Newman & Satz (2023). Equality = Sameness. The following questions will guide the paper. 1) How do we relate equity in education and equality in education? 2) How does Mathematics education enhance equity in education? 3) To what extent does Mathematics education augment equality in education?

Equity

Issues of equity and equal opportunities in education have been a major concern for teachers, administrators and educational researchers and policy makers while educational philosophers and theorists have devoted thousands of pages to review and discuss these constructs and assumptions (Burbules et al., 2016). “Educational equity” is universally lauded but equally ill-defined. At least five contrasting meanings of equity are in current use: equal distributions of outcomes across populations; equal outcomes for every child; equal resource allocations across students, schools, districts, states, or nations; equal experiences for each child; and equal levels of growth by each



child (Levison & Geron, 2022, p. 7). Each of these examples demonstrates that even if schools receive equal per-pupil funding—and even if schools provide “equal opportunity” in the form of equal curricula, student-teacher ratios, classroom structures, and other resources—children with diverse needs

and living in diverse contexts will be unable to access those learning opportunities in equitable ways (Levison & Geron, 2022, p. 3). Students come to school with diverse back-grounds, abilities, talents, and challenges. Schools ensure equity by recognizing, respecting, and acting on this diversity. Schools have the capacity to differentiate instruction, services, and resource distribution, to respond effectively to the diverse needs of their students, with the aim of ensuring that all students benefit equally (Levison & Geron, 2022, p. 4). Regardless of how one defines and measures educational equity in a particular context—as resources, growth, outcomes, distribution of opportunities, experiences, preference satisfaction, surpassing a threshold (adequacy), or otherwise—it will often be impossible to achieve full equity because of resource scarcity, contextual and structural injustices, or political or cultural barriers (Levison & Geron, 2022, p. 10). A study conducted in Ghana indicates that there is a significant variation among schools in their students' mathematics outcomes:

Figure 1: *Interaction Institute for Social Change (Angus Maguire cartoons)*

The most successful students are males with highly educated parents. These students have high academic expectation, like mathematics and are confident learning mathematics. They attend schools that are often located in towns but not in villages or remote areas. In these schools, the parents of students are highly educated, and the mathematics teachers do not frequently use calculators but often provide students the opportunity to explain their mathematical ideas. These findings demonstrate that efforts to improve the quality of mathematics education and ensure equity in mathematics outcomes would require a comprehensive and holistic approach involving students, parents, and teachers. These studies have highlighted the need for continued efforts to address equity in education and to ensure that all students have equal opportunities to succeed Frempong (2013).

Since independence, the government of Tanzania has introduced various reforms with the aim of reducing inequality with regard to access to and the provision of education. This signifies the government's willingness to ensure equity in the provision of education. Among other reforms, these include: building schools in remote areas; initiating a district quota for under-performing districts; the financing of all levels of education; the integration of schools; the introduction of a core curriculum; the lowering of entrance qualifications for disadvantaged groups, such as girls and roaming cattle herders; using the mother tongue as a medium of instruction; the abolition of user fees; and the initiation of financing mechanisms for public primary schools i.e., capitation and development/investment grants Komba (2012). Further, quoting other scholars equity implies the following: firstly, fairness in the operation of an educational environment of all by ensuring that

the educational resources and benefits are distributed in a naturally fair manner and that there is no group, district or individual pupil who is favored at the expense of others (Malekela, 1995).

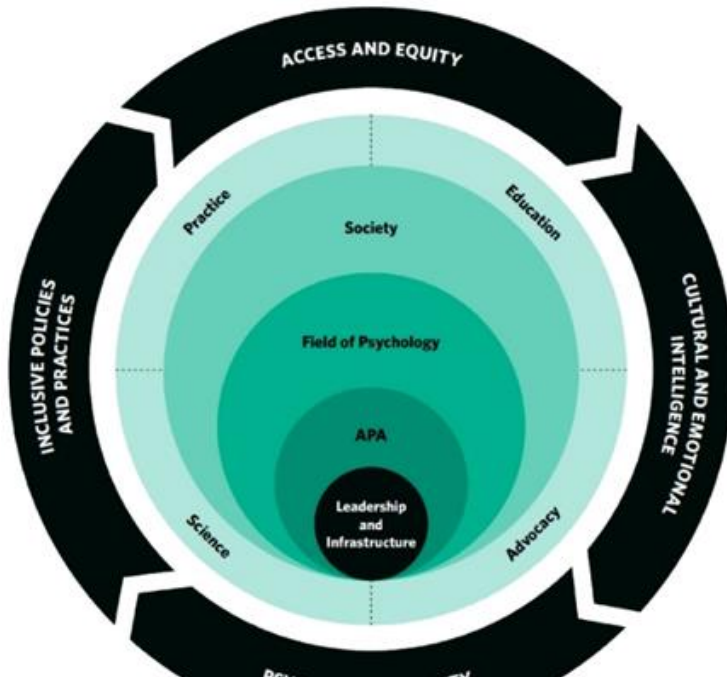


Figure 2: *Leadership and Infrastructure from Worthman*

Given Mexico's comparatively low coverage of higher education, findings indicate that although higher education coverage increased during this time period, inequalities persist between young people from different economic backgrounds, rural and urban areas, and indigenous and non-indigenous groups, thereby reproducing social disparities. Moreover, the most economically advantaged in society have most benefited from

the expansion in the higher education system. The study concluded by discussing alternative policy approaches that focus directly on disadvantaged groups to promote equity and inclusion in the higher education system Worthman et al., (2022) as observed in Figure 2.

Designing fair and inclusive education systems is a stepping stone to providing high quality education for every child. Inappropriate design and practices of education systems allow educational inequities and school failure (Hanushek and Wöessmann, 2010). Some system level policies, such as grade repetition or early tracking, tend to amplify socio - economic disparities and are conducive to disengagement and dropout, whereas other policies seem to mitigate them (Causa and Chapuis, 2009). It is not always clear how to best support schools, in particular low performing disadvantaged schools. Indeed, Causa and Chapuis (2009) have noted that,

There is also a positive association between inequality of opportunities and income inequality. As a consequence, cross-country regressions suggest that redistributive policies can help to reduce inequalities of educational opportunities associated

with socioeconomic background and, hence, persistence of education outcomes across generations Causa and Chapuis (2009)

UNESCO (2024) writing on “Education in Africa: Placing equity at the heart of policy” has noted that

This journey is not insignificant. Poor quality education programmes can have profoundly negative effects on children beyond learning and development. They can jeopardize their safety, health, and psychosocial well-being. It is vital for us to provide them with a safe, stimulating, and healthy environment in which they can grow to their full potential. A multidimensional approach to this task will allow us to consider the disparities of class, environment, gender (language, and political crisis within education systems and empower us to develop a global intervention strategy that leaves no child behind UNESCO (2023).

In addition, equity is at the heart of Sustainable Development Goals (SDG) 4. It is about giving all children equal access to safe, quality, and relevant education, and thus recognizes the importance of fairness (e.g., ensuring that personal and social circumstances are not obstacles to achieving educational potential. Several studies have been conducted in Sub-Saharan Africa on equity in education as reflected in the following documentations.

- The African Journal of Teacher Education has published several studies on equity in education, such as "Exploring Equity in Education Provision in Uganda" and "Teacher Education and Equity in South Africa."
- The Comparative and International Education Society of Southern Africa has conducted research on equity in education in several Southern African countries, such as "Equity in Access to Basic Education in Zimbabwe" and "Equity in Education in South Africa: A Comparative Analysis."
- The International Journal of Educational Development has published several articles on equity in education in Africa, such as "Equity and Quality in African Schooling" and "The Relationship between Equity Policies and Education Outcomes in Rwanda."

These studies highlight the need for continued efforts to address equity in education in Sub-Saharan Africa, and to ensure that all children have access to quality education regardless of their

background or circumstances. Educational equity means that each child receives what they need to develop to their full academic and social potential. Equity means providing resources according to the need to help diverse populations achieve their highest state of health and other functioning. Equity is an ongoing process of assessing needs, correcting historical inequities, and creating conditions for optimal outcomes by members of all social identity groups APA (2023). Working towards equity in schools involves:

- Ensuring equally high outcomes for all participants in our educational system; removing the predictability of success or failures that currently correlates with any social or cultural factor;
- Interrupting inequitable practices, examining biases, and creating inclusive multicultural school environments for adults and children; and
- Discovering and cultivating the unique gifts, talents and interests that every human possesses.

Equality in education

Equality in education refers to providing every individual with equal opportunities and access to quality education, regardless of their background, socioeconomic status, gender, race, ethnicity, disability, or any other characteristic. It aims to ensure that all students have the same chance to succeed and reach their full potential. This full potential calls for excellence as it has been noted by Schleicher (2014) who writes thus

Excellence in education without equity risks leading to large economic and social disparities; equity in education at the expense of quality is a meaningless aspiration. The most advanced education systems now set ambitious goals for all students, focusing on both excellence and equity. They also equip their teachers with the pedagogic skills that have been proven effective and with enough autonomy so that teachers can use their own creativity in determining the content and instruction they provide to their individual students Schleicher (2014).

First, students acquire soft skills in formal school settings. One study found that student achievement on tests accounts for just 20% of the effects of educational attainment on earnings (Bowles, Gintis, & Osborne 2001), which indicates that schools are cultivating non-cognitive skills

that tests do not measure, and that are consequential in the labor market (Levin 2012). A longstanding debate in the literature juxtaposes the view that we should prioritize equality in the distribution of educational opportunities with the view that an “adequacy” approach is the right way. Those who advocate the equality view may insist on equal outputs (i.e., educational outcomes, like the mastery of particular skills) or inputs (i.e., educational resources, like equal per pupil funding or qualified teachers). The adequacy view, by contrast, is seen as holding that what matters most is meeting a specified educational threshold Newman & Satz (2023).

In education, treating individuals with disabilities the same as those without does not always suffice to treat all equally, for disabilities sometimes give rise to special needs and requirements and this raises challenges for ‘inclusion’ (Warnock 2005). Placing disabled children in mainstream schools or classes may lead to bullying, as Warnock (2005) has noted, but placing disabled children in separate settings may further entrench the wide-spread social stigma associated with disability, even when there is much that can be done to ensure disability is not an obstacle to learning. It has been noted that

Improving students’ performance in school can also encourage healthier lifestyles and participation in democratic institutions and other civil society initiatives and organizations – all of which reduces the cost to society. The Survey of Adult Skills, conducted by the OECD in 2012, shows that skills are positively associated with self-reported good health, political interest and interpersonal trust (OECD, 2013a). Crime and other illegal activities may decrease, since better-educated people tend to be less involved in criminality (OECD, 2010b). Indeed, many economic and social problems, such as teenage pregnancy and unhealthy habits, are linked to low levels of educational attainment and skills (Cunha and Heckman, 2007; Heckman, 2008).

As the above discussion highlights, the realization of the ideal of equality of educational opportunity may be frustrated by competing conceptions of what equality itself entails, and also by other important values that are in tension with equalizing education opportunities (e.g., respecting family autonomy). Social scientific advances in recent years have clarified our understanding of the mechanisms behind children’s unequal access to educational opportunities, and the consequences of those inequalities for social mobility Chetty et al. 2014; Duncan & Murnane 2011. Second, educational attainment has long been seen to have a signaling function in the labor market (Spence 1973), whereby employers rely upon job candidates’ educational credentials as a proxy for future productivity. Educational attainment itself, then, apart from applicants’ demonstration of particular skills, is central to screening and differentiating candidates. Promoting equality in education involves addressing various aspects, including:

- The curriculum and teaching methods should be inclusive and representative of diverse cultures, experiences, and perspectives. This helps create a more inclusive and equitable learning environment where students feel valued and can see themselves reflected in the educational content.
- Efforts should be made to eliminate barriers that prevent certain groups or individuals from accessing education. This may involve improving infrastructure, increasing the number of schools in underserved areas, providing transportation facilities, and removing discriminatory admission policies.
- Providing teachers with training and professional development opportunities on inclusive teaching practices and cultural competence can help create a more equitable learning environment. Teachers should be equipped with the necessary skills to address the diverse needs of their students and create an inclusive classroom culture.
- Adequate and equitable funding is crucial to support equal educational opportunities. It involves ensuring that schools in disadvantaged areas receive sufficient resources and financial support to bridge the gap between privileged and marginalized communities.
- It is crucial to ensure that the education provided is of high quality, regardless of the socioeconomic status of the students. This involves hiring qualified teachers, providing adequate resources and learning materials, and implementing effective teaching methods that cater to diverse learning styles.
- Inclusive education emphasizes the importance of accommodating students with disabilities and special needs within mainstream educational settings. It promotes equal opportunities for all students to learn together, fostering a sense of belonging and reducing discrimination and stigmatization.
- Regular monitoring and evaluation of educational policies and practices are essential to identify and address any disparities or inequalities. This includes collecting and analyzing data on enrollment rates, academic performance, graduation rates, and other relevant indicators to measure progress and identify areas that require improvement.

By prioritizing equality in education, societies can strive to create a more inclusive, just, and equitable learning environment that empowers individuals and promotes social mobility. Making use of the theory of John Dewey who thought that students learn from human experiences and the

students can help change the future depending on what they learn throughout their lifetime Vaughan et al., (2017).

Methods

The study used documentary analysis, that refers to a research method, which examines and interprets various types of documents in order to gain insights and understanding about a particular topic or research question. It involves systematic examination and critical evaluation of written, visual, or audio materials such as texts, photographs, films, newspapers, government reports, letters, diaries, websites, and other recorded information. The rationale for this approach was that it offered a valuable method for understanding past events, exploring societal issues, analyzing

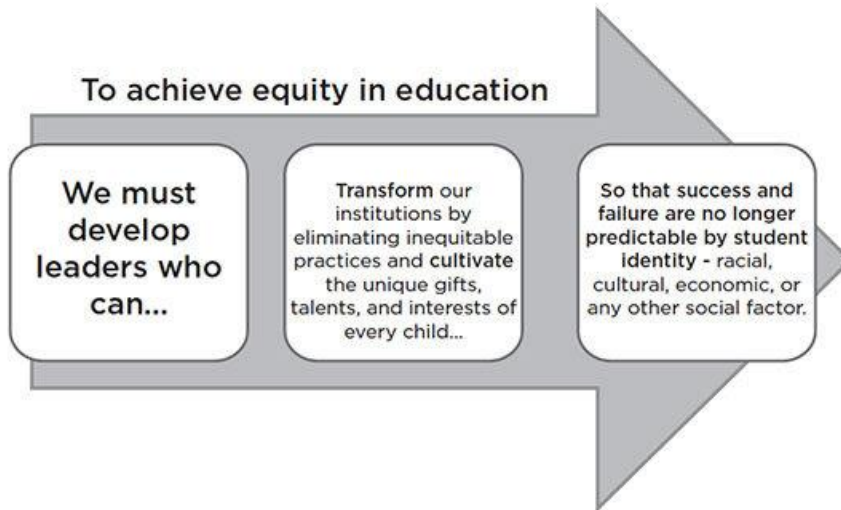


Figure 3: Modified from

<https://static1.squarespace.com/static/5e32157bff63c7446f3f1529/t/5f11e9d90cd94734d0079476/1595009497839/Educational+Equity+Definition.pdf>

policy documents, investigating media representations, or examining organizational records, among other applications. The content of the documents was systematically analyzed and interpreted to identify trends. This analysis involved qualitative methods like coding, thematic analysis, or quantitative methods like frequency counts or statistical analysis. The researcher drew conclusions, developed explanations and generated new knowledge based on the evidence gathered from the documents. The researcher extracted key information from the documents, such as facts, quotes, statistics, or any other relevant data. This process helped in identifying and compiling important evidence and supporting materials.

In summary for the methodology, the paper employed a qualitative research design based on document analysis to examine how issues of education, equality, and equity are addressed within mathematics education policies, curricula, and scholarly literature. Document analysis was selected as the primary method because it allowed for the systematic examination and interpretation of textual data to elicit meaning, gain understanding, and developed empirical knowledge from existing records (Bowen, 2009). The documents analyzed included documents focusing on education, equality equity and mathematics issues. These documents were purposefully selected to ensure relevance to the research and to capture multiple perspectives from both international and Tanzanian the contexts. Table 1 has the listed a few of the documents for the documentary analysis in addition to the references at the end of the paper. These documents were obtained from various sources, including archives, libraries, online databases and personal collections and reflections.

Table 1: *Table of some of the reviewed documents for the documentary analysis*

S/N	Document	Source
1.	Educational Equity Definition	https://www.nationalequityproject.org/education-equity-definition
2.	We are the national Equity Project	https://www.nationalequityproject.org/
3.	Equity and Quality in Education: Supporting Disadvantaged Students and Schools	https://www.oecd.org/en/publications/2012/02/equity-and-quality-in-education_g1g16956.html
4.	Teachers' Perception of Social Justice in Mathematics Classrooms	https://zuscholars.zu.ac.ae/works/3288/
5.	<i>Equality of educational opportunity.</i> In <i>Stanford Encyclopedia of Philosophy.</i>	https://plato.stanford.edu/entries/equal-ed-opportunity
6.	Conceptions of Educational Equity	https://journals.sagepub.com/doi/10.1177/2332858422121344
7.	Equity and quality mathematics education within schools: findings from TIMMS data for Ghana	African Journal of Research in Mathematics, Science and Technology Education, 14(3), 50–62.
8.	Increasing access but not equity: Higher education policy and participation in Mexico.	International Journal of Education Economics and Development, 13(4), 343-363.
9.	Education in Africa. Placing equity at the heart of policy. Continental report	https://www.unesco.org/en/articles/education-africa-placing-equity-heart-policy-continental-report

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| 10. OECD Reports: Education at a Glance | https://download.ei-ie.org/Docs/WebDepot/EI_Analysis_EAG2012_non-official.pdf |
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The analysis followed a thematic synthesis approach, involving three main steps: document selection, coding, and interpretation. Each document was first read in full to determine its relevance and credibility, followed by open and axial coding to identify emerging themes related pedagogical equity, and inclusivity with interest in mathematics education. To enhance trustworthiness, data triangulation was applied by comparing findings across policy documents, empirical studies, and curriculum texts. The researcher maintained an audit trail of the coding and interpretation process to ensure transparency.

Ethical considerations were observed by using publicly available documents and citing all sources appropriately. This methodological approach enabled a comprehensive understanding of how equality and equity principles are integrated—or neglected—in the study discourse and practice, highlighting potential areas for pedagogical reforms.

Findings

As for Ghana, in terms of geographic location, a performance gap was observed between urban and rural Ghana, which could be explained by the uneven distribution of educational facilities and resources. It was further observed that the current educational system is skewed more towards formal academic development to the neglect of vocational and technical training, especially in the informal sector. To address this form of educational inequity, policies should be put in place to expand Ghana's educational system to areas such as sports development, the creative arts, vocational, and technical education Takyi et al., (2019).

In regard to Ethiopia, the country has made significant progress in expanding access to education in recent years. The government has implemented various policies and programs to increase enrollment rates and improve the overall quality of education. Despite these efforts, however, challenges related to equity persist, particularly in rural and marginalized communities. Here are some key factors influencing equity in education in Ethiopia: a) Socioeconomic Factors: Poverty and socioeconomic status remain significant barriers to education. Many families struggle to afford basic educational expenses, such as uniforms, textbooks, and supplies. Inadequate financial resources also hinder the availability of quality education facilities and qualified teachers. b)

Ethnic and Linguistic Diversity: Ethiopia is a diverse country with numerous ethnic groups and languages. Language barriers can pose challenges, particularly for children from ethnic minority groups who may not have access to education in their native language. The lack of culturally relevant curriculum and teaching materials can further contribute to inequities. c) Gender Inequality: Gender disparities in education have been a concern in Ethiopia. Traditionally, girls have faced cultural and societal barriers to education, including early marriage, household chores, and limited economic opportunities. While progress has been made, gender gaps in enrollment and completion rates still exist, especially in rural areas. d) Geographic Disparities: There are significant disparities in education between urban and rural areas. Rural communities often lack adequate infrastructure, such as schools, classrooms, and teaching materials. Accessibility is a major challenge, as students in remote areas may have to travel long distances to reach schools, which can result in high dropout rates. Efforts are underway to address these issues and promote equity in education in Ethiopia. The government has implemented initiatives such as the Education Sector Development Program and School Improvement Program, which aim to improve infrastructure, teacher training, and curriculum development. Additionally, organizations and NGOs are working to provide scholarships, school feeding programs, and support for girls' education to address specific equity challenges. To achieve greater equity in education, Ethiopia needs continued investment in infrastructure, teacher training, and the provision of resources to disadvantaged areas. Efforts should also focus on eliminating gender-based barriers, providing support for marginalized communities, and promoting inclusive education policies that address the diverse needs of all students.

Tanzania issues in equity

Tanzania faced several issues related to equity in education. Based on historical challenges, here are some key issues that Tanzania has grappled with concerning equity in education:

- Access to education for children with disabilities or special needs has been limited in Tanzania. The lack of inclusive facilities and trained teachers has been a barrier to providing quality education for these children. In addition, one of the major issues in Tanzania has been ensuring equal access to education for all children, especially in rural

and marginalized areas. Geographic and economic disparities often hinder children's ability to attend school, particularly girls and children from low-income families.

- **Language Barrier:** In Tanzania, multiple languages are spoken, and the medium of instruction can vary across regions. The language barrier can hinder learning, especially for children whose first language is not the one used in the classroom. This is tied with recruiting and retaining qualified teachers, especially in remote and underserved areas. The shortage of trained teachers can impact the quality of education and limit access to learning opportunities for students.
- There have been concerns about the quality of education provided in Tanzania, with variations in teaching standards and resources between urban and rural schools. This inequality in educational infrastructure can lead to unequal learning outcomes for students. This is along with insufficient funding for the education sector which has been a significant obstacle in improving the quality of education and reducing disparities. Adequate investment in education is crucial to providing equal opportunities for all Tanzanian children.
- Tanzania has been working to address gender disparities in education, as girls' education has historically been affected by cultural norms, early marriage, and teenage pregnancies.

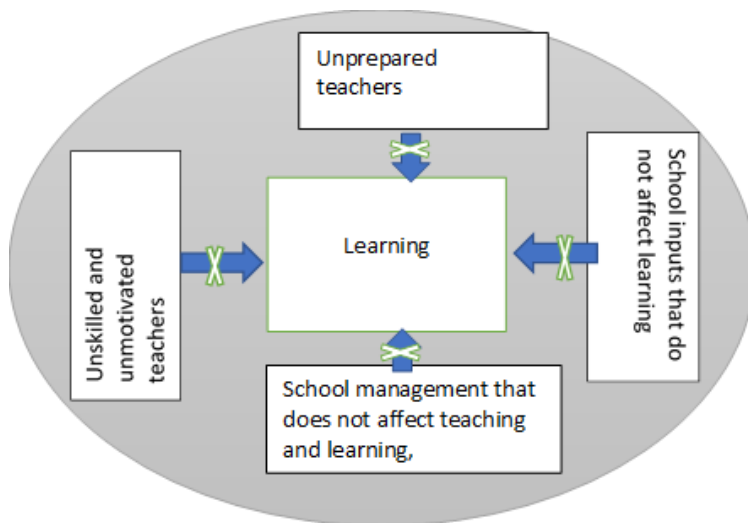


Figure 4: Factors drive differences in education outcomes

Efforts have been made to promote gender equality in education, but more work is needed to bridge the gap fully.

The Tanzanian government, along with various non-governmental organizations and international agencies, has been working to address these challenges and improve equity in education. Efforts have been made to expand access, improve teacher training, invest in school infrastructure, and promote gender equality to enhance educational opportunities for all Tanzanian children. A combination of factors drives differences in education outcomes between boys and girls, some of which are: Learners and their households, school inputs, Teachers and school Management as illustrated in Figure 4.

The following are general findings

- Inadequate policies and governance: Weak education policies and governance can also hinder equity education in Africa. Some countries lack policies to address issues such as gender disparities, child labor, and inclusive education, while others may struggle with corruption, inadequate monitoring, and weak accountability mechanisms.
- In many parts of Africa, girls face significant barriers to accessing education due to cultural and societal norms that prioritize boys' education. Girls may also face challenges such as early marriage, lack of sanitary facilities, and gender-based violence that prevent them from attending or completing school.
- Many African countries suffer from inadequate funding for education, which means that schools may lack basic resources such as textbooks, classrooms, and teaching materials. This can result in poor quality education and a lack of access to educational opportunities for marginalized groups.
- Poverty is a major obstacle to equity education in Africa. Many children and families living in poverty cannot afford the costs of education, such as uniforms, textbooks, and transportation, and are therefore unable to access quality education.
- There is a shortage of qualified teachers in many African countries, particularly in rural areas. This can lead to overcrowded classrooms, poor quality education, and a lack of support for students who need additional assistance.
- Armed conflict, displacement, and humanitarian crises can disrupt educational opportunities for children, particularly those in marginalized communities. Schools may be destroyed or damaged, and children may be forced to flee their homes, making it difficult to access education.

Addressing these challenges will require sustained efforts by governments, civil society organizations, and the international community to provide adequate funding and support for education, promote gender equality, and strengthen policy and governance frameworks for equity education.

Mathematics education enhancing equity in education

Mathematics education can play a crucial and significant role in enhancing equity in education by providing students with opportunities to develop critical thinking/essential mathematical skills and competencies, problem-solving skills, and a strong foundation in numerical and logical reasoning. Here are some ways mathematics education can promote equity:

- Promoting a growth mindset in Mathematics education can foster a belief that all students can learn and succeed in Mathematics. By encouraging students to embrace challenges, persevere through difficulties, and view mistakes as opportunities for growth, mathematics education can counteract negative stereotypes and build self-confidence and resilience. Conversely, Mathematics education plays a crucial role in building students' self-confidence and self-efficacy in their mathematical abilities. By providing support, differentiated instruction, and inclusive learning environments, mathematics education can help students overcome math anxiety, develop a growth mindset, and believe in their capacity to succeed. This empowerment contributes to educational equity by ensuring that all students have equal opportunities to thrive academically
- Mathematics education that incorporates real-world applications and problem-solving can make the subject more meaningful and relevant to students' lives. By showcasing how mathematics is used in various fields and contexts, students from diverse backgrounds can see the practical value of mathematical skills and develop an interest in pursuing related careers. Mathematics equips students with essential numeracy and problem-solving skills, which are crucial for success in various academic disciplines and real-life situations. By teaching these foundational skills to all students, mathematics education empowers them to participate fully in society, regardless of their background.
- Assessments in mathematics should be designed to fairly measure students' understanding and skills, considering diverse learning styles and backgrounds. Using a variety of

assessment strategies, such as performance-based assessments, portfolios, and collaborative projects, can provide a more comprehensive and equitable view of students' mathematical abilities. Mathematics education fosters critical thinking and reasoning abilities in students. These skills are valuable in analyzing and solving complex problems, making informed decisions, and understanding the world around them. By developing these skills in all students, mathematics education promotes equity by enabling them to approach challenges with confidence and competence.

- Mathematics education can be designed to cater to the diverse needs and abilities of all students, irrespective of their background or prior mathematical knowledge. An inclusive curriculum ensures that all students have access to mathematical concepts and skills, regardless of their race, gender, socioeconomic status, or disability. Mathematics education ensures that all students have access to high-quality mathematical instruction, regardless of their socioeconomic status, or geographical location. By providing equitable access to mathematical learning opportunities, it helps bridge educational disparities. Proficiency in mathematics opens doors to higher education and a wide range of career opportunities. By providing equitable mathematics education, students from marginalized or underserved communities can overcome systemic barriers and have equal access to pursue careers in STEM (Science, Technology, Engineering, and Mathematics) fields, which are often associated with higher earning potentials and social mobility.
- Mathematics education can help address achievement gaps by providing targeted interventions and support to students who are falling behind. Through differentiated instruction and personalized learning approaches, educators can identify and address the specific needs of students, thereby reducing disparities in mathematical achievement.
- Incorporating culturally relevant examples, contexts, and perspectives into mathematics education helps students see the relevance and applicability of mathematics in their own cultural contexts. By integrating students' cultural backgrounds into the learning process, mathematics education can foster a sense of belonging, engagement, and identity, particularly for underrepresented groups.
- Providing teachers with ongoing professional development opportunities focused on equity in mathematics education is crucial. By equipping educators with strategies to promote

inclusivity, cultural responsiveness, and equitable instructional practices, they can create an environment that supports all students' mathematical learning and achievement. Mathematics education can help challenge cultural biases and stereotypes that may perpetuate inequity in education. By promoting culturally responsive teaching practices, educators can incorporate diverse mathematical examples, perspectives, and problem-solving approaches that resonate with students from different backgrounds. This fosters inclusivity, encourages student engagement, and promotes equitable learning experiences.

In a nutshell, Mathematics education can enhance equity in education by cultivating mathematical mindsets, incorporating real-world applications, using equitable assessment practices, ensuring accessible and inclusive curriculum, addressing achievement gaps, embracing culturally responsive pedagogy, supporting teacher professional development. These efforts can contribute to a more equitable and inclusive learning experience for all students. Undeniably, Mathematics education serves as a powerful tool for promoting equity in education by providing essential skills, fostering critical thinking, expanding opportunities, challenging biases, and empowering students from diverse backgrounds. By ensuring equitable access, instruction, and support, mathematics education can help bridge the educational achievement gap and create a more inclusive and fair educational system.

Mathematics augmenting equality in education

Mathematics plays a significant role in promoting equality in education by providing a universal language that transcends cultural, linguistic, and socio-economic barriers. While Mathematics may not directly address all aspects of equality, it provides a foundation for equitable access to educational opportunities and can help mitigate disparities among students. The following ways has made Mathematics to contribute to equality in education:

- Mathematics is a language that is understood and used consistently across different cultures and countries. It provides a means of communication and understanding that transcends linguistic barriers. This allows students from diverse backgrounds to engage in mathematical learning on an equal footing. It provides a standardized system of symbols and notation that enables communication and understanding across diverse populations.

This common mathematical language helps level the playing field for students from different backgrounds, fostering equal access to mathematical knowledge and educational resources. Mathematics behaves as a universal language.

- Mathematics offers a unique feature of objectivity in assessment. In mathematical problems, solutions are derived through logical reasoning and evidence-based approaches. This objectivity helps to minimize subjective biases and provides a fair assessment of students' abilities, regardless of their background or personal characteristics. Mathematics often relies on objective assessment methods, such as tests and examinations with clear criteria for evaluation. These assessments are less susceptible to bias and subjectivity compared to some other subjects, allowing for a more equitable evaluation of students' abilities. Objective assessments provide a fairer basis for measuring academic achievement, minimizing the influence of factors unrelated to students' mathematical skills or knowledge.
- Mathematics serves as a fundamental building block for many disciplines and fields of study. Proficiency in mathematics opens doors to various opportunities in science, technology, engineering, finance, and other sectors. By providing equal access to quality mathematics, students from all backgrounds have a chance to pursue these opportunities and break the cycle of inequality. By introducing students to mathematical modeling and its real-world applications, mathematics education helps broaden their perspectives and demonstrates the relevance and usefulness of mathematics in different contexts. This exposure can motivate students from diverse backgrounds and interests to engage with mathematics, fostering equality by expanding opportunities and pathways for their educational and career development.
- **Critical Thinking and Problem Solving:** Mathematics fosters critical thinking skills and problem-solving abilities. These skills are vital for students to navigate real-world challenges and make informed decisions. By equipping students with mathematical reasoning, education promotes equality by empowering individuals to overcome obstacles and contribute effectively to society. : Mathematics cultivates logical reasoning and analytical thinking, enabling students to examine and evaluate arguments, evidence, and data objectively. These skills are crucial for making sound judgments and identifying fallacies or biases. By fostering logical reasoning and analysis, Mathematics helps students

develop a discerning mindset, allowing them to question assumptions and biases and promoting equality by encouraging critical thinking.

- **Mathematical Literacy:** Mathematical literacy is the ability to understand, interpret, and apply mathematical concepts in everyday life. It enables individuals to make informed decisions, solve practical problems, and participate actively in civic and economic matters. By ensuring mathematical literacy for all students, education helps to bridge the gap between different socio-economic groups and promotes social equality.
- **Data Analysis and Decision Making:** Mathematics provides tools for analyzing data, interpreting information, and making evidence-based decisions. In an increasingly data-driven world, mathematical skills are crucial for understanding complex issues, evaluating evidence, and forming rational opinions. By equipping students with these skills, mathematics promotes equality by enabling individuals to participate meaningfully in the decision-making processes that shape their lives and society. : In mathematics, problems can be designed to offer equal opportunities for all students to engage and succeed, irrespective of their background or identity. Math problems can be created with different levels of complexity, catering to students' diverse abilities and ensuring that everyone has a chance to participate and learn. This approach supports equity in the classroom by providing appropriate challenges that encourage growth and learning for all students.

While mathematics can enhance equality in education, it is essential to acknowledge that it is just one aspect of a comprehensive approach to equality. Other factors, such as inclusive pedagogy, equitable access to resources, and addressing social and economic disparities, also play critical roles in promoting equal educational opportunities for all students. Nonetheless, it is essential to note that while Mathematics can contribute to promoting equality in education, it is not a panacea. Numerous other factors, such as quality teaching, resources, social support, and inclusive policies, also play vital roles in achieving educational equality. A comprehensive and holistic approach is necessary to address the multifaceted aspects of equality in education.

Conclusions and Recommendations

Education policy does not happen in a vacuum. It requires openness and interactions between systems and their environments and is influenced by economic, political, social and technological trends (OECD, 2016; OECD, 2019). To achieve greater equity in education, each needs continued

investment in infrastructure, teacher training, and the provision of resources to disadvantaged areas. Efforts should also focus on eliminating gender-based barriers, providing support for marginalized communities, and promoting inclusive education policies that address the diverse needs of all students.

Equity and equality are two important principles in the context of education, aimed at ensuring fair and just opportunities for all students to access and succeed in their educational pursuits. While the terms are often used interchangeably, they have distinct meanings and implications. Equity in education emphasizes addressing the unique needs and circumstances of individual students to ensure that everyone has a fair and just chance to succeed. It recognizes that different students require different levels of assistance and resources to overcome obstacles and achieve educational goals. Equity involves identifying and understanding the specific challenges faced by certain groups or individuals and then providing targeted interventions, additional support, and resources to help level the playing field. The goal is to close achievement gaps and create an inclusive learning environment where every student can thrive.

In line with the above, equality in education refers to the idea of providing all students with the same resources, opportunities, and support, regardless of their individual needs, backgrounds, or circumstances. The focus is on treating all students alike, assuming that an equal starting point will lead to equal outcomes. However, this approach may overlook the fact that not all students start from the same position or require the same level of support to achieve success. As a result, some students may still face barriers that prevent them from reaching their full potential.

In summary, while equality aims to treat everyone the same, equity seeks to address and redress the unequal starting points and circumstances of students, allowing them to access education and succeed on a level playing field. Striving for educational equity means considering the diverse needs of learners and providing tailored support and resources to ensure that all students have an equal opportunity to reach their full potential. This means equity recognizes the need for personalized support and interventions to overcome barriers and achieve genuine equality of educational outcomes in an equitable education system, extra resources, such as targeted funding, specialized teaching methods, additional support, or accommodations, are allocated to students who need them the most. The goal is to bridge the achievement gap between various student groups

and promote greater inclusivity and social justice. While equality strives for sameness and equal treatment for all students, an equitable education system seeks to create a fair and just learning environment that maximizes the potential of every individual, regardless of their background or circumstances.

Mathematics education enhancing equity and Mathematics augmenting equality in education do make a comprehensive approach to promoting equality and equity in education. They focus on addressing disparities in access, learning outcomes, and opportunities in mathematics learning for students of diverse backgrounds, including race, gender, socioeconomic status, and disability. There is partnership and collaboration between schools, communities, and organizations to create a network of support for equitable mathematics education. Collaboration with parents and caregivers is also crucial in reinforcing mathematics learning outside the classroom. By implementing these strategies on Mathematics education enhancing equity and Mathematics augmenting equality in education will aim to reduce achievement gaps, increase representation of underrepresented groups in advanced mathematics courses, and foster a sense of inclusion and empowerment among all students in their mathematical pursuits. Ultimately, the initiative seeks to create a fair and just learning environment.

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