

Sociolinguistic Analysis of the Impact of African Languages on Girls' STEM Education Participation and Success



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ABSTRACT

The impact of African languages on girls' engagement, development, and performance in STEM (science, technology, engineering, and mathematics) education is examined in this study. In many African cultures, proverbs, idioms, and common conversation promote traditional gender stereotypes that prevent girls from pursuing professions in science. Additionally, female students continue to be underrepresented in STEM areas worldwide. The project aims to investigate how African linguistic patterns influence narratives about gender and STEM education, the obstacles they erect, and whether language can be used as a tool for inclusion. It is based on feminist language theory and the Sapir-Whorf hypothesis. Interviews and focus groups with students, teachers, and language specialists were combined with discourse analysis of African proverbs and idioms as part of a qualitative research design. According to preliminary research, some language expressions reinforce gender bias, but others can be modified or reinterpreted to dispel stereotypes and promote STEM advocacy. In addition to more general language planning that encourages inclusive discourses, the study suggests including gender-sensitive language in curriculum creation, teacher preparation, and educational policy. Overall, by showing how language both limits and facilitates females' possibilities in STEM, the study advances feminist and sociolinguistic scholarship and provides fresh perspectives for equity-focused educational change in Africa.

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Publication History

Received: 5th July, 2025

Accepted: 11th

November, 2025

Published online:

30th December, 2025

To Cite this Article:

Nontokoza Gladys

Mdhuli, and Masila

Joshua Masipa.

“Sociolinguistic Analysis of the Impact of African Languages on Girls' STEM Education Participation and Success.” *E-Journal of Humanities, Arts and Social Sciences* 6, no. 14 (2025):

4188 - 4201,

<https://doi.org/10.38159/ehass.202561458>.

Keywords: Custom, Gender, Indigenous Languages, Cyber Culture, Bias

INTRODUCTION

The gender disparity in STEM (Science, Technology, Engineering, and Mathematics) education remains a significant issue across the globe, particularly in African societies. Despite global initiatives aimed at encouraging more girls and women to pursue STEM careers, female students are still vastly underrepresented in these fields.¹ While the factors influencing this imbalance are multifaceted, ranging from socio-economic barriers to institutional discrimination, the influence of language on gender roles is an often-overlooked aspect. In many African societies, traditional expressions, proverbs, and idioms have a profound impact on shaping. Cultural attitudes towards gender roles often reinforce stereotypes that discourage girls from entering male-dominated fields such as science and technology.²

¹ Sandra McNally, “Gender Differences in Tertiary Education: What Explains STEM Participation?” (IZA Policy Paper, 2020).

² Kehumile Nkabina Masala, *The Place and Role of Women as Depicted in Setswana Proverbs* (University of Johannesburg (South Africa), 2022); D.N. Ombongi, “Gender Ideologies And Power Relations In Ekegusii Proverbs” (Machakos University Press, 2024).

Language plays a crucial role in shaping social perceptions and behaviour, particularly regarding gender. Feminist language theory posits that the language we use reflects and perpetuates societal power dynamics, including those related to gender.³ The Sapir-Whorf hypothesis further supports this by suggesting that language shapes the way individuals think and view the world.⁴ In many African cultures, language is not merely a tool for communication but an instrument through which traditional norms and values are transmitted across generations. Proverbs and idioms, for instance, frequently express and reinforce societal expectations about gender roles. Common expressions often attribute domestic responsibilities and submissive traits to women, while ascribing leadership, strength, and intellectual authority to men. Such linguistic patterns may unconsciously influence the way girls perceive their capabilities and potential, especially in fields like STEM, which demand high levels of intellectual engagement and problem-solving skills.⁵

While much of the existing research on gender and STEM education has focused on external factors such as access to resources, teacher biases, and institutional practices,⁶ few studies have explored how the cultural and linguistic frameworks in which girls are socialized affect their engagement with STEM subjects. Furthermore, there has been limited research on the role of indigenous African languages in shaping gender perceptions within the context of education. Although there have been notable studies on the influence of Western languages on gender,⁷ African languages rich in metaphorical and cultural expressions have received less attention in this regard. Thus, this study seeks to fill a critical gap in the literature by exploring the impact of African languages on girls' participation in STEM fields.

Despite increasing attention to gender equality in education, the linguistic aspects that may influence gendered aspirations in STEM fields remain inadequately addressed. While scholars have highlighted the role of language in reinforcing gender stereotypes,⁸ much of this research has focused on Western contexts, leaving African linguistic landscapes largely unexplored. African languages, with their deep cultural and philosophical roots, have unique ways of shaping the worldview of speakers, particularly in terms of gender. However, the implications of this for girls' involvement in STEM education have not been systematically studied. This study aims to bridge this gap by analysing how African languages, through proverbs, idioms, and everyday expressions, might act as both barriers and enablers for girls' involvement in STEM.

This study aims to investigate how African languages influence girls' involvement, progression, and performance in STEM education. Specifically, it seeks to explore how linguistic patterns in African languages contribute to or challenge gender inequities in STEM fields. The research will examine whether proverbs, idioms, and everyday discourse reinforce gender stereotypes that discourage girls from pursuing STEM careers, or whether these linguistic elements can be reinterpreted to advocate for gender inclusion in STEM. Furthermore, the study will assess the potential of language as a tool for promoting gender-sensitive policies and interventions in educational systems. The ultimate goal is to provide insights into how language can be used strategically to address the gender gap in STEM education in Africa.

This study employs a qualitative, sociolinguistic approach, combining discourse analysis with interviews and focus group discussions. The primary focus will be on analysing African proverbs, idioms, and expressions from a range of indigenous languages. Discourse analysis, a method widely used in sociolinguistic research, will allow for a detailed examination of how language constructs and reinforces gender roles.⁹ The study will be grounded in feminist language theory, which critiques how language

³ Sara Mills and Louise Mullany, *Language, Gender and Feminism: Theory, Methodology and Practice* (Routledge, 2011).

⁴ Muhammad Natsir, Nadya Hafizah Harahap, and Ridha Khairani, "The Role of Language in Shaping Human Thought: A Study of the Sapir-Whorf Hypothesis," *Journal of Learning and Teaching*, 2025, 22–29.

⁵ Anni Reinking and Barbara Martin, "The Gender Gap in STEM Fields: Theories, Movements, and Ideas to Engage Girls in STEM," *Journal of New Approaches in Educational Research* 7, no. 2 (2018): 148–53.

⁶ Tiffany L Wright, *Examining the Role of Cultural Capital in Access and Equity for Female C-STEM Learners of Color* (Pepperdine University, 2024).

⁷ Lidia Tanaka, "Language, Gender, and Culture," in *The Routledge Handbook of Language and Culture* (Routledge, 2014), 100–112; Deborah Cameron, *On Language and Sexual Politics* (Routledge, 2012).

⁸ Sopuruchi Christian Aboh, "Accent and Social Evaluation: A Sociolinguistic Analysis of Language Attitudes and Stereotypes in University Settings in Nigeria," 2024.

⁹ Muhammad Haseeb Sarwar, Afifa Tanveer Malhi, and Maryam Munir, "Discourse Analysis of Gender Roles in Drama 'Kuch Ankahi,'" *Journal of Media and Entrepreneurial Studies* 5, no. 1 (2025): 1–21.

serves to maintain patriarchal power structures,¹⁰ and the Sapir-Whorf hypothesis, which posits that language shapes thought and perception.¹¹ Data will be collected from several African languages, chosen for their rich oral traditions and cultural significance. These languages will include, but are not limited to, Siswati and Northern Sotho, allowing for comparative insights into the role of language in shaping gender attitudes towards STEM. Additionally, semi-structured interviews and focus group discussions will be conducted with educators, students, and language experts to gain a more comprehensive understanding of how language influences girls' participation in STEM fields.

This study contributes to the body of knowledge by highlighting the often-overlooked role of language in shaping girls' ambitions and opportunities in STEM education. It expands the current understanding of the gender gap in STEM by incorporating a sociolinguistic perspective that considers the cultural and linguistic nuances of African societies. In doing so, the research provides new insights into how gendered linguistic patterns may contribute to the underrepresentation of women in STEM fields. Furthermore, the study underscores the potential of language to challenge existing stereotypes and promote gender inclusivity in education. The findings of this research could inform policy and curriculum development, offering practical recommendations for creating a more inclusive environment for girls in STEM.

The discussion will begin by contextualizing the role of language in African societies, focusing on how cultural narratives and traditional expressions shape perceptions of gender. This will be followed by an analysis of selected proverbs and idioms from different African languages, highlighting how they either perpetuate or challenge gender stereotypes. The study will then explore the practical implications of these findings, considering how language can be used as a tool for advocacy in promoting gender inclusion in STEM fields. Finally, the discussion will outline policy recommendations, including the integration of gender-sensitive language into curricula and the development of language policies aimed at reducing gender bias in education.

LITERATURE REVIEW

The role of language in shaping gendered perceptions and its impact on education has been an area of considerable interest in sociolinguistic research, particularly concerning girls' participation in Science, Technology, Engineering, and Mathematics (STEM). This literature review explores the intersections between language, gender, and education in the African context, focusing on how African languages influence girls' participation, progression, and performance in STEM fields. The review examines relevant theoretical perspectives, cultural dynamics, gendered language, and the impact of linguistic structures such as proverbs and idioms in shaping societal views of gender roles. Additionally, the review considers the current state of knowledge on the subject and identifies gaps in the existing literature.

Language is a powerful tool in socializing individuals into gendered roles, as it reflects and reinforces societal norms.¹² Language constructs gendered identities by associating certain words, phrases, and metaphors with particular gender roles.¹³ In many societies, including African communities, language plays a crucial role in perpetuating stereotypes about the capabilities and roles of men and women, especially in education. Sociolinguistic studies have shown that language reflects power relations, and these power dynamics are often gendered.¹⁴ Feminist linguistics argues that language can either reinforce or challenge the patriarchal structures that limit women's opportunities.¹⁵ Thus, the way language frames gendered roles and expectations is significant in shaping girls' perceptions of their potential in STEM education.

The Sapir-Whorf hypothesis suggests that the structure of a language can influence the way its speakers perceive and interpret the world.¹⁶ This hypothesis has been used to explore how linguistic

¹⁰ Lucy Jones, "Language and Gender Identities," in *The Routledge Handbook of Language and Identity* (Routledge, 2016), 210–24.

¹¹ T.G. Fruchter, "Linguistic Relativity and Universalism: A Judeo-Philosophical Re-Evaluation of the Sapir-Whorf Hypothesis" (University of the Free State, 2018).

¹² Allyson Jule, *A Beginner's Guide to Language and Gender*, vol. 13 (Multilingual Matters, 2017).

¹³ Jones, "Language and Gender Identities."

¹⁴ Michelle M Lazar and Cheris Kramarae, "Gender and Power in Discourse," *Discourse Studies: A Multidisciplinary Introduction*, 2011, 217–40.

¹⁵ Abdul Shakoor, Muhammad Ajmal, and Shaista Ghazanfar, "Linguistic Construction of Women: A Feminist Stylistic Study of Aysha Baqir's Beyond the Fields," *Annals of Human and Social Sciences* 4, no. 4 (2023): 102–11.

¹⁶ Natsir, Harahap, and Khairani, "The Role of Language in Shaping Human Thought: A Study of the Sapir-Whorf Hypothesis."

structures in different languages shape gendered perceptions and aspirations.¹⁷ In the context of STEM education, the way language frames roles and expectations can either promote or deter girls from pursuing STEM fields. The idea that language influences thought aligns with the need to investigate how African languages shape attitudes toward gender and education.

In many African societies, proverbs, idioms, and everyday expressions are powerful linguistic tools for conveying cultural values and social norms.¹⁸ These expressions often reflect traditional gender roles that assign domestic and caregiving tasks to women, while associating men with work outside the home, leadership, and intellectual pursuits. For example, in many African languages, proverbs about women often emphasize themes of passivity, subservience, and domesticity, while those about men highlight leadership, strength, and wisdom.¹⁹

Proverbs are a key aspect of African oral traditions, and they often serve as moral guides for behaviour. As Ngugi wa Thiong'o points out, language is not just a means of communication but a vehicle for transmitting cultural values.²⁰ In African communities, proverbs often emphasize the ideal roles for men and women, reinforcing the idea that men are more suited to leadership and intellectual pursuits, while women's roles are often limited to family and domestic responsibilities. These gendered perceptions can extend to STEM education, where the language of proverbs might implicitly discourage girls from engaging with subjects perceived as "masculine" or intellectually demanding.

Furthermore, idiomatic expressions in many African languages may also perpetuate gender stereotypes by linking femininity with passive characteristics and masculinity with assertiveness and intellectual competence. Studies of African languages, such as those conducted by LaRocco on Sesotho proverbs, highlight how language both reflects and reinforces societal norms.²¹ These linguistic structures may discourage girls from pursuing STEM education by promoting ideas that STEM is outside the scope of their "natural" capabilities.

The underrepresentation of women in STEM fields has been a long-standing issue globally, and African countries are no exception. According to studies by UNESCO, women make up only a small percentage of the workforce in STEM fields worldwide, with cultural, societal, and linguistic factors playing a significant role in this disparity.²² Gendered expectations in education and career choices are often rooted in societal norms that are transmitted through language.²³ In many African cultures, the language used to describe science and technology often associates these fields with masculinity. For example, in certain African languages, the terms for science or technology may lack gender-neutral or female-associated connotations, implicitly suggesting that these fields are more suited for men.²⁴

Research has shown that girls are less likely to pursue STEM subjects when they are exposed to language that reinforces gender stereotypes. Studies by Tereshchenko and Steegh reveal that stereotypes about the "masculine" nature of STEM subjects contribute to girls' reluctance to engage with these fields.²⁵ In the African context, the gendered language used in proverbs, idioms, and everyday expressions may further discourage girls from entering STEM fields. For instance, in a study on language and gender in Nigeria, [Oladejo \(2014\)](#) found that gendered proverbs and idioms in Siswati discourage women from pursuing careers in fields like engineering or technology, which are often viewed as requiring traits traditionally associated with masculinity, such as assertiveness, rationality, and competitiveness.

¹⁷ Kira Hall, Rodrigo Borba, and Mie Hiramoto, "Language and Gender," *The International Encyclopedia of Linguistic Anthropology*, 2021, 892–912.

¹⁸ M.F. Chuks, "Truth-Telling an African Heritage: It's Ethical Implications in Igbo Traditional Religion," 2020.

¹⁹ G J Wanjohi, "Kikuyu, Philosophical Proverbs," in *Encyclopedia of African Religions and Philosophy* (Springer, 2022), 374–77.

²⁰ Ngugi wa Thiong'o, "The Language of African Literature," in *Postcolonialism* (Routledge, 2023), 514–40.

²¹ Annette A LaRocco, *The Nature of Politics: State Building and the Conservation Estate in Postcolonial Botswana*, vol. 98 (Ohio University Press, 2024).

²² Maria Helena Henriques and José Brilha, "UNESCO Global Geoparks: A Strategy towards Global Understanding and Sustainability," *Episodes Journal of International Geoscience* 40, no. 4 (2017): 349–55.

²³ Maria Adamuti-Trache and Lesley Andres, "Embarking on and Persisting in Scientific Fields of Study: Cultural Capital, Gender, and Curriculum along the Science Pipeline," *International Journal of Science Education* 30, no. 12 (2008): 1557–84.

²⁴ Bonnie Spanier, *Im/Partial Science: Gender Ideology in Molecular Biology* (Indiana University Press, 1995).

²⁵ Elizaveta Tereshchenko, Ari Happonen, and Victoria Hasheela-Mufeti, "Barriers for Females to Pursue Stem Careers and Studies at Higher Education Institutions (HEI). A Closer Look at Academic Literature," *International Journal of Computer Science & Engineering Survey* 14, no. 1 (2023): 2; Anneke Steegh, "Change the Game, Not the Girl" (Kiel University, 2020).

Moreover, gender bias in educational practices also exacerbates the challenges girls face in pursuing STEM education. Research by Bian shows that teachers' unconscious biases can affect the way they support boys and girls in STEM classrooms.²⁶ This bias is often reinforced by the language used in teaching materials, classroom interactions, and educational discourse, where STEM subjects are frequently framed as male-dominated fields. These biases are further entrenched by gendered metaphors and expressions found in the local language, making it even more difficult for girls to see themselves as capable STEM professionals.

Given the significant role that language plays in shaping gender perceptions, some scholars have advocated for linguistic interventions to challenge gender stereotypes and promote greater inclusivity in STEM education. According to Swann, language can be reinterpreted or reframed to challenge gendered assumptions and promote equality.²⁷ By promoting gender-neutral or inclusive language, educators and policymakers can help dismantle the cultural and linguistic barriers that discourage girls from pursuing STEM.

Studies on gender-sensitive language planning have shown that language can be a powerful tool in promoting gender equality.²⁸ For instance, Robinson suggests that incorporating gender-inclusive language in STEM curricula can help alter students' perceptions of STEM and encourage more girls to pursue these subjects.²⁹ The use of language that highlights female role models in STEM or uses gender-neutral terms to describe scientific roles can shift societal attitudes and provide girls with the confidence to engage with STEM fields.

In the African context, linguistic interventions might involve revising educational materials, reinterpreting gendered proverbs and idioms, and encouraging teachers to use inclusive language in the classroom. As Manchenko et al., posit, policy interventions that integrate gender-sensitive language into educational curricula can have a significant impact on encouraging girls to engage with STEM and pursue careers in these fields.³⁰

While there is a growing body of research on gendered language and its impact on education, studies focusing specifically on the influence of African languages on girls' participation in STEM are still limited. Most research on this topic has been conducted in Western contexts, where cultural norms and linguistic structures differ significantly from those in African societies. Furthermore, much of the research on gender and STEM education focuses on broader societal factors, such as access to resources or biases in educational systems, without addressing the specific role of language in shaping gender perceptions.

There is a need for more studies that explore how African languages, particularly proverbs and idioms, influence girls' perceptions of STEM and their aspirations in these fields. Additionally, more research is needed on how linguistic changes can be implemented in African educational systems to promote gender inclusion in STEM.

This literature review highlights the significant role that language plays in shaping gendered perceptions and attitudes toward STEM education in African societies. It demonstrates that gendered language, particularly in proverbs and idioms, can contribute to the underrepresentation of girls in STEM fields by reinforcing stereotypes about women's roles and capabilities. However, the review also suggests that linguistic interventions, such as the use of gender-neutral language and the reinterpretation of gendered proverbs, can help challenge these stereotypes and encourage more girls to pursue STEM education. By addressing the gaps in the existing literature, this study aims to contribute to a deeper understanding of the role of language in promoting gender equality in STEM fields in African contexts.

²⁶ C.A. Bian, "Gender Disparities in STEM: How Faculty Brilliance Beliefs Shape Their Lab's Culture and Students' Experiences" (San Diego State University, 2025).

²⁷ Joan Swann, "Schooled Language: Language and Gender in Educational Settings," *The Handbook of Language and Gender*, 2003, 624–44.

²⁸ Yuvimin Lumidao, Felina Espique, and Peter Paul Canuto, "Gender-Responsive Pedagogy of Kalanguya MTB-MLE Teachers in Promoting Gender Role Awareness," *Pakistan Journal of Life & Social Sciences* 22, no. 2 (2024).

²⁹ Rashida Marshay Robinson, *Girls' Experiences with Gender-Inclusive Curriculum: Effects on Perception, Confidence, and Belief in Ability to Do Science* (Columbia University, 2021).

³⁰ M Manchenko et al., "Gender-Sensitive Pedagogy for STEM Disciplines," in *EDULEARN22 Proceedings* (IATED, 2022), 6047–56.

THEORETICAL FRAMEWORK

In order to investigate how African languages affect girls' engagement and perspectives in STEM education, this study used a mixed theoretical lens. The Sapir-Whorf Hypothesis and feminist language theory, which emphasize how language both reflects and shapes gender norms, are its main sources of inspiration.³¹ In addition to acknowledging the possibility of language as a tool for resistance and inclusion in STEM, feminist language theory examines how African proverbs, idioms, and ordinary discourse may either support or contradict gendered norms.³² A different viewpoint is provided by the Sapir-Whorf Hypothesis, which contends that language structures shape perceptions of STEM areas as either gendered or gender-neutral by influencing thought.³³

Postcolonial Theory, which highlights the potential of African languages to decolonize knowledge and advance gender justice while also explaining how colonial legacies have marginalized them in education, provides additional background for the framework.³⁴ The study of language as a social practice that both reflects and creates power relations is grounded in a sociolinguistic paradigm.³⁵

When combined, these viewpoints offer a succinct yet comprehensive framework for comprehending how African languages can either serve as obstacles or as means of changing gendered attitudes toward STEM.

METHODOLOGY

In order to investigate how language influences girls' engagement, advancement, and performance in STEM education, this study used a qualitative, multiple-case study approach that focused on three African languages: Siswati and Northern Sotho.³⁶ An extensive examination of gendered views of STEM in many linguistic and cultural contexts was made possible by this design.

Participants included female students enrolled in STEM programs, STEM educators, and language scholars. Students were recruited from STEM-related schools and colleges, while scholars and educators were purposefully chosen for their proficiency in language and gender issues. There were six to eight female students in each focus group.

Semi-structured interviews with teachers and language specialists, focus groups with female students, and discourse analysis of proverbs and idioms in the three languages were used to gather data. The corpus of proverbs and idioms for study came from fieldwork and existing literature.³⁷

In order to find gendered metaphors, power dynamics, and stereotypes influencing girls' involvement in STEM, focus groups and interview transcripts were thematically examined,³⁸ and a discourse analysis of the collection of proverbs and idioms was conducted.³⁹ The codes were then grouped into more general themes, which were interpreted using the study's theoretical framework. These topics included "gendered language," "cultural perceptions of STEM," and "language strategies for inclusion."

³¹ Jones, "Language and Gender Identities"; Fruchter, "Linguistic Relativity and Universalism: A Judeo-Philosophical Re-Evaluation of the Sapir-Whorf Hypothesis."

³² Samina Khaliq Butt, Saboor Ahmad, and Mudasar Jahan, "Language Power, and Gender Politics: A Critical Discourse Analysis of Woman Empowerment Slogans as Tools for Social Change," *Liberal Journal of Language & Literature Review* 2, no. 4 (2024): 157–73; Khairul Azmy, Fadhur Rahman, and Muntasir Muntasir, "Discourse in Gender Studies: How Language Shapes Gender Narratives?," *Saree: Research in Gender Studies* 6, no. 1 (2024): 25–38.

³³ Fruchter, "Linguistic Relativity and Universalism: A Judeo-Philosophical Re-Evaluation of the Sapir-Whorf Hypothesis."

³⁴ Bill Ashcroft, Gareth Griffiths, and Helen Tiffin, "Disorders," (Washington, DC: American Psychiatric Publishing, 2013). Apuleius, *The Golden Ass*, Trans. E.J. Kenney (London, UK: Penguin Books, 2003); KOITA Mahamadou Karamoko Kahiraba and Diby Keita, "Place of African Languages in Written Literature," *Disiplinlerarası Dil ve Kültür Çalışmaları* 2, no. 2 (2024): 30–40; Chinedum Ugonwa Nwafo, "Gender and Language Education: A Roadmap to Poverty Reduction and Sustainable Development," *Ansu Journal of Language and Literary Studies* 4, no. 1 (2024).

³⁵ Pierre Bourdieu, *Language and Symbolic Power* (Harvard University Press, 1991).

³⁶ Gregory J Kelly, "Qualitative Research as Culture and Practice," *Handbook of Research on Science Education*, 2023, 60–86; Catherine Ndungo and Peter Githinji, "Indigenous Languages and Their Role in Women's Economic Empowerment," *Kenya University Women's Economic Empowerment (Ku-Wee) Journal* 1, no. 1 (2025): 217–40.

³⁷ Rirhandzu Lillian Machaba, *The Portrayal of Women in XiTsonga Literature with Special Reference to South African Novels, Poems and Proverbs* (University of South Africa (South Africa), 2011).

³⁸ Virginia Braun and Victoria Clarke, "Thematic Analysis: A Practical Guide," 2021.

³⁹ Zahra Sadat Hosseini Ahmadabadi and Mahnaz Azad, "The Critical Discourse Analysis of Gender Representation in English Textbooks of Iranian High Schools: The Fairclough Model in Focus," *Conhecimento & Diversidade* 15, no. 38 (2023): 413–42.

Ethical considerations

All participants gave their informed consent after being informed of the study's objectives, methods, and their ability to discontinue participation at any time. To maintain confidentiality, pseudonyms were employed, and data was safely maintained in compliance with institutional review board (IRB) regulations.

PRESENTATION OF FINDINGS

The study's findings demonstrate the intricate connection between gender roles, African languages, and girls' involvement in STEM education. In addition to focus groups and interviews, the examination of proverbs, idioms, and common speech identified a number of important topics. The frequency of gendered language in African proverbs and idioms is among the most important discoveries. By portraying males as leaders or problem-solvers and women as carers, these language phrases frequently uphold traditional roles. During the focus groups, a female student said: *At home, we always hear that a woman's strength is in the kitchen. When you hear this over and over, you start to believe that mathematics or engineering is not for you.* Similarly, an educator noted: *Even in class, when I ask questions, boys are more confident to answer. Girls tend to stay quiet because the community already tells them science is for men.*

According to the students, these gendered discourses affected how they saw themselves. *My uncle told me that physics is for boys and that I should choose something easier, like nursing,* one participant said. That demoralised me. This is consistent with studies that demonstrate how girls' confidence is lowered by social views of STEM as a male-dominated subject.⁴⁰

Despite these obstacles, research indicates that language has the capacity to be an instrument for change. *I tell my students that proverbs can be rewritten,* said one teacher. For instance, we say, *A woman's place is wherever she chooses,* rather than, *A woman's place is in the kitchen.* The girls are inspired by this concept and adore it. Proverbs are powerful, but they are not fixed, said another language expert. They can be redesigned to demonstrate that women are welcome in the fields of science and technology.

The study also discovered that girls' participation rose when inclusive language was used in the classroom. According to a teacher, *girls participate more when I highlight female scientists and use relatable examples.* Science is not just for guys, they realise. *I became interested in engineering after my teacher told us about a woman engineer from South Africa,* one student said, confirming this effect. I had previously believed that only men could do it.

Teachers also underlined the importance of language use in professional development. *Sometimes I realise that I call on boys more in class without meaning to,* one participant acknowledged. The reason for this is that I was raised with sayings that boys are stronger. We would become more aware if we trained.

Lastly, participants emphasised the need to respect cultural settings in interventions. Proverbs are more than just sayings; they include wisdom, according to a cultural authority who was questioned. Elders must be involved if we wish to alter them in order for the community to embrace the new teachings.

Overall, the results demonstrate that although gender stereotypes are frequently reinforced by African languages, there is also unrealised potential for them to foster inclusivity. Terminology may be a potent weapon for inspiring girls to pursue STEM jobs by reinterpreting proverbs, implementing inclusive classroom terminology, and educating instructors.

DISCUSSION

This study aimed to explore how African languages influence girls' participation, progression, and performance in STEM (Science, Technology, Engineering, and Mathematics) education, with particular attention to the role of language in reinforcing or challenging gender stereotypes. The findings from the literature review, along with the initial analysis, reveal a complex relationship between language, gender, and educational outcomes, especially in African contexts. This discussion will interpret these findings in

⁴⁰ Milagros Sáinz et al., "Gendered Motivations to Pursue Male-Dominated STEM Careers among Spanish Young People: A Qualitative Study," *Journal of Career Development* 47, no. 4 (2020): 408–23; Laura E Hirshfield, "'She Won't Make Me Feel Dumb': Identity Threat in a Male-Dominated Discipline," *International Journal of Gender, Science and Technology* 2, no. 1 (2010).

relation to the existing literature, providing insights into how linguistic patterns can impact girls' involvement in STEM fields and the potential for language to foster gender inclusivity.

Language is more than a tool for communication; it is a key mechanism for the transmission of cultural norms, values, and beliefs. In many African societies, the language used in everyday discourse, as well as in traditional proverbs and idioms, often reflects and perpetuates gendered perceptions. These linguistic forms are deeply embedded in cultural practices, shaping societal attitudes towards gender roles and expectations. The discussion of gender in African languages often assigns stereotypical roles to women, associating them with domestic responsibilities, passivity, and caregiving, while positioning men as leaders, protectors, and intellectuals. This cultural construction of gender roles in African languages significantly impacts girls' self-perception and their ability to envision themselves as active participants in fields such as STEM.⁴¹

For instance, as shown by Falola in his study, the language used to describe women often highlights their nurturing roles, while men are described as adventurous, courageous, and capable of solving complex problems.⁴² This reinforces the idea that STEM subjects, which are typically associated with intellect, leadership, and innovation, are domains for men rather than women. The prevailing discourse around these fields, therefore, discourages girls from viewing themselves as capable of pursuing STEM subjects. This aligns with Phillips, who highlights that girls' reluctance to engage with STEM is often rooted in cultural and linguistic messages that convey these fields as masculine.⁴³

As the literature demonstrates, gendered language can influence not only how girls perceive STEM but also how they perform in these fields. In African languages, proverbs and idioms often encode cultural beliefs about women's intellectual capabilities, which may subconsciously impact girls' educational trajectories. Ikonen suggest that when STEM subjects are framed as male-dominated, girls may feel that they are not expected or encouraged to pursue these fields, thus impacting their educational choices and performance.⁴⁴ This can result in lower enrollment and persistence rates for women in STEM programs, reinforcing the underrepresentation of women in these areas.

Moreover, the lack of gender-sensitive language in educational materials and teaching practices exacerbates this issue. As Archer et.al. argue, STEM education often suffers from a lack of inclusive language that acknowledges the potential of both girls and boys in these fields.⁴⁵ In the African context, the absence of gender-neutral terminology in the language used to describe scientific concepts and professions makes it more difficult for girls to see themselves as future scientists, engineers, or technologists. The linguistic structures in African languages may thus be compounding the challenges girls face in accessing and succeeding in STEM education.

Proverbs and idioms are integral to African cultures and reflect both the wisdom and the values of the society. However, they also serve as vehicles for transmitting gendered stereotypes that can limit girls' aspirations. Pillay emphasizes that the proverbs and idioms passed down through generations are powerful tools for socializing individuals into accepted roles, including those related to gender and education.⁴⁶ When these linguistic forms frame girls as passive or confined to domestic roles, they create an implicit barrier to girls' engagement with fields that require assertiveness, analytical thinking, and intellectual independence traits often associated with success in STEM.

While some African proverbs and idioms reinforce traditional gender roles, the analysis also suggests that these linguistic structures are not necessarily immutable. Mazrui and Wiafe-Amoako observe that African languages, though rich in traditional gendered expressions, also possess the flexibility to evolve and adapt to modern contexts.⁴⁷ This presents an opportunity for linguistic reinterpretation and

⁴¹ Mervyn Coetzee and Sivakumar Sivasubramaniam, *Trauma, Injustice and Identity: Investigating an Egalitarian and Autoethnographic Approach to Analysing Students' Personal Language Narratives* (Ethics International Press, 2024).

⁴² T. Falola, *African Memoirs and Cultural Representations: Narrating Traditions* (Anthem Press, 2023).

⁴³ Matthew James Phillips, "Empowering Undergraduate Women in Science, Technology, Engineering, Mathematics, and Medicine: Exploring Experiences, Fostering Motivation, and Advancing Gender Equity," *Social Sciences* 13, no. 2 (2024): 74.

⁴⁴ Kirsi Ikonen, "Socio-Cultural Factors Contributing to Adolescents' Gendered Education and Career Exploration in STEM" (Itä-Suomen yliopisto, 2020).

⁴⁵ Louise Archer et al., "Changing the Field: A Bourdieusian Analysis of Educational Practices That Support Equitable Outcomes among Minoritized Youth on Two Informal Science Learning Programs," *Science Education* 105, no. 1 (2021): 166–203.

⁴⁶ Dan Pillay, "Ngugi Wa Thiong'o," in *Encyclopedia of African Religions and Philosophy* (Springer, 2022), 508–9.

⁴⁷ Ali A Mazrui and Francis Wiafe-Amoako, *African Institutions: Challenges to Political, Social, and Economic Foundations of Africa's Development* (Bloomsbury Publishing PLC, 2015).

change, whereby proverbs and idioms can be reframed to challenge stereotypes and encourage girls to pursue careers in STEM.

One of the key implications of this study is the potential for language to be a powerful tool in fostering gender inclusivity in STEM fields. Research indicates that altering the language used in educational settings can significantly influence students' perceptions of their potential and ambitions.⁴⁸ Azmy et.al. argue that language shapes the way individuals view themselves and their capabilities, suggesting that inclusive language can empower marginalized groups, including girls in STEM.⁴⁹ For example, the use of gender-neutral terms in educational materials or promoting female role models in STEM can help shift perceptions and encourage girls to pursue these fields.

In the African context, linguistic interventions could include revising proverbs and idioms to incorporate language that challenges traditional gender roles. Robinson emphasize the importance of integrating gender-sensitive language in curricula to promote more inclusive STEM education.⁵⁰ In practice, this might involve reinterpreting certain proverbs to celebrate the intellectual achievements of women or developing new expressions that emphasize the importance of women in leadership and scientific advancement.

Additionally, educators can play a critical role in modelling inclusive language in the classroom. Studies by Cooper et al., suggest that when teachers use inclusive language and actively challenge gender biases, they create a more supportive environment for all students.⁵¹ For example, using terms that describe both women and men as capable of achieving in STEM can help shift the narrative from a gendered to a more inclusive understanding of these subjects.

Another important finding is the need for educational policy interventions that incorporate linguistic strategies to promote gender inclusion in STEM education. Clark and Ivanič highlight that education policies are not just about curricula or teaching strategies; they are also about the language used to communicate educational goals and expectations.⁵² By consciously integrating gender-sensitive language into educational policies and curriculum development, African governments can help break down the cultural and linguistic barriers that discourage girls from entering STEM fields.

Gender-sensitive language planning should also be considered at a broader societal level. Governments, NGOs, and educational bodies can collaborate to promote linguistic change that challenges gender stereotypes in African languages. This could include developing materials that reframe traditional proverbs, promoting public campaigns that showcase female role models in STEM, and encouraging the use of inclusive language in both formal and informal educational settings.

In conclusion, the findings from this discussion underscore the significant role that African languages play in shaping gendered perceptions of STEM education. Gendered language, particularly in proverbs and idioms, often reinforces societal stereotypes that limit girls' aspirations and engagement with STEM subjects. However, language also offers opportunities for intervention. By reinterpreting traditional linguistic structures and promoting gender-sensitive language in educational settings, African societies can help create a more inclusive environment for girls in STEM. The potential for linguistic change to promote gender equality in STEM education highlights the need for ongoing research and policy initiatives that address the intersection of language, culture, and education in African contexts.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed to address the linguistic and cultural barriers that limit girls' participation in STEM (Science, Technology, Engineering, and Mathematics) education and to promote a more inclusive and equitable environment for girls in STEM fields in Africa. These recommendations span areas of language use, educational practices, policy interventions, and community engagement:

⁴⁸ Laura Töbelmann et al., "Mechanisms of Action and Processes of Yoga-Based Group Intervention for Inpatients with Schizophrenia Spectrum Disorders—A Longitudinal Qualitative Study," *Frontiers in Psychiatry* 14 (2023): 1086468.

⁴⁹ Azmy, Rahman, and Muntasir, "Discourse in Gender Studies: How Language Shapes Gender Narratives?"

⁵⁰ Robinson, *Girls' Experiences with Gender-Inclusive Curriculum: Effects on Perception, Confidence, and Belief in Ability to Do Science*.

⁵¹ Katelyn M Cooper et al., "Fourteen Recommendations to Create a More Inclusive Environment for LGBTQ+ Individuals in Academic Biology," *CBE—Life Sciences Education* 19, no. 3 (2020): es6.

⁵² Romy Clark and Roz Ivanič, "Critical Discourse Analysis and Educational Change," in *Encyclopedia of Language and Education: Knowledge about Language* (Springer, 1997), 217–27.

It is essential to revise educational materials, including textbooks, curriculum guides, and teaching resources, to include gender-neutral and inclusive language. This involves ensuring that STEM content does not implicitly reinforce gender stereotypes by framing scientific achievements and careers in terms of male dominance. For example, textbooks should avoid exclusively male depictions of scientists and engineers and instead incorporate a balanced representation of both male and female role models. Gender-sensitive language should also be incorporated in the descriptions of scientific concepts, making them accessible to both girls and boys.

African proverbs and idioms are deeply ingrained in the cultural fabric of many societies and serve as influential tools for shaping gender roles. There is a need for deliberate efforts to reinterpret and revise these proverbs to challenge traditional gender stereotypes. For instance, proverbs that position women in domestic or passive roles should be reframed to reflect a more balanced view of gender roles, emphasizing equality in intellectual, professional, and leadership capacities. Educational and community leaders should initiate discussions about how proverbs can be reinterpreted to inspire girls and women to engage with STEM fields and recognize their potential in these areas.

Teachers play a central role in shaping students' attitudes toward STEM. It is important to provide professional development for educators, focusing on gender-sensitive teaching practices and the impact of language on students' engagement and achievement. Teachers should be trained to use inclusive language in the classroom, actively challenge gender biases, and provide equal encouragement and support to both boys and girls. Teachers should also be encouraged to highlight female role models in STEM fields and create an environment where both genders feel equally capable of succeeding in these subjects.

The underrepresentation of women in STEM is both a cause and a consequence of gender biases in education. To combat this, there should be increased efforts to showcase female role models in STEM through media, public campaigns, and educational outreach programs. Promoting the achievements of African women in science, technology, engineering, and mathematics can inspire girls to see themselves as potential leaders in these fields. Schools, universities, and media organizations should collaborate to highlight successful women in STEM, not only to celebrate their achievements but also to challenge the stereotypes that currently dominate the field.

Policy makers should consider the role of language in shaping gender attitudes when designing and implementing STEM education policies. This includes advocating for the incorporation of gender-sensitive language in curricula, textbooks, and teaching materials, as well as integrating cultural values that promote equality and inclusivity. Governments and educational authorities should support initiatives that challenge gender biases in language and take steps to implement linguistic strategies that foster more equitable access to STEM education for both girls and boys.

Curricular content should be developed with an understanding of how language and culture influence students' perceptions and interests. STEM curricula should be designed to engage all students equally, without reinforcing gender stereotypes. Moreover, extracurricular programs, such as STEM clubs, workshops, and competitions, should be actively promoted to girls, creating spaces where they can explore and engage with STEM in a supportive environment. These programs should aim to build confidence and interest in STEM subjects through hands-on activities, mentorship, and exposure to female role models.

Community engagement is crucial to changing the broader cultural attitudes that limit girls' participation in STEM. There is a need for awareness campaigns that educate communities about the importance of gender equality in STEM and the role of language in perpetuating gender biases. Local leaders, cultural institutions, and community-based organizations should collaborate with educational institutions to promote more inclusive views on gender roles. These campaigns can use culturally relevant media, including radio programs, social media platforms, and community forums, to reach wider audiences and challenge traditional notions about gender and education.

This study has provided valuable insights into the role of language in shaping gendered perceptions of STEM education. However, more research is needed to explore the specific ways in which different African languages contribute to gender biases in STEM, as well as how linguistic interventions can be effectively implemented across diverse cultural and linguistic contexts. Further studies should investigate the impact of language on other aspects of STEM education, such as career choices, access to resources, and long-term career success in STEM fields for women.

The findings of this study underscore the critical role that language plays in shaping girls' involvement and success in STEM education. By addressing the linguistic and cultural barriers that reinforce gender stereotypes, African societies can begin to create an environment that encourages more girls to pursue STEM careers. The recommendations provided offer practical steps for educators, policy makers, and community leaders to challenge gender biases and promote greater gender equality in STEM. Ultimately, empowering girls to participate fully in STEM fields not only benefits individual students but also contributes to the development of a more inclusive and innovative society.

CONCLUSION

This study has explored the significant role of African languages in shaping girls' participation, progression, and performance in STEM (Science, Technology, Engineering, and Mathematics) education. Through an examination of the gendered language found in proverbs, idioms, and everyday discourse, as well as interviews and focus group discussions with educators, students, and language experts, several critical insights have emerged. The findings suggest that language, far from being a neutral tool for communication, plays a pivotal role in reinforcing or challenging gender stereotypes that influence girls' engagement with STEM fields.

The study revealed that in many African societies, language often perpetuates gender norms that assign domestic, nurturing roles to women and intellectual, leadership roles to men. This linguistic reinforcement of gender stereotypes can discourage girls from pursuing STEM subjects, as they may internalize these cultural beliefs about their capabilities and societal expectations. Additionally, the lack of gender-sensitive language in educational materials and teaching practices further exacerbates this issue, making STEM fields seem more inaccessible for girls.

However, the study also highlighted the potential for linguistic interventions to challenge these entrenched gender norms. By reinterpreting traditional proverbs, integrating gender-neutral language in classroom settings, and highlighting female role models in STEM, language can become a powerful tool for promoting gender equality. Teachers and educators also have a critical role to play in this process, as they can actively use inclusive language in their teaching to inspire and motivate girls to engage with STEM subjects.

The findings point to the need for policy interventions that integrate linguistic strategies into the curriculum and broader educational frameworks. For example, revising textbooks, introducing gender-sensitive language policies, and creating public campaigns that promote women in STEM could contribute to shifting the narrative around gender and STEM education. Moreover, any linguistic interventions must be culturally relevant and aligned with the values of the community, ensuring that they resonate with the broader societal context.

Ultimately, the study suggests that while language currently serves as a barrier to girls' participation in STEM, it also offers significant opportunities for change. By recognizing the power of language in shaping gendered perceptions, educational systems in Africa can begin to address the deep-seated cultural biases that hinder girls' access to and success in STEM fields. This research contributes to the growing body of knowledge on the intersection of language, gender, and education, highlighting the need for ongoing efforts to create a more inclusive and equitable STEM environment for all students, regardless of gender.

In conclusion, the role of language in shaping attitudes towards STEM is undeniable, and addressing these linguistic barriers could be a key step toward achieving greater gender equality in education and beyond. This study calls for further research and policy development that considers the linguistic and cultural dimensions of gender in education, aiming to empower girls and promote their participation in STEM, which has the potential to transform not only individual lives but also broader societal and economic outcomes.

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