



Volume 23 (2026), pp. 229-248

American Journal of STEM Education:

Issues and Perspectives

eISSN 3065-1190 | Print ISSN: 3069-0072

<https://doi.org/10.32674/dq130n43>

Negotiating and Resisting Gender Stereotypes in STEM: Experiences of Women from Sub-Saharan Africa

Ernest Adom

University of Georgia, United States

<https://orcid.org/0009-0008-1644-2117>

ABSTRACT

Women remain underrepresented in science, technology, engineering, and mathematics (STEM) fields in sub-Saharan Africa. Gender-based stereotypes have been documented as among the major barriers shaping their participation. However, few studies have explored how women who persist in STEM negotiate these stereotypes in the sub-Saharan context. Using secondary interview data from 13 participants from Ghana, Nigeria, and Cameroon, the present study explored how women experience and negotiate gender-based stereotypes in STEM fields. The study revealed that stereotypes often challenged the intellectual competence and belonging of women while reinforcing expectations about femininity and capability in STEM. Despite these structural barriers, the participants negotiated stereotypes by using relational strategies such as academic achievement, psychological resilience, and self-definition to challenge exclusionary narratives and assert their presence in STEM. The findings suggest the need for institutions to create a more inclusive and equitable environment that fosters women's participation and belonging in STEM.

Keywords: STEM, stereotypes, women, sub-Saharan Africa, African feminist thought

© Author(s), 2026. Published by Star Scholars Press.

This article is distributed under the Creative Commons Attribution 4.0

INTRODUCTION

In science, technology, engineering, and mathematics (STEM), diversity drives innovation and supports equity, yet women remain underrepresented (Stout et al., 2016; Okeke et al., 2017). According to a UNESCO policy brief, women accounted for only 35% of all STEM college graduates globally between 2018 and 2023 (Global Education Monitoring Report Team, 2024). As a result, creating an equitable and inclusive environment to increase women's participation has become a priority for governments, researchers, and nongovernmental organizations. Sub-Saharan Africa is one context where these STEM inequalities are more pronounced, shaped by colonial legacies and cultural and institutional structures that position STEM as a masculine domain and limit women's innovative contributions to society (Rivett & Azaki, 2026). This masculine framing fosters pervasive stereotype experiences, creating one of the most enduring barriers women face in navigating their educational and professional pathways (Okeke et al., 2017; Ojong & Kareem, 2025).

Gender-based stereotypes often associate women with careers in caregiving while defining technical and scientific fields such as STEM as masculine (Boateng, 2016; Dube, 2015). Unfortunately, these negative stereotypes that women face as a result of their gender not only constrain their access but also position men as more capable, thereby undermining women's aspirations, participation, and sense of belonging in STEM fields (Ojong & Kareem, 2025). Consequently, women must develop strategies to legitimize their presence, navigate gendered expectations, and persist in STEM environments. While Block et al. (2019) reported that women responded to stereotypical incidents in different ways, such as by attempting to stop thinking about the incidents, blaming themselves, or confronting those who perpetuated the stereotypes, much of the scholarship on STEM within sub-Saharan Africa looks at women's experiences through a deficit lens that does not recognize their resilience, agency, and how they negotiate male-dominated fields (e.g., Courage et al., 2024; Ojong & Kareem, 2025; Okeke et al., 2017). By focusing on the barriers women face in STEM and their structural exclusion, existing scholarship fails to explain how they negotiate these spaces. Given recent concerns about promoting equity, diversity, and inclusion in STEM fields, understanding not only the barriers women encounter but also how they negotiate them is important for designing inclusive practices and policies that support them.

To address this gap in the literature, the present study used secondary qualitative interviews from SWIS Africa, comprising 13 participants from Ghana, Nigeria, and Cameroon, to examine how women not only experienced gender-based stereotypes but also used relational forms of negotiation in their STEM journeys. Drawing from Nnaemeka (2004) concept of nego-feminism, the following research questions were addressed: (1) How do sub-Saharan African women describe their experiences with gender-based stereotypes in STEM fields? (2) How do sub-Saharan African women negotiate gender-based stereotypes in STEM fields? The study argued that women's responses to gender stereotypes should be understood not only as individual resilience but also as forms of situated, relational, and negotiated agency within STEM environments.

LITERATURE REVIEW

Gendered Stereotypes and Women's Participation in STEM

Enrollment and participation in STEM across the region of sub-Saharan Africa are low, as many students who go to college do not major in STEM (Ojong & Kareem, 2025). According to a UNESCO report by Mutsvangwa and Zezekwa (2021), fewer than 25% of students in universities across sub-Saharan Africa are majoring in STEM degrees. These disparities are a concern as STEM continues to position countries for technological and scientific success, given that innovation is a major driving force of long-term economic growth and sustainable development (Fu & Shi, 2022).

Women represent one specific demographic that has received significant scholarly attention regarding this underrepresentation. In sub-Saharan Africa, women are more likely to enroll in social sciences and humanities majors and are underrepresented in STEM fields (Fisher et al., 2020). These participation gaps do not reflect a lack of interest in STEM but rather a persistent structural barrier that prevents the recognition and support of female students (Rivett & Azaki, 2026). Scholars have broadly identified barriers such as a lack of gender-responsive pedagogical practice, limited financial resources, and a lack of inclusive policies as playing critical roles (Courage et al., 2024; Founou et al., 2023; Okeke et al., 2017; Ojong & Kareem, 2025).

In addition to these broad structural barriers, pervasive negative stereotypes have been identified as partly explaining the sex difference in students' interest and motivation in STEM as a major (Ojong & Kareem, 2025). Stereotypes that can manifest as gendered microaggressions may impact their psychological and academic well-being (Guerin, 2026). These gender-based stereotypes are often embedded within broader social systems and the early academic and career socialization of girls (Dube, 2015; David, 2023). Girls from an early age are frequently socialized to view caregiving, teaching, and the humanities as more

appropriate or achievable pathways, whereas boys receive greater encouragement to develop technical, mechanical, and analytical skills associated with STEM fields (Cheryan et al., 2015). These structural issues are reinforced through different social actors, such as families, schools, and peer groups, who reinforce these expectations, creating cumulative disadvantages that can shape women's educational trajectories and decisions to pursue STEM (Siwale et al., 2023).

In higher education, barriers such as teacher bias, a lack of inclusive institutional policies, and unexamined disciplinary cultures that lack gender sensitivity (Dube, 2015; David, 2023; Goldman, 2012) can influence women's sense of belonging, aspirations, identities, career choices, retention, self-efficacy, and academic performance (McKinnon & O'Connell, 2020; Wrigley-Asante et al., 2023). While these stereotypes negatively influence students' decisions to pursue STEM, they also constrain the diverse perspectives they can bring into these fields (Courage et al., 2024; Shi & Wu, 2024). Indeed, research has linked these stereotypes to lower enrollment in STEM courses (e.g., Stout et al., 2016). Thus, women's underrepresentation in STEM cannot be understood solely as a matter of access or individual choice; it must also be understood in relation to the gendered socialization and structural conditions that shape their experiences throughout their educational pathways (Rivett & Azaki, 2026).

Negotiating Stereotypes in STEM for Women

The study also draws on the limited literature on women negotiating gender stereotypes in STEM fields to contextualize the findings. Because STEM fields are often associated with characteristics that are stereotypically perceived as more masculine than feminine (Cheryan et al., 2015), gender stereotypes about women's competence and agency can negatively shape their experiences and participation in STEM. Therefore, women who persist in STEM fields must negotiate these structural barriers across their academic and career journeys (Goldman, 2012; McKinnon & O'Connell, 2020).

While research examining how this negotiation takes place exists within scholarship in the Global North, attention has not been given to it in the sub-Saharan African context. For instance, Block et al. (2019) reported that undergraduate students in STEM majors in the U.S. negotiated gender stereotypes by sustaining themselves in the presence of stereotypes, choosing to blame themselves, and directly confronting the actors. Moreover, negotiation is not always about direct conformation; rather, it may involve negotiated practices through which women exercise agency within and around the constraints of gendered structures. Therefore, it is important to examine how women use relational forms of negotiation to address gendered expectations, persist within STEM environments, and develop and maintain a sense of belonging.

Theoretical Framework

The present research is guided by African feminist thought, particularly nego-feminism (Nnaemeka, 1997; 2004). African feminist thought is a framework for understanding women's experiences within postcolonial African societies that are centered on patriarchal structures and systems (Atanga, 2013). African feminist thought explains that patriarchal structures reinforce male dominance and authority, which in turn legitimizes the oppression of women across the political, economic, religious, and educational spheres of society (Tamale, 2020). African feminist scholars argue that Western feminist frameworks fail to adequately address the concerns of African women by not recognizing their unique social realities (Atanga, 2013).

Within the African feminist framework, Nnaemeka (2004) proposed nego-feminism (that is, "feminism of negotiation" and "no-ego feminism") as a lens through which to understand African women's experiences. Nego-feminism is grounded in shared African cultural values and emphasizes the principles of negotiation, reciprocity, compromise, and balance. Here, "negotiation" can mean either giving and taking or being able to cope successfully (Nnaemeka, 2004). The goal is to pursue social change by engaging in compromise and negotiation, whereas Western feminist approaches often emphasize challenging, deconstructing, and disrupting existing structures and norms (Nnaemeka, 2007). Nonetheless, Western feminism has represented African women as victims, ignoring their agency, especially when it does not involve direct confrontation as a resistance against patriarchal structures (Nnaemeka, 1997; 2004).

While resilience emphasizes women's capacity to persist despite structural adversity and agency highlights their capacity to act within constraints, nego-feminism helps explain how women strategically navigate those constraints through negotiation and relational practices that do not always take the form of direct resistance. In this study, nego-feminism is used to understand women's responses to gender stereotypes not as individual coping but as relational and negotiated forms of agency within patriarchal STEM environments.

State Contexts

Sub-Saharan Africa is a region on the continent of Africa that consists of 49 countries, with each of the countries having its own unique historical, cultural, and educational contexts that influence how women participate in STEM fields. In this study, participants from three countries (Ghana, Nigeria, and Cameroon) are represented; therefore, the findings should be understood within these contexts. Nigeria has seen a booming enrollment in higher education but still faces structural barriers such as resource constraints, gendered stereotypes, and a shortage of specialized faculty that persist to influence women's access to and participation in

STEM fields (Agboola, 2021). However, tailored interventions from the government, such as the Presidential Science and Technology Development Fund and the National Agency for Science and Engineering Infrastructure, have sought to improve STEM education (Agboola, 2021). Similarly, Ghana and Cameroon face challenges such as limited research funding, negative gender stereotypes, and a lack of inclusive policies that affect the extent to which women participate in STEM (Courage et al., 2024). Despite these barriers, in recent years, Ghana has invested in STEM-focused senior high schools and universities to broaden access to STEM (Amegah, 2024; Bugri, 2026). Through targeted scholarships and formal mentoring programs, Cameroon has also sought to increase female enrollment in STEM and address similar challenges that confront Ghana and Nigeria (Courage et al., 2024). Although these national contexts differ, they point to persistent gender disparities and structural barriers such as stereotypes that influence women's participation in STEM.

RESEARCH METHOD

The present study adopted a generic qualitative approach to understand how sub-Saharan African women from Ghana, Nigeria, and Cameroon, who participated in SWIS Africa interviews, experience and negotiate gender stereotypes in STEM fields. A generic qualitative approach was appropriate for this study because it sought to understand how individuals make sense of their experiences without being bound by a specific qualitative tradition (Kostere & Kostere, 2021).

Data Source

This study uses qualitative interview data from the Shaping Women in STEM (SWIS) Africa interview series, which is publicly accessible on YouTube. The interview series documents the experiences of women in STEM. Individuals who were interested in participating in the interviews were required to submit a form with their name, email, short biography, major, current role, and preferred interview format on the website of SWIS Africa. Following the submission of the form, individuals are invited to participate in the interview if they meet the following eligibility criteria: (a) being a woman of African descent currently engaged in any STEM field; (b) having stories of resilience, innovation, leadership, or impact; (c) being willing to share their journey in a written or video interview; and (d) having a passion for inspiring and mentoring others.

Although the SWIS Africa interview series was produced for community outreach and public engagement rather than academic research, they contain rich first-person narratives relevant to the present study. This study uses data to empirically investigate how women negotiate gender-based stereotypes in STEM

environments, guided by African feminists’ thought, to extract themes that manifested across the interviews. Scholars have recommended the use of secondary qualitative data when it provides access to rich, in-depth narratives on uncomfortable topics while reducing the burden on participants and maximizing the value of their contributions (Long-Suthehall et al., 2010).

Data Selection

The data in this study were purposefully sampled from the SWIS Africa interview series. The data were retrieved from the YouTube archive of the organization in March 2026. To select the sample, the following inclusion criteria were used: (a) an interview format exceeding 10 minutes, (b) a video with a clear audio quality for transcription, and (c) interviewees sharing experiences that were focused directly on the core topics corresponding to the research questions. The SWIS Africa interview series repository had 23 videos; however, 13 met the criteria. Ten videos were excluded because the participants' experiences did not directly align with the research questions. The interviews included in the sample were recorded between 2020 and 2026 and lasted between 13 and 36 minutes. The participants were predominantly from Nigeria, followed by Ghana and Cameroon. Notably, all the participants had completed their undergraduate degrees by the time of their respective interviews; many were pursuing graduate degrees, while a few were working in STEM fields. Sample adequacy was assessed using Malterud et al.’s (2016) concept of information power, which supports the use of fewer samples in contexts where the aim of the study and dialogue in the interview is specific to research questions. The transcript for each video was automatically generated from YouTube and cleaned line by line to ensure that errors and inaccuracies were corrected. Pseudonyms were used to represent participants' names in the study (see Table 1).

Table 1
Demographic Characteristics of Included SWIS Africa Interview Participants

Name	Major	Country
P1	Mathematics	Nigeria
P2	Chemical Engineering	Nigeria
P3	Food Science	Nigeria
P4	Petroleum Engineering	Ghana
P5	Electronics Engineering	Cameroon
P6	Marine Engineering	Nigeria
P7	Mathematics	Ghana
P8	Computer Science	Nigeria
P9	Electrical Engineering	Nigeria

P10	Civil Engineering	Ghana
P11	Civil Engineering	Ghana
P12	Mechanical Engineering	Nigeria
P13	Technology	Nigeria

Data Analysis

To begin the analysis, the transcribed data were organized and coded in ATLAS.ti software. Saldaña’s (2013) two-cycle coding was used to analyze the data. First, each transcript was read and broken into segments for interpretation and code assignment. The coding process was inductive for codes to emerge without being predetermined. In this initial coding process, 35 codes were inductively generated from the transcripts and were iteratively reviewed and refined, resulting in 20 final codes that were used in the next phase of analysis. These final codes included “male-dominated”, “resilience”, “self-confidence”, “mentorship”, and “community support”. After the first coding cycle, constant comparison was used to identify relationships, similarities, and contrasts across the interview transcripts. In this process, codes with similar meanings and patterns were grouped together to form broader categories (Saldaña, 2013). Through this process, related categories were synthesized to form the overarching themes presented in the findings section. To enhance the trustworthiness of the analysis and findings, the transcripts were repeatedly read and reviewed to ensure that they accurately represented the experiences shared by the participants in the SWIS Africa interviews. As recommended by Thorne (1994) for analyzing secondary qualitative data, a transparent audit trail was used to document coding decisions, theme development, and analytic memos throughout the study.

FINDINGS

This study sought to understand women's experiences with gender stereotypes (RQ1) and how they negotiate and resist these gender-based stereotypes (RQ2). For research question one, the themes that emerged were (1) questioning women's intellectual competence and right to be in STEM and (2) enforcing masculinity as the norm in STEM. In addressing research question two, the following themes emerged: (1) stereotypes as a source of motivation for academic success, (2) the cultivation of psychological resilience and self-belief, and (3) redefining women’s place in STEM. Each theme is detailed below.

RQ1: Women's Experiences with Stereotypes

Questioning Women's Intellectual Competence and Right to Be in STEM

When participants explained their undergraduate experiences in STEM, they described experiencing gender stereotypes in ways that questioned their intellectual competence and their right to be in STEM. Under this theme, women's choice of a STEM major was contested and often met with surprise. These assumptions were communicated directly through comments made by their male peers. In some instances, women were asked indirectly to confirm whether they had made the right decision or knew what they were doing in STEM environments. For instance, when P1 reflected on her experiences as a mathematics major, she described being directly asked the question by her male classmate, "How can you be a woman and study math?" P1's experience illustrates how her participation in STEM was met with surprise. Similarly, P9 recounted being met with a comment from her male student who asked her, "I hope you will be able to do this ... Don't you want to do something easier?" This comment framed STEM fields as inappropriate and academically demanding for women, suggesting their inability to succeed in these fields.

Participants also shared being directly told to their face that STEM fields are not for women, challenging their belonging in these fields. P4, who pursued engineering, recalled how male upperclassmen challenged her decision on her very first day on campus. She noted:

My first day on campus, the seniors were like, 'What course are you here for?' and I was like, 'Oh, I came here for oil and gas engineering.' They were like, 'This course is only meant for guys; ladies are not welcome.'

Interestingly, these experiences were particularly predominant among engineering majors. P2, for instance, shared an encounter in which a male classmate questioned her place in engineering. She recounted in her interview, "He was like, 'What are you doing?' I was like, 'What do you mean?' He said, 'Engineering? This place is for boys. You will not be able to make it here. What are you doing here?'" P2 further recalled another instance where a male peer remarked that her admission into the engineering program was "a wasted spot that would have been given to a guy." While this statement may seem like a direct threat, it was an expression of gender-based gatekeeping that reinforces the perception of STEM as a male domain.

Furthermore, these gender-based stereotypes were described as influencing how participants received support from their male counterparts, as described by P4. While peers can be a source of support for women, P4's story reveals that assumptions about women's competence in STEM influenced her access to support. She noted:

We have this mindset that men are good in science and mathematics; women can't be. Women, we are just meant for reading and the visual arts. Therefore, my colleagues saw it to be very challenging for a woman to approach them. Sometimes they don't want to give you support.

The experiences shared by women in this study support the idea that stereotypes can be embedded in everyday interactions to define who is considered intellectually credible within STEM.

Enforcing Masculinity as the Norm in STEM

In sharing their experiences in STEM, participants described how masculinity was constructed as a normative requirement for success in STEM fields. Through unspoken norms, participants shared that they were expected to adopt masculine traits, norms, and behaviors to be recognized as legitimate members of the STEM community. One major way in which masculinity was enforced as the norm was through physical appearance. For example, a participant shared how women's expressions of femininity were policed through their appearance. P5 explained that she and other women in STEM were expected to pay less attention to their appearance as STEM majors. She noted:

When you go there [into STEM], it is either you become a man, like you have the masculine energy, or you do not take care of yourself. They like to look at this girl [and say] she used to do her hair very well, but now she's always in cornrows... So first there's this misconception that you need to be masculine to survive in this field.

These expectations positioned masculinity as a condition for being accepted and perceived as capable within STEM. Consequently, women were required to negotiate or suppress aspects of their femininity to belong in these fields.

Additionally, participants described how the framing of STEM as a masculine domain extended to assumptions about their physical and technical capabilities. P6, for example, shared how she was denied an internship placement because recruiters perceived women as less physically and technically capable than men did:

I could not find a spot to do an internship. Why? Because they felt like, 'Oh, you're female, and you would not be able to do what a man would be able to do in the field.' I would not want to waste resources hiring you, and this is not a field for you to go and sit in the office and press computers all day. No, you have to work; you have to move around, and they do not feel like you could do that... Meanwhile, the [male] counterparts in my field all got different spots.

P6's experience illustrates how women in STEM were evaluated against masculine ideals that privileged men's perceived physical and technical capabilities, thereby devaluing women's capabilities and limiting their access to opportunities such as internships.

RQ2: Negotiating Gender-based Stereotypes

Stereotypes as a Source of Motivation for Academic Success

In the interviews included in this analysis, the participants not only described the ways in which they experienced gender-based stereotypes but also how they negotiated these structural barriers in STEM environments. One of the themes that emerged from the interviews was turning stereotypes into motivation for academic success. The participants noted that instead of accepting narratives about STEM as being described as a male-dominated field, they chose to push it back. The participants sought opportunities to prove themselves academically to establish their legitimacy in STEM to peers and instructors. P4 talked about how she had to change the expectation that she was going to fail academically to motivate herself. She reiterated:

They had a mindset that I'm a female, so I cannot do it, and I need to leave it for the guys, but I was also ready to prove to them that as a female, there is nothing that must limit you.

Similarly, P2 shared how a male classmate predicted she would fail because engineering was "not a place for girls," which motivated her to study and graduate as a top student in her class. In her interview, she recounted:

You know whenever they said that... It was always a challenge to me. I was like, okay, I'm going to show you guys... But those kinds of things motivated me and showed me this uncomfortable position where I needed to prove to them that I also deserved to be here. I want to be here. And trust me, I graduated from the top three in my class. So where are those boys who said I could not do engineering?

In a different interview, P7 also shared facing stereotypes from her male classmates, which motivated her to study harder and succeed. On the basis of her experience, P7 explained:

It's like the boys were always looking down on the girls that were doing math. Like they thought that nothing good could come out of us in my class, to be specific. So, in a way, I feel like that motivated me to study more to show them that I'm a girl, but I can also do this.

Importantly, these experiences of the participants from Ghana, Nigeria, and Cameroon suggest that proving that one can succeed in STEM, regardless of gender, was one of the ways some women negotiated gender stereotypes in the study. Academic performance was a form of evidence to contradict assumptions about women's competence.

Cultivating Resilience and Self-Belief

While participants faced stereotypes, they described developing internal resilience and belief in their own abilities to resist stereotypes as they go through higher education without allowing them to define their abilities or aspirations. For some of the women, resilience involved developing confidence in their own abilities and remaining committed to their STEM education despite discouraging comments or assumptions about their competence. For example, P9 shared that she negotiated stereotypes by cultivating resilience and refusing to allow it to define aspirations. She shared:

You know, if you know you have a passion for this, just follow your passion. Do not really listen to the stereotypes, do not listen to the negative things that people might say, and just be resilient in the face of challenges because I know that challenges might come up... Do not think you cannot succeed in STEM. Do not think you are not good enough. It is only until you try before you know, and basically, do not let the stereotypes discourage you or impede you.

P9's experience describes a deliberate choice to privilege her own aspirations over the gendered assumptions of others. P3 was another participant who mentioned that overcoming stereotypes first required changing how she viewed herself after repeatedly hearing that men were naturally better suited for STEM. She explained:

That was a mentality that had to change in me before I was able to achieve whatever I desired to achieve. And that is why I always encourage people, especially if you're a lady and you're coming into STEM. Do not listen to that stereotype. It has always been, and it will still be. So, the first thing is to erase that mentality from your mind.

Other participants also shared that they had to ignore stereotypes about women's participation in STEM and focus on their academics instead. P8 described intentionally distancing herself from negative stereotypes about women in STEM fields, noting, "There are always misconceptions with, you know, females in a male-dominated field, but I would say I tried not to immerse myself in that because I wanted to have a mindset that would help me to succeed." These narratives suggest that women in the study viewed demonstrating confidence as a way to negotiate stereotypes.

Redefining Women's Place in STEM

In the interviews, the participants also described the ways in which they actively redefined what it means to be a woman in a male-dominated field such as STEM. Instead of conforming to masculine norms, the women in the study resisted the dominant narratives by affirming their gender identity, asserting their intellectual capabilities, and highlighting female achievements. P5 was one of the participants who spoke about this approach by emphasizing that women can negotiate stereotypes by rejecting societal doubts about their place in STEM while remaining authentic to their identity:

I would just say the only way we can actually break through these [stereotypes] is by ensuring that we go through the process without validating what society is saying... We have the brain to understand this without leaving ourselves, our purpose, and what we are meant to do and what we are meant to be without forgetting who we are. We can do all of this.

While P5's response emphasizes rejecting societal doubts, P11 also reframed the ability to succeed in STEM as an individual attribute rather than a gendered characteristic, asserting that women possess equal intellectual legitimacy. She noted:

I believe intellectually there's nothing that says that ladies are intellectually inferior to men, nothing of the sort... We can all do the math. It is not a gender thing. Physics is not a gender thing; it is rather individual.

In addition, elevating the achievement of women and making them more visible was another way in which women redefined STEM as a space in which women can succeed. P13 discussed the importance of women making their voices heard and achievements seen. She shared:

I want women to own their achievements and, when you do something, share it. I want women to own their achievements and have a voice. When you do something, share it; stand by your achievement. Let's say our story, because I believe every woman must learn the act of storytelling, and you must be able to tell your story by yourself.

While participants shared a common commitment to reclaiming their place in STEM, their personal pathways into these disciplines varied. P12 explained that her decision to pursue engineering was explicitly driven by a desire to challenge prevailing gender stereotypes and dismantle historical barriers:

I chose engineering because, I guess, right from when I was very young... I like breaking barriers, and I have heard a lot about how they do not have many females in engineering. So, for me, the thing was challenging myself so that I could do this.

With respect to the women in this study, redefining what it means to be a woman in STEM involved more than simply participating in a male-dominated field. It involved actively challenging the assumptions that position STEM as masculine, affirming its intellectual capabilities, and making its accomplishments visible.

DISCUSSION & CONCLUSIONS

In higher education, broadening the participation of women in STEM fields has become important because diverse perspectives in STEM can enhance innovation and technological advancement. Despite the importance of gender representation in STEM, women continue to be underrepresented, with stereotypes being documented as a contributing factor (Courage et al., 2024; Goldman, 2012; McKinnon & O'Connell, 2020). Broadly, the findings of this study show that the participants from Ghana, Nigeria, and Cameroon experienced negative stereotypes that were uniquely tied to their gender. Women complete the same prerequisite courses in high schools before they are admitted to STEM and have the capacity to succeed, as all the participants had completed their undergraduate degrees. In fact, research suggests that the ability to succeed in STEM is not associated with gender but rather depends on other contextual factors, such as home learning resources, lower socioeconomic status, teaching methodologies, parental support, and attendance at rural or public schools, which can amplify gender disparities in STEM achievement (Bulala & Ntumi, 2025; Wrigley-Asante et al., 2023). However, the findings showed that women faced stereotypes that challenged their sense of belonging and legitimacy, as well as their ability to succeed. While these assumptions can affect those who participate in STEM, they continuously reinforce STEM as a male-dominated field.

Many of the stereotypical comments described STEM as demanding and labor intensive and as an environment in which only men possess the abilities necessary to succeed. Strain et al. (2026) reported that women in STEM experienced gendered strain through stereotypes questioning their analytical abilities, pressure to conform to masculine norms, and the expectation to perform in ways that demonstrated their belonging in STEM. The present study extends this scholarship by showing how women are considered weak and less equipped to compete in this masculine environment. Surprisingly, these assumptions reflect the broader social perceptions and beliefs held about women in many sub-Saharan African societies. For instance, Inngs (2021) posits that compared with men, some African proverbs describe women as weak, voiceless, and peripheral. Perhaps another factor that may have contributed to women's experiences with stereotypes is how they are positioned as more capable in domestic and care-oriented roles. Existing literature on sub-Saharan Africa has shown that expectations around traditional gender roles, where women are expected to pursue domestic, care-oriented, or subordinate roles in African society, are among the major factors influencing women's decision to

pursue STEM (Boateng, 2016; Dube, 2015). These findings contribute to the literature and suggest that access does not mean that women are recognized as legitimate members of the field, as they continued to experience the STEM environment as a masculine space where they needed to justify their presence. Thus, gender inequality in STEM fields may operate not only through barriers to entry but also through everyday processes of recognition and belonging.

Despite these stereotypes, the findings supported existing scholarship that women in the study negotiated gender-based stereotypes to succeed in STEM fields. Block et al. (2019) reported that women use strategies such as self-blaming and direct confrontation; participants in the present study described demonstrating agency rather than confrontation in claiming their legitimacy in STEM. For instance, participants described being motivated to succeed academically, cultivating self-belief, and internally redefining STEM as a space in which women can compete and succeed because of their encounters with stereotypes. It is important to mention that negotiation on the path of women does not mean that these structural barriers were removed. Instead, it emphasizes individual agency and resilience as those who were able to negotiate these spaces without overlooking those who may have been forced out by these structural barriers.

The findings extend Nnaemeka's (2004) nego-feminism framework by emphasizing that participants' ways of negotiating their legitimacy in STEM fields are not simply examples of individual resilience or coping but rather negotiated forms of resistance through which they worked within and against gendered expectations. For instance, participants asserted their ability to participate in STEM while maintaining their sense of self. This distinction is important to recognize because it shifts the interpretation of women's persistence from an individual capacity to overcome challenges toward a relational process of negotiation. Therefore, nego-feminism helps explain not only that women exercised agency but also how and toward what ends they exercised it.

LIMITATIONS

The present study has several limitations that should be considered when interpreting the findings. First, using secondary interview data introduces important limitations to interpreting participants' experiences. Because SWIS Africa conducted the interviews to highlight the educational experiences, resilience, and impact of women across Africa, they may disproportionately represent women who persisted in STEM and overcame adversities such as stereotypes. Additionally, the present study purposefully selects interviews where participants share their experiences with stereotypes, which may further amplify narratives of resistance and agency in the dataset. Furthermore, the reliance on secondary interviews restricted the researcher's ability to direct the line of questioning. This constraint resulted in uncollected contextual details, such as

specific institutional dynamics or socioeconomic backgrounds, that could have provided additional depth when participants' narratives were interpreted. Finally, because the dataset was restricted to participants from three sub-Saharan African countries, Ghana, Nigeria, and Cameroon, geographic diversity remains limited. Consequently, these findings reflect only the experiences made visible through this specific archive and cannot be generalized to all women in STEM across the continent.

IMPLICATIONS

These findings have direct implications for policy and practice in STEM in higher education across Ghana, Nigeria, and Cameroon. Although each participant in this study described personal ways in which they negotiated stereotypes in STEM, it is still important for universities to consider ways to reduce the burden placed on women to negotiate these stereotypes individually. Departments can adopt strength-based approaches through research opportunities, mentoring programs, and conference support that recognize women's abilities and achievements, reinforcing departments as strategic sites for institutionalizing gender equity. Crucially, these institutional efforts must avoid using the experiences of successful women as evidence that STEM fields are equitable across the three countries studied. Additionally, departmental efforts can include gender-responsive pedagogy training that prepares faculty and advisors to establish classroom and departmental norms that discourage gender-based comments, ensure equitable participation in collaborative activities, and create clear processes for students to report and address gender-based exclusion.

Moreover, departments should promote women's participation in internships and fieldwork by partnering with employers to give women opportunities to gain the skills and practical experience needed to secure employment after graduation. Policymakers should partner with advocacy groups such as SWIS Africa to provide resources that help them develop tailored, community-based initiatives to make STEM fields more equitable and inclusive for women in Ghana, Nigeria, and Cameroon. Finally, the findings highlight the need for universities to promote the visibility of women in STEM.

REFERENCES

- Agboola, O. S. (2021). Women and STEM education in Nigeria: Progress, shortcomings, challenges, and way forward. In A. S. Etim & J. Etim (Eds.), *Overcoming challenges and barriers for women in business and education: Socioeconomic issues and strategies for the future* (pp. 211–225). IGI Global. <https://doi.org/10.4018/978-1-7998-3814-2.ch011>

- Amegah, A. (2024). Re-Imagining policy discourses concerning the participation of young women in STEM-related TVET in Ghana. *Journal of Vocational Education & Training*, 76(4), 863-886.
<https://doi.org/10.1080/13636820.2022.2115938>
- Atanga, L. L. (2013). African feminism? In L. L. Atanga, E. E. Sibonile, L. Litosseliti, & J. Sunderland (Eds.), *Gender and language in sub-Saharan Africa: Tradition, struggle and change* (pp. 301–314). John Benjamins Publishing Company.
- Block, C. J., Cruz, M., Bairley, M., Harel-Marian, T., & Roberson, L. (2019). Inside the prism of an invisible threat: Shining a light on the hidden work of contending with systemic stereotype threat in STEM fields. *Journal of Vocational Behavior*, 113, 33–50. <https://doi.org/10.1016/j.jvb.2018.09.007>
- Boateng, F. K. (2016). In the birdcage of gender discrimination: A grounded theory study of STEM women's experiences in Ghana. *AERA Online Paper Repository*
- Bugri, V. (2026). Addressing structural and pedagogical challenges in STEM higher education: Insights from Ghana. *American Journal of STEM Education*, 20, 77–90. <https://doi.org/10.32674/bb7dfa66>
- Bulala, T., & Ntumi S (2025) Evaluating gender gaps in STEM achievement in African secondary schools: a quantile regression and mediation analysis approach. *Frontiers in Education*, 10, 1607412.
<https://doi.org/10.3389/feduc.2025.1607412>
- Chavez, D. (2024, November 26). *What you need to know about the challenges of STEM in Africa*. UNESCO. <https://www.unesco.org/en/articles/what-you-need-know-about-challenges-stem-africa>
- Cheryan, S., Master, A., & Meltzoff, A. N. (2015). Cultural stereotypes as gatekeepers: Increasing girls' interest in computer science and engineering by diversifying stereotypes. *Frontiers in Psychology*, 6, 49–53.
<https://doi.org/10.3389/fpsyg.2015.00049>
- Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, 143(1), 1. <https://doi.org/10.1037/bul0000052>
- Courage, F. K. P., Cyrielle, N. N. T., & Andigema, A. S. (2024). *An in-depth review of barriers, strategies, and opportunities for enhancing female participation in STEM*. Preprints.Org.;
<https://doi.org/10.20944/preprints202411.0697.v1>
- David, J. (2023). *Gender disparities in STEM education and career choice*. Social Science Reports.
- Dube, T. (2015). Gender disparities in educational enrollment and attainment in sub-Saharan Africa. *Journal of Educational and Social Research*, 5(3), 279–283

- Fisher, M., Nyabaro, V., Mendum, R., & Osiru, M. (2020). Making it to the PhD: Gender and student performance in sub-Saharan Africa. *PloS one*, 15(12), e0241915. <https://doi.org/10.1371/journal.pone.0241915>
- Founou, L. L., Yamba, K., Kouamou, V., Yeboah, E. E. A., Saidy, B., Jawara, L. A., Bah, H., Ba, S. B., Aworh, M. K. & Darboe, S. (2023). African women in science and development, bridging the gender gap. *World Development Perspectives*, 31, 100528. <https://doi.org/10.1016/j.wdp.2023.100528>
- Fu, X., & Shi, L. (2022). Direction of innovation in developing countries and its driving forces. *World Intellectual Property Organization (WIPO) Economic Research Working Paper Series*, (69).
- Goldman, E. G. (2012). Lipstick and labcoats: Undergraduate women's gender negotiation in STEM fields. *NASPA Journal About Women in Higher Education*, 5(2), 115-140.
- Global Education Monitoring Report Team. (2024). *Support girls and women to pursue STEM subjects and careers*. UNESCO. <https://doi.org/10.54676/BPSL3344>
- Guerin, A. (2026). The hidden burden: Impostor syndrome among women of color in STEM education. *American Journal of STEM Education*, 22, 183–203. <https://doi.org/10.32674/4016nt20>
- Igwe, P. A., Hack-Polay, D., Mendy, J., Fuller, T., & Lock, D. (2021). Improving higher education standards through reengineering in West African universities—A case study of Nigeria. *Studies in Higher Education*, 46(8), 1635–1648. <https://doi.org/10.1080/03075079.2019.1698534>
- Inngs, J. (2021). Weak or wily? Girls' voices in tellings and retellings of African folktales for children. *Children's Literature in Education*, 52(3), 342–356.
- Kostere, S., & Kostere, K. (2021). *The generic qualitative approach to a dissertation in the social sciences: A step-by-step guide*. Routledge.
- Long-Sutehall, T., Sque, M., Addington-Hall, J. (2010). Secondary analysis of qualitative data. A valuable method for exploring sensitive issues with an elusive population? *Journal of Research in Nursing*, 16(4), 335–344.
- Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, 26(13), 1753–1760.
- McKinnon, M., & O'Connell, C. (2020). Perceptions of stereotypes applied to women who publicly communicate their STEM work. *Humanities and Social Sciences Communications*, 7(1), 160. <https://doi.org/10.1057/s41599-020-00654-0>
- Mutsvangwa, A., & Zezekwa, N. (2021). STEM education: A ray of hope for African countries. *Unnes Science Education Journal*, 10(2), 79–89.
- Nnaemeka, O. (2004). Nego-feminism: Theorizing, practicing, and pruning Africa's way. *Signs*, 29(2), 357–385. <https://doi.org/10.1086/378553>

- Nnaemeka, O. (Ed.). (1997). *Politics of mothering: Womanhood, identity, and resistance in African literature*. Routledge
- Ojong, A. S., & Kareem, E. (2025). Advancing equity in STEM education for girls in sub-Saharan Africa: A systematic review through an intersectional lens. *American Journal of STEM Education*, 13, 57–84. <https://doi.org/10.32674/6xz0w635>
- Okeke, I. N., Babalola, C. P., Byarugaba, D. K., Djimde, A., & Osoniyi, O. R. (2017). Broadening participation in the sciences within and from Africa: Purpose, challenges, and prospects. *CBE—Life Sciences Education*, 16(2), es2.
- Rivett, U., & Azaki, J. I. (2026). The underrepresentation of women in STEM research in Afrika: Can nego-feminism offer a solution? In H. Whitehead & M. Dipieri (Eds.), *Dismantling gender barriers in STEM* (pp. 255–266). African Minds. <https://library.oapen.org/bitstream/handle/20.500.12657/112541/1/9781067253776.pdf>
- Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed). Sage Publications Ltd. <https://doi.org/10.4135/9781036235611>
- Shi, W., & Wu, R. (2024). Women’s strength in science: Exploring the influence of female participation on research impact and innovation. *Scientometrics*, 129, 4529–4551. <https://doi.org/10.1007/s11192-024-05089-x>
- Siwale, K., Mwalemba, G., & Rivett, U. (2023). Experiences of African women in STEM careers: A systematic literature review. In *Proceedings of the 9th African Conference on Information Systems and Technology* (pp. 1–16). Kennesaw State University. <https://digitalcommons.kennesaw.edu/acist/2023/presentations/9>
- Stout, J. G., Grunberg, V. A., & Ito, T. A. (2016). Gender roles and stereotypes about science careers help explain women and men’s science pursuits. *Sex Roles*, 75(9), 490–499. <https://doi.org/10.1007/s11199-016-0647-5>
- Strain, S., Leibnitz, N., Ruben, R., Li, Y., & Burkholder, E. (2026). Living in the tensions: Investigations of gender performativity in STEM. *arXiv preprint arXiv:2601.07126*.
- Tamale, S. (2020). *Decolonization and Afrofeminism*. Daraja Press.
- Thorne, S. (1994) Secondary analysis in qualitative research: Issues and implications. In J.M. More (Ed.), *Critical issues in qualitative research methods* (pp. 263–279). Thousand Sage
- Wrigley-Asante, C., Ackah, C. G., & Frimpong, L. K. (2023). Gender differences in academic performance of students studying Science Technology Engineering and Mathematics (STEM) subjects at the University of Ghana. *SN Social Sciences*, 3(1), 12. <https://doi.org/10.1007/s43545-023-00608-8>

Bio

ERNEST ADOM is a doctoral student in higher education at the University of Georgia. His research focuses on equity, access, and success in STEM education; the experiences and pathways of underrepresented students in higher education; STEM workforce transitions; and internationalization in higher education. Email: adomerst22@gmail.com