Exploring the Impact of Perceived Discrimination and Segregations on Career Choice among Building Technology Students in Developing Countries

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Abstract
The disproportion of female students in Building Technology (BT) programs in Nigerian Universities persists, leading to unequal job opportunities and income generation, raising social inequalities. This disparity may be closely related to the low enrollment of females in BT compared to males and the unwelcoming and discriminatory environment within the field. This research was conducted in Nigeria and presents evidence of variations in students' career choices based on perceived discrimination, and how this factor impacts their academic perseverance. The research also delves into the segregation of female students and the correlation between segregation and perceived discrimination, offering new insights into the specific scenarios in which prejudice and segregation occur. The study involved seven-nine (79) students currently undergoing their undergraduate program in BT at the Federal University of Technology Yola as respondents. The study used a quantitative method, the results revealed significant disparities between male and female students regarding the factors that motivated them to enroll in the BT program. A noteworthy connection was found between female students' motivating factors for enrolling in BT, such as career awareness, and in terms of segregation, female students were notably less inclined to interact with male students.
Keywords: Career Choice, Discrimination, Segregation, Gender Inequality and Building Technology

Introduction
Enrollment in Nigerian higher educational institutions has doubled in recent years, but there is inequality in terms of gender (Ogunode 2023). These inequalities differ by academic discipline, and in some Technical Vocational Education fields, such as Building Technology

(BT), the field remains overwhelmingly male-dominated (Okwelle, Chijioke et al. 2018, Andiema and Manasi 2021). Gender stereotypes are present in our households, educational institutions, and within society as a whole and therefore, responsible for the low enrollment of these girls into the BT (Ertl, Luttenberger et al. 2017, Merma-Molina, Ávalos-Ramos et al. 2022). In many developing countries, including Nigeria, the societal structure is patriarchal, with male-dominated power dynamics evident in both organized society and individual relationships (Brulé 2023). The United Nations Human Development Report highlighted gender inequality as a significant policy challenge which shows women in developing countries are often deprived of opportunities for education, employment, and other rights (Baltà Salvador, Peña Carrera et al. 2023). Gender disparities are influenced by various factors such as sociocultural norms, low economic status, and limited access to education (Nyiransabimana, Jarbandhan et al. 2024). The education of girls, especially in Technical and Vocational Education (TVE), has not been a top priority due to socio-cultural beliefs biased attitudes, and the common belief that a girl's place is in her husband's home. (Edokpolor and Chukwuedo 2018). This low enrollment is particularly evident in TVE. It has been widely recognized that girls' access to and participation in education, especially in science and Technical Vocational Education, is generally poorer compared to boys (Ogunode 2023).

To address these gaps, the Nigerian government has agreed to achieve and improve the percentage of the population with higher education by opening more universities. Data from 2021 show that the male enrollment population reached 438,260 (55.8%) out of the 785,259 undergraduate students in Nigerian Universities in 2021 while that of the female is 346,999 (44.2%) (Ilokanulo Samuel Nchekwubemchukwu 2021). However, these differences between the male and female populations in enrollment are greater in some developing countries. The percentage of the female population enrolled in the BT program at the Federal University of Technology Yola, Nigeria, a public institution focused on Science and Technology Research where the study was conducted was 9.48% (12) out of the 79 of the total students enrolled, and that of the male is 52.98% (67) in the 2022/2023 academic session. The university's enrollment statistics highlight the disparities mentioned earlier.

Addressing these inequalities in universities is a matter of national and international concern and a fundamental aspect of equality policies, as they result in knowledge gaps with significant implications for social and economic development (Okwelle, Chijioke et al. 2018). Moreover, this aligns with the Sustainable Development Goals (SDGs) of the 2030 Agenda set by the United Nations. SDG 10 (Reduced inequalities) focuses on eliminating demographic disparities (Declaration 2016). Encouraging participation in BT fields will bring benefits at both individual and collective levels, contributing to progress towards a more ethical and egalitarian society. Specifically, as BT programs are associated with job growth, increasing the involvement of underrepresented groups will help promote income equality and career opportunities among the population, aligning with SDG 8 (Decent work and economic growth) (Rai, Brown et al. 2019). It is also important to note that increasing the representation of diverse populations in leadership and management positions within the BT industry, which is currently male-dominated, will contribute to enhancing the industry's approach to modern construction techniques (King-Lewis 2020). The analysis of problems and the development of solutions should not solely reflect the perspective of a specific social group that does not accurately represent the diversity of the population (Aldaajani 2023). Additionally, increasing

the presence of disproportionate female BT students will help challenge existing stereotypes and provide more role models for future generations. Numerous studies have shown that teams with diverse backgrounds and gender sensitivity are more effective at problem-solving compared to homogeneous groups (Adeite 2023) and that learning in a diverse environment is vital for the academic growth of all students (Markey, Graham et al. 2023, Hunek 2024), as it encourages critical and innovative thinking and supports effective problem-solving (Markey, Graham et al. 2023).

The diversity of students' backgrounds in the program will also contribute to the development of open-mindedness, respect, and cultural awareness, which are essential in today's globalized world with increased cross-cultural interactions (Lyu 2024). Despite efforts to promote female participation in BT, persistent inequalities show that current actions are insufficient (Kuteesa, Akpuokwe et al. 2024). Therefore, further exploration and gathering of new empirical data are necessary to understand the factors behind these inequalities. This study explored the position of female students in the BT program at two critical points: their career choices and the inequalities they face in the academic environment. This study aims to provide insight into the disparities in the experiences of female students compared to their male counterparts and identify factors that hinder their participation in the field.

Theoretical Framework
The low enrollment of female students in BT programs in Nigerian universities is connected to the prevalent stereotypes in the field, which traditionally associate BT with males, who make up the majority of enrolled students (Owolabi, Ogundipe et al. 2023). Stereotypes are formed from societal and cultural predispositions, beliefs, and opinions that are generalized to individuals belonging to a stereotyped group (Baltà Salvador, Peña Carrera et al. 2023). These biases can be unconscious, meaning individuals may not realize they have unintentionally learned deeply ingrained stereotypes that influence their behavior, interactions, and decision-making (Banchefsky and Park 2018). Despite being unconscious, stereotypes shape attitudes and behaviors, creating specific social expectations about people in the stereotyped group, and perpetuating social gaps and underrepresentation (Banchefsky and Park 2018, Baltà Salvador, Peña Carrera et al. 2023). These stereotypes can impact female students' access to BT courses. In recent literature, it has been noted that female students' participation in BT is low compared to their male counterparts, who make up the majority of the program (Michael and Modebelu 2020). Another recent literature identified several theories that can impact female involvement in BT. To begin with, the Expectancy Value Theory (EVT) and Social Cognitive Career Theory (SCCT) propose that individuals are more likely to develop an interest and pursue a career in which they feel competent and anticipate satisfactory outcomes (Flores, Navarro et al. 2021, Baltà Salvador, Peña Carrera et al. 2023). However, those who feel unable to conform to established stereotypes in BT tend to have lower self-confidence, which may affect their performance and undermine their interest in BT as a career (Ertl, Luttenberger et al. 2017).
Furthermore, the support and encouragement from society, parents, lecturers, and peers can significantly influence female students' career choices in BT. Extrinsic motivational factors also come into play, as BT programs are often associated with manual dexterity, which is also taken into account when selecting BT as a career (Walker, Greene et al. 2006). Students who do not conform to traditional stereotypes in EVT may experience reduced confidence in their

abilities, leading to lower expectations and diminished career interests in this field (Eccles and Wigfield 2020, Baltà Salvador, Peña Carrera et al. 2023). Additionally, extrinsic motivational factors, such as technical skills associated with EVT, also play a role in the decision-making process (Eccles and Wigfield 2020, Baltà Salvador, Peña Carrera et al. 2023). While there has been extensive research on career choice factors for women in TVE which include BT, there is a lack of previous research specifically on female students' choice of BT. Given that personal characteristics and social identities can influence these factors, it is vital to expand current research to include female students' motivation to pursue the BT program. The expectations set by BT stereotypes are based on individuals' social identities such as gender, which affect students' expectations, interests, and motivations (Starr 2018). This is because stereotypes play a crucial role in career decision-making, with students often choosing careers based on whether they align with the roles defined by stereotypes (ŠIMOVIČOVÁ and URBANČÍKOVÁ 2023). Careers that do not align with stereotypes in the case of women, such as BT, are less likely to be seen as aspirational, potentially dampening vocational aspirations, especially for aspiring female students (Kano, Sheikh et al. 2021).

Female students may feel unwelcome in male-dominated BT programs due to perceived hostile climates, stemming from stereotypes and unconscious biases, which could influence their decision to enroll (Cundiff, Nadler et al. 2018). Encouraging female participation in BT will require understanding how motivation sustains their involvement in the program, identifying and supporting the aspects that can promote female students' motivation in BT programs, and challenging established stereotypes. The motivations driving female students to break through established stereotypes and enroll in and persist in BT may not be fully comprehended. Therefore, these motivating factors in choosing BT by female students may be linked to academic perseverance, as motivation can impact how much female students strive to achieve a specific goal (Yu and McLellan 2020), such as graduating with a good grade. Some research indicates that motivation plays a significant role in task completion and persistence (Lee and Song 2022). Intrinsic motivation, rooted in engaging in an activity for inherent satisfaction like passion rather than external incentives, pressures, or rewards, is seen as an ideal prerequisite to maintaining and reinforcing involvement in a field (Lee and Song 2022). On the other hand, involvement based on external motivation, such as pursuing a high salary, is more likely to falter in the face of challenges like disappointment, failure, or stereotyping.

Providing new empirical evidence to address these gaps will be valuable as it can help elucidate which factors can be encouraged to attract female students who are not currently enrolling in the BT program and to keep them motivated, as well as which factors may sustain their perseverance during their studies. However, it's important to note that stereotypes in BT can also impact the academic journey and perseverance of female students who choose to enroll despite being stereotyped. Research indicates that female students in BT often feel more alienated compared to their male peers and perceive the campus environment as intimidating (Wilson and VanAntwerp 2021). These feelings of isolation in BT environments can diminish the academic drive and determination of female students. Understanding the factors that motivate female students despite these stereotypes is crucial for improving their persistence.

Method

The research utilized a quantitative approach and was conducted at the Federal University of Technology Yola, Nigeria, a public institution focused on scientific and technological research. A sample of 79 respondents from second-year BT students of the 2022/2023 academic session were selected using simple random sampling. The anonymity of the respondents and the confidentiality of the data were ensured. Emphasis was placed on safeguarding personal data, and it was confirmed that the respondents had consented to participate in the study. The students' feedback was sought to understand their experiences and challenges within the BT program. Therefore, the study evaluates the disparities and educational segregation in career choice among BT students in developing countries to enhance the system.

The Research Instrument

The survey questionnaire was developed using items from existing literature and adjusted to suit the research. Initially, demographic information, such as age and gender, was collected to describe the sample. Respondents were presented with six discriminatory experiences and asked to indicate if any of these situations had occurred, using a 5-point scale. The questionnaire underwent a validation process to ensure clarity and relevance of items, and to identify any ambiguity. The questionnaire, created using Google Forms, was emailed to respondents by the researchers along with a consent letter explaining the study's purpose for administration. Respondents were urged to answer all questions honestly and based on their opinions.

Data Analysis Technique

The collected sample underwent characterization for analysis, with the variables being defined and classified. Initial analyses were conducted to identify missing values, and outliers and to characterize the sample. The relationship between career choice factors among students of different genders was examined using the t-test analysis. Additionally, mean and standard deviation were utilized to investigate perceived discrimination and segregation in career choice in the BT program.

Result

Table 1 show that Male (mean = 4.46, S.D. = .611) and Female (Mean =4.42, S.D = .515), t $_{(77)}$ = .245, p= .272. Since the p-value is greater than 0.05, this indicates that there is a significant difference in the perceptions of the respondents based on self-aspiration which is in favor of the male, which has a higher mean value. Similarly, in the case of job fulfillment, the male (mean = 4.60, S.D. = .524) and Female (Mean =4.50, S.D = .522), t $_{(77)}$ = .591, p= .888, indicating that the p-value is greater than 0.05. This shows the significant difference in the perceptions of the respondents which is still in favor of the male, which has a higher mean value. In both self-aspiration and job fulfillment, the female respondents perceived discrimination and segregation in the system.

Table 1
T-Test Analysis of Respondents Perceptions Based On Self-Aspiration And Job Satisfaction

	Gender	N	Mean	Std. Dev	t	df	Sig.
Self-aspiration	Male	67	4.46	.611	.245	77	.272
	Female	12	4.42	.515	.277	17.071	
Fulfilling job	Male	67	4.60	.524	.591	77	.888
	Female	12	4.50	.522	.592	15.241	

Table 2 reveals that male and female respondents generally had positive perceptions of discrimination, and segregation in career choice. As indicated in Table 2, the mean values are greater than 2.5, which is the average mean value. The positivity of the mean value is determined by comparing each one with 2.5. Therefore, any mean value greater than or equal to 2.5 means agreement with the statement in the questionnaire item while those with less than 2.5 mean disagreement. Thus, since all the mean values are greater than 2.5, it means that the respondents agreed that there is discrimination and segregation in the BT program. For instance, items number 3, 4, and 6 in Table 2 (career awareness, financial incentives, and their skills in the area) were some of the items that made them choose BT as a field and all have a mean value of 4.32, 4.30 and 4.43 (bold), which is greater than 2.5. This indicates that the majority of respondents have the same perceptions of perceived discrimination and segregation in career choices among BT students. This also applies to item number fourteen (17) in Table 2 which has a mean value of 4.46 (bold) greater than 2.5. This is the same with all the eighteen items since they all have a mean value greater than 2.5.

Table 2
Mean and Standard Deviation of Perceived Discrimination and Segregation.

S/N	Items	Min	Max	Mean	Std. Dev.
1	Societal expectations	2	5	4.30	.607
2	Professional Expectations	2	5	4.33	.571
3	Career Awareness	2	5	**4.32**	.589
4	Support from family	2	5	**4.30**	.822
5	Self-aspiration	3	5	4.46	.595
6	Employment Opportunity	3	5	**4.43**	.523
7	Unequal Training	2	5	4.29	.736
8	Microaggressions	1	5	4.23	.905
9	Inadequate Support	3	5	4.28	.505
10	Interaction discrimination	4	5	4.39	.491
11	Job fulfillment	3	5	4.58	.522
12	Sponsorship discrimination	4	5	4.43	.498
13	Gender-Specific Roles	2	5	4.27	.812
14	Segregation in classroom	2	5	4.43	.673
15	Limited Access to practical	2	5	**4.53**	.596
16	Decision-Making exclusion	2	5	4.48	.695
17	Social Exclusion	2	5	4.58	.569
17	Segregation in extracurricular activities	3	5	**4.46**	.550

Discussion

Significant differences have been established between the female and male students in Building Technology (BT) from which interesting replications can be made. Concerning self-aspiration, female students showed their skills in the area to a lesser extent as a relevant factor in career choice as compared to male students. As some literature pointed out, this outcome may be related to the stereotype threat in BT programs, which makes those who do not fit these stereotypes feel less capable and have less confidence in their abilities (Casad, Petzel et al. 2019). Another significant finding is the indication by the female students of the expectations of having a profession that makes them self-reliant and makes them feel fulfilled as reasons for enrolling in a BT program even though BT is male-dominated. One possible explanation is the opportunity gap between male and female professionals, which results in female students not having the same aspirations as male students despite enrolling in the same BT program (Smeding 2012, Casad, Petzel et al. 2019). In addition, female students showed to a greater extent having a positive impact on society as a relevant factor in their career choice. This finding aligns with previous studies on motivators in decision-making processes (Olafsdottir and Einarsdottir 2024), which indicate that male students tend to have more individualistic values and are more interested in personal goals such as obtaining a certain professional status than female students, whose values tend to be more collectivist. Based on these results, to attract more diverse female talent to the BT program, it would be relevant to give more visibility to the social impact that BT can have on society and encourage a more collective vision of these studies, beyond promoting personal interests such as cultural norms or societal values (Emennu 2022, Olafsdottir and Einarsdottir 2024). Besides, it is important to establish equality in the BT industry, in decision-making areas among different genders, origins, and backgrounds to prevent females from being in disproportionate groups and having the same professional aspirations in this field as their male counterparts.

The support students received from their families was a significant factor and may even reduce the likelihood of dropping out of their studies (Khan, Aradi et al. 2017). Therefore, efforts to break the stereotypes must also be made within the personal and family environment of the students to receive support from their environment to enroll in BT even if they do not fit the established stereotype. Other motivational factors associated with female students' underrepresentation are related to job prospects, such as the ease of finding a job and that the job makes them feel fulfilled. Often, these are values for which the universities promote BT programs and consistently, they emerged as motivators for students. However, it is curious that in the case of male students, the fact of being able to easily find a job did not show an association with their persistence, in the case of female students, the easiness of finding a job as well as having a job that allows them to raise a family was associated with their disproportionality (Mustapha, Abubakar et al. 2021). Given that it is often more difficult to find a job in the BT industry for those females due to the stereotypes that exist in society (Menéndez-Espina, Llosa et al. 2020, Baltà-Salvador, Olmedo-Torre et al. 2022), it may be a more relevant factor for female students when pursuing a degree in BT. Considering that the female students who enroll in BT programs are overcoming many barriers, one would expect that they would have a high vocation and that this would be a relevant driver for their academic progress (Menéndez-Espina, Llosa et al. 2020, AGUNDU 2021). It would be interesting for further research to look more deeply into the construct of vocation among BT students according to their gender to explain this finding.

Furthermore, this study analyzed male students' interactions with female students.

In line with previous studies on segregation on university campuses (Ogunode, Tsevenda et al. 2024), the findings indicated that female students were less likely to interact with their male students. This finding suggests that segregation exists in the BT program and that male students fail to interact with female students, making it difficult for the female students to integrate and take advantage of the benefits that peer interactions can bring, such as fostering creative thinking and problem-solving and the development of more empathetic and respectful behaviors among the student (Calavia, Blanco et al. 2021). The results of the present study extend previous knowledge by identifying the environments in which these segregations occur the most. According to the findings, segregation exists especially in practical, and extracurricular activities, settings in which male students were significantly less likely to interact with female students (Baltà-Salvador, Olmedo-Torre et al. 2022). In contrast, no significant differences were found between the male and female in the classes, so both male and female students interacted within classes. One explanation for these findings is that while in the classroom, students are required to interact, in environments where they are not obliged to interact, such as group activities in which partners can be chosen or in common areas and outside of class hours where they can decide whom to go with, these interactions do not occur to the same extent, thereby, leading to segregation.

These results indicated that the efforts that should be made within the classes for students to interact with each other are not transferring to other areas and academic campuses. Therefore, the universities should reinforce student integration actions beyond the classroom, for example, by organizing extracurricular activities for the entire student with faculty supervision to foster positive relationships among students, such as cultural trips, and sports (Baltà Salvador, Peña Carrera et al. 2023). In addition, the institution may host discussion forums on discriminatory behaviors or organize outreach talks and discussions with vulnerable groups to give a personal view of discrimination, segregation, and unconscious bias, as well as the importance of inclusion in the academic setting. It will also be relevant to offer training and practical workshops on the detection of bias and the tools for confrontation and intervention, both for students who suffer discrimination and for witnesses, to generate a network of allies on the academic campuses (Banchefsky and Park 2018). This study has found worrying results concerning the association between students' interactions and their perception of discrimination. Perceived discrimination was related to the interactions with students, such that the greater the interaction with female students, the greater the perceived discrimination.

As the finding shows, in classes, which is where male students indicated that they interacted more with female students, is where female students reported feeling more discriminated against. This finding suggests that it is not enough to bring students of different genders into the BT program and wait for inclusion to emerge; instead, lecturers must take an active role and ensure that no one feels discriminated against in interactions among the students (Hartman, Forin et al. 2019). Although these discriminations may be due to unconscious actions, they can have a relevant impact on the discrimination that female students perceived during their interactions with other male students (Flores, Navarro et al. 2021). On the other hand, in spaces where male students do not interact as much with female students, female students did not feel significantly more discriminated against than male students, and their perception of discrimination was also lower than in classes. One possible explanation is that a disproportionate number of students can choose whom to interact with in extracurricular

activities and leisure time, and this can make these environments safer for them. In contrast, in classrooms where students cannot choose their peers, female students felt more threatened. These results may indicate that segregation is acting as a coping strategy for female students (Ferm and Gustavsson 2021, Zhang, Holdsworth et al. 2021). Coping strategies refer to the cognitive, behavioral, and emotional efforts used to manage stressful or unpleasant situations (Zhang, Holdsworth et al. 2021). These strategies can cause students to have less perception of discrimination than they have to face. As previous literature indicated (Baltà-Salvador, Olmedo-Torre et al. 2022), in the case of female students, isolating themselves in safer intragroup contexts, such as ethnically homogenous groups, can help them to reduce their negative experiences and protect themselves from discriminatory environments.

However, this tendency toward grouping may pose a barrier to campus integration and can lead to increased ethnocentrism, fostering negative attitudes among students (Quinton 2019). Therefore, academic personnel must ensure that interactions between students are enriching and that the bonds established expand beyond the classroom. For example, some dynamics can encourage students to interact with other classmates beyond their group in group activities, such as establishing rules and rotating students in the group in each practical period. Strengthening relationships within the classroom, with lecturers to ensure good working dynamics, can help reduce segregation outside the classroom. Moreover, events outside school hours can also be organized during the academic year to encourage student encounters beyond the classroom. In conclusion, in line with previous studies (Hodge, Dougherty et al. 2020), the perception of discrimination was correlated with female students' disproportionality, so if the required attention is not given to the discriminatory treatment of female students, their disproportionality may increase and thus aggravate the underrepresentation of these groups.

Conclusion
The paper found variations in students' career choices based on perceived discrimination, and this factor significantly impacts students' academic perseverance. The paper also highlighted the correlation between segregation and perceived discrimination, shedding light on the specific circumstances in which bias and segregation occur. Moreover, the research discovered significant disparities between male and female students regarding the factors that motivated them to enroll in the BT program. Female students showed less inclination to interact with male students, indicating a clear segregation within the field. Based on these findings, it's essential to implement strategies to address the gender disparities and discriminatory practices in BT programs. Firstly, institutions in developing countries should work on creating a more inclusive and welcoming environment for female students pursuing BT. This could involve initiatives to raise awareness about gender equality in BT program, initiating mentorship programs, and support networks. Secondly, efforts should be made to eliminate gender stereotypes and biases within the field of BT through education and training. By promoting an environment free from discrimination and segregation, more female students will enroll and pursuit career in BT, thereby reducing gender inequalities in the industry. Conclusively, nurturing collaboration between male and female students is crucial to breaking down barriers and promoting equal participation in BT programs. In general, addressing the issues of perceived discrimination and segregation in BT programs will not only

lead to a more diverse and inclusive program but also contribute to overall socio-economic growth, progress and development of the society.

Theoretical and Contextual Contribution

The theoretical contribution of this paper lies in its investigation of the relationship between perceived discrimination, segregation, and career choices, highlighting the impact of these factors on academic perseverance and enrollment patterns. By exploring the disparities between male and female students in BT programs, the paper offers an insights into the fundamental reasons for the unequal representation of female BT program. This adds to the existing knowledge by expanding our understanding of the role of perceived discrimination and segregation in shaping career choices, especially in TVE. Contextually, the paper addresses a persistent issue in the HEIs of Nigeria, and possibly in other developing countries. Through focusing on the inequalities in enrollment and societal impact on gender representation in BT programs, the paper also highlights the socio-cultural and economic implications of these inequalities. Furthermore, the study's emphasis on the Sustainable Development Goals (SDGs) aligns it with international efforts to reduce demographic disparities and promote equality. In this situation, the paper serves as a critical resource for policymakers, educators, and stakeholders in developing stratagems to promote gender equality in TVE. It provides valuable empirical evidence that can guide the formulation of policies aimed at reducing perceived discrimination and segregation, eventually nurturing a more inclusive and diverse educational environment. Therefore, the paper not only contributes to academic knowledge but also plays a vital role in addressing real-world challenges and fostering positive societal change.

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