

# African Journal of Gender, Society and Development

Volume 11 Number 3, September, 2022

## Table of Contents

**An Analysis of Gender Clauses in Political Parties' Constitutions in Lesotho**

*Mamello Rakolobe and Hoolo 'Nyane*.....7

**Shouldering A Double Burden: A Phenomenological Exploration of Gender-Based Violence Among Black African Migrant Women in Durban, South Africa**

*Venencia Paidamoyo*.....33

**Gender-Based Violence against Men and Boys: A hidden Problem**

*Mandlenkosi Richard Mphatheni, Ntsika Edward Mlamla and Philisiwe Nicole Hadebe*.....59

**The Vulnerability to Violence among Women with Physical Disabilities in the City of Tshwane Pretoria, South Africa**

*Yeukai Leoba Muruzi and Priscilla Gutura*.....85

**Work-Life Balance: Experiences of Women during the COVID-19 Pandemic**

*Gerelene Jagganath and Shanta Balgobind Singh*.....109

**Indigenising Informal Financial Mechanism (IFM) of Rural Women in the Northern Region of Kwazulu-Natal, South Africa**

*Andile Vincent Mthembu, Unathi Kolanisi, Nothando Delight Qumbisa*.....125

**Women's Contribution to Indigenous Knowledge Food Security in the Lokaleng village, Northwest Province, South Africa**

*Gabriel Ekobi, Lovelyne Mboh and Pius Tanga*.....145

**Gender in Civil Engineering Education: A Case Study of the University of Ibadan, Nigeria and Institut d’Enseignement Supérieur de Ruhengeri, Rwanda**

*Folake O. Akintayo, Jacqueline Nyirajana, Olatunde Okunlola and Ikeoluwapo B. Barunwa.....*169

**The History of Gender Inequality: Analysis of Gender Inequality as a Colonial Legacy in Africa**

*Mohammed Xolile Ntshangase and Tlhakodisbo Joel Matabane.....*185

UNIVERSITY OF IBADAN LIBRARY

African Journal of Gender, Society and Development  
ISSN: 2634-3614 E-ISSN: 2634-3622

Indexed by IBSS, EBSCO, COPERNICUS, ProQuest, ERIH PLUS,  
SABINET and J-Gate.

Volume 11 Number 3, September 2022  
Pp 169-183

## Gender in Civil Engineering Education: A Case Study of the University of Ibadan, Nigeria and Institut d'Enseignement Superieur de Ruhengeri, Rwanda

DOI: <https://doi.org/10.31920/2634-3622/2022/v11n3a8>

**Folake O. Akintayo**

*Department of Civil Engineering,  
University of Ibadan, Nigeria  
Email: fo.akintayo@ui.edu.ng*

**Jacqueline Nyirajana**

*Department of Civil Engineering,  
INES Ruhengeri, Rwanda  
Email: njacky01@yahoo.fr*

**Olatunde Okunlola**

*Department of Civil Engineering,  
University of Ibadan, Nigeria  
Email: olatundeokunlola@gmail.com*

&

**Ikeoluwapo B. Baruwa**

*Department of Adult Education,  
University of Ibadan, Nigeria  
Email: ikeoluwapobaruwa@gmail.com*

## Abstract

Engineering and technology are basic in any country's development. Addressing the gender gap in civil engineering education will help to narrow the gender pay gap, enhance women's economic security and ensure a diverse and talented STEM workforce. This paper focuses on gender disparity in civil engineering education at Institut d'Enseignement Supérieur de Ruhengeri (INES), Rwanda, and the University of Ibadan (UI), Nigeria. Data were sourced from the graduating records of the Departments of Civil Engineering, INES Ruhengeri, Rwanda, and the University of Ibadan, Nigeria, covering a period of 5 years (2016 - 2021). Data were analysed using excel tools. The Department of Civil Engineering, University of Ibadan, recorded a slight increase in the number of female graduating students from 5 in the 2015/16 session to 6 in the 2020/21 session, representing a 20% increment and a slight reduction in the number of male graduating students in the department from 37 in the 2016/17 session to 28 in the 2020/21 session representing a 32% reduction. At INES, Ruhengeri, the number of male graduating students in the Department of Civil Engineering increased from 46 in the 2016/17 session to 145 in 2020/21, showing a 215% increment, and the number of female students increased from 18 in 2016/17 to 23 in 2020/21 showing an increment of 28%. The overall percentage of females in civil engineering education is below 20% compared to over 80% of males in the two institutions. Although the number of male graduating students decreases as the year progresses, the increase in female graduating students is not significant. Hence the gender gap seems to remain with year progression. The study proposes an improvement in motivating female students by providing scholarships, including pedagogical motivation in science courses

**Keywords:** *Civil engineering, Engineering education, Gender inequality, STEM*

## 1. Introduction

To a higher degree, the present age is determined by the availability of those willing to advance their societies with engineering and technology tools and knowledge because these tools are crucial for humanity and also serve as prerequisites to self-development. Science and technology has been described as an infiltrating force that necessitates the development and improvement of individual well-being (Abubakar *et al.*, 2019). It equitable distribution and creation give room for significant national and global restructuring (Pawley *et al.*, 2016). This is seen in engineering education being a growing field in recent decades through

the involvement of professional societies, research centres, journals, and learning institutions (Borrego and Bernhard, 2011; Jesiek *et al.*, 2009). However, the last decades have reported a lower degree of women involvement in Science, Technology, Engineering and Mathematics (STEM) programmes (Aderemi *et al.*, 2013), Kishore (2008) corroborated this position. While men are ably represented, women are somewhat underrepresented in the global technology workforce.

To ensure the participation of all, most especially the women in science and technology, the United Nations recognised through the Fourth UN World Conference on Women (1995) that, women's empowerment and full social participation are necessary in building a developed, peaceful and equal world (Aderemi *et al.*, 2013). Though, women's inclusion and participation, to a certain degree, increased in the 21st century (British Council, 2001; ISACA, 2017), many of these challenges remain puzzling and, therefore, need to be addressed in the workplace and higher institutions of learning. Being a societal and economic concern, and amongst the multiplicities of limitations existing in literature today, this study conceives gender in civil engineering as a focus to be explored due to the longstanding belief that the field of study remains with the male domain (Zacaj, 2010).

The culture of change in the global age has improved in most societies, as it has negated the belief that has been in tradition over the years. The stereotype in the field of engineering was so evident that the children and youth believe the field aim at designing bridges, machines and buildings or constructing roads, and in its emphasis, it was a discipline or profession made for the men, not the women. Contrary to this misconception, there have been few changes in the enrolment and graduation pattern of females and males in higher institutions today. Though, while some developed climes are improvising some approaches and retaining the females to encourage or mainstream gender in engineering education, other climes, specifically Nigeria and Rwanda, are striving to humanise gender in engineering owing to some factors like cultural barriers, religious ideology, admission requirements early marriage, among others.

This study recognises the educational, economic and social implications that civil engineering education poses in bringing about sustainable growth and development in the 21st century. Having recognised the growing concern of gender gap or differences, this study aims to justify its position by providing the graduating records of

students in the Departments of Civil Engineering, University of Ibadan, Nigeria, and Institut d'Enseignement Supérieur de Ruhengeri (INES-Ruhengeri), Rwanda. This paper also recognises the need for female education as a way to mainstream the existing gap and further create a neutral atmosphere devoid of restricting females from participating, enrolling or participate in engineering programmes.

### **1.1 Addressing the Gender-Gap**

The United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2019) described gender gap as a degree of imbalance between males and females in access and participation in sciences and technology courses or the differences between males' gross enrolment and females' gross enrolment in science and technology courses. UN equally establishes gender equality as a human right and an essential component of sustainable development (Organisations, 2017). Aremu and Michael (2014) reported that male and female perceptions differ in technology use, and there is a substantial difference in the acceptability and usability of computer-based learning packages for electrical and electronic technology. This signifies that male and female students differ in how they perceive technology courses; males perceive it as noncomplex while females perceive it as very difficult. This is possibly one of the reasons the female and male genders find it hard to participate in most science and technology courses.

Learning engineering courses is a national and worldwide phenomenon for gender barriers. Mburu and Hu (2005) conceive engineering to be one of the most crucial professions, yet populated by men globally. Several studies have also indicated various gender-related challenges in the school system that prevent women from choosing engineering education. The challenges are many but the prominent one is the perspective that – 'it is a male profession, not for the women'.

In Nigeria, the educational imbalance between male and female students in science and technology education is due to reasons such as cultural barriers, religious ideology, and early marriage (Chima, 2013). These problems may interrupt female students from achieving their completest perspective in solving environmental change. Famolari (2014) discussed the gender gap for women in science and technology as a well-known subject today that women held less than 25% of the positions in Nigeria's STEM companies. In contrast, recent studies in the USA and

European countries show that men and women have the same qualification in the relevant subject areas in high school (Kolmos *et al.*, 2013). As the fundamental people in society, girls need education beyond basic literacy, occupying them with practice tools to actively participate in complex problems facing the globe.

To promote gender equality, the Rwandan government recognises that the basic skills of science courses are needed to equip women with the knowledge, confidence, and creativity to address significant problems in the community. The teachers are encouraged to focus on pedagogical practices and attitudes in engineering subjects in Technical Vocational Educational Training (TVEI) schools and Universities by empowering laboratory equipment. Consequently, the concentration on teachers would reduce the gender gap and further improve girls' performance and learning outcomes. Also, through the Imbutu Foundation introduced in Rwanda, girls realised the kernel of engineering and saw reasons to participate because of its realities. In addressing the gender gap, this paper realises that scholarships availability provided for females in Rwanda, unlike Nigeria, has contributed to the increase of female engineering graduates in the contemporary age.

## **2. Method and Materials**

Data were collected from the Department of Civil Engineering and University of Ibadan, Nigeria. The data were generated based on the number of graduating students from the undergraduate programme at the University of Ibadan from 2016 to 2021. Data were also collected from the Department of Civil Engineering of INES Ruhengeri, Rwanda. The data were generated from the graduating students in the department from 2016 to 2021. All results were analysed based on the comparison of gender balance and representation using Microsoft Excel tools. A comparison was made between male and female students in the Department of Civil Engineering of the University of Ibadan and INES Ruhengeri for each session. The small sample size and variable student intake may affect the calculated values, but this paper is aimed at investigating the trend.

### 3. Discussion of Findings

Out of the 184 graduating students in the Department of Civil Engineering, the University of Ibadan, Nigeria, from 2016 to 2021, 24 were female and 160 were male.

Table 1: Gender data of the graduating civil engineering students of the University of Ibadan (2016 – 2021)

<b>Session</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>2015 – 2016</b>	37	5	42
<b>2016 – 2017</b>	35	2	37
<b>2017 – 2018</b>	23	7	30
<b>2018 – 2019</b>	37	4	41
<b>2020 – 2021</b>	28	6	34
<b>Total</b>	<b>160</b>	<b>24</b>	<b>184</b>

Among the 679 students who graduated from the Department of Civil Engineering, INES Ruhengeri, Rwanda, between 2016 and 2021, 107 were female and 572 were male.

Table 2: Gender data of the graduating civil engineering students at INES Ruhengeri (2016 – 2021)

<b>Session</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>2016-2017</b>	46	18	64
<b>2017-2018</b>	111	17	128
<b>2018-2019</b>	98	25	123
<b>2019-2020</b>	172	24	196
<b>2020-2021</b>	145	23	168
<b>Total</b>	<b>572</b>	<b>107</b>	<b>679</b>

### **3.1 Distribution of female students per academic session**

#### **3.1.1 INES Ruhengeri**

Figure 1 shows the number of female civil engineering students from 2016 to 2021. It was revealed that there is an increase in the number of female graduands from 18 in the 2016/2017 session to 23 in 2020/2021.

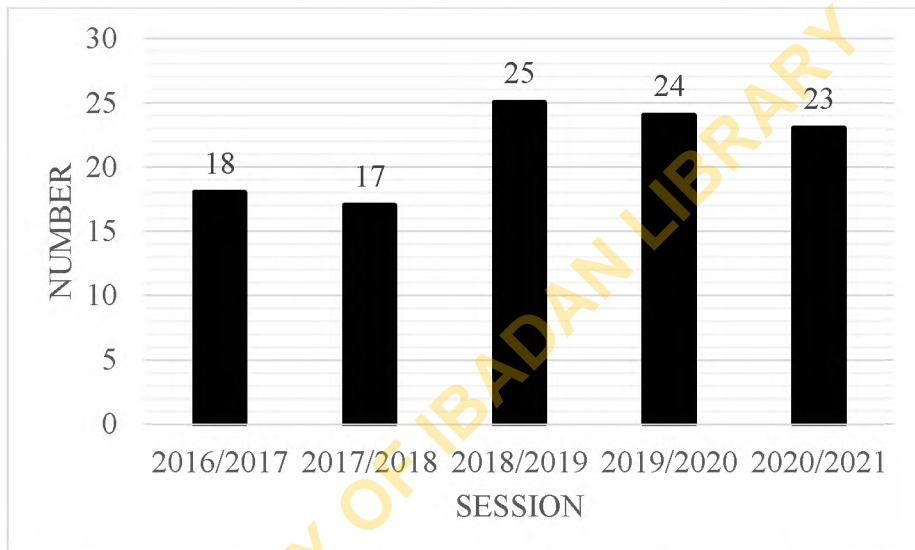


Figure 1 Graduating female students in civil engineering at INES Ruhengeri (2016 - 2021)

The scholarship the Forum for African Woman Educationalists (FAWE) Rwanda provided to the economically challenged girls to join INES-Ruhengeri motivated the increase in the number of female students in the Department of Civil Engineering. The scholarship scheme reflects solid progress beyond uniformity in basic literacy to practice to empower the basic skills of girls.

#### **3.1.2 University of Ibadan**

The distribution of the female graduating students in the Department of Civil Engineering, University of Ibadan is shown in Figure 2. Over the years, there has been an increase in the number of female graduating

students; while 5 female students graduated during the 2015/2016 session, 6 female students graduated in the 2020/2021 session.

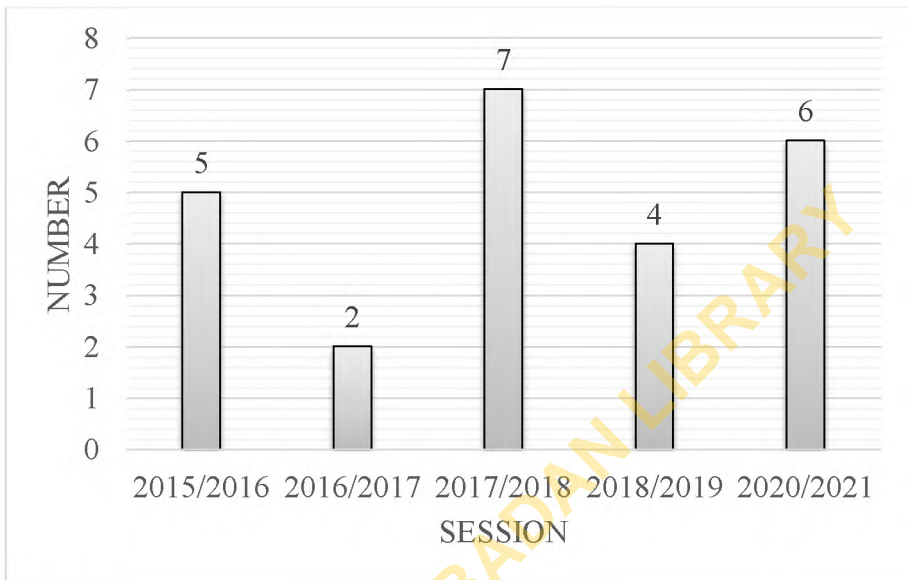


Figure 2 Graduating female students in civil engineering at INES University of Ibadan (2016 -2021)

The low number of female graduating students can be attributed to a lack of motivation, the perception that engineering is a male-oriented field, engineering involves heavy lifting and the lack of policies bridging the gender gap in STEM.

### ***3.2 The comparison of female and male distribution per session***

#### ***3.2.1 INES Ruhengeri***

Figure 3 shows the number of male and female students who studied civil engineering during the five academic sessions. Results showed an increase in the number of male graduating students from 46 in 2016/2017 to 145 in the 2020/2021 session. Also, the number of female graduating students increased from 18 in the 2016/2017 session to 23 in the 2020/2021 session.

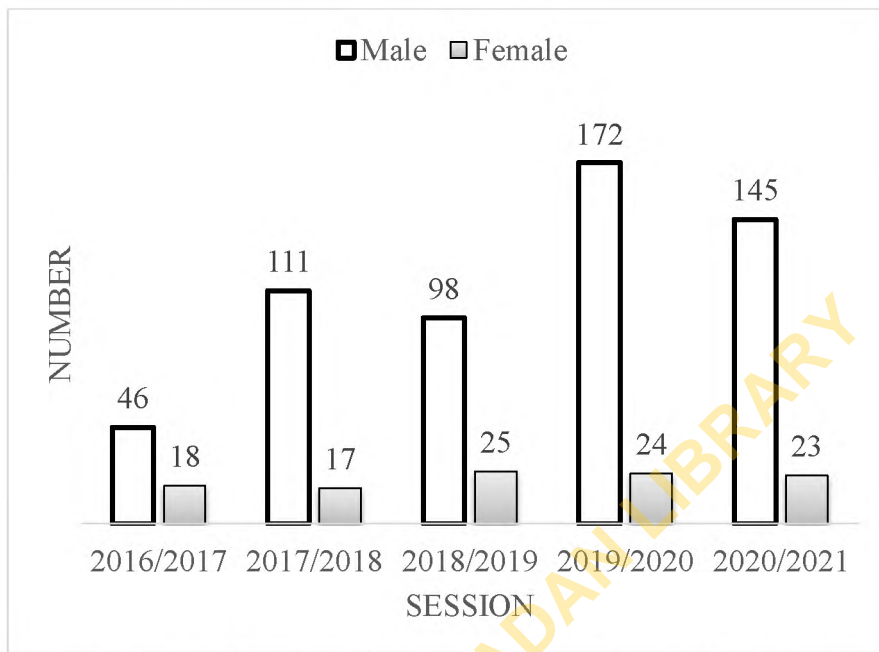


Figure 3 Number of male and female graduating students in the civil engineering department, INES Ruhengeri (2016 - 2021)

The difference in the number of graduating students of both genders was highly significant in all five sessions.

### 3.2.2 University of Ibadan

Considering the yearly gender gap in the Department of Civil Engineering, University of Ibadan, Figure 4 shows the number of male and female graduating students in the department between 2016 and 2021. While the 2017/2018 session had the highest number of female civil engineering graduating students with 7 students, the 2016/2017 session had the least with 2 students. And while the 2015/2016 and 2018/2019 sessions had the highest number of male civil engineering graduating students (37), the 2017/2018 sessions had the least (23).

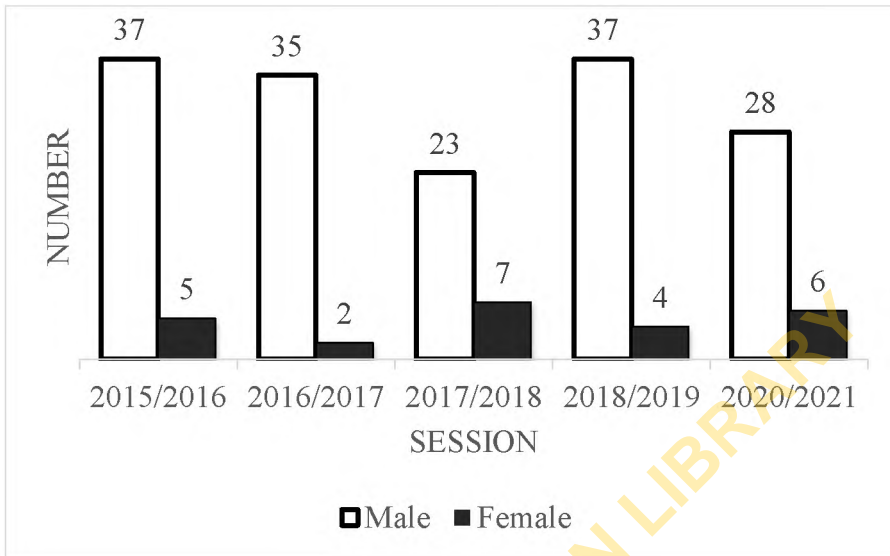


Figure 4 Number of male and female graduating students in the civil engineering department, University of Ibadan (2016 - 2021)

Over the years, there has been no significant reduction in the gender gap, as seen in Figure 4. Although the number of male graduating students decreases as the year progresses, the increase in female graduating students is not significant; hence the gender gap remains with year progression.

### 3.3 The percentage distribution of male and female students

#### 3.3.1 INES Ruhengeri

Figure 5 indicates the percentage of male students relative to female students. The percentage of male students increased from 72% in the 2016/2017 session to 86 % in 2020 /2021. In contrast, the percentage of female students decreased from 28 % in 2016/2017 to 14% in 2020/2021.

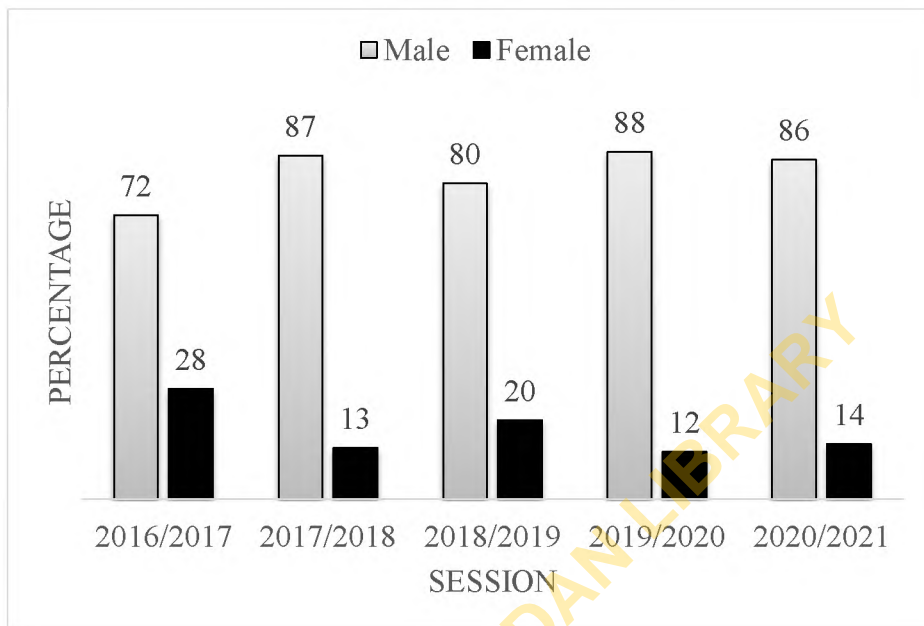


Figure 5 The percentage distribution of male and female civil engineering graduating students at INES Ruhengeri (2016 - 2021)

### 3.3.2 University of Ibadan

Figure 6 shows the percentage variation of male and female graduating students in the Faculty of Technology, the University of Ibadan throughout the study. The percentage of female civil engineering graduating students increased from 12% in the 2015/16 session to 18% in the 2020/21 session. However, we had a decrease in the number of male civil engineering graduating students from 88% in the 2015/16 session to 82% in the 2020/21 session.

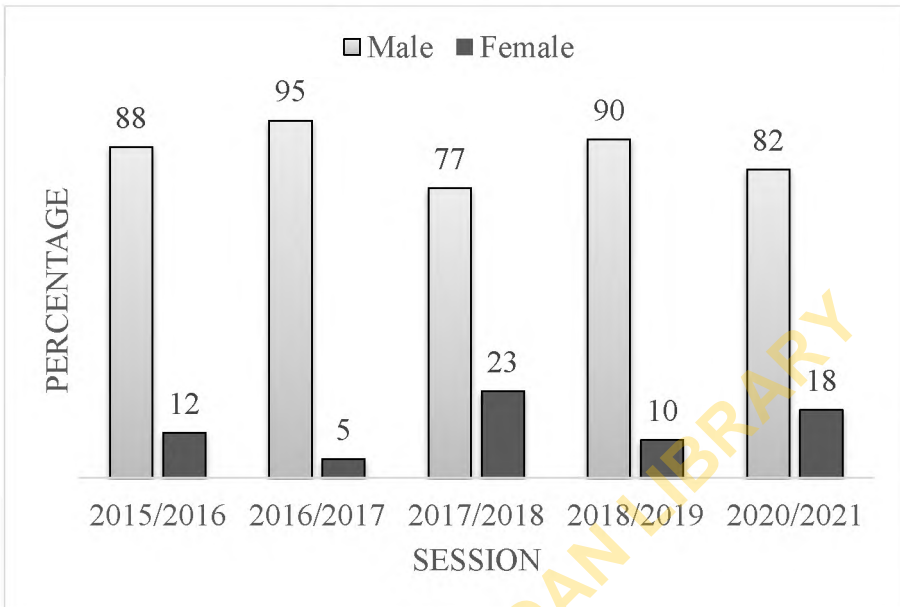


Figure 6: The percentage distribution of male and female civil engineering graduating students at the University of Ibadan (2016 – 2021)

The result shows a form of progression; however it is insignificant, which agrees with existing literature that factors contributing to the gender gap in STEM are cultural biases; that science is the domain of males and not essential for girls' future lives, and that girls are not as capable as boys when it comes to science learning. According to Kolmos *et al.* (2013), the most important motivational factors for students in engineering education are good social and financial motivation.

From the results gathered, there was an increase in the percentage of female graduating students from 12% in the 2015/2016 session to 18% in the 2020/2021 session, and a reduction in the number of male engineering graduating students from 88% in the 2015/2016 session to 82% in the 2020/21 session in the Department of Civil Engineering, University of Ibadan, Nigeria. At INES, Ruhengeri, the percentage of male graduating students in the department increased from 72% in the 2016/2017 session to 86 % in 2020/2021. The percentage of female students decreased from 28 % in 2016/2017 to 14% in 2020/2021.

There are several reasons attributed to this. They include but are not limited to religious beliefs, cultural barriers, lack of female role models, lack of motivation, the perception that engineering is a male-only field,

and engineering being heavy lifting and one with a lack of gender-incorporated policies.

#### **4. Conclusion**

Despite the great strides toward ensuring gender equality over the past few years, there are yet several professions where women are underrepresented, Civil engineering being one. This is evident from the results gathered from the University of Ibadan in Nigeria and Institut d'Enseignement Supérieur de Ruhengeri (INES-Ruhengeri) in Rwanda. The result agrees with existing literature gathered that there is a disparity in the number of male and female civil engineering students as the year progresses. The Department of Civil Engineering recorded a slight increase in the number of female graduating students from 5 in the 2015/16 session to 6 in the 2020/21 session, which represents a 20% increment and a slight reduction in the number of male graduating students in the department from 37 in the 2016/17 session to 28 in the 2020/21 session, which represents a 32% reduction. At INES, Ruhengeri, the number of male graduating students in the Department of Civil Engineering increased from 46 in the 2016/17 session to 145 in 2020/21, showing an increment of 215%, and the number of female students increased from 18 in 2016/17 to 23 in 2020/21 showing an increment of 28%. The overall percentage of females in civil engineering education is below 20% compared to over 80% of males in the two institutions.

There are several reasons attributed to this and they include religious beliefs, cultural barriers, lack of female role models, lack of motivation, the perception that engineering is a male-only field, engineering involves heavy lifting and the lack of policies bridging the gender gap in STEM. This gender gap can be bridged by reorienting students and parents on the need to choose science and engineering-oriented subjects, employing female role models in STEM fields so as to spur female student interest and providing scholarships for female students in STEM-based courses so as to increase their motivation. Lastly, this paper also recommends a larger study should be conducted in Africa as the continent can never escape poverty if females are not trained to the level where they can earn sustainable incomes.

## References

- Abubakar, A., Abdullahi, N., Abubakar, M. and Aliyu, A. (2019). Gender Gap in Science and Technology Education in Nigeria. *International Journal of Education and Evaluation*, Vol. 5(3), 13-21. ISSN 2489-0073
- Aderemi, H., Hassan, O., Siyanbola, W. and Taiwo, K. (2013). Trends in enrollment, graduation and staffing of science and technology education in Nigeria tertiary institutions: A gender participation perspective. *Academic Journals*, Vol. 8(21), 2011 - 2020.
- Aremu, A. and Michael, B. E. (2014). Gender differences in acceptability and usability of computer-based learning package in electrical and electronic technology in Nigeria, *Journal of science and education publishing from scientific research to knowledge*, Vol 1(10), 10-19.
- Borrego, M., and Bernhard, J. (2011). The emergence of engineering education research as an internationally connected field of inquiry. *Journal of Engineering Education*, Vol. 100(1), 14-47. <http://dx.doi.org/10.1002/j.2168-9830.2011.tb00003.x>
- British Council (2001). Women in Science, Engineering and Technology: UK experience; Briefing sheet 16.
- Bureau, G. E., & Office, C. (2019). White Paper on Gender Equality 2019. (June).
- CEBR. (2016). Engineering and economic growth : a global view. Royal Academy of Engineering, (September), 1-80. Retrieved from <https://www.raeng.org.uk/publications/reports/engineering-and-economic-growth-a-global-view>
- Chima, M. (2013). History of science education in Nigeria. Retrieve on 08/03/2021 From [www.martinslibrary.com.blogspot.in/2013/03/history-of-science-education-in-Nigeria-HTML?m=1](http://www.martinslibrary.com.blogspot.in/2013/03/history-of-science-education-in-Nigeria-HTML?m=1).
- EAC. (2009). Gender and Community. (January). Organizations, U. A. E. (2017). Gender balance guide. (September), 1-66.
- Famolari, D. (2014). With a clear gender gap in science, technology, engineering, and math (STEM). Retrieve on 08/03/2021 from [www.varizonventures.com/blog/2014/12](http://www.varizonventures.com/blog/2014/12).
- Fomunyan, G. F., Matola, N. and Moyo, S. (2020). Gender and Gender Mainstreaming in Engineering Education in Africa. *International Journal of Engineering and Advanced Technology (IJEAT)* ISSN: 2249-8958.
- ILO. (2019). A Quantum Leap For Gender Equality: For a Better Future of Work For All. Retrieved from [www.ilo.org/publns](http://www.ilo.org/publns).

- ISACA (2017). Women in Technology survey, “The Future Tech Workforce: Breaking gender barriers”. Available: <http://www.isaca.org/info/2017-women-in-technology-survey/index.html>?
- Jesiek, B. K., Newswander, L. K., and Borrego, M. (2009). Engineering education research? Discipline, community, or field? *Journal of Engineering Education*, 98(1), 39–52. <http://dx.doi.org/10.1002/j.2168-9830.2009.tb01004.x>
- JICA. (2012). Country Gender Profile : Rwanda Final Report Japan International Cooperation Agency. (December).
- Kayibanda, A. (2018). Gender Equality Strategy : UNDP Rwanda (2019 - 2022).
- Kishore L (2008) Girls, women in science & technology education. Merinews online publication.
- Kolmos, A., Mejlgaard, N., & Haase, S. (2013). Motivational factors, gender, and engineering education. *European Journal of Engineering*, (June). <https://doi.org/10.1080/03043797.2013.794198>
- Mburu, W. P., & Hu, X. (2005). Female Engineering Students : Career Motivation and Their Learning Experience. *Engineering Education*, 1–10.
- Pawley, L., Schimpf, C. and Nelson, L. (2016). Gender in Engineering Education Research: A Content Analysis of Research in JEE, 1998-2012. *Journal of Engineering Education Vol. 105(3)*, 508–528
- UNESCO. 2019. L'Oréal-UNESCO for Women in Science Programme. International Rising Talents. Retrieved from <https://en.unesco.org/science-sustainable-future/women-in-science/rising-talents>
- Zacaj, A. (2010). Gender Differences in Engineering Education: An Exploratory Study. A thesis presented to the University of Waterloo, Waterloo, Ontario, Canada.

## **Acknowledgements**

Part of this work was carried out at the Institut d'Enseignement Supérieur de Ruhengeri (INES-Ruhengeri), Rwanda by Folake O. Akintayo during a short research visit funded by the Royal Academy of Engineering (UK), grant number HEPSSA 1921/3/58. Opinions reflect those of the authors and do not necessarily reflect those of the funding agency.