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Research paper

Gender qualities, creativity and performance in geosciences in a sustainable university system for global capacity building

Ademila, Omowumi

Department of Earth Sciences, Adekunle Ajasin University, Akungba-Akoko, Nigeria
Corresponding author E-mail: omowumi.ademila@aaua.edu.ng

Abstract

Contributions of women to global politics, policy making, education and community development in the contemporary world despite their active familial roles and declining economy has led to sustainable global development. Their prominence has not been felt in geosciences to harness endowed earth's treasures. Women academic geoscientists play vital roles investing into the future of countries for improved human lives. This study focuses on imbalanced gender structure of staff and students of Earth Sciences in a university system with intention to promoting gender inclusiveness in geosciences. The study employs sex-based counts of students (males and females) and women academics in Earth Sciences to investigate the reason(s) for low proportion of women in academic career in Nigerian university system. Data acquired from 2018 - 2023 academic sessions, revealed that < 13% female students defended their final year projects in a male dominated academic staff department that has one female in the staff gender composition. Thus, emphasis on employment of more female lecturers in geosciences in university system's policy and other establishments would add value to their roles in global capacity building. This would advertently boost female students' enrollment because of gender inclusiveness and performance of female folks at all levels of their academic pursuit. It guarantees quality in moulding and training students, enhances gender equity in the system by motivating them to take up academic careers, and as role models to emulate. This promotes women diversification in Earth Sciences, thus motivating and boosting their informed participation, creativity and improved solutions to their environment.

Keywords: *Capacity Building; Gender Composition; Gender Inclusiveness; University System; Women Academic Geoscientists.*

1. Introduction

Recently women have developed more skills and technical know how to tackle societal problems and infrastructural defiencies globally by engaging in acquisition of useful competencies that meet contemporary demands for enhancement of human lives. Pressure on scarce resources of Nigeria has prompted women diversification into different fields of geosciences. Inclusion of women in inter-governmental policies and decision making has brought creativity and aspiration to end gender inequality most especially in the labour market to boost women's status in diverse professions and enhance national development. Women in academic sciences and technology particularly in geosciences are playing vital roles investing into the future of countries to ensure improvement of human lives and society. The clamour for national development is associated with youth and women empowerment, as women's emancipation hold the key to the future. Sustainability of all the aspects of national integrity and development (socio-economical, moral, educational and political) can only be achieved by women involvement in professional career of science, law and engineering studies, thus creating synergy between women empowerment and gender qualities in capacity building. This is due to their endowment in transforming the country through their wealth of knowledge, creativity, initiative and resourcefullness. Perception that women are not competent and capable to engage in practical oriented courses of Science and Engineering is one of the major reasons for women under-representation in these disciplines. This imbalance leads to unequal gender treatment witnessed in Earth Sciences/Geosciences today. Geophysics is a professional area that women have shown interest in, for advancement and life changing experience. Breaking gender barrier through initiatives would encourage female students into geosciences end the struggles encountered in the discipline in order to make use of the opportunities in acquisition, developing skills for better performance and innovative application of new technologies. This study aims at promoting gender inclusiveness in science, engineering and technology particularlly in field-based academic disciplines like geosciences in tertiary institutions, to harness the endowed treasures of the earth. This intends to establish the trend of promoting women's participation in exploiting the treasure of geosciences, engineering and technology for enhancement of human lives with a view to motivate, attract and spur the potentials in female folks participation for creativity and improved decisions in finding solutions to earth's problems.

2. Methodology

This study is borne out of mind to focus on gender issues of imbalanced gender structure of staff and students, final year field-work data acquisition projects selection by male students compared to their female counterparts with preference for less technical projects. Women marginalization in geosciences has been a major concern that has a negative impact on workplace environment and the profession. This study would proffer solutions to regulate the professional structure to bring into limelight the full potentials of women in the profession by admitting more female students in tertiary institutions and recruiting more women into different levels of geoscience specialization (career advancement). This is for innovate skills enhancement for the purpose of ensuring robust socioeconomic, financial growth and greater human capital development.

2.1. Women in geosciences

This study employs sex-based counts of students (male and female) and women academics in geosciences (geology and geophysics) to investigate the reason(s) for low percentage/proportion of women in academic career in Nigerian university system compared to their male counterparts. The results of this study (number of women academics and female students in geosciences) were subjected to statistical analysis; correlation coefficient, t-test and regression. From the data-based method, it was observed that the percentage of women within academia reduces gradually with increasing rank. Thus, the emphasis should be on the employment of more women in the university system, industries and other establishments to add value to their roles in nation capacity building. Employment of more women academics in the university system would offer gender equity in the system and motivate female undergraduate who aspire to take up academic career as role models and emulate their good steps in the chosen career. The roles of women in the society cannot be overstated because of their characteristic feminine nature, which is full of conscientiousness, supportive, diligent and nurturing roles which make them successful in their chosen career irrespective of contemporary challenges. Women academics personality and hardworking spirit plays active role in teaching process, which facilitates learning techniques that boost students' interaction and exchange of views that build cognitive, emotional and psychomotor aspect of students. Women academics show good examples in her work and assignment of responsibilities from which students emulate, learn and acquire new behaviour in dealings with diverse aspects of life. This has made teaching profession in tertiary institutions more attractive to women despite the battering from the society in shaping the minds of students and the future of the country. The fact that women lately arrived into the academic world should not be the yardstick for their underrepresentation in policy making and leadership of the university. Supporting and enhancing the status and levels of women in academics and industries would offer them the opportunity to network, mentor and serve as role models to the younger generation thus creating effective means of improving female involvement in diverse professional disciplines for nation's building and development. Women in Geosciences are full of energy and enthusiasm to make differences in their chosen careers by encouraging and inspiring students to be their best. Involving more women in geosciences guarantee female students approval and confident to pursue higher education to explore career/professional opportunities for educational and human capacity building. This would also reduce dropout rates of female students in universities, in order to be suitable for decision-making positions and be relevant in the society. Undermining the potentials of women would end up in developmental failure and retrogressive life style cycle. The intention to bring positive idea and innovation in increasing the low percentage of women in academics and geoscience despite their late arrival into the men dominated academic world calls for attention. This would involve designing a functional structure that would enhance development with focus on promoting female students' education at all levels, building capacity, soliciting for more women involvement in professional disciplines and empowering women academics. This is to influence changes in the decisions, policies, administrative and leadership positions of the university system.

2.2. Study strategy, time and data

Geology and Applied Geophysics studies (Department of Earth Sciences) at Adekunle Ajasin University, Akungba-Akoko, Nigeria, as case study started at inception from its relocation from Ado-Ekiti, Ekiti State to Akungba-Akoko, Ondo State in December, 1999. This study is conducted with a total of 510 students completed and defended their compulsory final year six-credit project work to earn their degree in their chosen area of specialization. Out of the total number of students, 61 (12%) were female and 449 (88%) were male students (Table 1), this indicates that based on student gender, < 13% of the students who defended their final year projects between 2018 – 2023 academic years were female. The final year project is designed for students to demonstrate their skills and knowledge in any of the subjects taught in the course of their degree studies. The final year project topics given by academic staff or chosen by students directly under their lecturers' supervision and modified to meet contemporary trend. The departmental permanent teaching staff during the period of study were 21, of which only two are women but at the time of writing up this research work, one of the two female lecturers was no more working in the department. This analysis shows 5% female lecturers, which is lower than the 12% female students for geoscience degrees. Scarce representation of female in this field of geoscience is linked to reluctance to take on time-consuming field work mapping, lack of skills and mentorship roles of women, imbalances between home and work responsibilities, low level of productivity to meet targeted goals and the notion that women are less career-oriented compared to men. The performance of students in this discipline over the years would have improved if there were more female lecturers because of their roles in contributing to the development and success of the students.

Table 1: Number of Students That Defended Their Final Year Projects Between 2018 – 2023 Academic Years

Academic year	Total students	Male	Female
2018	79	60	19
2019	95	76	19
2021	129	120	9
2022	169	158	11
2023	38	35	3
Total	510	449	61

3. Contributions of women academics in geosciences to the society

Women have been noted to contribute immensely to the success and development of society with their abilities, knowledge and personalities presenting them as great virtue and specially created figure of God to motivate people (old, young, female, male and children) in

achieving great feats in all aspects of human endeavours in the society. Women in this contemporary world with their peculiar nature have positively impacted on people and act as role models in different capacities. Women have considerably been engaged in education but with lowest proportion in geosciences occupations (Gonzales, 2010). Hence, the need to increase the number of qualified women in geosciences within the education system by revising the appointment and promotion policies of university academic manpower to facilitate the increase. Also, publicize the achievement of women in geosciences to motivate aspired female students enrollment into the discipline (Hill et al., 2010; Pereira, 2014; Gill and Bullough, 2017) with impressive career performance for maximum benefits and global capacity building. Female board members are more vibrant, readily prepared for meetings and curious in their dealing than men for better performance and improvement of an organization (Virtanen, 2012). Women academics especially have played important roles in shaping and training future leaders in various disciplines for nation's building and development. Women academics in this 21st century have advanced to top by climbing the academic ladder positions of leadership of becoming the Vice-Chancellor, Deputy Vice-Chancellor, Deans and Professors in universities worldwide with high productive academic work than their counterpart. The innate skills of women academics which comprise of good foresight, supportive and prudent among others, give them upper hand which keeps them intact, coping with stress in academics and societal challenges. Increase in number of women academics has brought positive changes and gender sensitivity to university system which have made students (male and female) feel more comfortable in their studies and free to interact with their lecturers without intimidation. The qualities of women academics in supporting and empowering students has helped indigent students and other purposeful women in academic world to address some issues in their studies and disciplines to actualize their dreams of building talented scholars that would be beneficial and impact positively on the society. Women propensity to good leadership and potential to understand students better than their male counterparts endows them with the ability and strength to excel at higher levels managing the affairs of the university system. Without bias, Nigerian women academics have led new frontiers in academics through their influence and motivate a good proportion of women who have flair for teaching and research in postgraduate class to choose academic career. Flexible and innovative interaction of women academics in geosciences with students has also equipped them for success in all ramifications of life. This is due to the fact that they understand that they are mothers to students and strive to enhance their teaching management, professional and research skills through effective contemporary technology to adapt to new teaching skills through collaboration and research thereby encouraging students to learn, make themselves relevant to new trends in their area of specialization and prepare the future generation of women academics to trend better and higher in the academic world without stress. The interview with some of the students revealed cogent reasons for choosing Geology and Applied Geophysics as their course of study. It all boils down to positive impact of the teaching staff on students, apart from creating robust professional links with geoscience industries, academic institutions, recognized and practicing geoscientists in and around the country. The course would train students to have requisite knowledge of the basic features, processes, and techniques of the application of geophysics to diagnose the subsurface setting for foundation integrity and stability. This would boost research and collaboration skills on sustainable infrastructural and quality environmental development of their states and country. Students of this course would be relevant in civil engineering construction companies, science and technology sector, groundwater exploration (borehole companies), geotechnical industries, environmental monitoring and techniques for remediation and effective sustainable solutions. The course will also offer the students the boldness to interact with scientists, engineers, geoscience practitioners, policy-makers and other relevant stakeholders to share their knowledge and experience in the field to effectively characterize the heterogeneous subsoil properties beneath engineering site and enhance successful and sustainable structural development. This course (Geology and Applied Geophysics) will equip students with the needed theoretical and practical training on how to maximize the benefits of diagnosing subsurface geology and reducing the challenges of frequent structural failure. In essence, the students acquire practical skills on how to use geophysical techniques to investigate the geological setting of sites for the design and construction of civil engineering works. The course will expose students to practical and state-of-the-art geophysical tools for exploring and characterizing the subsurface geology.

3.1. Outstanding qualities of women in geosciences

Access of women to quality education guarantees their advancement in diverse professions and enhances their roles in geosciences despite social, political and technological changes. Women's decisive contribution in education, politics, policy interventions and community development are channels to green economy, social and environmental sustainability. Despite the restrictions enforced on women by society, records have shown a number of successful women who have made it to the zenith of their career in their various disciplines. This has made constant entrance of women in academic profession advantageous to the society because of their passion for their work and diligence which motivate students to learn. Nowadays, women are actively involved as geologists, geophysicists, engineers and decision-making experts in the execution of environmental project works. Ademila, Omowumi an Associate Professor of Adekunle Ajasin University, Akungba-Akoko, Nigeria has employed different geophysical methods and geotechnical analysis to unravel the intrinsic reasons for continuous highway failure in Sub-Saharan Africa and proffered lasting solutions for sustainable highway to prevent human and valuables losses (Ademila and Olayinka, 2020; Ademila, 2021; Ademila, 2022). Maureen Raymo, a Research Associate Professor of Boston University stated that rise of mountain ranges (Himalayas) cause greenhouse effect reversal with its weathering resulting to removal of CO_2 from the atmosphere causing global cooling which form the basis of carbon cycle controlling life on earth. Also, Marcia McNutt was the first woman to run a self-sponsoring institute of oceanography with over 200 staff in United States, where she inspired a team of scientists and engineers to develop best instruments and platforms globally used for deep-sea research (Association for Women Geoscientists (AWG), 2002). Emmy Noether is another renowned woman to devise Noether's theorem (mathematical principle) which form the basis of quantum physics from which the general relativity theory was derived. Another distinguished first woman Professor of science at Harvard, Cecilla Payne-Gaposchkin proposed that all stars are composed mainly of hydrogen and helium. Beatrice "Tilly" Shilling, an aeronautical engineer and a motorcycle racer winner, who designed a small metal ring suitable for aircraft engine fuel line to ensure consistent free flow of fuel. This helped the British fighter pilots of World War II to dive with no anxiety on engine cut-out (AWG, 2002). This shows that women have been contributing and performing excellently in the field of geosciences, despite their low involvement in the profession through life changing roles they played in the history of geology and its advancement (Gonzales, 2010; Higgs and Wyse Jackson, 2007).

4. Results and discussion

Educating a girl child is likened to educating a nation. This is because educated women would invest in their children's education. Investing in human capital and education of girls and women is certainly a significant means of advancement. Thus, there is need to focus

on ensuring that girls have equal access to primary, secondary and tertiary education as their male folks. Enrollment rates of girls into primary schools are equal with the boys but contend with culture, norms of inferiority of girlchild and religion. Women should not be seen as wives and mothers alone but as endowed treasure of environmental growth and development. Wrong ideas, wrong family advice, counselling and lack of role models have made female students uncomfortable and unstable in geoscience studies. Also, restriction of girls in the study of science, engineering and technology, has limited the future career choice of youthful girls in such disciplines. Low proportion of female students than their male peers during their final year project defense (Fig. 1) indicate their continuously low rate in geoscience academia and research careers with resultant effect of few women at the career peak. Dropout rates of female students in geosciences are much higher than their male peers. Enhancing the education quality of female students in geosciences should include giving them scholarships and bursary at different levels of their studies which would attract them to the field. It was found that larger number of students (male and female) admitted into 100 Level are more than the number of students that eventually defended their project in 400 Level as they kept decreasing as they progressed to higher classes of their studies. Thus, strategies should be put in place to address some of the issues driving them out of geosciences to other departments. Provisions should also be made for female students' counsellors to work on their undue anxiety of low esteem by consistently guiding and encouraging them. Works study scheme and students' soft loans have also been provided by the management for indigent students who might pull out because of financial constraint and this has gone a long way in encouraging their level of involvement in their academics, thus boosting their performance academically. Social activities have been introduced like Nigerian Mining and Geosciences Society (NMGS) Students' week, which make them socially involved, relax from studies of the four walls of classroom and refreshed with series of orientation programmes providing students with the importance of geosciences in exploring the earth for sustainable national development. The percentage of female graduates within the period of study (2018 – 2023) as shown in Fig. 2 is insufficient to boost the number of women in geoscience academia and the industries. This however shows that there is need for publicity amongst secondary school students planning for higher institutions on the benefits of geoscience and particularly female students in choosing successful academic and professional geoscience career. In the Department of Earth Sciences, the proportion of female students declines progressively at higher levels. Hence, the percentage of female students who earned the degrees decreased during this period of 2018 – 2023. Gender bias, low-admission and dropping out of female students before project defense to earn a bachelor's degree are factors contributing to gender disparity observed which has led to low percentage of female students receiving geoscience degrees between 2018 and 2023 (Fig. 2). Unequal provision, male students' preference for field work and practical, discrimination of female students in field mapping exercises, awards discrimination, secluded and hostile environment are also contributing factors to gender disparity. Gender equality can only be achieved with increased retention of female students and more women in geosciences. A scheme should be designed to combat the above factors for positive impact in advancing women in geosciences. Inclusion of female students and women in geosciences and other related male-dominated disciplines would encourage them to build their professional skills and excel at different stages of their careers. Female students in schools and women in organizations or workplace setting bring life and vigor as they are recipe for career change and development. Thus, government and some non-governmental organizations should collaborate with relevant agencies to empower and ensure the wellbeing of girls, female students and women. This study advocates for quality education in schools at different levels, through special means of motivating our young students in geosciences; to improve on their studies and reading habits with deliberate emphasis on the girl child and female students.

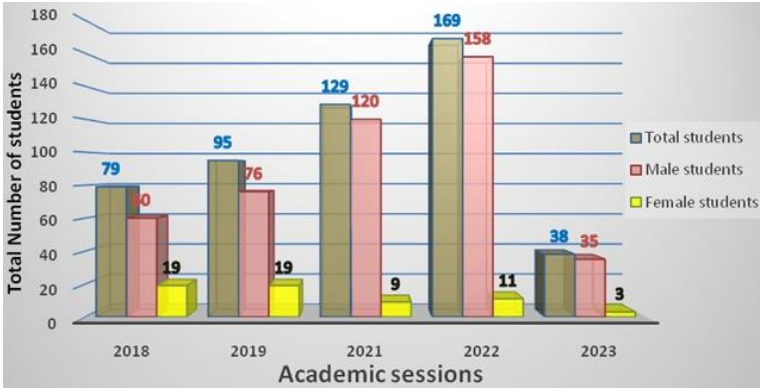


Fig. 1: Number of Final Year Project Students (Male and Female) Between 2018 – 2023 Academic Sessions.

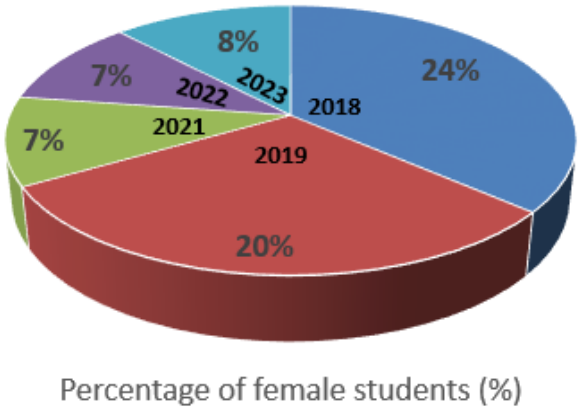


Fig. 2: Percentage of Female Students between 2018 – 2023 Academic Sessions.

Reluctance of scientific organizations to admit women has caused struggles for them especially in education and employment due to the belief that they are weak, unintelligent and unknowledgeable to engage in scientific studies. They are not encouraged to participate in

field-based work because of their inability to meet the challenges involved (Bracken and Mawdsley, 2004). However, involvement of women in education and gainful employment would boost their full potentials in the developmental processes and grant them access to better life. The society needs to build and inculcate confidence in girls and female students to study science related subjects/disciplines, as they are not difficult to comprehend. They should be encouraged to study sciences, engineering and technology courses at higher institutions. They need to understand that they have the ability to solve and tackle mathematical problems from primary and secondary schools and can make successful careers in geosciences. Jacobs and Steinberg, 1990 in their studies have shown that massive women intake into a certain profession lowers the prestige attached irrespective of political affiliations. Women constitute the minority observed in the leadership administrative positions, senior/professorial cadre within the University system (Fig. 3), senior management positions within public and private services. Hence, the need for more female students' admission into geosciences and other science related disciplines by the university management to invest and impact on them to compete favorably with their male peers by tapping their innate potentials. It also serves as a clarion call on the university administrators and government at all levels to employ more women in geoscience academia and other fields. Further investment in leadership skills, innovation, researching and collaboration skills will enable women function at different spheres of organizations for productive work. Results of the study (Fig. 3), highlights the need for support for indigent women in geosciences and more women participation in all spheres of leadership and governance. Improving the well-being of women in the society is of topmost priority to the host community leaders and government of the country to enable them contributes their quota to the nation's socioeconomic development. Devillard et al., 2012 attested that men benefit in an environment where women's efforts are geared up towards creating a comfortable and conducive working atmosphere as this would make them more active in their duties and parenting role without affecting their career prospects. This emphasizes the need for more female students to be trained in the sciences so that they can be admitted to study science based courses and add value to women in science leadership. Figure 3 shows staff gender composition in the department, dominated by males. This means that graduated female students from Earth Sciences ended up in other employment and not in academics. Between 2018 and 2021, the male lecturers increased, while the female decreased (Fig. 3). The small increase observed for male lecturers resulted from male students dominating the department thereby leading to more male lecturers. For the same period, the number of female lecturers (2) in 2019 declined to one (1) between 2021 and 2023 (Fig. 3). The present teaching condition of the Department of Earth Sciences with just a woman as an Associate Professor (Fig. 4) has boosted the performance of female students to study rather than dropping out of the department when they feel that they cannot cope academically. This instills in them a drive for hard work. Similar trend is noticeable for the professorial cadre, no woman is a Full Professor (Fig. 4) as well as in other cadres. Whitelegg and Smidt, 2004 suggested that an establishment having no female role models in the society detest career perception of working arrangements. Geosciences should not be considered a masculine field of study due to the fieldwork activities. Female role models should be reflected in appointment in the department and university as a whole so as to attract successful collaborative teamwork with robust productivity. Department of Geology in some other universities also fall into this category of no female professor despite decades of their existence (Higgs and Wyse Jackson, 2007) because of their reluctant to appoint female into their institutions unlike geological surveys and industries. Gender discrimination has discouraged and excluded women from excelling at different stages of their careers prevalently field geological/geophysical mapping right from undergraduate to postgraduate to senior academic levels. A special intervention scheme is needed to help graduate geoscience women access quality child health care and education to make full participation in field work exercise convenient. Boosting the morale and involvement of women in geoscience academia can be resolved by providing support and impactful strategies that would positively influence their career to be successful geoscientists to open doors for networking and collaboration in multidisciplinary research and knowledge sharing. Contributions of female academic staff in tutoring, supervising students' final year projects and monitoring their results to earn their degrees will prompt and promote professional development of real female earth sciences knowledge-based network. This will help the future female geoscientists and women in geoscience academia build a rapport of successful academic achievement with a synergy helping to accomplish female role models in earth sciences. Again, more female geoscientists involvement in teaching geoscience courses would make female geoscience students courageous and self-assured of their future career. The sense of discipline and professional activities introduced by the only female academic staff (author) of the department had form part of the departmental activities that have given female students hope, swap undue anxiety, build their morale and offer them the assurance of successful future career. From my experience at the university, women academics are more productive and impactful than their male peers. Women academics have the tendency to cope better with associated academic stress due to their characteristic innate nature and endowed patience to overcome encountered challenges which have made them relevant in academia. Positive change women have introduced in geoscience academic system balancing home and work is second to none, promoting new idea creativity, innovation and gender sensitivity within the university system. These show that women academics should not be neglected in decision making in the university educational policy, act and programmes to enhance development of teaching profession and promote democracy in education. This is due to women's feeling that any decision made today on education would determine our future and destiny. From the statistical analysis (t-test), t-value calculated (t_{cal} = 2.35) exceeds t-tabulated value, which shows that the limited number of female academic staff of the Department of Earth Sciences (Fig. 5) have significant effect on the female students of the department at 95% confidence level. This reveals that the contributions of female academic staff have created positive impact on students, their performance and global development. Correlation coefficient, r = 0.55 shows positive correlation between the limited female staff and female students of the department with regression equation (R):

$$y = 2.0 + 8.5x$$

This quantifies the relationship that exists between the limited female academic staff and female students of the department.
Where x stands for female academic staff, y is the female students of the department. It shows that the more the female staff in the department, the more the aspiration of female students even in high school to enroll for the course in the university and willingness to graduate to earn degrees in geosciences. The eagerness and enthusiastic to pursue their degrees and specialize in geosciences would in turn guarantee their maximum contribution to stabilize the economy for human advancement and global capacity building.

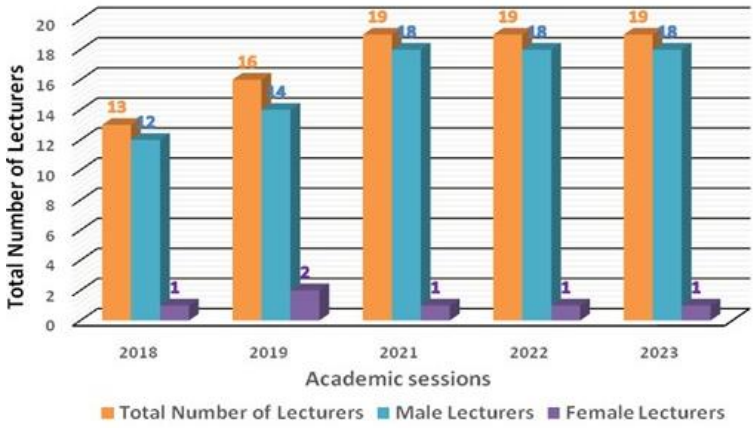
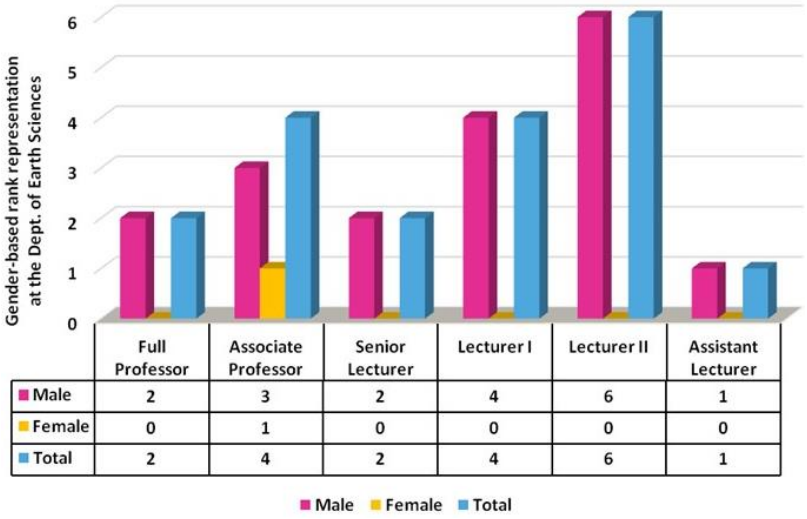


Fig. 3: Number of Academic Staff (Men and Women) in the Department between 2018 – 2023 Academic Sessions.



	Full Professor	Associate Professor	Senior Lecturer	Lecturer I	Lecturer II	Assistant Lecturer
Male	2	3	2	4	6	1
Female	0	1	0	0	0	0
Total	2	4	2	4	6	1

Fig. 4: Gender-Based Representation of Ranks InDepartment of Earth Sciences.

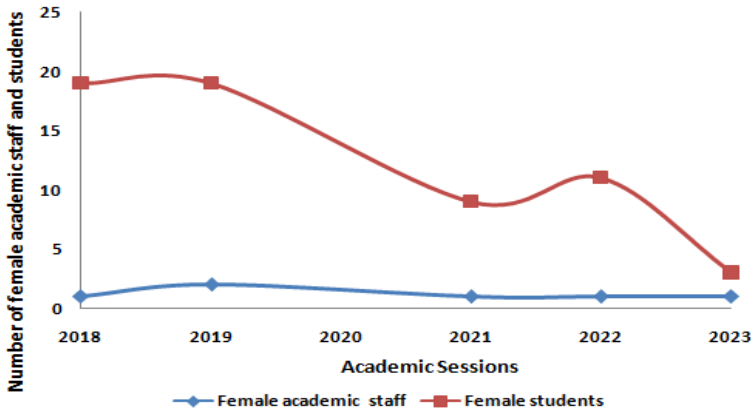


Fig. 5: Female Academic Staff and Female Students in the Department between 2018 – 2023 Academic Sessions.

4.1. Personal involvement in outreach/field programmes to encourage female students

As Nigerian Mining and Geosciences Society (NMGS) Staff adviser to students and Students Industrial Work Experience Scheme (SIWES) Coordinator in the Department of Earth Sciences, I build up rapport for good informal conversation and relationship with my students (males and females) and endear with them to pour their mind and needs to me at all times. I direct, monitor and mentor students in area of their academic needs and refer them to text books for enhanced knowledge in the area of their interest. I encourage them to focus on their studies and go with them to annual conferences/conventions of NMGS wherein they interface with other like minds (students) from other institutions and seasoned scholars (Professors) in national and international discourse to enlighten them more in all areas of geosciences. I expose them to scholarly studies for higher degrees by international donors (Schlumberger, Tech women and Full-bright grants and scholarships). I build confidence in the girl/female students by ensuring that they are not harassed by the opposite sex and ensure that they are fully integrated in all areas of geosciences' trainings. I passionately arrange for extra tutorials for students deficient in some areas to buckle up to face the reality of the courses. I organized monthly vivals in my courses for the students to appraise, showcase their knowledge and share that knowledge with others. I also expose them to interfaculty and inter-university competitions to expose them to new areas of global knowledge and capacity building. Again, I accompany my students on field mapping exercise for exposure in their projects. This enables them grab deep knowledge of their work, makes them focus in its applications and enhance inclusion of the environment. As resource person in Women in Nigerian Mining and Geosciences Society (WNMGS), this affords me the opportunity to

mentor women of other disciplines into specializing in geosciences. I facilitate their studies at postgraduate level and coordinate their internship to industries for content based knowledge.

4.2. Economic and environmental development

The perception that women are stifled, not intelligent to function at corporate levels involving economic decision-making and unable to cope in male dominated environment have become issues of great concern. Although, women are responsible for household management and more cautious of their environment, they are still addressed as inferiors in handling key areas of government and international organizations. This has made them continuing in the effort to improve their status academically, morally and socially with resultant positive effects on the society. Women representation at different management boards varies in all countries (Devillard et al., 2012) but then, gender equality policy must be adopted to promote gender quality and equality at all management levels. Variance in proportion of women across all sectors of leadership is driven by social, environmental and economic factors of specific establishment and country. From all indications, decision made without women involvement always end up in failure. This serves as a call to encourage women involvement in decision making positions to shaping the minds of female students and brightening the future of the country. Women academics are better teachers that not only teach but relate better to students to encourage and inspire them to be their best by assisting them pursue higher education. This would help students explore career opportunities and be willing to join the profession to introduce new teaching techniques to promote and guarantee the future of the profession. Professional negotiation skills are essential for women in leadership positions because not everyone is endowed with innate capability to succeed at negotiating with others for approval of proposals due to differences in opinions of individuals. Negotiation act portrays women as covetous and desperate to confidently interact and mingled with people to counter arguments for acceptance of their proposals especially in male dominated workplace setting. Significant hurdle for professional women and women academics in leadership positions is the negotiating challenge as they are more sensitive and instinctive than their rational and logical men counterparts. Women are insecure at negotiating work deals, agreements and research partnerships than their men folks due to discouragement encountered for poor negotiating skills coupled with the notion that men are highly competitive than women in all aspects. Women academics are important assets to university system having priority of successful outcome because of their positive approach to teaching, research, collaboration and negotiation skills for excellent performance. In performance-oriented conditions, women work efficiently as they improvise solutions to some difficulties faced by students in their studies due to their warmness, friendly, pleasant and selfless attitude. Women academics are hardworking, dedicated, interactive and focused in acquiring skills, unlike their male folks. This enables them to be more functional in technical fields and building rapport with other workers in order to maintain integrity in the workplace. They also stick to agreed decisions and implement strict disciplines to ensure equity in administrative processes of governance. Thus, women's role in leadership is usually not individualistic but based on collective decision making in an administrative system. Women also bring equality into workplace environment by being quiet over attitude purposely demonstrated to hurt the female folks. Rather than being aggressive, they cover their self-esteem by ensuring that there is a mastering of their jobs with resultant wavering off of oppositions and distractions. Women academics at different cadre of their career usually create a healthy and workable academic environment for female students such that they are drawn into researches that enhance their capacity to positively engage in areas which hitherto were preserved for male counterparts. This has helped women to be confident of further engagements in promoting their future career, wherein domination of unproductive work is challenged and corrected from an unbiased perspective. Cautious, intelligent and resourceful nature of women has endowed them with the ability to harness and function optimally in the field of geosciences, for life impact advancement. These women's features have helped in preparing and building the minds of students for future tasks and readiness for successful academic achievement for sustainable development. This study establishes that the effort and number of women academics in geosciences is significant to the level of achievement and innovation in the university system. Their unrelenting efforts have made them delve into topical areas of geosciences with effect of checking environmental impacts in communities, managing natural resources and its hazards characterization, controlling perceptions and gender-based experiences, modeling changes in climate pattern and effective planning for agricultural and natural resources renewal towards environmental and socio-economic development.

4.3. Substantial progress by women in geosciences

Females in most institutions are yet to be properly assessed and appointed into top academic positions in the Sub-Saharan regions. This is as a result of low representation of females, but it is being addressed by incursion of females into the academics. Substantial progress by women in geosciences has attracted more females into the profession and more female students into the geoscience field of study. This boosts the participation of women in the profession. Thus, the need for active women in the Department of Earth Sciences is welcomed; as they would guide upcoming female students in the profession without fear of discrimination. They would also serve as role models and mentors to the students as they painstakingly listen to their complaints and find plausible solutions that enable the students maximize their inbuilt capacity and remain focused in their field of study in order to accomplish their goals. More women venturing into geosciences would have impact on societal and national growth. The only female Associate Professor in the Department of Earth Sciences has a personal interest, drive and personal commitment to make successes in the profession by painstakingly following due processes in teaching and researching at all spheres. The successes recorded and status attained by her had made her students to emulate her by consequently furthering their education at postgraduate level. This will in no distant time make up for gaps in deficiency of female role models in the department.

5. Conclusion

The proportion of female students in geosciences declines progressively at higher levels. Gender bias, low-admission and dropout rate of female students before project defense to earn a bachelor's degree are factors contributing to gender disparity observed which has led to low percentage of female students receiving geoscience degrees between 2018 and 2023. Reluctance of scientific organizations to admit women has caused struggles for them especially in education and employment due to the belief that they are weak, unintelligent and unknowledgeable to engage in scientific studies. However, involvement of women in education and gainful employment would boost their full potentials in the developmental processes and grant them access to better life. Women constitute the minority observed in the mining and geosciences society. Hence, the need for more female students' admission into geosciences and other science related disciplines by the university management to invest and impact on them to compete favorably with their male peers by tapping their innate potentials. The present teaching condition of the Department of Earth Sciences, Adekunle Ajasin University, Akungba-Akoko, Nigeria

with just a woman as an Associate Professor has boosted the academic morale and performance of female students, thus reducing the rate of their drop out to other departments. Access of women to quality education guarantees their advancement in diverse professions and enhances their roles in geosciences despite social, political and technological changes. The percentage of female graduates within the period of study (2018 – 2023) is insufficient to boost the number of women in geoscience academia and the industries. This shows that there is need for publicity amongst secondary school students planning for higher institutions on the benefits of geoscience and particularly female students in choosing successful academic and professional geoscience career. Women academics are seen to be more productive and impactful than their male opponents. They have the tendency to cope better with associated academic stress due to their characteristic innate nature and endowed patience to overcome encountered challenges which have made them relevant in academia. Women in geosciences have introduced positive changes in the academic system, promoting new ideas, creativity, innovation and gender sensitivity within the university system. This shows that women academics should not be neglected in decision making in the university educational policy, acts and programmes to enhance development of teaching profession and in promoting democracy in education. This is because women project into the future to give equitable opportunities to the next generation. Even at that, gender discrimination has discouraged and excluded women from excelling at different stages of their careers, field geological/geophysical mapping right from undergraduate to postgraduate to senior academic levels. Thus, a special intervention scheme is needed to help graduate geoscience women have access to quality child health care and education. Boosting the morale and involvement of women in geoscience academia can be resolved by providing support and impactful strategies that would positively influence their career to be successful geoscientists. This opens doors for networking and collaboration in multidisciplinary research and in knowledge sharing to solve challenging issues. Thus, this study establishes that despite the limited number of women academics in geosciences, they have contributed immensely to the level of achievement and innovation in the university system through their involvement in education and quality scientific research towards the socio-economic and environmental development of the nation.

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