

Good Practices in Gender Mainstreaming in Science at the Women's University in Africa (WUA), Zimbabwe

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ABSTRACT

In order to learn from and share good practices, this article analyses the experiences of Women's University in Africa (WUA), and its success stories in reducing or removing structural barriers to women's and other underrepresented groups' participation in science. With funding from the International Development Research Centre (IDRC) we set to establish WUA's good practices in gender mainstreaming in science. Data were gathered through a desk study of pertinent reports and University regulations, key informant interviews with important staff members, a gender audit questionnaire, and focus group discussions with students. The study found that the University has a policy of a female: male student ratio of 85%:15%. However, is not yet fully reflected in science, calling for interventions specifically targeted at increasing the uptake of science by female students. As a way of mainstreaming gender, the University adopted flexible study methods, such as face-to-face and open-distance learning among others.

Keywords: gender responsive pedagogy, gender gap, gender equity, gender mainstreaming, science programmes

World over, the important role of science and technology and gender equality for development has become imperative as espoused in the Sustainable Development Goals (SDGs) (United Nations, 2015). In Zimbabwe, the country's Vision 2030 for example, acknowledges the pivotal role of science and technology, with a particular focus on science disciplines in the country's industrialization agenda that is aimed at ensuring that the country attains an upper middle-income status by 2030. The 2021-2025 National Development Strategy1 (NDS1) acknowledges the gender gap in Science, Technology, Engineering and Mathematics (STEM) disciplines and there is a commitment by NDS1 to address it through inclusive and equitable access to education. In support of this vision, the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development developed doctrine Education 5.0, a framework and road map that describes the important role of universities in the country's industrialization agenda and emphasizes on the place of science in this development agenda (GoZ, 2018). Although Science is identified as one of the vehicles to the realization of vision 2030 in Zimbabwe, the vision also identifies gender equality, a human right and a foundation for peaceful, prosperous and sustainable development as an enabler and key driver for this vision. To this end, inclusive science initiatives are recognized as fundamental for Zimbabwe's industrialization agenda.

The situation on the ground, however, is that women have achieved near-parity in several fields but with persisting gaps in science (National Science Foundation, 2011). The current stock of graduates is still highly skewed

towards Humanities and Social Sciences, while the proportion of students in sciences averages less than 25% (World Economic Forum, 2016; Iwu & Azoro, 2017; Febraro & Pickering; Evans, 1995). Women continue to remain underrepresented among science graduates in Zimbabwe with female students at 19% compared to 39% of male students (World Economic Forum, 2018). Studies on the underrepresentation of women in sciences have linked it to structural factors created through the social structures of institutions and the segmentation of the labour market and internalised values and beliefs about appropriate roles and expectations (Evans, 1995). In other words, the participation of women in science disciplines tends to be hampered by the deeply entrenched patriarchal and cultural norms and practices that tend to undermine women's agency and perpetuate the subservient status of women. Furthermore, the gap is commonly attributed to negative stereotypes and lack of role models, lowering girls' performance, aspirations vis-à-vis Science and technology, covert discrimination, implicit biases and career preferences (McCullough, 2011). Societal constraints can and do force women to make 'choices' that often lead them away from science fields.

In trying to address some of these barriers to women's participation in science disciplines, the government of Zimbabwe has put in place measures such as affirmative action to facilitate women's entry into public universities with two points less than men as well as scholarships for females enrolled in science disciplines. Yet these initiatives have not registered significant traction towards the desired goal as the above statistics have shown. The continued gender disparities in higher education and in science disciplines in Zimbabwe saw the birth of WUA in 2002, with a specific mandate to address gender disparities in education. WUA's mantra is, '*addressing gender disparity and fostering equity in university education*'. Owing to its background, WUA has put in place policies and practices that deliberately promote diversity and inclusion to ensure that barriers to access to education by women in all fields are addressed. However, since its inception, no comprehensive study has been conducted to interrogate WUA's experiences and the effectiveness of its measures to mitigate or eliminate systemic barriers to a greater participation of women and other underrepresented groups, as well as increase diversity of personnel in science fields for lessons and best practice sharing. It is against this backdrop that with funding from the International Development Research Centre (IDRC) we set to document WUA's experiences using desk review of relevant reports and university policies, including literature on other Universities, key informant interviews with key staff members, gender audit questionnaire and focus group discussions with students. This manuscript presents the measures that the University has implemented to promote gender equality in the University in general and in science programmes in particular. It starts with a presentation of the barriers to gender equality in science before presenting the measures implemented by the University.

Barriers to engendering science disciplines at WUA

There are a number of factors affecting gender equality in science disciplines at WUA that this section discusses. These include absence of a clear gender mainstreaming strategy informed by evidence from gender analysis, absence of a gender policy, lack of gender responsive pedagogical skills and gender awareness in general, and limited science programmes for prospective students to choose from, among others.

Lack of gender analysis and gender mainstreaming strategies

Although the WUA has a Human Resource policy and an HIV/AIDS and Anti-sexual harassment policy in place, it does not have a standalone gender policy and mainstreaming strategy. Gender mainstreaming involves the integration of a gender perspective into the preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and educational programmes, with a view to promoting equality between women and men, and combating discrimination (United Nations, 2007). The lack of a gender policy deprives the university of a Guiding Framework for mainstreaming gender. A gender policy would emphasise gender mainstreaming in all areas including policy, staffing, and infrastructure and curriculum design and delivery among others. The gender policy elaborates a set of guiding principles, which emphasise, among other things, the need to apply gender analysis to all learning activities (United Nations, 2007). A gender policy and a mainstreaming strategy are important documents for effective mainstreaming of gender (Morley, 2005). These documents guide the organization in addressing gender issues in a structured and systematic manner and create more targeted opportunities for female students to take up science programmes.

Due to the absence of a gender policy, gender analysis, a critical stage in gender mainstreaming, is not set as a pre-condition for programme design in the University, only broad-based needs assessments were conducted, hence programmes were rolled out without being informed by the results of a gender analysis. The lack of a gender analysis limits the programmes' responsiveness to gender equality issues since it is meant to enhance understanding of the culturally determined gender elements relevant to curriculum design and delivery. Gender analysis precedes any gender mainstreaming action to help determine areas and methods of intervention and makes women's and

men's differing needs and problems visible (Jahan, 1995; Nabbuye, 2018; United Nations, 2002). This ensures that policies and programs are not based on incorrect assumptions.

Pedagogy related factors

While the numbers of women entering different disciplines at WUA has increased, course content in the major academic disciplines has not been revised to give attention to gender and to women in the form of language, resources, representation of women, references and teaching styles. Poor pedagogical practices reinforce gender inequalities (Nabbuye, 2018). A study on gender equity in Commonwealth Higher Education by Morley (2005) revealed discriminatory practices against female students as a result of gender-insensitive pedagogical processes. The findings of this study reveal that some lecturers view women and girls through stereotypes—characterizing girls as struggling to actively engage in science disciplines. However, some lecturers at WUA had started to use gender responsive pedagogies although they had not received any formal training in gender-sensitive pedagogy. This was not peculiar to WUA only but to other tertiary institutions in Zimbabwe as well as they had also not made a deliberate effort to build the capacity of lecturers in gender sensitive pedagogy. Most of the lecturers had not received gender-sensitive pedagogy training at any point. Chapin and Warne (2020, p.1) elaborate that in gender responsive pedagogy, “The learning needs of male and female learners are addressed in teaching and learning processes (inside and outside of the classroom)”. Nabbuye (2018) postulates that gender-sensitive pedagogy can make a big difference for women and girls’ learning experience in the classroom. Further, gender blind teaching practices reinforce gender inequalities in the classroom, leading to the concept of a ‘hidden curriculum’ in which male students are permitted to dominate discussions and classroom space (Chapin & Warne, 2020). Gender responsive pedagogy can be enhanced in the University by developing gender sensitive monitoring and evaluation instruments which help to identify and address specific needs, challenges and constraints, as well as opportunities for female students and come up with transformative actions in higher education (Batliwala & Pittman, 2010). Data from the monitoring and evaluation process provides crucial information for adjusting programmes and activities. In order to achieve gender equality related goals, and in order to know if and when such efforts have been successful, gender-sensitive indicators should be developed to measure the gender-related changes over time. They can be quantitative, based on sex-disaggregated statistical data, such as the numbers of female and male students enrolled in science programmes.

LIMITED SCIENCE PROGRAMMES AT WUA

The enrolment of female students in science programmes at WUA as in other Universities in Zimbabwe is low. WUA’s enrolment at the time of the study in 2020 was at 5,158 students across the three faculties of Social and Gender Transformative Sciences, Management and Entrepreneurial Sciences as well as Agricultural Sciences. Of the 5,158 students, 107 were in science disciplines. One of the reasons cited for the limited enrolment of female students in science programmes was the limited number of science programmes from which prospective students could choose. **Table 1** above shows the science programmes offered at WUA at the time of the study.

Table 1

Science programmes at WUA

Diplomas	Undergraduate degrees	Postgraduate degrees
Diploma in Environmental Management	BSc honours degree in clinical midwifery	MSc livestock science and meat technology
	BSc honours in horticulture	MSc agribusiness systems management and development
	BSc agriculture honours degree in animal science	
	BSc agriculture honours degree in agribusiness management	
	BSc honours degree in business intelligence and data analytics	
	BSc honours degree in information and infrastructure management services	
	BSc honours degree in computer science	
	BSc honours degree information systems	

Although one of WUA’s 20216-2020 Strategic Plan Focus areas is STEM with the intention “to increase and create quality and relevant science and technology learning”¹, science programmes were considered expensive to introduce, requiring around US\$700,000 to have a laboratory in place, hence the university started with programmes that do not require a laboratory. It is a requirement by the Zimbabwe Council of Higher Education that introduction of science programmes be preceded by the construction of a laboratory. Laboratories for science

¹ WUA 2016-2020 Transformational Strategy.

programmes that require practical sessions were not available at both the main campus in Harare and Marondera campus hence students had no opportunity for practical experiments.

Due to the heavy investment in infrastructure that is required for science disciplines, only the Harare and Marondera campuses were offering science programmes at the time the study was conducted. For the Livestock Science and Meat Technology programme, the University partnered with a local abattoir in Marondera for its practical sessions. However, the abattoir does not have all the relevant equipment required for this degree programme. The lack of relevant infrastructure limits the University's efforts to fulfil its mandate to foster gender equality in university education, especially in science disciplines.

The study revealed that modules that focus on livestock production at WUA tend to be gender stereotyped because of gender role socialisation. It was established that some female students tend to face challenges in these modules especially in relation to the practical aspects of the modules due to lack of prior experience working with animals. Lack of experience is a result of gender stereotypes and gender role socialisation (McCullough, 2011; Nabbuye, 2018). However, some of the interviewed female science students and alumni revealed that they were very comfortable doing the modules in the program. They attributed this comfort to having done some of the stuff at diploma level. It was also noted that female alumni found the program quite interesting as one female alumnus submitted: *Personally, I did not face any challenges because I performed better than all men in the class. I could assist them in some of the modules. But I cannot deny that there were some women who looked down upon themselves, lacked confidence and struggled in some of the modules.*

To substantiate the above excerpt, another interviewee from a different science programme indicated that while the program was interesting and relatively easy for some, it was difficult for others. In a class of 25 students, five (25%) could not finish with others. They repeated some modules such as Programming, Networking which have mathematical calculations. Although many female students performed at par with male students in their academic work, they contended that the demands for motherhood and household chores affect their time for self-study or even attending lectures. To navigate such challenges some students, bring their children to the Day Care Centre but like what shall be pointed out later on, the operating hours for the Centre do not cater for evening and weekend classes. Unfortunately, the University has not been tracking the performance and retention of female students in science programmes.

LACK OF SCHOLARSHIP PROGRAMMES

Owing to the demands of science disciplines particularly in relation to practical sessions, the study established that generally, sciences are more expensive than other disciplines at both secondary and University level. A look At WUA's website revealed that their science related undergraduate degrees are charged US\$650 while undergraduate humanities related degrees are US\$638. Master's degrees are charged US\$857. Science related post-graduate diploma are charged US\$723 while social science post-graduate diplomas are charged US\$638. Where resources are limited and in the absence of scholarships, due to the culture of son preference, women are discouraged from pursuing Science related careers. Generally, available scholarships for science programmes in Zimbabwe do not focus on women and girls. For example, the Joshua Nkomo Scholarship targets those high performing students, male or female, pursuing undergraduate degrees in science. The government's scholarship programme to support female students in science programmes was discontinued in 2017. Scholarships at WUA, for example, the Vice Chancellor's, is given to the overall best student, regardless of sex. As can be seen this scholarship only caters for those in stream and no scholarships for beginners, let alone female student beginners in science.

GOOD PRACTICES IN PROMOTING WOMEN IN SCIENCE AT WUA

This section presents the practical and policy interventions by WUA to mitigate the barriers to women and girls' participation in science programmes.

Increasing women in the leadership of the university

Having women in positions of influence helps as they serve as role models, hence is critical for the career advancement of women. The University has made a deliberate effort to ensure female representation in senior positions. **Table 2** shows gender composition of senior management at WUA.

While the top management of the University is female dominated, a glaring gap is on deans of faculties, who are all male.

There is almost gender parity in the WUA staff compliment. Out of a staff compliment of 137 in August 2020, 69 (50.4%) were male while (68) 49.6% were female. Of the 18 senior lecturers in the University, 7 (38.9%) were female. Out of the 37 lecturers, 17 (46.0%) were female. Females dominate the support staff compliment at 51.5%.

Of the 66 support staff members, 32 (48.5%) were male. Most lecturers in the available science programmes were males in the ratio one female lecturer to three male lecturers. There were 13 full time lecturers in science programmes, and of these only 4 (31.0%) were female. While increasing the numbers of female staff members across the board is important, it is also critical that the University introduces regular gender trainings for all staff as a measure to address knowledge and skills gaps in gender mainstreaming.

Table 2

Gender composition of senior management at WUA

Title	Sex
Vice Chancellor	Female
Pro-Vice Chancellor (Academic Affairs)	Female
Finance Director	Male
Librarian	Female
Registrar	Female
Dean Social and Gender Transformative Sciences	Male
Dean Management and Entrepreneurial Sciences	Male
Dean Agricultural Sciences	Male

Quota system for female students

The University has a policy of female: male student ratio of 85%:15%. This, however, is not yet reflected in the science disciplines, calling for interventions specifically targeted at increasing the uptake of science programmes by female students. Of the 5,158 students in August 2020, 107 were in science disciplines and of these 65 (61.0%) were female. The use of the quota system is a viable option in enhancing women participation in science programmes. Studies indicate that where the quota system is applied, there are positive gains inasmuch as women participation in science is concerned (Giva & Santos, 2019, Gaidzanwa, 2007). This may come in Affirmative Action where female students, for example at the University of Zimbabwe had to enrol in the same programme with males with two points less than males (Gaidzanwa, 2007). However, affirmative action has been described by Odora Hoppers (2007, p.223) as “short-sighted” because when women massively enter mainstream, they are happily absorbed into precisely the same problematic mould. In other words, Odora Hoppers (2007) is of the view that through affirmative action, no meaningful transformation takes place. Women join just to make numbers but have no decision-making opportunities. In fact, those who enter through affirmative action count themselves as being luck but are “impotent in terms of gender awareness and are totally unable to develop any gender strategies in a coherent manner” (Odora Hoppers, 2007, p.223). The idea that women have fewer points than males, further piles scorn on women, they are enrolled not on merit but on the good will of the system.

Flexible methods of study and examination schedule

The University uses flexible methods of study which include, face to face and Open Distance Learning (ODL) and these methods overcome usual obstacles of distance and time often encountered by mature students who are unable to access higher education (WUA Admissions Policy). The modes of lecture delivery at WUA include day, evening, full time, and part-time classes. Part time classes can be conducted during weekends and evenings and on a block release basis. All science programmes at WUA are offered on a part-time basis and have been seen to be friendly to women due to their multiple roles. The timetable thus considered existing gender roles and interests for both men and women. Since most of the interviewed alumni female students enrolled for the program while working, they applauded WUA’s timetabling of their lectures. They could come to school at 5pm after work and go back home around 9pm and during weekends. This arrangement enabled students to balance between work and school, a rare feat in other institutions of higher learning. However, some students felt that learning time should be increased, weekend hours present pressure on them to understand issues.

WUA provides a flexible examination schedule. In an effort to cater for working students, particularly working mothers, WUA sets two examination papers for each module; the main paper and the special paper. Students who miss examinations for valid reasons, are given an opportunity to write a special examination paper. This has allowed students who are employed to catch-up with their studies. Female students who could have missed examinations as dates of examinations coincide with their dates of expectations have benefitted from this arrangement.

Day care centre

The WUA day care centre was established to provide day care services to children so that their mothers can concentrate on their studies. This is consistent with experiences in Nigeria where a number of higher education institutions have childcare facilities on campuses (Gaidzanwa, 2007) to cater for female students’ children as well

as those of female academics. The fee structure is flexible to accommodate female students who face emergencies such as those who need day care services for just a day, week or month. The fees are not charged per term. However, the calendar of the Day Care Centre is not harmonised to the University calendar, hence, female students face challenges when the day care centre closes while the university is still open.

Foundation mathematics bridging course

Science disciplines are perceived to be tough and not feminine. Hence the trend has been that some girls at secondary school level drop science subjects especially Mathematics (Blickenstaff, 2005), which is a prerequisite for enrolling for most science fields at university level. This automatically reduces the numbers of female students that enrol for science programmes at University level. WUA Admissions policy stipulates that the minimum entry requirements for undergraduate degree programmes include at least five approved 'Ordinary' level subjects including English Language (or equivalent) plus at least two Advanced level passes or at least five approved 'Ordinary' level subjects including English Language (or equivalent) plus a relevant diploma with a duration of not less than two years. For science disciplines, a pass in Mathematics at Ordinary Level is compulsory. Because most female students fail to enrol for science programmes because they would have either failed or dropped Mathematics at ordinary level, the University has introduced a Mathematics bridging programme. This programme is meant to prepare students for entry into university programmes requiring Maths.

Special enrolment requirements

Unlike other universities, WUA provides a flexible enrolment system. To this end, the University provides varied channels of entry into the university accepting students with relevant diplomas and certificates to enrol for certain programmes. More so, the University considers approved prior learning which takes cognisance of sufficient experience in a specific field.

Compulsory module on gender

WUA has introduced a compulsory module on gender for all students in the University. This is meant to raise the students' awareness to gender issues. This module has been found to be handy by many student and alumnus participants in enhancing their gender awareness during their studies or at the work place. The module opens avenues for women participation and involvement in decision-making as well as breaking the glass ceiling that impedes women advancement in all spheres of life.

Most of the alumni indicated that what they learnt at WUA, especially from the Gender Studies module changed their mind-sets. According to one interviewee, the low regard for women by male workmates in her organisation changed. Workmate interactions between males and females greatly improved as male workmates who went through WUA programs changed their perceptions about women and began to accept women leadership. The interviewee indicated that because of his advocacy for female participation at every level of the organisation, the organisation had introduced a gender section within the Human Resources department. He had been tasked to head this section.

The university, however, does not have a similar gender training programme for its staff members.

Conducive institutional culture

The study sought to establish the extent to which the university has established a working and operating environment that promotes the empowerment of women and the breaking down of norms and values that perpetuate gender inequality. Staff that participated in in-depth discussions acknowledged that the working environment at the university in terms of gender relations is very good and promotes equal interaction between men and women. The university has a Human Resource policy and an HIV/AIDS and Anti-sexual harassment policy. These policies help to create a conducive environment for both students and staff at the University. However, as already indicated, there is no standalone gender policy and mainstreaming strategy which then deprives the University of a Guiding Framework for mainstreaming gender.

Decentralisation of university education

WUA programmes are offered from the Harare main campus in Manresa and from the satellite campuses in Mutare, Bulawayo and Marondera to promote decentralisation of access to education. Science programmes are only offered from the Harare and Marondera campuses, thereby disadvantaging those who would want to access the programmes from other campuses. The unavailability of accommodation and transport services at WUA campuses posed additional challenges and were regarded as major hindrances to uptake of degree programmes in the University in general and science programmes at Marondera campus, since the University does not provide

transport services to the Marondera campus, which is about 75 km from Harare. This does not only limit opportunities to access to higher education, but dwarfs efforts meant to enhance women participation in science at WUA.

CONCLUSION AND RECOMMENDATIONS

WUA has introduced and implemented a number of measures to address gender related barriers to women's participation in university education. However, there are still glaring gender disparities in science related disciplines at WUA. These disparities are explained by several factors that include gender stereotyping, shortage of scholarships targeting female students, pedagogy related factors including the hidden curriculum in science education, lack of gender analysis informing programme design and masculine university environments among others. WUA has put in place various measures to bridge the gender gap in science education, namely, increasing women in University leadership, a quota system for female students, flexible methods of study, a day care centre, a foundation Maths bridging course, a compulsory module on gender for students, a conducive and inclusive institutional culture supported by an HIV/AIDS and Anti-Sexual Harassment Policy and decentralisation of University education through a multi-campus system. Although these measures have addressed some of the barriers to science education, lack of interface between primary, secondary and University education, pedagogy related barriers, financial constraints, and limited science programmes to choose from remain outstanding gaps.

Considering these gaps, the study proffers the following recommendations:

1. Design a simple, specific framework on gender sensitive pedagogy for use by all lecturers
Quality education and gender-sensitive pedagogy should be clearly specified by giving lecturers a framework or a specific structure they can use. Using this structure can provide lecturers with easy-to-apply detailed and context-specific guidance as they work towards implementing gender-sensitive pedagogies in the classrooms.
 2. Continuous tracking of gender disaggregated data in science disciplines
There is need for continuous collection of gender disaggregated data on enrolment, performance and retention in different science disciplines accompanied by action plans to increase women's participation in areas where they are underrepresented.
 3. Provide accommodation for students
There is need to provide accommodation for students at both Harare and Marondera campuses to access to university education, particularly rural female prospective students.
 4. Promote mentorship programme for female science students
There is need for the University to promote mentorship schemes for female science students as well as establish a career guidance unit focusing on career counselling and outreach programmes to high schools.
- Based on the findings of the study, the following recommendations are made:
1. Staff development in gender sensitive pedagogy in science
There is need for capacity building of university lecturers to review curriculum to make it more inclusive and representative of women's interests. This training in gender sensitive pedagogy can be coordinated by the ZIMCHE. The training can cover among other things, how gender should be introduced to the curriculum and how it can be incorporated, course content, resources and pedagogy
 2. Gender policy and mainstreaming strategy in universities
There is need for a formal and well-structured gender policy which is supported by a gender mainstreaming strategy with clear objectives and plans for achieving gender equality especially in science programmes, with clearly delineated accountability structures and systems.
 3. Gender audits and gender analysis in universities
There is need for universities to conduct gender audits to unearth some of the internal practices that act as barriers to women's participation in science programmes.

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Ethical statement

The study received ethical approval from the International Development Research Centre, Canada. Prior to data collection, formal permission was obtained from the relevant ministry. Informed consent was obtained from all participating WUA, administrators, staff and students including alumni. Participation in the study was entirely voluntary, and confidentiality and anonymity were assured. All data collected was used solely for research purposes.

Competing interests

The author declares that there is no conflict of interest regarding the publication of this paper.

Author contributions

The authors jointly contributed to the conception and design of the study, the preparation of the manuscript, the critical review and final approval, and agree to be responsible for all aspects of the work.

Data availability

The data that support the findings of this study are available from the authors upon reasonable request.

AI disclosure

The authors declare that no generative artificial intelligence tools were used in the conception, analysis, or writing of this manuscript.

Biographical sketch

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