WEEC-BG PROJECT FACT SHEET

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IDRC GRANT / SUBVENTION DU CRDI : - WOMEN IN ENGINEERING EDUCATION AND CAREERS IN BENIN AND GHANA

Background

The Women in Engineering Education and Careers in Benin and Ghana (WEEC-BG) project is a three-year project running from January 2020 to December 2022. It is one of the eleven successful projects selected for funding from about 180 proposals submitted in response to the International Development Research Centre's (IDRC) Call for Proposal on "Breaking Systemic Barriers to Women's Participation in Science". The IDRC projects on "Breaking Barriers to Women's Participation in Science" are intended to identify and address systemic barriers that inhibit greater participation of women and other underrepresented groups in the fields of science, technology, engineering, and mathematics (STEM) in the public and private sectors in low and middle-income countries (LMICs).

Objectives of the Project

The main objective of the project is to contribute to bridging the gender gap in engineering in Ghana and Bénin through original research and policy recommendations. Specifically, the project seeks to provide strong evidence of trends in female participation in engineering education and careers over the past decades, provide insights into the impacts of policies and practices, and identify recommendations for closing the gender gap in engineering and STEM in general. **This fact sheet highlights the key findings of the Ghana study.**

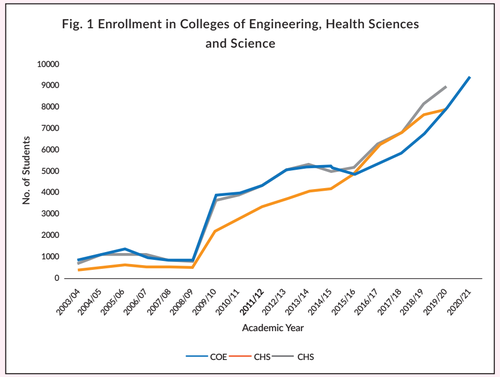
Methods Used

Institutions of study: Kwame Nkrumah University of Science and Technology (KNUST), College of Engineering and the Ghana Institution of Engineering (GhIE).

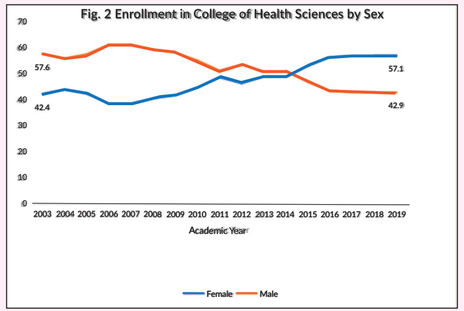
Data Sources: Review of secondary data, policy documents, interviews (focus group discussions, survey, in-depth interviews and information gathering workshops with STEM students and lecturers, engineering professionals and decision and policymakers).

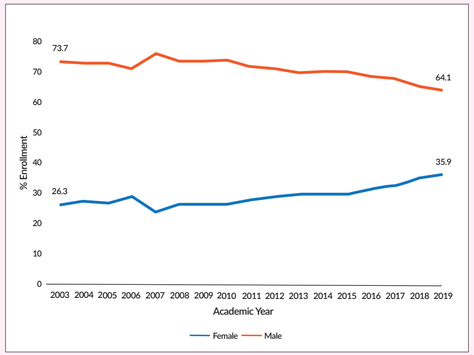
Key Findings

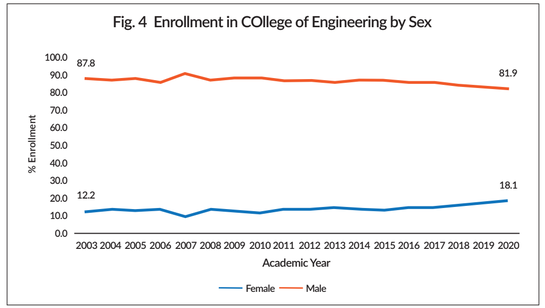
At KNUST, undergraduate enrolment in three STEM Colleges, namely College of Engineering (CoE), College of Health Sciences (CHS) and College of Science (CoS) has increased by 12 times from 1,953 in 2003/04 to 24,632 in 2019/2020 academic years.



Similarly, female enrolment in CHS, CoS and CoE has increased from 42.4%, 26.3% and 12.2%, respectively to 57.1%, 35.9%, and 18.1% over the same period (Figures 2, 3, 4).







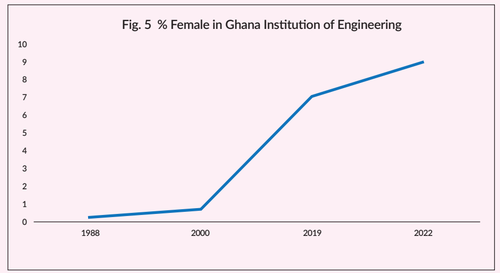
Relatively good progress has been made in closing the gender gap in STEM but a lot more efforts are needed for better impacts especially in engineering, which is lagging.

Gender disparity exists within programmes in the three colleges as shown in Table 1. Female enrolment is highest in health, food and life science related programmes.

Table 1 Percentage of female enrolled in various STEM programmes (2020/21 Academic Year)

College of Health Sciences	%	College of Science	%	College of Engineering	%
Community Health	78.3	Food Science and Technology	71.6	Biomedical Eng.	40.1
Nursing	77.9	Theoretical and Applied Biology	52.3	Petrochemical Eng.	27.2
School of Medicine and Dentistry	61.0	Biochemistry and Biotechnology	47.3	Chemical Eng.	25.8
Sports & Exercise Sciences	49.6	Environmental Science	46.5	Materials Eng.	25.4
School of Medical Sciences	47.7	Optometry and Visual Science	46.2	Mechanical Eng	23.5
Pharmacy	45.7	Actuarial Science	41.0	Petroleum Eng.	20.5
Herbal Medicine	39.5	Chemistry	34.8	Agricultural Eng.	19.7
Medical Diagnostics	36.4	Physics	30.1	Geological Eng.	19.6
School Of Veterinary Medicine	29.9	Statistics	29.6	Industrial Eng.	18.7
Total	57.1	Mathematics	24.7	Telecommunication Eng.	18.5
		Meteorology	16.6	Civil Eng.	18.2
		Computer Science	13.8	Metallurgical Eng.	17.4
		Total	35.9	Geomatic Eng.	17.2
				Electrical/Electronic Eng.	14.8
				Aerospace Eng.	12.9
				Marine Eng.	1 2.5
				Computer Eng.	11.6
				Automobile Eng.	3.7
				Total	18.2

The gender gap is even wider at the professional level based on membership of GhIE (Fig. 5).



Why is it important to bridge the gender gap in engineering and STEM in general?

At the work place, women scientists and engineers

- Pay attention to details
- Can multi-task
- Can be better managers
- Are painstakers and meticulous especially in designing models
- Are critical – look at the end from the beginning, pay attention to excellent project execution
- Are empathetic and create calm and peaceful working environment
- Increase productivity
- Provide alternative views and contribute to inclusive decision-making
- Can be more trusted with responsibilities, especially those requiring high level of integrity

In the home/ community/ society, women engineers

- Serve as mentors and role models
- Champion awareness creation on science and engineering
- Are good at teaching and solving scientific and engineering problems
- Inform gender-sensitive and inclusive national policies and decisions
- Contribute to job creation and poverty reduction
- Contribute to taxes for development projects
- Become financially independent and can support their families.
- Are more likely to curb corruption in project execution

"In a workplace where there are women engineers, there is always harmony. The environment is calm, which increases productivity because sometimes there are some pressures that only women can calm down; some things would have aggravated to some stages, but because there is the presence of a woman as an engineer, things are managed differently." (Female Professional Engineer)

Which interventions have contributed to the progress made in bridging the gender gap in STEM?

National Policies & Programmes

- 1987 - Educational system was restructured with increased focus on STEM. This created
  - opportunity for students to study both elective mathematics and Biology thus broadening students' programme choices at the tertiary level
  - Opportunity for applicants to change their programme selection based on the WASSCE results
- 1987 - STME Clinic for Girls started to promote STEM education among girls.
- 1997 - Girls' Education Unit was established to work towards reducing gender disparities in education
- Science Education Unit was established to introduce programmes aimed at increasing students' enrolment in STEM subjects
- Science Resource Centres were established in selected schools to provide facilities for the teaching and learning of science.
- 2015 - ICT in education policy was developed to introduce ICT as a subject from Primary to Sec.
- 2018 - Education Strategic Plan (2018-2030) was developed highlighting improved quality teaching & learning of STEM at all levels
- GSTEP - Ghana Science and Tech Explorer Prize for JHS students commenced to strengthen their interest in STEM and entrepreneurial skills

Science, Technology and Innovation (STI) Policy (2017-2020) – Strategies include:

- 60% of all enrolment in public universities should be in STEM by 2030; 80% for Technical Universities.
- 10% of the student population in tertiary educational institutions enrolled in STEM courses at the post-graduate level.
- Improve STEM education with emphases on creativity and innovativeness at all levels.
- Revamp the practice of industrial attachments for STEM students.
- Incentivize firms to support industrial attachment programmes for STEM students.
- Provide scholarships for promising science students.
- Establish mechanisms for encouraging young people to study the sciences.
- Initiate mechanisms for the early identification of talented young scientists.
- Establish mentoring programmes in STI for the youth.
- Design special incentive and motivation packages for female science students.

Ghana Tertiary Education Commission 2012 Norms for Tertiary Education (Universities)

- 50% female for all new entrants, 50% female for total enrolment
- Quota for students from disadvantaged secondary schools is 5%

Advocacy Groups and Events

- 1999 - Ghana Institution of Engineering (GhIE) established the Women in Engineering (WinE) Unit to among others, encourage young women to consider engineering as an option.
- 2018 - Women in STEM Ghana (WiSTEMGh) was launched with the objective to inspire young females' participation in STEM subjects and careers.
- 1988 - Ghana Chapter of the Organisation for Women in Science for the Developing World (OWSD) was established and re-launched in 2018 to help develop the careers of female scientists and encourage young women to study STEM.
- 2018 - MiDA Ghana Power Compact's Internship and Mentoring Program (GPCIMP) commenced to provide female students in Universities and SHS with mentorship, training and technical skills.
- Women in Engineering (WinE) of Ghana Engineering Students' Association (GESA), KNUST exists and is promoting women rights and participation in engineering.
- At the global level, 11th February every year is observed as International Day of Women and Girls in Science to advocate for full and equal participation of women in STEM while 4th March is marked as World Engineering Day to promote engineering as a career

KNUST POLICIES AND PROGRAMMES

Gender policy strategies include:

- Adopting concessionary measures in disciplines where the number of one gender is low. Examples are
  - Lowering grade cut-off point by 1 for female STEM applicants
  - Intake of students from deprived Senior high schools
- Ensuring gender equity in the award of scholarships – some scholarships are specifically for females. Example, Total and Tullow Scholarship (engineering only), Mastercard, GNPC & Baker Hughes Scholarship (for females)

Equality and Diversity Policy seeks to

- Ensure that all members of the University Community are treated with fairness, dignity and respect
- No discrimination on grounds of age, disability, pregnancy and maternity, race, religion, belief or sex in any decisions concerning student admissions, progression or provision of support and facilities or services
- Increase % of women in senior academic leadership roles, applying to academic posts, and progressing to higher academic grades.
- Facilitate the return to work of staff from maternity, paternity and adoption leave.
- Improve the work/life balance of staff, particularly those with childcare responsibilities

Teaching and Learning Policy (TLP): The goal of the Policy is to enhance Teaching and Learning activities by providing guidelines to all academic and supporting staff as well as the student of KNUST.

Mentorship Policy - for staff professional development

- Older and more experienced lecturers provide mentorship to newer ones
- Mentorship and orientation are organised for fresh and continuing students

Practical and Industrial capacity building

- Industrial attachment for younger and newer lecturers
- Careers fairs on campus and field trips for students
- College of Engineering Innovation Centre was built to train students and faculty members on topics based on modern trends and industry demand and to help to create businesses from ideas.

Outreach programmes

- SYGNUS – Engineering and Science Summer Camp – outreach programme for 280 females, 20 males for SHS Students and teacher trainees
- NextGen Engineers Programme – an outreach programme for SHS Students and teacher trainees
- Open Day – targeting SHS students in Ashanti Region.

Other Programmes

- Students Exchange Programme with international universities
- KNUST Engineering Education Project (KEEP) for postgraduate students – It targets 30% females
- KNUST College of Engineering Endowment Fund established to
  - Improve quality and expand access to postgraduate programmes
  - Provide scholarships to attract brilliant postgraduate and needy undergraduate students
  - Improve infrastructure to support teaching and learning

Infrastructural development

- New 4-storey building with library and ICT facilities provided at CoE.
- Audi-visuals, public address systems, projectors, and computers with monitors provided in major CoE lecture rooms

RECOMMENDATIONS FOR IMPROVEMENT

Despite the aforementioned interventions, gender disparity still exists in engineering, science and mathematical programmes. The following recommendations are proposed:

- Create awareness and sensitise basic and secondary school teachers, parents etc.
- Promote early mentorship and career guidance/ outreach programs at all levels of education.
- Promote and showcase more female engineer role models/mentors.
- Mainstream gender approach in teaching - use gender-sensitive audio-visuals to make illustrations.
- Make concerted efforts to place qualified females in positions if both males and females qualify for placement.
- Advocate for a curriculum revision to make it more practical-oriented and gender-responsive.
- Include engineering subjects in the curriculum from an early age.
- Produce storybooks and documentaries about female and male scientists and engineers.

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