

Gender Parity of Science Students in Covenant University

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Abstract—Science is the key to technological and economic development of a society. Over time, science field has been a male dominated branch of study. Advancing women equality in this field of study will influence the world's economy positively. Assessment of gender parity index in tertiary institutions is a tool that will enable the recruitment of female students into the sciences. Ten (10) years of undergraduate and five (5) years of postgraduate students data of Covenant University were used for this study. It was observed that more female opted for biological sciences. The total number of female science students was found to range from 5.0-14.8 %, 6.5-36.7 % and 9.1-50.0 % for first, second and doctorate degree respectively. The result showed 90 % disparity in favour of males for science undergraduate students, 40 % disparity for masters and 90 % for doctorates' students. Strategies to win more female into the sciences should be encouraged.

Keywords—Science; development; gender parity

I. INTRODUCTION

Sciences played a substantial role from the creation of the earth till the development we see in our world today. Scientific inventions and innovations are the manifestations of latent potentials and not gender abilities. World over, increasing women participation in all human endeavours has been encouraged, having realized the contribution of women to economic growth. When girls do better in society, everyone benefit [1]. Literature revealed that where about 57% of the nation's college population are women, less than one-third major in science, technology, engineering or mathematics (STEM) [2]. The study noted that women have the ability but lack the interest. Contrarily, survey by [3] showed that out of girls that are in sciences, most of them are attracted to the life sciences.

According to [4], 85 percent of the measured growth in U.S. per capita income is due to scientific revelation and technological innovation. Inability to reach full mathematical potential jeopardizes future economy [4]. Community initiatives that will birth the best of Sciences should be encouraged. Recognizing and utilizing women potentials has

yielded positive result in Saudi Arabia. In 2011, just 1 % of researchers are women but within two years the number has increased to 19 % [5]. She suggested that highlighting women success stories will encourage more female to pursue careers in the sciences. The study by [6] noted that honouring scientist achievements and inclusion of qualified women as speakers at conferences will increase women's overall participation in scientific discourse.

A survey by [7] on female student in U.S College showed that discouragement from school authorities through lack of diversity in teaching approach is responsible for low female graduate in STEM fields. The study by [8] revealed that weaker and unequal positions of women in scientific communities are the worst obstacles discouraging younger women from the sciences. Researcher [9] reported a decline in the number of women earning a bachelor's degree in Physics. She stated that the scarcity of early guidance and mentorship are the major factors. Another Researcher reported that good role models and ignoring stereotypes are powerful driving force in pursuing career in Physics [10]. Research by Organization for Economic Cooperation and Development (OECD) found that girls do worse than boys in mathematics due to lack of self-confidence on the part of the girls [11]. Mathematics anxiety resulting in poor performance by girls has been reported by [12]. Literature revealed that Mathematics phobia is transferrable [13].

Rather than living with the notion that sciences is male dominated field of career, it is time for all and sundry to put up adequate strategies to tap the science abilities in women in order to further advance its usefulness. Mathematics is the engine for a vibrant economy [4]. Harnessing women creativity is a boost to our economy. Therefore, the study was embarked upon to determine the gender parity index of science students at Covenant University in order to develop strategies to win more girls in the sciences.

II. METHODOLOGY

The data used in this study was obtained with approval from the Center for System and Information System of the

University. The records of students who enrolled for undergraduate, masters and doctorate programmes were collected. Ten (10) years calendar session for undergraduate, five (5) years each for masters and doctorate programmes were used. The selection of the sessions for each level of education was based on the researcher's discretion, bearing in mind the full accreditation of such programmes.

The choice of using five (5) core science Departments in the College of Science and Technology was based on the objective of the study. Descriptive method such as mean, ratio and percentages was used to analyze the results. These are presented in tables and figures. The gender parity index (GPI) was calculated using (1).

$$GPI = \frac{\text{No of female enrolm}}{\text{No of male enrolm}} \quad (1)$$

Where GPI = 1 means equal parity; GPI < 1 means disparity in favour of male; and GPI > 1 means disparity in favour of female.

III. RESULTS AND DISCUSSIONS

The result presented in Table 1 showed that more female enrolled for Biological Science programme with 74.2 % for the number of years studied. This can be corroborated with the fact that females in the sciences are attracted to the life sciences courses [3].

The percentage enrollment for Chemistry, Computer Sciences, Mathematics and Physics are 48.3 %, 34.3 %, 35.8% and 20.2 % respectively. These values showed that Mathematics related courses frighten the females. This

Table 1: Undergraduate students at Covenant University

Degree in view	Session	Course of Study										Total of Science student		Grand total of all students	
		Biological Sciences		Chemistry		Computer Sciences		Mathematics		Physics		F	M	F	M
		F	M	F	M	F	M	F	M	F	M				
UNDERGRADUATES	2005/2006	26	6	10	10	45	53	9	7	1	7	99	83	752	833
	2006/2007	29	7	7	10	37	62	4	9	2	9	79	97	775	784
	2007/2008	43	19	20	14	35	61	6	17	2	20	106	131	855	912
	2008/2009	50	16	19	23	30	70	13	16	11	49	123	174	831	1038
	2009/2010	49	16	17	25	32	85	6	16	10	57	114	199	919	1136
	2010/2011	28	8	14	14	19	45	3	11	15	52	79	130	622	784
	2011/2012	29	9	13	10	34	81	1	7	11	30	88	137	779	1046
	2012/2013	29	10	10	9	21	49	4	1	10	35	74	104	761	964
	2013/2014	18	5	11	8	28	67	3	5	10	37	70	122	729	927
	2014/2015	21	16	9	16	27	17	4	6	14	43	75	158	863	1008
Total	10 Sessions	322	112	130	139	308	590	53	95	86	339	907	1335	7886	9432

confirms the study by [12] that girls have higher mathematics anxiety than boys.

According to [2] very few women choose further learning in mathematically based fields. The myth that careers in those field are meant for the male gender is also a factor. More so, Physics is known to be tough and require more hard work, this might be responsible for having the least value.

Figure 1a showed that for ten (10) years running, 90 % of the session had fewer females enrolled for sciences than their male counterpart. Lack of interest on the part of females and inability to pay the price to make a career in these fields are major challenge. Study has shown that girls are more interested in careers where they can play the role of helpers and make the world a better place [3]. Furthermore, Figure 1b depict that males pursue higher education than females.

The result presented in Table 2, showed that more female enrolled for Biological Sciences and Chemistry courses at Master's level. The Doctorate programme has Biological Sciences, Chemistry and Computer Sciences having more female enrollment during the study period. The burden of family finance has forced some women to pursue higher degree in order to meet the need of their home. While these categories of women do that, they still opted for the less Mathematics oriented courses in the sciences. This is evident in the gender gap of students who enrolled for Physics and Mathematics programme at the Master's and Doctorate level.

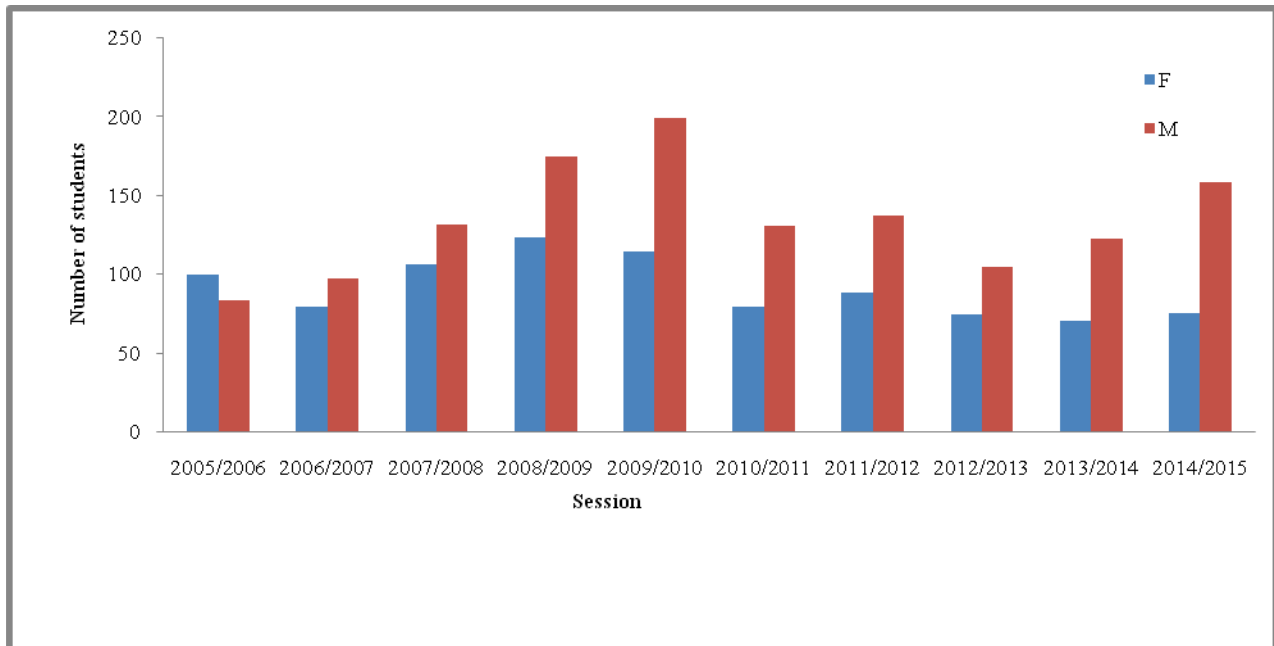


Figure 1a: Total number of undergraduate science students per session



Figure 1b: Grand total of all undergraduate students per session

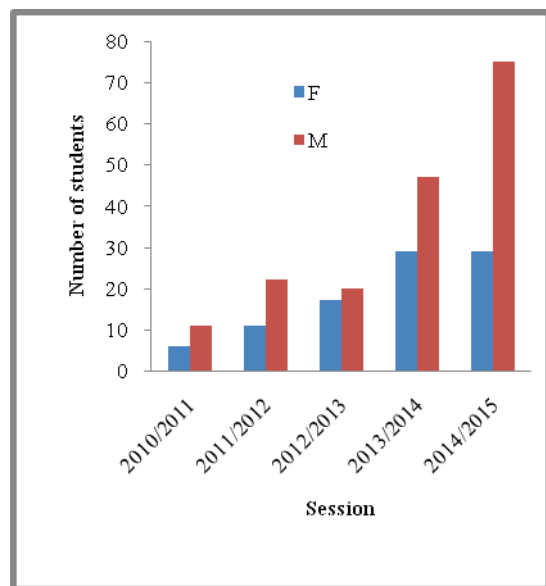
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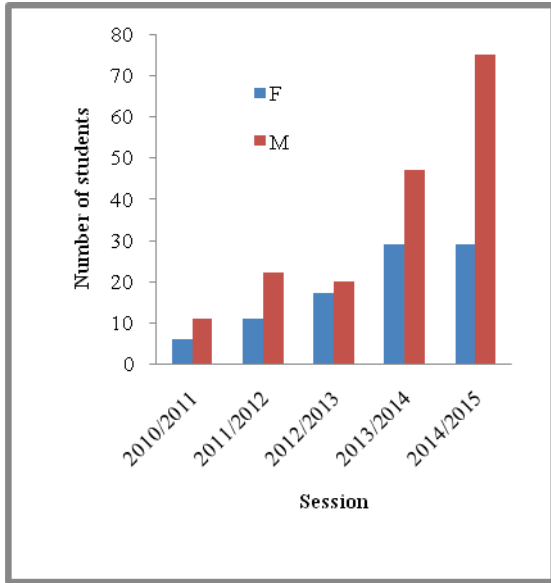
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Table 2: Postgraduate students at Covenant University

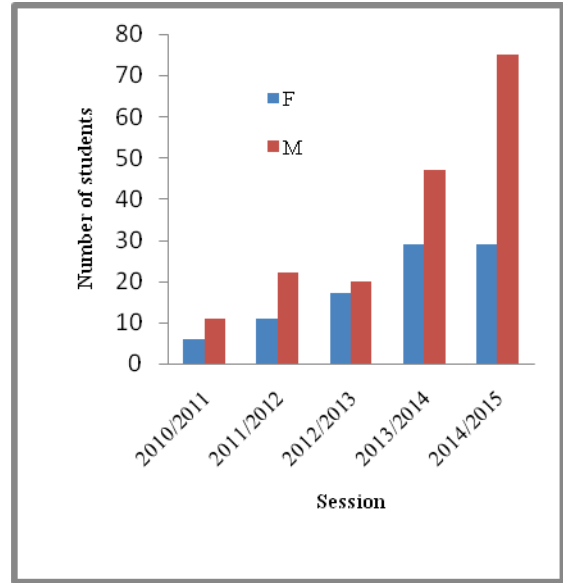
Degree in view	Session	Course of Study										Total of Science student		Grand total of all students	
		Biological Sciences		Chemistry		Computer Sciences		Mathematics		Physics		F	M	F	M
		F	M	F	M	F	M	F	M	F	M				
MASTERS	2010/2011	2	1	1	2	3	3	0	1	0	2	6	9	52	58
	2011/2012	11	1	1	1	3	4	0	0	0	2	15	8	63	62
	2012/2013	2	0	0	0	0	3	0	0	0	1	2	4	31	50
	2013/2014	9	6	4	2	3	6	0	0	2	1	18	15	49	58
	2014/2015	6	3	3	3	3	4	1	1	0	2	13	13	101	109
Total	5 Sessions	30	11	9	8	12	20	1	2	2	8	54	49	296	337
DOCTORATES	2010/2011	0	1	2	0	1	0	0	0	0	0	3	1	6	11
	2011/2012	0	0	0	0	1	0	0	0	0	3	1	3	11	22
	2012/2013	2	0	2	0	0	0	0	1	0	2	4	3	17	20
	2013/2014	6	2	1	1	2	1	0	5	2	4	11	13	29	47
	2014/2015	4	3	2	2	1	3	1	8	0	0	8	16	29	75
Total	5 Sessions	12	6	7	3	5	4	1	14	2	9	27	36	92	175

(a)



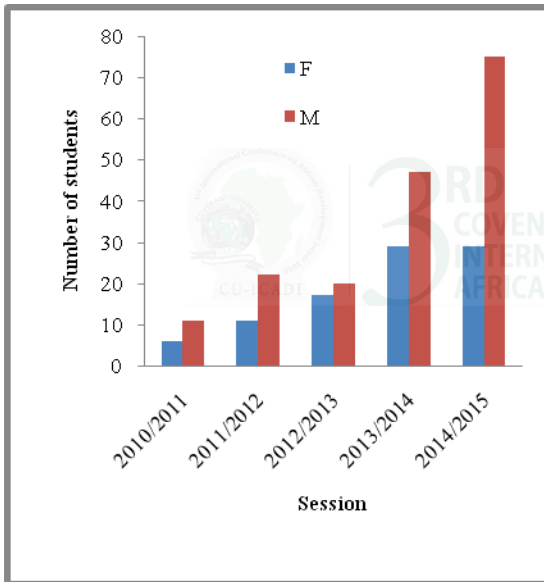


(b)



(d)

(c) Total number of doctorate's science students per session (d) Grand total of all doctorates' students per session



(c)

Figure 2: (a) Total number of master's science students per session (b) Grand total of all master's students per session

Table 3: Gender Parity Index of undergraduate students at Covenant University

Degree in view	Session	Total of Science student		Gender Parity Index (science)	Grand total of all students		Gender Parity Index (all students)	Female science students in the University	Female students in the University
		F	M	GPI	F	M	GPI	(%)	(%)
	2005/2006	99	83	1.2	752	833	0.9	13.2	47.4
	2006/2007	79	97	0.8	775	784	1	10.2	49.7
	2007/2008	106	131	0.8	855	912	0.9	12.4	48.4
	2008/2009	123	174	0.7	831	1038	0.8	14.8	44.5
	2009/2010	114	199	0.6	919	1136	0.8	12.4	44.7
	2010/2011	79	130	0.6	622	784	0.8	12.7	44.2
	2011/2012	88	137	0.6	779	1046	0.7	11.3	42.7
	2012/2013	74	104	0.7	761	964	0.8	9.7	44.1
	2013/2014	70	122	0.6	729	927	0.8	9.6	44.0
	2014/2015	75	158	0.5	863	1008	0.9	8.7	46.1
Mean	10 Sessions	91	134	0.7	789	943	0.8	11.5	45.6

The result of figures 2 (a-b) and 3 (a-b) depict that both at Master's and Doctorate level, the number of males enrollment for the science courses considered superseded that of females. The same was also observed for all the students. Parental factor might be a major contributor on this regards.

Most parents believe that their male children will preserve the name of the family. As such they prefer to spend more money on the education of the male children than the females.

Table 4: Gender Parity Index of postgraduate students at Covenant University

Degree in view	Session	Total of Science student		Gender Parity Index (science)	Grand total of all students		Gender Parity Index (all students)	Female science students in the University	Female students in the University
		F	M	GPI	F	M	GPI	(%)	(%)
MASTERS	2010/2011	6	9	0.7	52	58	0.9	11.5	47.3
	2011/2012	15	8	1.9	63	62	1.0	23.8	50.4
	2012/2013	2	4	0.5	31	50	0.6	6.5	38.3
	2013/2014	18	15	1.2	49	58	0.8	36.7	45.8
	2014/2015	13	13	1.0	101	109	0.9	12.9	48.1
Mean	5 Sessions	11	10	1.1	59	67	0.8	18.3	46.0
DOCTORATES	2010/2011	3	1	3.0	6	11	0.5	50.0	35.3
	2011/2012	1	3	0.3	11	22	0.5	9.1	33.3
	2012/2013	4	3	1.3	17	20	0.9	23.5	45.9
	2013/2014	11	13	0.8	29	47	0.6	37.9	38.2
	2014/2015	8	16	0.5	29	75	0.4	27.6	27.9
Mean	5 Sessions	5	7	1.2	18	35	0.6	29.6	36.1

The gender parity index for the three levels of education is presented in Tables 3 and 4. Gender parity index for undergraduate was low for all the sessions considered but for one session (2005/2006). The mean being 0.7, this indicates disparity in favour of males. There was also a disparity for all students in favour of male. The mean disparity is 0.8 in favour of males. However, at the masters and doctorates cadre, the baton changed. The mean disparity was 1.1 and 1.2 in favour of females for masters and doctorate programmes respectively. Contrarily, the mean disparity for all students was 0.8 and 0.6 in favour of males for masters and doctorates programmes respectively.

According to [14], recording parity in gender parity index does not necessarily mean that the educational situation for a gender group has improved but rather, the participation or opportunities for the other gender group might have declined. Using percentage scale, female science students are 11.5%, 18.3 % and 29.6 % for undergraduates, masters and doctorates programmes respectively. This further confirms the low number of female science students at Covenant University. Fear of the future, loss of interest, lack of strong will power, parental consent, gender discrimination among others are some

of the contributing factors to the low turnout of females in the sciences at Covenant University.

IV. CONCLUSION

This study revealed that the numbers of female science students are very low compared to their male counterpart at the three levels of education at Covenant University. Biological Sciences Department recorded higher numbers of female than males in the three levels of education. Chemistry Department enrolled more females than males at masters and doctorates level. The Department of Computer Science could only boast of more females at the doctorates level. Department of Mathematics and Physics had very low number of females in the three levels of education for the study.

Proffering solution to the factors barring women from pursuing careers in the sciences will encourage and motivate young girls to ply this route. Imbibing the culture of possibility mentality and inculcating same in our young girls at the elementary and secondary school level within. Transferring the same culture through community impact initiatives to this cadre of schools in the neighbourhood will serve as a winning strategy.

REFERENCES

- [1] R. Barnett and C. Rivers, "Gender equality: Doing the math". Los Angeles Times, January 20, 2012.

- [2] P.S. Clute, "Beyond the Math study". Los Angeles Times, July 30, 2008.
- [3] Girl Scouts, "Generation STEM: What girls say about Science, Technology, Engineering and Mathematics?" A Report from the Girl Scout Research Institute, USA. 1: 7-9, 2012.
- [4] P.S. Clute, "Mathematics is the engine that creates". The Desert Sun, June 20, 2014.
- [5] L. Al-Gazali, "Remove social barriers: 35 Scientists of the world speak up for equality". Nature, 495: 35-36, March 7, 2013.
- [6] V. Valian, "Invite women to talk: 35 Scientists of the world speak up for equality". Nature, 495: 36, March 7, 2013.
- [7] Bayer Corporation, "U.S. Female Students Enter College Most Prepared for STEM Studies". The Corporate Social Responsibility Newswire, December 7, 2011, http://www.csrwire.com/press_releases/33452.
- [8] L. Husu, "Women in universities in Finland: Relative advances and continuing contradictions", 7: 98, 2007.
- [9] E.Y. Andrei, "Inspire our daughters: 35 Scientists of the world speak up for equality". Nature, 495: 37, March 7, 2013.
- [10] L. Nordling and A. Weltman: "Driving force; 30 something science". Nature, 495: 31, March 7, 2013.
- [11] R. Adams, "Girls lack self-confidence in maths and science problems, study finds". The Guardian; March 5, 2015: <http://www.theguardian.com/education/>.
- [12] A. Devine, K. Fawlett, D. Szucs, and A. Dowker, "Gender differences in Mathematics anxiety and the relation to Mathematics performance while controlling for test anxiety". Behavioral and Brain Functions, 8 (33): 1-9, 2012.
- [13] K. Kaplan, "Female teachers may pass on math anxiety to girls, study finds". Los Angeles Times, January 26, 2010.
- [14] L. Tyson and S. Zahidi, "Closing gender gap economic participation". October 31, 2014. <http://www.project-syndicate.org>.

