

## Survival Rate in Science and Technology Programmes: Flow of Student in Kenyan Universities

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**Abstract:** Ministry of Education is determined to improve access, equity, quality, and relevance of education through better management of service delivery to all learners. Achievement in this sector will, therefore, enhance economic growth, create more employment, and guarantee sustainable development for the Kenyan people. The country therefore, has no choice but must make massive investment in science, mathematics and technology education, particularly in women; if at all the set targets will be to achieve the goals well articulated in Vision 2030. The purpose of the study was to determine the rate of flow of men and women in selected science and technology programmes in Kenyan universities is the same and to investigate alternative strategic to enhance survival rate of flow of men and women in selected science and technology programmes in Kenyan universities is the same. The theory used in this study was Liberal feminism. It is rooted in the tradition of 16th- and 17th-century liberal philosophy, which focused on the ideals of equality and liberty. The research design used in this study is ex post facto. The study was carried out in 3 Kenyan public and 3 private universities. The data of the study was collected using questionnaires and focus group discussion. The obtained data was analyzed using Wilcoxon Mann–Whitney Test. This test is a non-parametric analog to the independent t-test and is used when one does not assume that the dependent variable is a normally distributed interval variable (one can only assume that the variable has at least ordinal). The findings indicate that lack of adequate qualified personnel remain the number one factor that hinders the full rolling out of SMT programmes besides the expensive equipment in both public and private universities. It is recommend that girls are equally good in terms of performance at the university level means gender gap can be crossed in STs related professions. A lot then needs to be done from early childhood education, through primary to secondary school level to significantly improve the number of girls transiting to university.

**Keywords:** Survival Rate, Flow, Programmes, Universities.

### INTRODUCTION

Equity or inequity can be defined in terms of two basic principles [1]. The first is unequal opportunities; that a person's life achievements should be determined primarily by his or her talents and efforts rather than by pre-determined circumstances such as race, gender, social or family background. The second principle is avoidance of deprivation in outcomes, particularly in education, health and consumption levels. Equality between men and women relates to their dignity and worth, equality in their worth, equality in their rights, opportunities to participate in political, economic, social and cultural development, and to benefit from results [2]. Gender equity means giving men and women, girls and boys, the same opportunities to participate fully in the development of their societies and to achieve self-fulfillment.

The term gender equity is used to imply social justice and fairness in the distribution of resources and

opportunities among men and women (staff and students) in universities in Kenya [3]. According to Filmer [4], measured by the percentage of children who reach the last year of primary school, known as the primary completion rate, the world has made substantial progress toward reaching the Millennium Development Goal of enabling all children to "complete a full course of primary schooling. The primary completion rate in low-income countries increased from 57 per cent to 73 per cent between 1991 and 2006, with growth in all of the poorer regions: Latin America and the Caribbean (82 to 99 percent), Middle East and North Africa (77 to 91 %), South Asia (62 to 80percent), and Sub-Saharan Africa (51 to 60 percent). There are, however, large inequalities in education across and, importantly, within countries.

Documenting inequalities across countries is straightforward. So, while some countries are reaching 100 per cent of children completing primary school, the

rate is below 50 per cent in many countries: a sizable group of children still fails to complete school. This failure is especially large in countries where progress has been slow, but also exists in countries where overall progress is being made. The situation is worse in universities. Despite expansion in the numbers of students attending universities, disadvantaged communities and groups continue to be seriously under-represented in higher education throughout the world. Little is being done by government to promote greater access and equity in higher education, a significant contribution to social justice.

Kwesiga [5], mentioned gender inequity as one of the many challenges facing higher education in Sub-Saharan Africa, in the new millennium, it exists at all levels; within the student body, within academic staff, and within the decision-making cadre. Moreover, a broad sharing of economic and political opportunities enhances economic growth and development because greater equity implies more efficient utilization of resources. Few, if any, of today's developed nations have developed by excluding the majority of their people from economic and political opportunities.

Data available from Ministry of Education indicate that between 1999 and 2004, North Eastern and Coast provinces had gender disparities of more than 10 per cent while in Central Province, it was only 2 per cent. The widest gender gaps have been at the higher education levels, where, in 2004, female students made up only 36 per cent of those enrolled in the universities. Achievement of gender equity and equality in education is, therefore, a core development issue and a goal in its own right. Towards the achievement of the above goal, the government has developed a Gender and Education Policy, which provides a comprehensive framework of principles and policies that will be pursued in order to achieve gender equity and equality [6].

The policy acknowledges ongoing initiative in bridging the gender gaps in educational provision. It also identifies the special measures that the government, stakeholders and education providers will use to address the inequalities in education. The policy will also provide a framework for planning and implementation of gender responsive education, research and training at all levels. The policy highlights the key gender concerns in education, including disparities in enrolment, retention and transition rates and persistent negative social cultural practices and attitudes, which inhibit balanced achievement learning environment that are not conducive to the needs of girls. Other areas include stereotyping in learning materials and classroom teaching and lack of appropriate gender role models, among many other issues.

The gender policy caters for all education tiers. It addresses issues of access, equity, retention,

progression, transition, relevance and quality. It will also apply to financing, governance and management of education. The implementation of the policy will involve collaboration among various ministries- Education, culture and social services and office of the president. It will also involve the private sector providers, civil society organizations, faith-based organizations, Kenya National Union of Teachers (KNUT), communities. However, the primary responsibility is with Ministry of Education. One civil society provider known as, Society for Economic Development, conducted a study on education, and established that, Kenya is characterized by large inequalities with respect to income distribution and this has constrained economic growth. As such, investment in education is an important strategy to address such inequalities, and thus facilitate economic growth.

The study concluded by giving the following recommendations among others. First, to achieve EFA in the primary education sub-sector and also address the challenges within the sub-sector, there is need to increase the enrolment of girls at all tiers of the education system by improving retention, completion rates, and examination performance of girls, especially in mathematics and sciences. Second within the management of education and training in Kenya, there are fewer women managers as compared to men. To address this imbalance, there is need to enhance gender parity and balance at the management level. Third in a number of instances, girls who get pregnant are forced into early marriages, drop out of school and are not provided with opportunity for re-entry. To address this issue, there is need to develop and adopt mechanisms that will allow the re-entry of girls who drop out of school due to pregnancy and early or forced marriage.

Forth, TIVET and university education play a key role in the development of any country. To address the concerns of workforce skill development and enhancement, there is need to develop TIVET institutions, especially in underserved areas of the country, and provide loans to TIVET trainees. At the same time, there is need to improve the existing university loans system to ensure availability of financial support to poor students. Fifth at present, males dominate management of higher education in particular public universities. To address this inequality, there is need to set affirmative action that will guarantee equitable access to and management of university education and ensure that more women are admitted to science-based programmes than is the case currently.

Sixth, to enhance learning and training opportunities to all adults, out of school youth, other vulnerable groups and expand the post-graduate programme to cover all districts, there is need to promote open and distant learning opportunities. According to World Bank's *Kenya Gender and*

*Economic Growth Assessment Paper*, gender inequalities in education and access to agricultural inputs could result in one-off increase in output by as much as 4.3 percentage points of GDP, followed by sustained year-on-year increase of 2.0 to 3.5 percentage points in GDP growth. To achieve its target of 7 per cent real GDP growth, the government of Kenya therefore, must address gender-based barriers [7].

### Statement of the Problem

Despite the numerous courses of action the gender disparity in science and technology has posed a major challenge not just in Kenya but as well as global order. The ratification of a number of international instruments and declarations is a tacit acknowledgement of failure of government to mainstream gender in their programmes and activities. Kenyan education policy provides a framework for planning and implementation of gender responsive education as well as research and training at all levels. Similarly despite the many efforts by various institutions to mainstream gender equity to resources remains a pipe-dream. Yet few studies have been conducted in the area of gender and educational facilities [8]. Mainstreaming means that power in social relations is redistributed, so that women have equal access to the same resources as men. Female students have not have had equal access to laboratory, computer and library resources, due to fear of sexual harassment during night time hours. The progression in successive years has also been a challenge as women’s morphology poses myriad of problems making them not to compete at par with their male counterparts

### Objective of the Study

- To determine the rate of flow of men and women in selected science and technology programmes in Kenyan universities is the same.
- To investigate alternative strategic to enhance survival rate of flow of men and women in selected science and technology programmes in Kenyan universities is the same.

### Hypothesis of the Study

**Ho:** There is no significant relationship between men and women in rate flow in science and technology programmes in Kenyan universities.

### RESEARCH METHODOLOGY AND METHODS

The study adopted a mixed approach in collecting and analyzing data. In mixed methods studies, researchers purposely integrate quantitative and qualitative data rather than keeping them separate so as to maximize the strengths and minimize the weakness of each type of data [9]. A mixed methods designs involves the collection and analysis of both quantitative and qualitative data in a single study in which data are collected concurrently or sequentially, are given priority, and involve integration of the data at one or more stages in the process of research [10]. This study adopted a concurrent approach where both quantitative and qualitative data was collected at the same time and using the same respondents. It mixed both quantitative and qualitative research instruments by use of triangulation. Creswell, Plano, Gutmann and Hanson [11] noted that in concurrently collecting both forms of data at the same time, the researcher gets to contrast. This study used the focus group discussion and Questionnaires to collect data. The study found it necessary to use the instruments in order to achieve the stated objectives besides the combination of all the instruments was meant to capture both quantitative and qualitative data [12].

### FINDINGS AND DISCUSSION

The purpose of this section was to establish to determine the rate of flow of men and women in selected science and technology programmes in Kenyan universities was same. Respondents were asked to give information relating transition from one academic to the other. Total numbers of students in first year nominal rolls for particular cohorts were compared with respective terminal data as reflected in graduation booklets. The study used the Wilcoxon Mann–Whitney Test since the three variables were not normally distributed. This test is a non-parametric analog to the independent t-test and is used when one does not assume that the dependent variable is a normally distributed interval variable (one only assume that the variable has at least ordinal). Findings were presented in Tables 1-4 and Figures 1-3.

### Lecturers Perceptions on Women’s Transition

Transition rate from one academic year to the other is very similar according to lecturers as shown in table-1.

**Table-1: Perceptions of Lecturers on Women’s Transition**

Statement	SD	D	U	A	SA
A higher percentage of women than men repeat academic years	30%	60%		10%	
Transition of women from one year to another is smoother than that of men	20%	40%		30%	10%
Graduation rate of men is higher than that of women	30%	20%		30%	20%

90 per cent of respondents disagree with the statement that a higher percentage of women than men repeat academic years. 60 per cent of lecturers believe

that transition of women from one academic year to the other is independent of gender.

**Table-2: Repetition Rates of Male and Female**

Gender		Have you ever repeated any year of study		Total
		Yes	No	
Male	Count	11	89	100
	% within Gender	11.0%	89.0%	100.0%
Female	Count	4	87	91
	% within Gender	4.4%	95.6%	100.0%
Total	Count	15	176	191
	% within Gender	7.9%	92.1%	100.0%

Table-2 indicates that 95.6 percent of females as compared to 89 per cent of males have never repeated any year of study. 89 per cent of males have never repeated academic years as compared to 95.6 per cent of females.

**Students rate of flow with Examinations Re-sits**

Students who do not score minimum marks in particular examinations are required to re-sits for them, to be considered to have passed. This can therefore be another good indicator of performance of men and women in STs.

**Table-3: Percentages of Students by Gender Sitting for Re-sits Examinations**

Gender		Have you ever sat for supplementary exam		Total
		Yes	No	
Male	Count	17	82	99
	% within Gender	17.2%	82.8%	100.0%
Female	Count	24	65	89
	% within Gender	27.0%	73.0%	100.0%
Total	Count	41	147	188
	% within Gender	21.8%	78.2%	100.0%

On sitting for the supplementary exam, the results showed that both boys and girls were equally likely to sit for the supplementary exams. Though females in lower levels are more exposed to risk of

failing examinations because of household chores and failure to access sanitary pads, this is not a problem at university level.

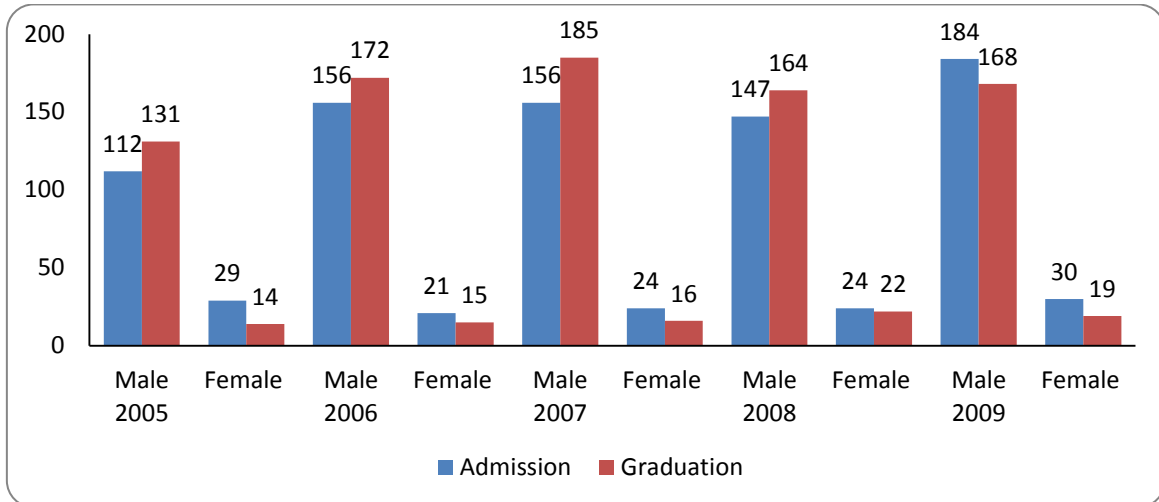
**Table-4: Interference from Either Gender**

Gender		What form of problem do you experience in your learning from students colleagues of other gender		Total
		Dominance in use of facilities	Contempt	
Male	Count	27	25	52
	% within Gender	51.9%	48.1%	100.0%
Female	Count	29	15	44
	% within Gender	65.9%	34.1%	100.0%
Total	Count	56	40	96
	% within Gender	58.3%	41.7%	100.0%

On the problem experienced in the learning from students colleagues, the results showed that there was no significant relationship with gender. This means the problems that students might experience have no relationship with gender. While reproduction is a human essential, a woman's inability to take up opportunities at particular times is often seen as her own fault. The percentages do not give a clear consensus on who among men and women has a higher rate of graduation. This is a confirmation of an earlier assertion

**Trends for Admission and Graduation**

The following are the analysis trends for the admission and graduation data for the science oriented courses in some selected universities in Kenya as shown in figures 1-3. According to Republic of Kenya [13] Engineers Registration Board statistics, there were 277 registered consulting engineering, only five (1.8 %) are women. Of 1,341 registered engineers, only 43 are women. Of 5,387 registered graduate engineers, only 413 (7.7 %) are females, while of 1,145 graduate technicians only 17 are women.

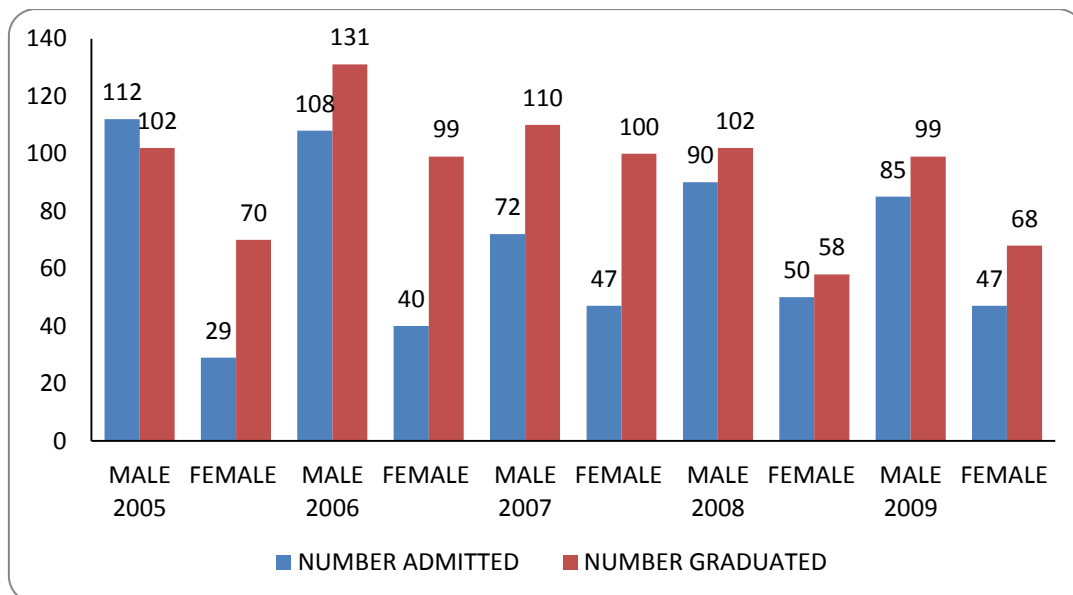


**Fig-1: Engineering in University of Nairobi**

Based on the above figure 4.25, the results show that in 2005, 2006 and 2009, there were more male graduates than the females admitted to pursue an engineering course at the University of Nairobi. However, in 2007 and 2008, there were more males who graduated than those who were admitted to pursue the same. Nevertheless, the results of the study showed that in any year, there were more males admitted to pursue the Engineering course than females. In addition, in the results showed that there was no statistical difference between the average number of males admitted to pursue an engineering course with the average number of males who graduated with the same.

However, the results showed that there was a statistical difference between the average number of females who were admitted and those who graduated. The negative sign means that the average number of females admitted to pursue an engineering course was more than those who graduated at the University of Nairobi.

The results show in figure-2 indicate that there were more graduates in any given year than the number of students admitted to pursue a degree in medicine. This is because data on those admitted on self sponsored programme was not availed.



**Fig-2: UoN medicine admission and graduation rates by gender**

Further, the results show that there was more men pursuing the medicine course when compared with their female counterparts. However, the difference was minimal as demonstrated by the graph above.

Nevertheless, the results of the survey showed that there was no significant difference between the average number of men who were admitted and those who were graduating with a degree in medicine at the UoN.

However, according to the results, there was a significant difference in the average number of females admitted and those who graduated where those who

were admitted being more than those who graduated this is attributed to the fact that data on privately sponsored programmes were not availed.

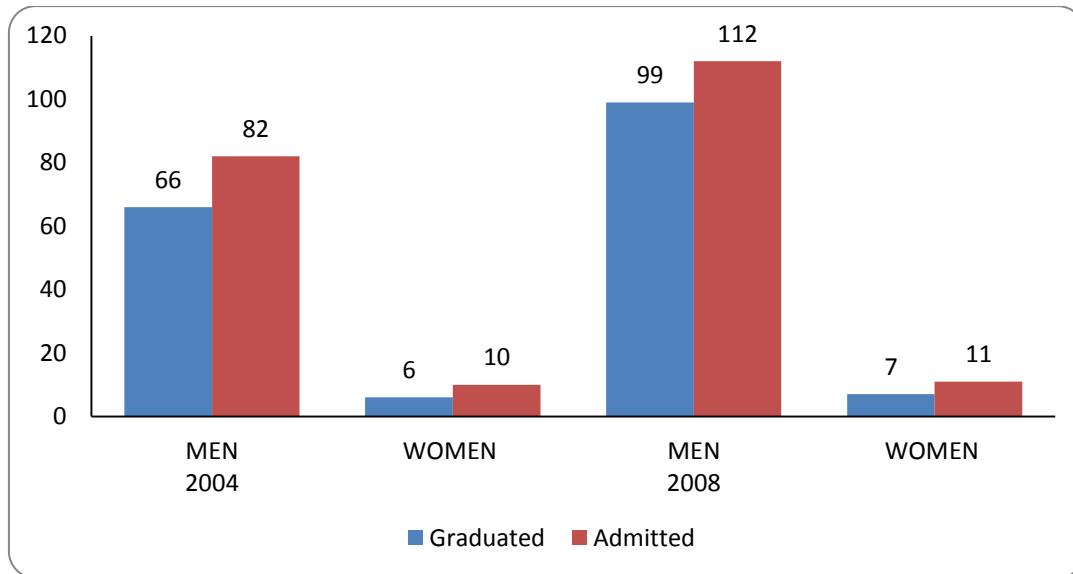


Fig-3: Engineering in JKUAT

According to the above figure 3, in both years, there were more male admitted to the Engineering Department than were the female. In addition, there were also a higher number of males who graduated from the same course when compared with their female counterparts.

The results of the survey also showed that was no significant difference between the average number of males who were admitted to pursue the engineering

course and those who graduated from the same course, however, the results showed that there was a significant difference between the average number of girls admitted to pursue the engineering course and those who graduated in the same course where those who graduated were less than the average number of those who were admitted. The following table 5 shows analyzed results of students' perceptions on transition from one academic year to the next.

Table-5: Students' Perceptions on Transition.

	Gender	N	Mean Rank	Sum of Ranks	Z	P
Lowering of university admission points for girls by one point is not enough	Male	99	77.48	7671.00	-4.731**	0.000
	Female	90	114.27	10284.00		
In secondary school girls are not properly inducted on performance of sciences	Male	98	88.67	8690.00	-1.576	0.115
	Female	90	100.84	9076.00		
epetition rate for women is higher than that of men	Male	94	94.90	8921.00	-1.381	0.167
	Female	85	84.58	7189.00		
Transition rate for men is smoother than of women	Male	82	81.74	6702.50	-0.362	0.718
	Female	78	79.20	6177.50		

\*\*significant at 0.05 level of significance

On whether university admission points for girls should be lowered by one point, P value is significant, meaning majority of respondents feel that by lowering university admission points by one unit is not adequate. Despite the affirmative action by government where women are admitted with point lower than their male counterparts have not helped

increase student numbers significantly. According to republic of Kenya 2011, the total enrolment in all universities grew by 1.8 percent from 177,735 students in 2009/10 academic year to 180,978 students in 2010/2011 academic year. The total enrolment in the public universities dropped by 0.4 percent from 89,611 in 2009/2010 to 89,257 in 2010/11 academic years.



During the same period, the total female enrolment increased by 1.8 per cent from 52,945 to 53,873 student

On comparison of repetition rate for women and men, P value of 0.167 is not significant and it indicates that repetition rate of men is equally the same with that of women. Failures to obtain minimum mark, indiscipline, sickness or even pregnancy are some of major factors that make students repeat academic years. It means women have higher chances of repeating than their male counterparts.

On comparison of Progression P Value of 0.718 is not significant meaning majority of respondents feel that transition in Kenyan universities for women is equally the same with transition rate for men. Enrolments at secondary and tertiary education levels have converged across genders in many countries, although significant gaps remain in some regions. The exception is Sub-Saharan Africa where more boys gained secondary school access relative to girls between 1999 and 2008, worsening gender disparities in this period. During the last decade, tertiary education enrollments surged in all regions of the world. On average, we now observe a gender gap favoring females. Female tertiary enrollment rates in 2008 lagged behind in 36 countries (out of the 121 with available data), but exceeded males in 79 countries. Across regions, MENA, and to a lesser extent South Asia, experienced the greatest relative growth in female tertiary student enrolments [14].

## CONCLUSION

Women just require encouragement from childhood and they can do equally well. Critical work has been undertaken at the educational ministerial levels, but this is not reflected in the strategies *Vision 2030* proposed for this subsector. While such proposed measures as increasing financial support to poor students, improving quality, and increasing spaces for admission to secondary and university levels will likely benefit disadvantaged students, there is a need to link these initiatives explicitly to the disparities that exist by sex. In the immediate to medium term, the sub-sector should target female students from poor families across all regions so as to increase enrolment, retention and completion (post-primary and post-secondary), and transition. The distribution of financial assistance should be aimed at narrowing the gender gap, and intra- and inter-regional targets should be set for the medium to longer term.

## Policy Implication

There is need to carry out further research as this study was limited to SMTs programmes in the Kenyan universities. Studies need to be done to establish how well Kenyan universities are equipped to handle STs Programmes. This is because employers are already concerned that graduates are not equipped to

handle work challenges of 21<sup>st</sup> century. Second, it is important to establish workability of partnerships of between public facilities such as hospitals and private universities to speed up learning. There is no need of duplicating already existing facilities when they are available in nearby governments departments.

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