

# Gender Differences In Academic Mindsets And Academic Achievement Among Form Three Students In Nairobi County, Kenya

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**Abstract:** Poor academic achievement poses a threat to the educational sector in Kenya, which is an important pillar in the realization of vision 2030. Therefore, this study sought to establish gender differences in academic mindsets and academic achievement among form three students in Nairobi County, Kenya. The study was guided by Social Cognitive Theory of Motivation and Personality. Explanatory sequential mixed methods design was adopted. Purposive, stratified, and simple random sampling procedures were used. A sample of 488 participants was selected from 10 public secondary schools. Quantitative data was collected through self-report questionnaires which comprised of adapted scales for Academic Mindsets. The quantitative data was further cross-checked through interviews conducted with 40 participants who were purposefully selected from those who had filled the questionnaires. Academic achievement was inferred from student's academic records. Quantitative data were analyzed mainly using t-test for independent samples while qualitative data were analyzed thematically. The study found significant sex differences in academic mindset scores ( $t(486) = -2.47, p < .05$ ). The qualitative findings were in tandem with the quantitative results. In conclusion, the significant gender differences in academic mindsets implies their importance in the teaching learning process. Therefore, the study recommended that, teachers, parents and all stakeholders in education create an enhancing environment to foster the development of academic mindsets among secondary school students.

**Keywords:** Academic Mindsets; Gender Differences; Academic Achievement; Secondary School Students.

## I. INTRODUCTION

Education in the 21<sup>st</sup> century has experienced a shift where emphasis has been placed on gender equity in the classroom in order to foster academic achievement of both boys and girls. However, poor academic achievement continues to be a threat to the educational sector in Kenya which is an important pillar in the realization of the objectives of vision 2030 with regard to attainment of socio-economic and political development of the country. With this knowledge comes the need to establish the factors associated with this poor academic achievement. Among the numerous factors that

may have a major impact on academic achievement are gender differences in academic mindsets and academic achievement. Gender is the range in physical, biological, mental and behavioral characteristics pertaining to and differentiating between the feminine and masculine (female and male) population. Gender parity is a key indicator of progress made towards global achievement of education for all (UNESCO, 2000). Moreover, this parity is attained when the same proportion of girls and boys enter the education system, achieve educational goals and advance through different cycles (UNESCO, 2003). However, according to Amunga, Musasia, and Julius (2010), while indeed gender parity has

almost been achieved in some regions, there are those which have gross disparity in academic achievement.

The term “Mindset” in learning was officially proposed by Dweck in 2006. According to Dweck, Walton, and Cohen (2011), students have a very important role in learning. More specifically, they emphasize on the motivation that students carry with them in the form of mindsets and skills. People may have different mindsets in different domains but this study specifically focused on mindsets as they relate to intelligence and academic achievement. Academic mindsets are beliefs or ways of perceiving oneself in relation to learning and academic achievement (Farrington et al., 2012). Moreover, Dweck et al. (2011) asserts that, the most important concern about students’ belief in their ability is the sustainability of their self-efficacy and especially when they encounter inevitable challenges and setbacks in schools. Therefore, the major issue in this study is not just the self-efficacy belief but how sustainable is this self-efficacy and this is the student’s mindset about intelligence (Dweck & Leggett, 1988).

According to Dweck (2000), for students to be successful, they must love learning, seek challenges, value effort, and persist in the face of obstacles. Therefore, when one encounters challenges, his or her mindset determines their level of persistence. Dweck identifies two types of mindsets in relation to intelligence. They include fixed and malleable mindsets. With fixed mindset, intelligence is a constant, inherent trait, and nothing can be done about it. Fixed mindset is also referred to as entity theory. With malleable academic mindset, while intelligence may be naturally different among individuals, it can be developed through learning. Malleable mindset is also referred to as growth mindset or incremental theory (Dweck, 2000).

Over the years, empirical research has indicated that, despite the measures that have been taken, gender gaps in academic achievement has remained a global issue. For instance, in the USA, Macnamara and Rupani (2017) in their study on the relationship between intelligence and mindset at a Case Western University pointed out that, gender differences in academic mindsets was among the factors that had a role in the relationship between intelligence and mindset hence academic achievement. On the same vein, Cheng, Kopotic, and Zammara (2017) conducted a study at Harvard University on whether parent’s growth mindset has a role in addressing gender gaps. The study reported that, a gender gap persists as women are underrepresented among science, technology, engineering, and mathematics jobs and degree completion. In addition, the study found a significant gender differences among boys and girls. Boys scored more than girls on growth mindset.

In Africa, a study by UNESCO (2015b), reported that, Sub-Saharan Africa continues to show good progress in education, yet wide disparities within each country are still holding back full achievement of the Universal Education-For-All goals. In Ethiopia, a study by Tesema and Braeken (2018) on regional inequalities and gender differences in academic achievement pointed out that, gender inequality is still evident in access, enrolment, and literacy figures, especially, in Sub-Saharan Africa including Ethiopia. In Nigeria, Adigun, Onihunwa, Irunokhai, sada, and Adesina (2015) pointed out

that, gender was a key factor that may have considerable effects on student’s academic achievement.

In Kenya, although no study has specifically been done on gender differences in academic mindsets and academic achievement, related studies have indicated that, gender plays a great role in academic achievement. According to Mokua (2013), education at all levels in Kenya is still a gendered terrain and gender disparities are widest at the secondary and tertiary levels. Moreover, Kashu (2014) in a study on gender and academic performance in secondary schools in Kenya reported that, boys were still scoring higher than girls in overall performance and across subjects. Therefore, with this glaring gender disparity in academic achievement, the current study sought to find out if there were gender differences in academic mindsets and academic achievement among form three students in Nairobi County, Kenya.

## II. STATEMENT OF THE PROBLEM

Poor academic achievement among students in KCSE examination in Nairobi County has been declining over the years (2015 – 2018). For instance, in 2016, those who obtained between grade D and E were 58.09%. These candidates with low grades do not have many options given the tight race for professional courses and employment. Furthermore, poor academic achievement is a threat to the educational sector in Kenya which is an important pillar in the realization of the objectives of vision 2030 with regard to attainment of socio-economic and political development of the country. Therefore, there was a need to further study some of the causes of poor academic achievement among secondary school students.

Based on the background to the study, the majority of the studies done in developed countries have reported gender differences in academic mindsets and academic achievement (Cheng, Kopotic, & Zammara, 2017; Macnamara & Rupani, 2017; UNESCO, 2015b). In addition to being done in countries with different systems of education and backgrounds, these studies focused on university and college students with few studies focusing on secondary school students. Therefore, there was a gap at the secondary school level on gender differences in academic mindsets and academic achievement within African contexts.

In Africa, and more specifically in Kenya, related studies have not addressed the issue of gender differences in academic mindsets and academic achievement. Therefore, the central problem of this study was to examine gender differences in academic mindsets and academic achievement among form three students in Nairobi County, Kenya.

## PURPOSE OF THE STUDY

The purpose of this study was to establish whether there were gender differences in academic mindsets and academic achievement among form three students in Nairobi County, Kenya. This was important as it could shed more light into measures aimed at reducing gender parities in academic achievement of boys and girls.

## OBJECTIVES OF THE STUDY

- The study was guided by the following objective:
- ✓ To establish gender differences in students' academic mindsets and academic achievement.

## III. LITERATURE

### GENDER DIFFERENCES IN ACADEMIC MINDSETS AND ACADEMIC ACHIEVEMENT

Empirical research has presented mixed results with regard to gender differences in students' academic mindsets and academic achievement. One such study was done by Rudig (2014) who studied implicit theories of intelligence at the University of Nevada, Las Vegas. The study investigated the role theories of intelligence play in understanding mathematics. The study hypothesized that, respondents who believe intelligence is a malleable trait would engage more in finding solutions to problems than their fixed mindset counterparts. The study comprised two experiments using a sample of 92 and 130 students respectively. Results revealed significant gender differences in students' academic mindsets. More girls than boys endorsed a fixed mindset, while there were no significant gender differences in malleable mindset. This study involved university students and was experimental in nature. The current study involved secondary school students in a different set up to determine gender differences in academic mindsets and academic achievement in Kenya.

Similar findings were found by De Kraker-Pauw, Wesel, Kabbendam, and Atteveldt (2017) in their study on teacher mindsets concerning the malleability of intelligence and the appraisal of achievement in the context of feedback. The study sample consisted 106 teachers (63 males, 43 females) from 11 secondary schools in the southwest of the Netherlands. One of the objectives of the study was to establish the effect of mindset, gender and domain on the appraisal of achievement. A multiple linear regression was conducted. The analysis showed that gender ( $\beta = 0.32$ ,  $t = 3.396$ ,  $p < .001$ ) and mindset ( $\beta = 0.19$ ,  $t = 2.034$ ,  $p = .05$ ) were significant predictors with male teachers presenting a more growth oriented mindset giving higher associations. This study used secondary school teachers in Netherlands. The current study on gender differences in academic mindsets and academic achievement used secondary school students.

In another study, Macnamara and Rupani (2017) conducted a study on the relationship between intelligence and mindset. The participants of the study were 103 (53 females, 47 males) at Case Western Reserve University. Their mean age was 18.5 ( $SD = 1.82$ ). Using a correlational research design and an Intelligent Mindset Questionnaire, results revealed that, there were significant gender differences with males having a greater growth in intelligence mindsets than female. This study utilized a correlational research design and university students. The current study utilized a sequential mixed method design to compare the findings.

Inconsistent results were however found by Hwang, Eccles, and Reyes (2016) in their study on who holds a fixed mindset and whom does it harm in mathematics? In the

longitudinal study, 16,200 10<sup>th</sup> grade students were followed through their secondary and post-secondary years. The study sought to establish whether there were differences in mindsets across subgroups including gender, race/ethnicity, socioeconomic status, and achievement level. Multiple regression was conducted and the results revealed that female students did not differ significantly from male students in their endorsement of a fixed mindset.

On the same vein, Matheson (2013) conducted a study on students' beliefs about learning and intelligence in Southeastern Ontario Canada. Using an exploratory research design and a sample of 243 (116 females, 127 males) secondary school students from one rural school, results showed no significant difference between males and females in implicit theories of intelligence. Similar results were obtained by Furnham et al. (2003) in their study on personality, cognitive ability, and beliefs about intelligence at a university college in London. Utilizing a correlational research design and a sample of 93 (70 females, 23 males) British university students, results revealed that correlations of beliefs about intelligence with academic achievement were not affected by gender. This inconsistency in findings made the current study necessary using secondary school students to establish gender differences in students' academic mindsets.

Other inconsistent findings were found by Milligan (2016) on her study, "Math class is tough" The role of mindset in middle school girls' and boys' math achievement. One of the objectives of the study was to examine whether gender differences in theories of intelligence contribute to the adoption of different achievement goals. The study utilized a 2 x 2 (Gender x Scale type) between subject design. The participants were 1154 (48% female and 52% male) middle school students from four different schools in a Midwestern school district. Multiple regression results revealed that, there were no significant differences between males and females in the type of implicit theory of intelligence. This study utilized a 2 x 2 between subject design. The current study used a sequential mixed methods design to compare the findings.

Based on the literature reviewed, the majority of the studies on gender differences in academic mindsets and academic achievement were done in the developed countries. In addition, these studies presented methodological gaps and the results were inconsistent and inconclusive. Consequently, there was for need for the current study which used sequential mixed method design to examine gender differences in academic mindsets and academic achievement among form three students in Nairobi County, Kenya.

## IV. RESEARCH DESIGN

The researcher adopted an explanatory sequential mixed method design. This design involves two phases of data collection and analysis. In the first phase, quantitative data was collected and analyzed, with an intention of first addressing the study objective. It was then followed by a second phase which involved collection and analysis of qualitative data in order to explain in more detail the quantitative results (Creswell, 2018). For the quantitative data, the researcher used a correlational research design. According

to Fraenkel, Wallen, and Hyun (2015), a correlational research design describes the degree to which two or more quantitative variables are related and there is no manipulation of such variables hence its suitability for the current study. For the qualitative data, in-depth interviews were conducted on a purposively selected number of participants in order to get personal perspectives of the participants regarding academic mindsets. The purpose of the qualitative phase was to explain further the earlier obtained quantitative results. Therefore, explanatory sequential mixed method research design was considered suitable for this study since it allows the exploration of relationships between variables in depth.

## PARTICIPANTS

The study comprised 488 form three students (243 girls, 245 boys) from 10 public secondary schools in Nairobi County, Kenya. The participants age ranged between 15 – 23 years.

## MEASURES

Three research instruments were used in this study. They were a student's questionnaire, a pro forma summary of student's academic results and an interview schedule. The questionnaire comprised of two parts. Part I (items 1 – 5) consisted of student's demographic information regarding their age, gender and type of school. Part II consisted of (items 1 – 8) on academic mindsets. Academic mindsets were assessed using an adapted scale from academic mindset questionnaire developed by Dweck (2000). This questionnaire comprised (items 1-8) of students' fixed and malleable academic mindsets. There were four items reflecting student's fixed academic mindset like "I have a certain amount of intelligence and I cannot do much to change it". There were also four items reflecting students' malleable academic mindset like, "No matter who I am, I can significantly change my intelligence level". Students' responses were rated on a six point Likert scale ranging from between 1 (Strongly Agree) and 6 (Strongly disagree). Scores from malleable items were reversed so that strongly disagreeing with a fixed mindset item is similar to strongly agreeing with malleable mindset item. The scores ranged from 8 to 48 with a low score indicating strong endorsement of the constructs and high score indicating low endorsement of the constructs.

The internal consistency was determined using the Cronbach's alpha also referred to as coefficient alpha. Dweck, Chiu, and Hong (1995), reported high internal reliability of academic mindset scale across six studies with an alpha range of .94 to .98. The pilot study data for the adapted mindset items had an internal consistency of .80 to .85. The overall internal consistency for all the items of the academic mindset questionnaire was .85. Therefore, this internal consistency was considered high enough to adopt the academic mindset questionnaire in the current study. Data on student's academic achievement was inferred from participants' academic records.

An interview schedule was used to collect qualitative data on students' academic mindsets. Since the purpose of the qualitative data was to build on the quantitative results, interviews were conducted on 40 purposively selected

participants. These were participants who had filled the quantitative questionnaires and had rated themselves very highly in fixed and malleable academic mindsets. They were then followed through their academic achievement results.

## PROCEDURE

Purposive sampling, stratified sampling, and simple random sampling procedures were used to select Nairobi County, 10 public secondary schools and the 488 form three students who participated in the study. The participants were briefed on the purpose of the study and the main variables were explained. They were also assured of the confidentiality of the information they provided. It took 15 – 20 minutes to fill the questionnaire. The filled questionnaires were then collected by the researcher and the participants thanked for their participation. The researcher then requested the respective class teachers to provide the academic achievement records of the participants for end of term 1 and end of term 2, 2016.

The second phase of data collection involved interviews. The participants were purposively selected from the participants who had filled the questionnaire. The researcher explained the purpose of the interviews to the participants. The participants were assured of the confidentiality of the information they provided. Pseudonyms were used. The interviews were transcribed verbatim and the transcripts were used for analysis.

The raw data obtained from the questionnaires was coded, cleaned and scored for statistical analysis by the computer using Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistics were used and more specifically a t – test for independent sample was used to determine gender differences in academic mindsets and academic achievement. Academic achievement results were analyzed through a pro forma table. The mean scores were transformed into Z scores then into T scores. Qualitative data from the interviews was analyzed thematically.

## V. RESULTS

### DESCRIPTION OF GENDER DIFFERENCES IN ACADEMIC MINDSETS

The participants' scores in academic mindsets were analyzed to find their mean and the standard deviation. The results are as presented in Table 1.

		Sex					
		Male		Female		Total	
		N	%	N	%	N	%
LAM	Average	144	29.5	123	25.2	267	54.7
	High	101	20.7	120	24.6	221	45.3
	Total	245	50.2	243	49.8	488	100

Note. N = 488; LAM = levels of academic mindsets.

Table 1: Levels of Academic Mindsets by Sex of the Respondents

The results in Table 1 revealed that more than half of the respondents were average in academic mindset with more



boys (29.5%) than girls (25.2%) in the average category. Interestingly, there were more girls (24.6%) than boys (20.7%) in the high level category. This implied that majority of the respondents, both boys and girls did not rate themselves very highly in academic mindsets. A further analysis was done to establish whether there were gender differences between the two subscales of academic mindsets. The results are shown in Table 2.

	Sex	N	M	SD
FAM	Male	245	14.58	4.12
	Female	243	15.32	4.45
MAM	Male	245	19.08	3.81
	Female	243	19.13	3.76

Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; M = mean; SD = standard deviation

Table 2: Gender Differences in the Subscales of Academic Mindset

The results in Table 2 showed that, girls had a higher mean ( $M = 15.32$ ,  $SD = 4.45$ ) in fixed academic mindset subscale than boys ( $M = 14.58$ ,  $SD = 4.12$ ). Interestingly girls had also a higher mean ( $M = 19.13$ ,  $SD = 3.76$ ) in malleable academic mindset subscale than boys ( $M = 19.08$ ,  $SD = 3.81$ ). Furthermore, descriptive analysis of academic achievement scores by sex was performed to find the mean and the standard deviation. The results are shown in Table 3.

	Sex	N	M	SD
Acad. Ach.	Male	245	50.30	10.14
	Female	243	40.70	9.86

Note. N = 488. M = mean; SD = standard deviation; Acad. ach. = academic achievement.

Table 3: Sex Differences in Academic Achievement

As observed in Table 3, boys had a higher mean ( $M = 50.30$ ,  $SD = 10.14$ ) than girls ( $M = 40.70$ ,  $SD = 9.86$ ) in academic achievement. As seen in Table 2, more girls than boys endorsed a fixed academic mindset and this could have led to more boys performing better than girls since fixed academic mindset is associated with low academic achievement.

The null hypothesis to be tested was:

$H_{01}$ : There are no significant gender differences in students' academic mindsets and academic achievement.

To make this hypothesis testable, two supplementary null hypotheses were formulated.

$H_{01.1}$ : There are no significant gender differences in students' academic mindsets.

$H_{01.2}$ : There are no significant gender differences in academic achievement.

In order to test the first supplementary null hypothesis, an independent samples t-test for the individual subscales of students' academic mindset scores was performed. The results are presented in Table 4.

ACMS	T	Df	Sig. (2-tailed)	MD	SED
FAM	-1.91	486	.05	-.74	.38
MAM	-.13	486	.89	-.04	.34

Note. N = 488. df = degrees of freedom; MD = mean difference; SED = standard error of the difference; FAM = fixed academic mindset; MAM = malleable academic mindset.

Table 4: Independent Samples t-test of the Subscales of Students' Academic Mindsets

As observed in Table 4, statistically significant sex differences were found in fixed academic mindset ( $t(486) = -1.91$ ,  $p < .05$ ). This meant that more girls than boys endorsed a fixed academic mindset implying that, girls give up easily especially when they are not able to perform a task. On the contrary, there were no significant sex difference between boys and girls on malleable academic mindset ( $t(486) = -.13$ ,  $p > .05$ ). This meant that, despite the fact that more girls than boys endorsed a malleable mindset, their mean differences were not statistically significant.

In order to test the second supplementary null hypothesis, an independent samples t-test of academic achievement was conducted. The results are shown in Table 5.

	T	df	Sig. (2-tailed)
Academic Achievement	.66	486	.50

Note. N = 488.

Table 5: Independent Samples t-test of Sex Differences in Academic Achievement

The results in Table 5 indicated that there were no significant sex differences in academic achievement ( $t(486) = .66$ ,  $p > .05$ ). The second supplementary null hypothesis was therefore accepted and it was therefore concluded that, the academic achievement of boys and girls was the same. This confirmed the results as presented in Table 2 that, girls were better than boys in academic mindset scores. This according to Rudig (2014) could have been contributed by the fact that girls with fixed mindset may perform as well as those with malleable mindset so as to prove their ability.

## VI. QUALITATIVE DATA ANALYSIS

The purpose of qualitative analysis in the current context was to explore in detail the earlier obtained quantitative results (Creswell, 2018). This was meant specifically to shed more light into the quantitative findings by getting the specific personal perspectives of the participants in reference to students' academic mindsets and academic achievement. For instance, when the fixed mindset participants were followed through interviews, it emerged that, a majority of them had low academic achievement results. On the other hand, those participants who endorsed a malleable academic mindset had high academic achievement results. This corroborated the quantitative results obtained earlier (Creswell, 2018).

## VII. DISCUSSIONS

The results of the current study revealed that, there were significant sex differences in fixed academic mindsets. More girls than boys endorsed a fixed academic mindset. On the contrary, there were no significant sex differences between boys and girls on malleable academic mindset. Moreover, there were no significant sex differences between boys and girls in academic achievement. These findings concur with those by Rudig (2014) among university students who reported significant sex differences in students' fixed

academic mindset. However, there were no statistically significant sex differences in malleable academic mindset. Girls and boys who believed in effort expenditure performed almost the same.

The results of the current study were also consistent with those by De Kraker-Pauw, Wesel, Kabbendam, and Atteveldt (2017) in their study on teacher mindsets concerning the malleability of intelligence and the appraisal of achievement in the context of feedback. The analysis showed that gender and mindset were significant predictors with male teachers presenting a more growth oriented mindset giving higher associations. Similar results were reported by Macnamara and Rupani (2017) on their study on the relationship between intelligence and mindset at Case Western University. Using a correlational research design and an Intelligent Mindset Questionnaire, results revealed that, there were significant gender differences with males having a greater growth in intelligence mindsets than female.

Inconsistent results to the current study were however found by Hwang, Eccles, and Reyes (2016) in their study on who holds a fixed mindset and whom does it harm in mathematics. The study sought to establish whether there were differences in mindsets across subgroups including gender, race/ethnicity, socioeconomic status, and achievement level. Multiple regression was conducted and the results revealed that female students did not differ significantly from male students in their endorsement of a fixed mindset.

Other inconsistent results to the current study were found by Matheson (2013) who conducted a study on students' beliefs about learning and intelligence in Southeastern Ontario Canada. Results showed no significant difference between males and females in implicit theories of intelligence. Similarly, Furnham et al. (2003) in their study on personality, cognitive ability, and beliefs about intelligence at a university college in London reported that, correlations of beliefs about intelligence with academic achievement were not affected by gender.

Other inconsistent findings were also found by Milligan (2016) on her study, "Math class is tough" The role of mindset in middle school girls' and boys' math achievement. One of the objectives of the study was to examine whether gender differences in theories of intelligence contribute to the adoption of different achievement goals. Multiple regression results revealed that, there were no significant differences between males and females in the type of implicit theory of intelligence.

## VIII. CONCLUSION AND RECOMMENDATIONS

The study found that more girls than boys endorsed a fixed academic mindset. On the other hand, there were no significant differences between girls and boys in malleable academic mindset. In addition, the study found no significant differences between girls and boys in academic achievement. This could have been contributed by the fact that, the fixed mindset girls could have worked harder to prove their ability (Rudig, 2014). Therefore, the study recommended that, teachers, parents and all stakeholders in education create an enhancing environment to foster the development of malleable

academic mindset of both boys and girls to enhance academic achievement among secondary school students.

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