INFLUENCE OF TYPE OF SCHOOL ON SELF PERCEPTION OF MATHEMATICAL ABILITY AND ACHIEVEMENT AMONG GIRLS IN SECONDARY SCHOOL IN HARARE

1Tambo, Lucian. K., 2Munakandafa, Walter., 2Matswetu, Vimbai, S., & 2Munodawafa, Violet
1ILSA College, 57 Fife Avenue
Harare, Zimbabwe.
2Bindura University of Science Education
Department of Science Education
P. Bag 1020, Bindura, Zimbabwe.
Phone: +263 772 931 248.
*Corresponding Author - E-mail: wmunaka@gmail.com

Abstract
The study explored the influence of type of school on fourth-year secondary school girls’ self-perception of ability and achievement in Mathematics. The study sample comprised of 90 girls from one girls-only school and one co-educational school in Harare district, who were selected using stratified random sampling techniques. Girls’ perception of their ability in mathematics was measured using a self-administered questionnaire with both open- and closed-ended questions Mathematics achievement was assessed using document analysis of the two schools’ national examination results over an eleven year period. The findings indicate that the self-perception of mathematical ability of girls in the single-sex school is higher than those in co-educational school. However, there is no significant difference in the achievement of ordinary level girls in mathematics attending either the single-sex or the co-educational school ($\chi^2 = 0.4368$ p < 0.05).

Introduction
The gender gap in mathematics achievement has been a topic of considerable research over the past decades. As our world grows even more dependent on technologically driven competencies, girls’ participation in mathematics affects future career and economic opportunities. Mathematics is perceived as the ‘critical filter’ creating access for women into equitable higher paying professions such as engineering (Sells, 1973). According to Maple and Stage (1991), over recent decades women have made increased strides in pursuing mathematically oriented college degrees, yet men outnumber women two to one in quantitative
university concentrations. The United States Bureau of Labour and Statistics (2007) has asserted that in mathematics-related fields such as engineering, women’s participation is still below 20%. They go on to say that the gender imbalance of women’s participation in engineering seems striking as the demand for engineers over the next several years is projected to grow between 10% and 20%.

Zimbabwe has had impressive successes in educational development since 1980 notwithstanding, as Runhare and Gordon (2004) put it,

“there remain challenges in realising the goals of gender equality and equity in education, which are critical to the achievement of EFA (Education For All). The key indicators on enrolment, access, attrition, and completion in Zimbabwe in 2001 indicated that there had been stagnation in educational development since 1990. Serious disparities and inequalities persist in the system with gender being a key contributory factor.” (p.2).

Whilst there is a multiplicity of interrelated barriers to gender equity in education in Zimbabwe, Runhare and Gordon (2004) have identified three distinct areas requiring attention if equity is to be achieved:

- A gender-insensitive school environment.
- A home and community environment that is not adequately supportive.
- A policy environment that is insufficient to address the education needs of girls.

Much of the research into gender issues in education reveals that girls do not achieve as much as boys in Mathematics. (Levin, Sabar and Libman 1991; Young and Fraser 1990; Becker 1989). Furthermore, it appears that girls do not enjoy the subject as much as boys, lack confidence in their ability in mathematics, and that ultimately, fewer numbers of girls than boys choose to study mathematics at tertiary level (Spielhofer, O’Donnell, Benton, Schagen and Schagen, 2002). This may in part, be due to the stereotypical belief that many students, parents and teachers have that mathematics is a masculine subject

It might be possible to act positively to counteract this stereotyping in single sex schools. By educating girls in mathematics classes where only girls are present, and by
presenting mathematics courses in a way that overtly dismisses the claim that mathematics are for boys, girls may be able to achieve better results in mathematics, and may develop a more positive attitude towards the subject. This view is similar to that of Tully and Jacobs (2010:1) who noted that female students were encouraged to study engineering after secondary school 'because of a self belief that they are good at maths'. Nurturing this belief in school could result in more girls pursuing more scientific careers and studying mathematics related courses at tertiary level.

This study therefore sought to find out if single sex or co-educational schooling does have an impact on perceptions of ability and mathematical achievement of girls in Zimbabwean schools. The results from this study may provide important evidence with regard to the effect of single sex schooling on girls’ achievement in mathematics that could provide the basis for further studies.

**Problem statement**

Nyagura and Riddell (1994) found that girls’ achievement was significantly lower than that of boys in Zimbabwean schools, particularly for mathematics.

This research sought to find out whether single sex schooling is beneficial to the education of girls in mathematics or not.

**Main research question**

Does an all-female mathematics classroom have a positive impact on girls’ self-perception of their ability and achievement in mathematics?

**Specific research questions**

1. What are the self-perceptions of mathematical ability of girls in single sex schools?
2. What are the self-perceptions of mathematical ability of girls in co-educational schools?
3. What effect does the type of school have on the achievement of girls in mathematics at ordinary level?
Significance of the study
Mathematics is an area in which few women choose to venture as a career. While many educational or social factors may be influencing their reluctance to do so, understanding how the type of school affects girls’ self perception of their mathematical abilities is important. This may be useful in developing policies and ways to encourage and support girls to enjoy, and achieve better grades in mathematics such that they are encouraged to pursue mathematics-related careers.

Delimitations of the study
This study focussed on one girls’ school as well as one co-educational school within Harare district, in Zimbabwe. No research was carried out in boys’ schools since the comparison only concerns girls in the different learning environments. Also, the research was based on the Zimbabwe Schools Examinations Council (ZIMSEC) Ordinary (‘O’) level national examination results of the pupils, rather than their assessments during the school term.

Assumptions
The researchers assumed the following:

- Teachers in both schools in the study are equally qualified and competent.
- Pupils at both the schools in the research are from fairly similar socio-economic backgrounds
- Both schools in the research have adequate resources, in the form of textbooks, stationery and classrooms.

Literature review
The debate about whether single sex schools are better than co-educational schools and vice versa is one that has been on-going for many years, and seems likely to continue. According to Shaw (1995), most of the public appears to be in favour of co-educational schooling, while a number of professional educationists have returned to the belief that single sex education is more beneficial. There has been recent interest in the possible advantages of single sex grouping within mixed schools in order to gain the benefits inherent in both types of groupings (Stables, 1996).
Research done during the 1960s by Dale (1969) proposed that there were more benefits for boys and girls in being educated in mixed settings, which was viewed as a more progressive form of secondary schooling at the time. The drive behind this was the pursuit of equal opportunities for all. Dale advocated co-education as favouring better social development, and boys’ academic achievement, and suggested that co-educational schooling did not harm girls’ progress. Many single sex schools in the United Kingdom, America and Australia have subsequently transformed into co-educational schools. (Elwood and Gipps, 1999).

However, organisations such as the American Association of University Women have been critically looking into the effects of co-educational schooling on girls’ achievements, and have suggested that girls’ and boys’ schooling needs to be rethought (Elwood and Gipps, 1999).

Feminists in the United Kingdom in the late 1970s and early 1980s advocated that single sex schools were places where girls achieved better results. In 1976, according to Elwood and Gipps (1999), Shaw (1995) proposed that girls’ academic achievement was closely linked to school type, where most of the high achievers attended single sex schools. Elwood and Gipps, revealed that other researchers found that girls were more likely to take mathematics and science in girls’ only schools, even though these schools were generally less equipped in the classrooms and laboratories. This could be a result of positive self concept that the girls in these schools may have.

The self concept refers to the ‘sum total of beliefs that people have about themselves’ (Kassin, Fein and Markus, 2008:54). This has to do with one’s beliefs about personal attributes and it influences one’s thoughts, feeling and behaviour (Kassin et al). Therefore a person may have views or beliefs concerning what they may or may not be capable of doing in the present and in the future. Tully and Jacob (2010) indicate that ‘in measures of self-perception of mathematical skill and ability female students from single-gender schools outscore their male engineering counterparts’.

The development of the self concept is closely linked to what an individual imagines other people think of him/her. Charles Cooley put forward the concept of the ‘looking glass self’ which states that ‘other people serve as a mirror in which we see ourselves...other people help us define ourselves’ (Kassin et al, 2008:55 and 61). Thus the self concepts that pupils may have in
relation to their potential in different subjects are probably influenced by other people in the society, especially teachers in the classroom in this case. Hence teachers’ comments and communication of expectations regarding particular pupils in the classroom, help to shape individuals’ self concept and ultimately their performance. Such expectations are quite important in influencing performance since people have a tendency to act in a manner consistent with the expectations of others (Ritzer, 1996).

Some studies have shown that girls in single sex schools may have less stereotypic views than those in co-educational schools regarding the role of women in society and, are not afraid of success and taking up leadership roles (Lee and Lockheed, 1990). This may be partly due to the role models available in these schools, where the majority of teaching staff is usually female. Much of the literature also suggests that single sex environments are academically advantageous for girls because of their increased confidence and participation in class (Spielhofer et al, 2002). However Spielhofer et al. caution that there is not much evidence that shows that this results in improved academic performance.

On the contrary Elwood and Gipps (1999:38) suggest that “when boys and girls are mixed, there is a tendency for each group to assert their sexual identity and define themselves by means of behaviour, and indeed by subject choice, choosing subjects that are traditionally seen to be masculine or feminine”.

According to Streitmatter (1999), teachers exposed to both single sex and co-educational classes believed that girls did better academically in single sex classes. This appears to lend weight to concerns that gender bias against girls still exists in co-educational classrooms (Datnow and Hubbard, 2002). Nevertheless, Elwood and Gipps (1999) state that students who attended single sex schools believed that they had been academically advantaged, whereas attendance at co-educational schools was viewed to have been socially beneficial. Students in co-educational schools tended to have a more positive view of the school's impact on their social and personal development, while girls who attended single sex schools felt that they would have been distracted by the presence of boys and value having been stretched academically, but mention spitefulness and competitiveness as negative aspects of this type of schooling. While girls from co-educational schools did not believe that boys dominated the lessons, subject choice is more polarized at co-educational schools, and girls in single sex schools tend to take Mathematics and Science more than those in mixed schools...there seems to be a positive effect on the confidence and academic
performance of girls in single sex classes’ (Elwood and Gipps, 1999:53-54). Thus teaching boys and girls seems to require very different environments, emphasis, contexts and techniques of teaching and assessment (Arnot, James, Ruddick and Duveen, 1998).

In some developing countries, research indicates that girls are discouraged from attending school (where most of the government schools are co-educational) because of the threat of physical abuse, rape and pregnancy. Education in Africa is marked by low levels of access by girls, according to Morrell (2000). Gordon and Runhare (2004) also highlight a lack of gender sensitisation policy in Zimbabwean schools which could promote gender equity in education in terms of access to education and experiences in schools. In the light of gender bias in co-educational environments, single sex schooling may have great potential for gender equity in education, and subsequently employment, in Zimbabwe.

There is no definitive answer to the question of whether single sex schools provide a better learning environment for girls from literature. Some studies have suggested that academic achievement and self-esteem is higher in single sex schools (Cardona, 2011; Takahashi, 1997; Lee and Lockheed, 1990). On the other hand, Jackson (2011) came to the conclusion that single sex schools reinforce sex stereotypes as shown by the fact that girls took fewer science subjects in these schools.

Salomone (2003) sums up the debate by asking whether separating the sexes at certain points in the educational experience can alleviate to any degree the negative effects of the differences between boys and girls. She suggests that much of the research does not provide definite conclusions. Smyth (2010) also concludes that there is little consensus on the effect of single sex schooling or co-education on achievement though it appears there is evidence of gender stereotyping in co-educational schools.

In light of the above, this research sought to find out whether single-sex schooling has a positive impact on girls’ self perception of their mathematics ability and achievement in mathematics in the Zimbabwean context.

Method
This study is an ex post facto research undertaken to examine whether the type of secondary school that girls attend (single sex versus co-educational) affects their achievement in mathematics at Ordinary level. Kerlinger (1970) cited in Cohen, Manion and
Morrison (2000) have defined *ex post facto* research more formally as that in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables. The independent variable or variables are studied in retrospect for their possible relationship to, and effects on, the dependent variable or variables. The researchers thus examined retrospectively the effects of school type (Single sex or co-educational) on subsequent performance in mathematics at O-level with a view to establishing a causal link between them.

Advanced level and Ordinary level girls from both schools completed questionnaires with both closed and open-ended questions which enabled the researchers to compare their perception towards, as well as their self perception of ability in, mathematics. Document analysis of ZIMSEC Ordinary level mathematics examination results in one single-sex and one co-educational secondary school from 1999 to 2009 was done.

Two schools were chosen by way of purposive sampling, whereby “the researcher handpicks the cases to be included in the sample, on the basis of the researcher’s judgement of their typicality” (Cohen et al, 2000). The two schools in this study were chosen since they were identified as having very similar socio-economic backgrounds, class size, religious and cultural ethos. The main difference between the two is that one is co-educational and the other is a single-sex school.

The population from which the sample was drawn is Form 3 and Form 4 girls currently doing Mathematics at ‘O’-level and Lower sixth girls at the two schools in Harare. Stratified random sampling was done to choose the sample to take part in the study. Thus 15 girls in the Lower sixth from each school were in the sample. Form 3 and 4 girls were sampled using random assignment of numbers through Excel and 30 girls out of 180 were chosen from the single sex school, while 30 girls out of 110 were chosen from the co-educational school. The total sample had 90 girls.

*Data collection techniques*

The study was conducted by analysing the results of girls who have written the ZIMSEC ‘O’ level Mathematics examination from 1999 to 2009. This instrument was chosen for this study because it has been written over a number of years, and so more data can be made available for analysis than if a single administration of another instrument was to be carried out. The examinations are
administered under controlled and standard conditions for all the students. The results achieved in these examinations have already been statistically adjusted by the Zimbabwe School Examinations Council to ensure that they are of similar standard every year, and the effects of changing the examination every year have been made negligible.

A pilot-tested and self-administered questionnaire was used to gather both quantitative and qualitative data from students as a means of ascertaining whether the relative achievement of girls in mathematics, is directly related to the type of school. This questionnaire was used to establish the individual perceptions of girls concerning mathematics and whether or not these are influenced by the type of school. It had both closed and open-ended questions focusing on the girls’ opinions with regard to both their teachers’ and their own perceptions about their performance in mathematics, as well as their prospective career paths.

The independent variable is the type of school that the girls attend. The dependent variable is the grade they achieved in the ZIMSEC Ordinary level mathematics examination.

Data presentation

Self-perception of mathematical ability of girls in single-sex and co-educational schools

Participants’ views of boys’ and girls’ capabilities in mathematics

The majority of the participants (94.1%) from both schools were of the view that both boys and girls have equal capabilities in mathematics and that gender plays no role in this. However, of those who did not agree with this view, more were from the co-educational school compared to those from the single sex school.

Table 1. Mathematics is a boys’ subject

<table>
<thead>
<tr>
<th>Type of school</th>
<th>% Strongly Agree</th>
<th>% Agree</th>
<th>% Disagree</th>
<th>% Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-educational</td>
<td>5</td>
<td>5</td>
<td>7.5</td>
<td>82.5</td>
</tr>
<tr>
<td>Single sex</td>
<td>0</td>
<td>2.2</td>
<td>8.89</td>
<td>88.89</td>
</tr>
<tr>
<td>Total</td>
<td>2.35</td>
<td>3.53</td>
<td>8.23</td>
<td>85.88</td>
</tr>
</tbody>
</table>
It would appear that girls in the single sex school are less inclined to hold stereotypical views of mathematics as being more suited to boys than girls. Interestingly, although the majority of the participants appear to have less stereotyped attitudes towards girls in mathematics, they appear to be somewhat reluctant to choose a mathematics-related career. Slightly more than half (52.5%) of the girls from the co-educational school, and 66.7% of those from the single sex school indicated that they would be confident to pursue a mathematics-related career path.

**Self-rating of performance in Mathematics**

Generally, girls from both schools had a positive perception of their performance in mathematics as shown in Table 2 below.

**Table 2. Self rating of performance in Mathematics**

<table>
<thead>
<tr>
<th>Type of school</th>
<th>%Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Co-educational</td>
<td>7.5</td>
</tr>
<tr>
<td>Single sex</td>
<td>4.44</td>
</tr>
<tr>
<td>Total</td>
<td>5.88</td>
</tr>
</tbody>
</table>

There was, however, a stark contrast between girls from the two schools in terms of their self-perception of their level of performance in mathematics, with 67.5% of girls from the co-educational school rating themselves as being either average or poor. Only a few of the girls from the co-educational school viewed themselves as being good let alone very good. On the contrary, more girls from the single sex school viewed themselves as being good or very good at mathematics.

**Agreement with teacher rating in mathematics**

Most of the girls from the co-educational school indicated that their performance in mathematics was average, and that they felt that their teachers viewed their performance as average or poor. However the students did not always agree with their teachers’ view. Table 3 shows the relationship between the type of school attended and the students’ level of agreement with their own view of how their teacher rates their performance.
Table 3: Students' reaction to perceived teachers' rating of their ability

<table>
<thead>
<tr>
<th>Type of school</th>
<th>Can do better than teacher's rating</th>
<th>Do my best in challenging problems</th>
<th>Lower self confidence than the teacher</th>
<th>Am not good in Maths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-educational</td>
<td>47.5</td>
<td>35.0</td>
<td>5.0</td>
<td>12.5</td>
</tr>
<tr>
<td>Single-sex</td>
<td>17.8</td>
<td>62.2</td>
<td>11.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Total</td>
<td>31.8</td>
<td>49.4</td>
<td>8.2</td>
<td>10.6</td>
</tr>
</tbody>
</table>

There is a difference between girls from the two schools regarding their individual perceptions of how their teachers view their ability. Close to half (47.5%) of the girls from the co-educational school were of the view that their teachers rated their performance lower than they were actually capable of compared to those at the single sex school. Not surprisingly, many of the girls in the co-educational school disagreed with how they thought their teachers rated them in this regard. In contrast, most (62.2%) of those from the single sex school rated themselves as highly as they were rated by their teacher and consequently tended to concur with their teachers’ judgements of their ability as compared to fewer girls (35%) from the co-educational school.

It is important to note that many (64.4%) of the girls from the single sex school also perceived their teacher as viewing them as either good or very good at mathematics. They agreed with his judgement of their capabilities which in most cases was the same as, or higher than, their self rating with response such as:

“Yes, though I can improve”;

“Yes, because I know I’m good if I put in some effort”

; “Yes, because the marks I obtain tally with his judgement” and

“Yes, with practice I am very good at it”

Thus a positive attitude from the teacher at this school may also be responsible for cultivating a positive self rating of ability in mathematics among the students.

On the other hand, the majority (82.5%) of the girls at the co-educational school indicated that their teacher judged their performance as ranging from average down to very poor. However
over 90% of these girls stated that they did not agree with what they thought to be their teacher’s view, in fact, they believed that they could do better than his expectations. In some cases the pupils indicated that the teacher largely undermined their mathematical capability. Some responses given by girls from the co-educational school when asked whether or not they agreed with their teacher’s judgement of their ability were as follows:

“No, because I know I’m more capable than what he thinks”;

“No, because he does not acknowledge the topics I can tackle easily”;

“No, because I am capable of better grades”,

“No, because he hasn’t really helped me to achieve my full potential. I know I can be better”

*Pupils’ expected grade in ‘O’ level Mathematics national examinations*

Pupils’ self-rating of their ability coupled with their perceptions of teacher’s rating of their competence, may influence pupils’ expectations regarding their grades in national examinations as shown in Fig.1 below.
Most of the students at the single sex school are confident of obtaining an A grade in the final examinations. Conversely, at the co-educational school most students believe they may get a B grade. Interestingly, no student from the single sex school expected to fail mathematics in the national examinations.

In conclusion, while the two schools in the study are very similar in most respects, it would appear from these results that there are differences between the single sex and co-educational learning environments. The most striking differences between the responses in the questionnaires relate to the latent perception of mathematics as being unsuitable for girls. Although nearly all (95%) of the participants believe that girls and boys have equal capabilities in mathematics, the majority of girls, particularly from the co-educational school, were not intent on pursuing a maths-related career and had a generally lower self-perception of...
their ability in mathematics compared to their counterparts from the girls’ only school.

The effect of type of school on the achievement of girls in mathematics
The data on pupils performance in mathematics in public examinations in the past eleven years collected from the two schools is presented in Table 4 below. A comparison of the results obtained each year from 1999 to 2009 was made.

Table 4: Students’ ‘O’ Level Mathematics results from 1999 to 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Co-Educational school</th>
<th>Single Sex school</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pass (%)</td>
<td>Fail (%)</td>
</tr>
<tr>
<td>1999</td>
<td>88.4</td>
<td>11.6</td>
</tr>
<tr>
<td>2000</td>
<td>82.5</td>
<td>17.5</td>
</tr>
<tr>
<td>2001</td>
<td>89.1</td>
<td>10.9</td>
</tr>
<tr>
<td>2002</td>
<td>89.0</td>
<td>11</td>
</tr>
<tr>
<td>2003</td>
<td>88</td>
<td>12</td>
</tr>
<tr>
<td>2004</td>
<td>83.5</td>
<td>16.5</td>
</tr>
<tr>
<td>2005</td>
<td>76</td>
<td>24</td>
</tr>
<tr>
<td>2006</td>
<td>84.5</td>
<td>15.5</td>
</tr>
<tr>
<td>2007</td>
<td>92.6</td>
<td>7.4</td>
</tr>
<tr>
<td>2008</td>
<td>89.7</td>
<td>10.3</td>
</tr>
<tr>
<td>2009</td>
<td>88</td>
<td>12</td>
</tr>
</tbody>
</table>

In the years 1999 and 2000, those who failed in the co-educational school were 3% and 8% more than those who failed in the single sex school respectively. In 2001 the single sex school had a failure rate 8% more than that of the co-educational school. In the years 2002, 2003 and 2009, the difference was only around 1%, which is insignificant. In 2005 there is the highest difference in failure rate where the students in the co-educational
school performed poorer by 16.7% than those in the single sex school. Finally, between 2006 and 2008 the single sex school performed on average 6% poorer than the co-educational school.

The academic achievement of the total number of students in the single-sex and co-educational schools, over the eleven year period, is shown in table 5.

Table 5: Total students’ ‘O’ Level Mathematics achievement from 1999 to 2009

<table>
<thead>
<tr>
<th>Academic achievement</th>
<th>Co-educational school</th>
<th>Single-sex school</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>607</td>
<td>814</td>
<td>1421</td>
</tr>
<tr>
<td>Fail</td>
<td>96</td>
<td>118</td>
<td>214</td>
</tr>
<tr>
<td>Total</td>
<td>703</td>
<td>932</td>
<td>1635</td>
</tr>
</tbody>
</table>

Analysis of the data using the chi-square test indicated that the difference in the general performance of girls at single-sex and co-educational schools is insignificant ($\chi^2_{\text{calculated}} = 0.4368$, 1 d.f. at $p < 0.05$).

**Discussion**

The responses given by the girls in the questionnaires, suggest that they have a tendency to manifest confidence and capability in the subject such that they do not view mathematics as a masculine subject. However they indicated a reluctance to pursue the subject further. This is an example of what Collins (1991) identified as the, “We can but I can’t” paradox, whereby girls would strongly defend the abilities of their sex in general terms, but be hesitant about their own potential and choices.

The trend pertaining to prospective career paths chosen by most girls in the study, particularly those at the co-educational school, not being mathematically oriented, can be explained from a psycho-social perspective. Some researchers like Robertson (1988) claim that mathematics is not seen as congruent with female sex role identity, a problem exacerbated whenever career related choices must be made at such vulnerable ages as early adolescence. Robertson (1988) points out that the pattern described in social-psychological studies of girls’ characteristics, that is, low self-esteem, a belief that success is due to luck and
failure due to lack of ability, over-estimating the difficulty of unfamiliar tasks, and hesitancy over risk taking, do not promote success in mathematics-related careers.

Findings from this study concur with the prevailing view from literature that girls attending single sex schools apparently have higher self-perception in mathematics, than their co-educational counterparts. In this study it was found that whereas the girls from the single sex school were positive and full of praise for their teacher as well as their teacher’s perception of their performance, the girls from the co-educational school lacked confidence in their mathematical ability. The most striking aspect of the co-educational school girls was their lack of confidence in their teacher’s view of their individual capabilities in mathematics. Typical responses given by girls from the co-educational school on this aspect suggest that they are aware of the low expectations their teacher has about them in mathematics yet they believe they can perform better than these expectations. On the other hand, the personal attributes of the teachers from the single sex school, most notably their encouragement and high expectations regarding the girls’ performance in mathematics, appeared to motivate the pupils from the single sex school to excel and to believe in themselves and their abilities. This is evident from the responses given by students from the single sex school pertaining to the same question. While there is no significant difference in level of achievement between the two schools, the difference in self perception of mathematical ability is significant and might have important implications for girls’ career choices and fields for further study. This is because the belief concerning one’s capabilities in mathematics may influence one’s decision on further studies despite the grade obtained in the final examination.

**Conclusion**
The analysis of the questionnaire administered to students indicates that there are differences in self perception of mathematical ability between the mixed and single sex classrooms. Girls attending the single sex school had a greater level of confidence in tackling mathematics than girls attending the co-educational school. From the analysis of Ordinary level examination results, there is no consistent or significant difference in the levels of achievement between the single sex school and the co-educational school.

**Recommendations**
Based on these findings, we recommend that it is necessary for teachers to be aware of the gender biased expectations, which
they may have for students in mathematics. According to McCormick (1994:57), ‘females are more likely to become passive spectators (or drop out) rather than to be active participants in their education if they feel that their teacher has low expectations of them academically’. It is important for the teacher to avoid gender stereotyping of mathematics in the co-educational classroom and have high expectations for all students. It is probable that higher confidence in mathematical ability of girls attending a single sex school encourages them to pursue mathematics in their further studies and future careers. However, the conclusions in this study are tentative and more research is needed.
References


