

Challenges Faced by Girls in Learning Science in Mixed Sex Schools of Marondera East District

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Abstract

This study established the perceptions of teachers, pupils and school heads on difficulties girls face in learning science in mixed sex schools. A descriptive survey design was adopted. A Closed-ended questionnaire was administered to female science students. Structured interviews were conducted with male students, science teachers and school heads. The data was analysed using the manual sort and count, grouped, coded, classified, categorized and trends and patterns analysed as they emerged. The study established that teachers are aware of some obvious factors such as teachers' biases and preferential treatment of boys as factors that hinder girls' progress in science. Teachers were however not clear of the link between subtle cultural norms, the masculine nature of science and the poor performance of girls in science. Girls on their part cited patriarchal values such as hostile class environments, domestic gendered division of labour, and unfriendly teaching styles as some of the constraints to their progress in science. The study proposed the engendering of the teacher education science curriculum as well as in-service of practicing teachers as ways to reduce the burden faced by girls in studying science.

Keywords: Perceptions, Science Learning, performance, attitude, patriarchal socialisation, gender stereotype

Introduction

Keller, 1998; Barbra and Cardinare 1991 and Kalu, 2005 have published work on the possible causes of girls' poor performance in science subjects. They have reported girls' relative underachievement in science and has

been attributed to factors such as patriarchal socialisation which results in teachers' differential treatment of boys and girls, boys' domination of classroom interactions and the masculine nature of science knowledge. The above studies reveal that most of these studies concentrated on teacher-pupil and pupil-pupil interactions in the classroom.

The feminist standpoint theory has emerged in recent years as a framework to think about the nature of what is taught as school science and the practice thereof. Feminist standpoint theorists Kelly (1985), Harding (1991), Keller (1998), among others, support the view that men and women have different standpoints in life, yet science is developed primarily from the perspectives of one group, that is male. Keller (1998) further argues that many women are strangers to science because the logic of science dominated and developed by men can never be totally compatible with women's standpoints. Kelly (1985) and Moir and Moir (1998) agree that the inherent masculinity of science is the prime reason for girls' avoidance of science.

Moir and Moir (1998) note that differential treatments by teachers as well as classroom domination by boys are some of the reasons for gender differences in science classes. When teachers treat students differently by sex, they may be communicating subtle messages about self worth and ability to their students. Observations by Kalu (2005) in Nigeria show that boys are more actively engaged in classroom discourse than girls, this involves more interaction with teachers as well as dominating group discussions in settings like laboratory activities. The boys demand more attention than girls, ask more questions and call out answers. Real world examples used by teachers are often taken from areas of study described by boys as areas of interest (Barbra and Cardinare, 1991 and Jones and Wheatly, 1989). This may contribute to the girls not seeing the subject as useful in their choice of career. Kelly (1985) says furthermore, the teachers direct more questions to boys, this applies irrespective of teachers' gender, such attention on boys contribute to further exclusion of girls. This is simply a replay of the scenes rehearsed at primary socialisation level, the

family. Kalu (2005) sums it by blaming gender socialisation which results in some negative effects towards the girls, which include the self-esteem by girls who grow up thinking that they are not quite as good as men, and unfortunately men think so too.

According to Sayers (1994) primary socialisation in the family channel boys and girls into different domains. The public sphere, which requires the knowledge of science, is considered a male domain and the private sphere for females requires very little knowledge of science. In education, science subjects are considered a male domain while arts and humanities belong to females. Rwodzi (2006) adds that in Zimbabwe teachers seem prejudicial against girls learning science. By allocating this division the curriculum reproduces sex stereotypes constructed at home.

It is against this background that the study sought to find out the perceptions of teachers, pupils and school heads on difficulties girls face in learning science in mixed sex schools (mss). The research is focusing on the perceptions on why girls encounter difficulties in learning sciences at Advanced Level in a mixed sex school. Perceptions as used in this study are the opinions or views of the respondents on difficulties girls are facing when learning science in mixed sex school.

Research evidence and personal experience of the researcher show that girls were not doing very well in science subjects especially those learning in mss in Zimbabwe. Even the girls who would have done very well at Ordinary Level (first four years of secondary school) in single sex schools (sss) who take up sciences at Advanced Level (pre-university) in mss were not doing as good as those remaining at sss and not as good as boys. The study therefore investigated the perceptions of school heads, teachers and students on difficulties girls face in learning science in mss. The main research questions guiding this study were:

- What are the perceptions of school heads, teachers and students on difficulties girls face in learning science in mss?

- How can science be made more accessible to girls in mss?

Methodology

The method used in this study was the descriptive survey research and it enabled the researcher to work with a limited number of cases and drew up conclusions that cover the generality of the whole population. A sample of five schools was selected by stratified random sampling, that is, the schools were divided into homogenous groups (groups containing similar characteristics) that is two girls high schools, one mixed sex rural school and two mixed sex high-density urban schools. This guaranteed equal representation of different schools in the population. The sample for the study consisted of 50 girls studying Advanced Level sciences in Marondera East Education District in Zimbabwe in 2006. Purposive sampling was used to select all the teachers teaching science at each school and the school heads. The researcher focussed on the perceptions of teachers, pupils and school heads at one go for the purposes of validating and triangulating the information from different informants on the difficulties girls face in learning science. The research was carried out in Marondera East Education District in Zimbabwe. Marondera was chosen because that is the area the researcher was teaching for ten years at sss.

Data was collected from the respondents using a 20-item questionnaire and interviews. The main focus of the questionnaire was to find out if the girls blame their science teachers, their administrators, and their male classmates or if it is their attitude to blame for their poor performance in science in mss. The questionnaire was divided into four categories. The first category aimed at finding out from the girls the learning difficulties they encounter in learning sciences in mss. The second category was to find out the learning conditions that the girls prefer. The third was to establish the role of the science teachers and administrators in the learning of science and to realize if the teachers and administrators helped to alleviate the learning difficulties faced by girls. The fourth category was to find out girls' perceptions of perceiving science as a female domain. The

questionnaire was administered to the girls and follow up interviews were conducted with teachers, administrators, boys and girls. In-depth informal and formal interviews with the participants were conducted to build up rapport, explore key aspects and probe deeper into emerging categories about the perceptions of teachers and students on girls' poor performance in science in mss.

Qualitative data gathered was analysed using the manual sort and count, grouped, coded, classified, categorized and trends and patterns analysed as they emerged. Thick descriptions were also employed using information from the questionnaire and interviews.

Before administering the questionnaire and interviews, the researcher had to get verbal informed consent from the respondents. The researcher explained the purpose of the research, procedures to be followed during the research and how and why they were selected. After getting informed consent from the respondents, the researcher then administered the questionnaire and interviews.

Results and Discussion

The major aim of this study was to find out the perceptions of teachers, pupils, and school heads on difficulties girls face in learning science in mixed sex schools. The frequencies and percentages of respondents selecting "strongly agree(SA), agree(A), not sure(NS), disagree(D), and strongly disagree(SD)" against the given item are presented in Tables 1, 2, 3, and 4. The item numbers in the tables are as they appeared on the original questionnaire administered to the respondents. The findings are presented and discussed under the following themes: girls' perceptions of teachers' attitudes, girls' perceptions of their confidence about science, girls' perceptions of the usefulness of the sciences' content, girls' perceptions of perceiving science as a female domain. Also presented are results from interviewing the school heads and teachers under the following theme: school heads and teachers perceptions on girls learning sciences in mss.

Table 1 Girls' perceptions of teachers' attitudes

N=50

No.	Statement	SA	%	A	%	NS	%	D	%	SD	%
1.	My teachers have been interested in my progress in science.	30	60	9	18	2	4	4	8	5	10
2.	It's hard to get science teachers to respect me.	20	40	8	16	4	8	6	12	12	24
3.	My teachers would not take me seriously if I tell them I am interested in a career in science.	15	30	7	14	9	18	12	24	7	14
4.	Girls certainly are smart enough to do well in science.	33	66	5	10	2	4	7	14	3	6
5.	My science teachers often ask me questions during the lesson.	8	16	4	8	6	12	15	30	17	34

Scoring Directions

Each positive item receives a score based on points

Strongly agree =5 Agree =4 Not sure =3 Disagree =2 Strongly Disagree =1

The scoring for each negative item should be reversed

Strongly agree =1 Agree =2 Not sure =3 Disagree =4 Strongly Disagree =5

The study indicates that most of the girls perceive that the strategies and teaching techniques of their teachers somehow encourages them to study science and show progressive attitude on the subject.

Differential treatment of girls and boys by teachers was reported as a factor contributing to the difficulties girls face in studying science. The girls expressed that some teachers show their negative expectations on girls' study of science. Comments from the girls' interview such as "...girls are wasting our time let's move on" were said to be discouraging.

Some revealed that because they are girls they are given easier tasks in class than boys and they think it's unfair. Five girls interviewed and 64% of questionnaire respondents were of the opinion that their teachers rarely asks them questions in class as they mostly direct questions to the boys. The girls thought boys in their class are given higher marks and no matter how hard they try themselves, they always fail.

Thirty percent of the girls doing Advanced Level sciences were already, regretting their choice. They are laying the blame on the teachers who tend to brush them off when they have difficulties in class and to the fact that the boys are expected to excel better than girls, get higher marks and give answers to difficult questions.

Table 2 Girls perceptions of their confidence about science

N=50

Question	SA	%	A	%	NS	%	D	%	SD	%
6. I am sure that I can learn science.	22	44	11	22	3	6	9	18	5	10
7. Science is hard for me.	6	12	4	8	7	14	16	32	17	34
8. I know I can do well in science.	19	38	14	28	4	8	6	12	7	14
9. Most subjects I can handle well, but I just can't do a good job with sciences.	9	18	8	16	3	6	19	38	13	26
10. I do not ask questions in science lessons because the boys will tease me or make rude remarks.	23	46	12	24	7	14	3	6	5	10
11. I prefer science that is taught in a collaborative way (group activities, projects, outdoor activities) to the traditional lecture method.	26	52	13	26	1	2	6	12	4	8

Scoring Directions

Each positive item receives a score based on points

Strongly agree =5 Agree =4 Not sure =3 Disagree =2 Strongly Disagree =1

The scoring for each negative item should be reversed

Strongly agree =1 Agree =2 Not sure =3 Disagree =4 Strongly Disagree =5

Table 2 results indicates that 66% of the girls are confident that they are able to learn science, however, they have been facing difficulties in learning science but still they are assertive of coping up.

Girls are scared of asking questions in class, as the boys would laugh at them. In interviews when girls were asked whether they compete with the boys they revealed that they dislike competing with boys, as this makes them lose confidence. As one girl puts it, "...I used to come first in my science class at my former school but here no, its tough." her former school was a single sex girl's school. The girls also revealed that boys are always out performing them in class and they participate in all activities more than that they do and believe there is stiff competition

Girls also pointed out during the interview that the affirmative action which allow female applicants to enter universities with lower qualifications to be fighting against them as this seem to confirm that women cannot do as well as their male counterparts in science. This tends to discourage girls from working hard.

The questionnaire revealed that girls, enjoy collaborative learning, which include group activities, small projects and so forth as opposed to the traditional lecture method mostly used by teachers. This is also confirmed in the interviews, when five girls said that they prefer to ask their classmates or friends when they have a problem.

Table 3 **Girls' perceptions of the usefulness of the sciences' content**
N=50

Question	SA	%	A	%	NS	%	D	%	SD	%
11. Science will not be important to me in my life's work.	3	6	7	14	6	12	16		18	36
12. I will need science for my future.	26	52	8	16	5	10	9		2	4
13. Taking science is a waste of time.	7	14	6	12	6	12	11		20	40
14. Science is useful to boys only.	4	8	7	14	3	6	19		17	34
15. Science is a worthwhile, necessary subject.	17	34	18	36	4	8	6		5	10

Scoring Directions

Each positive item receives a score based on points

Strongly agree Agree Not sure Disagree Strongly Disagree
 =5 =4 =3 =2 =1

The scoring for each negative item should be reversed

Strongly agree Agree Not sure Disagree Strongly Disagree
 =1 =2 =3 =4 =5

The study reveals that 68% of the girls consider that studying science is both valuable and practical. Since we are on a modernised era through knowledge about sciences suits the advancement of technology nowadays. On the same reason, girls can easily deal with or adapt with the fast growing modernisation.

Table 4 Girls' perceptions of perceiving science as a female domain.

N=50

Question	SA	%	A	%	NS	%	D	%	SD	%
16. It's hard to believe a female "girl" could be a genius in science.	3	6	7	14	4	8	17		19	38
17. When a girl has to solve a science problem, she should ask a boy for help.	13	26	12	24	3	6	15		7	14
18. Girls can do just as well as boy in science.	27	54	7	14	2	4	8		6	12
19. When I need help with my science, I usually ask the boys.	14	28	11	22	1	2	9		5	10
20. Boys are given more time to study at home	30	60	10	20	2	4	7		1	2

Scoring Directions

Each positive item receives a score based on points

Strongly agree Agree Not sure Disagree Strongly Disagree
 =5 =4 =3 =2 =1

The scoring for each negative item should be reversed

Strongly agree	Agree	Not sure	Disagree	Strongly Disagree
=1	=2	=3	=4	=5

The result of this research has resolved the issue on gender discrimination in terms of knowledge, ability, intelligence and comprehension in science. It is evident that 70% of the girls believe that they can achieve independently and can sometimes out perform boys.

Both the questionnaire and the interview solicited information on girls' own perception on studying science. All the girls said at home boys have more time to study but most of their time is spend doing domestic work. Some said during the holidays they are not allowed to visit libraries but their brothers are allowed. This seem to indicate that society place constraints on girls and allow boys more space. This restriction on girls seems to point out to girls that women should worry most about the reproductive sphere. Reproductive work involves care and maintenance of the household and its members. This includes bearing and rearing of children, water and fuel collection, food preparation and family health care. This sphere requires very little knowledge of science as it is taught in schools. On the other hand boys are given more space in preparation of their participation in the productive work, such as fishing, farming and formal employment, which include medicine, engineering and many others. This sphere requires a lot of scientific knowledge. So the simple division of labour at household level sends different messages to boys and girls that in turn affect their participation in school.

Sixty percent of the girls revealed that they consult boys when they are stuck. This is in sharp contrast with the boys who showed their pride by indicating that they do not consult girls as far as science is concerned. Further probing on why boys do not see it prudent to seek help from their female counterparts revealed that almost all the boys are convinced that science is not for the girls. In fact, it appeared that boys are less

encouraging and make derogatory remarks against girls in their classes especially to those that do extremely well. In the event that girls do well, boys suspect dubious means to have been used. Boys as well as some girls view the girls who do well in science as *showing off, not true women, liked and undeservedly favored by teachers*.

School heads and teachers perceptions on girls learning sciences in mss

On the contrary to the girls perceptions teachers feel the collaborative approach is time consuming for them to use and boys do not really like it. Only one of the six teachers interviewed saw the need of changing the teaching approach to a more collaborative one.

What the girls said also contradicted with what the teachers said when asked whether they treated the girls in the same manner as boys. Four out of six teachers said that they treated the girls in the same manner as boys. This kind of contradiction makes one interpret that teachers are unconsciously focusing their attention on the boys who demand more attention than girls who are kind of shy and reserved.

The interview further solicited teachers' beliefs and expectation on girls' performance in science. Teachers raised a number of issues on why they think girls in mss perform poorly in science. The interview revealed that at home these girls do not have time to study especially those in the farms where they have to do all the domestic work, whilst the parents are at work. Both female and male teachers agreed that as girls grow they start experiencing puberty procaine like menstruation, boyfriends who tend to disturb them and as a result they perform poorly in challenging subjects like sciences.

Of the six teachers interviewed, four were quite positive that girls can be equally good in sciences but one was not quite sure as he believes that history shows that girls perform poorly and that it will always be like

that. The other teacher cited his experience was adamant that all his experience as a Physics teacher, girls have failed to prove that they are good in the subject.

All in all, the teachers concurred that boys are more intelligent than girls. They even tend to agree that they ask girls simpler questions, and direct the more challenging ones to boys. None of the teachers was able to link girls' inability in science with factors such as patriarchal socialisation, teacher biases and the hostile environment created by boys and the masculine nature of knowledge that is accepted as scientific.

Instead, teachers claimed that girls have attitude problems and tend to concentrate on other subjects they consider to be easy like Fashion and Fabrics, humanities and arts. The girls were also said to be too shy to ask even if they do not understand a concept, they just remain quite maybe they dread to be laughed at by classmates.

On the question on whether there are any science subjects, which girls cannot manage, no matter how hard they try. The three female teachers interviewed revealed that if girls try hard they can manage any science subject and the brave once take sciences at 'A' Level. Lack of elaboration seem to indicate that the teachers themselves are not clear of the forces that act against girls as they attempt to learn science together with the boys.

On the role- played by teachers in improving the performance of girls in science, the female teachers claimed they give them extra individual work although they do not seem to have time to work on them or they do not bother and also give them equal attention as boys and encourage them to study, but the results are always disappointing. The male teachers revealed that if students have problems only boys are the ones, who usually come to ask, not the girls and hence it is difficulty for the teacher to intervene. Teachers sometimes counsel girls just to assure them that science is just as easy as any other subjects but they are still not pleased with the results and they also encourage them to come for remedial lessons but most of them do not bother attending. The most disturbing thing is

that teachers seem not to be aware of socio-cultural issues that shape such behaviour from girls.

Four of the teachers interviewed encouraged their fellow practitioners to treat the girls and boys equally despite that the topic is easy or difficult. Two teachers suggested that the teachers should even be tougher on the girls than before and give them more challenging work and this will in a way encourage them to work harder.

The interview with the school heads revealed that they are aware of most of the problems girls face in their attempt to learn science in mms and all of them were confident that girls in mss can perform equally well as the girls in girls' only schools. Heads cited teacher preferential treatment of boys, girls' low esteem, and boys' aggressive behaviour towards girls as some of the problems girls face in science classes. However, school heads just as their teachers were unable to link factors such as the patriarchal socialisation to girls' low esteem and to boys' aggression. It was also apparent that school heads are not aware of the masculine nature of what is taught as science.

In an effort to improve the performance of the girls in science in mss the heads said they are encouraging the teachers to treat the girls equally in all classroom activities and that teachers should form groups of mixed abilities so that girls also participate. Two heads said they look for slightest opportunities to recruit female science teachers in the school so that they serve as role models and motivate female students to like sciences. All the heads also recommended that the teachers should work hand in hand with the girls' parents and convince them that sciences are just like any other subject, which just need a positive attitude, hard work and concentration.

Finger pointing on who is to blame for the poor performance of girls in science in mss has emanated in this study. On one hand girls blame the negative attitude of the teachers who believe that boys are better than girls in sciences and the social belief that girls will not pass sciences. They also blame their male classmates, whom with the support of the teachers make them feel like their performance in sciences is inferior to that of boys.

On the other hand teachers pointed at girls' low self-esteem and their lack of concentration as causal to their poor performance in science.

The implication that girls are scared of asking questions in class was reflected by Kaiser-Messmer (1993) who highlights that the boys in class affect the performance of girls also mentioned this kind of suppression. O'Connor (2000) also observes that boys taunt and harass girls so as to cow them away from active participation in science lessons. This result in girls deliberately avoiding to answer questions fearing taunting and harassment by boys.

This gives an impression of the pressure that brighter girls in general experience from their peers in class. This could mean that some of the failure or dismissal performance experienced by some girls could be out of fear of succeeding in subjects that have male overtones. Girls feel that they are not expected to do well in sciences. Thus, the girls' lack of effort and zeal towards sciences may be results of all these social constructs stemming from the notion that the subjects are considered male domains. This could be interpreted in Bourdieu (1996) thinking as tacit ways employed by boys to keep check on girls and make sure they do not participate in science, which they consider a male domain.

This seems to suggest that girls give up the fight to boys. Again Bourdieu (1996) would call this *doxa* meaning that girls will take it for granted that boys are better in science than them. If teachers do not accommodate the ways in which the girls prefer to learn science, it will mean that elimination of the difficulties girls face will be rather difficult.

Mutasa and Wills (1994) also highlight the differences between boys and girls' learning styles. The two suggest that boys are attracted to the physical aspects of science whilst girls suffer from the lack of involvement and mechanical experiences. They further argue that the traditional methods of physics involving wires, tools, abstract objects and mechanical things are not always attractive to girls. Rwodzi (2006) also discovers that 66% of teachers believe that mathematical and science positions were suited for boys.

In Nigeria, Kalu (2005) found that boys tend to be more assertive and more forceful to get teachers' attention while the girls tend more toward compliance and conformity. Kalu attributes such classroom behaviors to socialization and sex-role expectations inherent in most African communities.

The division of labour in the home seems to be communicating that girls should not trouble themselves with hard sciences but focus on subjects like Fashion and Fabrics and Food and Nutrition, which they are guaranteed to pass and will in future be of use to them in their reproductive work. Such societal attitude which Callan and Clements (1984) concludes need a lot to convince the society that girls can be equally good if given the chance.

Girls' perception of themselves in studying science showed variations from parental influence to lack of self-confidence by the girls themselves. Zietsman (1997) points out that the learning of science depends on perceptions, aspirations, beliefs and motives, which no doubt influenced by social interactions and expectations. Rwodzi (2006) agrees as he discovered that 30% to 50% of science and mathematics teachers still preferred to teach boys, arguing that boys were ambitious, active, like challenges, more determined and more forthcoming in class.

Conclusion and Recommendations

In view of the findings, the researcher reached the conclusion that teachers and school heads in Marondera East District just as good as their counterparts across the country are not quite abreast of gender issues that impact negatively on girls as they learn science in mss. The researcher therefore recommend in-service workshops and seminars across the country to sensitize teachers and school administrators on stumbling blocks girls face in and outside science classroom as well what teachers can do to assist girls to learn science in mss. The Researcher further recommend for the gender mainstreaming of the science teacher education curriculum of all teacher education institutions across the country.

Various efforts also need to be taken to empower the girls and raise their self-esteem. This will be done in an effort to deconstruct the subordinate status acquired by girls in their primary socialisation. Teachers would be required to play a leading role and involve parents in attitude change. Attitude change can be done by exposing to possible careers that require sciences and also exposing them to successful female role models in the field of science. Boys too, need to be sensitised about their stereotyped behavior.

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