The Impact of Students’ Attitudes on the Teaching and Learning of Chemistry in Secondary Schools in Bureti District, Kenya

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Abstract
The achievement of students in Chemistry in Kenya’s secondary schools has remained low. Thus, the study, on which this paper is based, sought to investigate the prevailing attitude of students towards Chemistry; the circumstances and factors that condition these attitudes were investigated and suggestions on possible remedies were given. The study used the descriptive survey research design. The target population comprised Form Four students in ten selected secondary schools in Bureti District of Rift Valley Province, Kenya. Stratified random sampling technique was used to select the respondents. Schools were selected from the following categories: Girls’ schools, Boys’ schools and Co-educational schools. Simple random sampling was used to select the respondents from Form Four classes as well as a teacher in each school. In all, one hundred and eighty-nine students and ten teachers were selected. The data collection instruments were questionnaires based on the Likert scale and document analysis. Data was analyzed descriptively using frequency tables, means and percentages while hypotheses were tested using Analysis of Variance. The results showed that a number of indicators revealed that there are some factors influencing students’ attitudes; some of the factors are anxiety over career opportunities and peer influence. Furthermore, it was noted that self-concept of ability is a possible determiner of academic achievement. Science teachers’ should encourage development of positive self-concept of ability among students. Among other recommendations, the study suggests that guidance and counselling of students in schools should be encouraged to ensure positive attitudes towards and full participation by girls in the subject. The study is of great significance to curriculum developers, the Kenya Institute of Education as well as Chemistry teachers.

Keywords: impact, students attitudes, teaching, learning, chemistry, secondary schools, Bureti District,

INTRODUCTION
Chemistry as a science subject is a pivot in the Kenyan secondary school curriculum since other subjects, e.g. Physics and Biology, depend on it. The study of Chemistry involves pursuit of truth, a process that instils diligence patience and objectivity in learners. Chemistry learning develops the scientific habits in students, which are transferable to other areas in life. Such habits involve non-reliance on superstition, use of critical thinking and respect for other people opinions. Deboer (1987) points out that students’ achievement is influenced by favourable attitudes towards oneself as well as the subject. A student with positive self-concept of ability spends more time and energy in the subject thus gaining mastery of subject resulting in success. A study on the attitudes of the students towards Mathematics has shown that achievement in Mathematics, or any other subject, is determined by one’s attitude towards the subject rather than one’s attitudes being determined by one’s achievement in the subject (Maritim, 1979). The theoretical framework adopted in this paper is based on Ajzen and Fishbein’s (1975) theory of reasoned action. The theory explains that the beliefs represent the information that is known by an individual about the subject. Thus an individual’s attitude towards any subject is a function of that person’s beliefs about that object as well as the implicit evaluative responses associated with those beliefs. It could therefore be argued that beliefs affect attitudes and these attitudes affect the intentions and behaviours. The enhancement of positive self-concept of ability of a student in science will possibly in turn enhance the students’ performance by fostering development of favourable attitudes towards the science subject.

Attitudes Towards Sciences
Since the teaching-learning process also concerns itself with the promotion of desirable behaviour, education must draw some of its principles from psychology. This entails having a good grasp of all theories that influence the teaching and learning process. Attitudes associated with science appear to affect students’ participation in science subjects and impacts in science (Linn, 1992). Further research on psychological effects has found that students’ self-concept of ability to perform in science positively correlates with achievement. It has been observed that many students fear Chemistry. Such fear is characterized by mass disenchantment among the students towards the subject. The end product has been the declining popularity of the subject over the years. According to Keeves and Morgenstern (1992), students’ anxiety towards the learning of Chemistry makes them lose interest in sciences.
On the other hand, Deboer (1987) points out that students’ achievement is influenced by favourable attitudes towards oneself (positive self-concept) as well as the subject. A student with positive self-concept of ability in a subject has a higher probability of developing favourable attitudes towards that subject, and as a result spends more time and energy in the subject thus gaining mastery of the subject resulting in success. Deboer (1987) further argues that as a result of this success, the student is reinforced further to continue performing well in the subject possibly developing stronger favourable attitudes towards the subject, resulting in a vicious cycle.

Mwamwenda (1995) argues that a person’s self-concept is a guide to their personality in terms of his or her own feelings, attitudes, psychological health and the way he or she is likely to interact with others in and outside his or her environment. Mwamwenda (ibid.) further points out that a pupil with a positive self-concept stands a better chance of performing better than a pupil with negative self-concept of ability. Thus it can be argued that enhancement of positive self-concept of ability of a student in science will possibly enhance the students performance by fostering development of favourable attitudes towards Chemistry. However, care should be taken when interpreting results of a relationship between achievement and attitudes. This is because low achievement does not necessarily mean the students have unfavourable attitudes, towards science or any other subject for that matter.

Research has further shown that there is a positive correlation between attitudes and achievement; however, neither attitudes nor achievement is dependent on the other; rather they interact with each other in a complex and unpredictable way (Ajzen & Fishbein, 1975). Factors that influence students’ attitudes towards a subject vary from one place to another. Furthermore, there are also other stronger predictor variables outside the school, which influence students’ attitude towards a subject. These include parental influence and beliefs from ones culture (Muya, 2000). As such, the area pertaining to the attitudes towards sciences needs more research because the performance in Mathematics and Sciences is still low.

This lends more weight to the study conducted by Garrahy (2001), on three third-grade teachers’ gender-related beliefs and behaviours, who found out that teacher’s attitudes towards the subject significantly, correlate with students’ achievement. Thuo (1984) has investigated the relationship between teacher’s attitudes towards Mathematics and sciences and students achievement in Kiambu District Kenya. The findings of this study showed a positive correlation between teachers’ attitudes towards Mathematics and Sciences and students achievement. These results were strengthened by the observation that the students who were taught by those teachers with negative attitudes had low achievement.

Another study by Kiragu (1988), on factors affecting achievement in Mathematics at secondary school level in Kenya, has established that teachers’ qualification, quality of textbooks, frequency of marking and interest among students are significant. However, a critique by Kiragu (1988) on a similar study conducted earlier by Kathuri and Pals (1993) asserts that the significant relationship between students’ attitudes towards a subject and academic achievement is a function of their personal attitudes rather than external factors, which may influence them. As such, the conclusions on the above studies were not sufficiently adequate as they were only based on teachers influence on students’ attitudes towards mathematics. Similarly, it is also difficult to go by Kiragu’s (ibid.) critique when handling similar findings from research settings conducted in other study areas. This is because factors which influence teachers’ attitudes towards a subject vary from one place to another.

Furthermore, there are also stronger predictor variables outside the school, which influence students’ attitudes towards a subject. These include parental influence and beliefs from ones culture. Hence the area pertaining to attitudes towards Mathematics and Sciences needs more research since students’ achievement is still low. In other instances, there has been controversies as to why girls and boys perform differently in Mathematics and Sciences (Dawrey & Watson, 1995) and (Watson, 1995). An important issue is the relationship between students’ attitudes and the instructional contexts. Do different instructional contexts influence students’ attitudes and do different attitudes result in different opportunities of learning and achievement?

Research from different countries with different educational systems and curricula will provide an opportunity to identify the relationship between students’ attitudes and instructional contexts of these countries. The majority of the existing studies concern attitudes towards science in general. Only few studies attitudes toward a particular discipline like Biology and Physics and only two towards Chemistry have been conducted (Menis, 1989).

Ramsden (1998) has pointed out the use of “Science” as an umbrella term to encompass Biology, Physics and Chemistry. It has been suggested that the research of students’ attitudes must focus on separate disciplines within science rather than on Science, because students (girls in particular) respond more to Biological sciences than Physical sciences. Menis (1989) further argues that the assessment of students’
attitude towards Chemistry and Sciences should be concerned with at least three distinct referents. He identifies these three referents as an attitude towards the importance of Chemistry and Science, an attitude towards Science as a career, and an attitude towards Chemistry and Science in school curriculum. Their attitudes regarding the difficulty of Chemistry lessons are related to concepts, symbols and problem solving. It seems that students find the use and application of Chemistry concepts and symbols more difficult than their understanding. The application of Chemistry concepts and symbols depend on the ability of the students to transfer from macroscopic level to symbolic level and vice versa (Dori & Hameiri, 2003). Chemistry teachers can transfer rapidly from one level to another, but students cannot do the same. In addition to the difficulties that students have in understanding and applying chemical concepts, such as atoms, molecules, mass, volume, and mole, they also have difficulties in solving chemical problems requiring Mathematical skills. Thus, they consider difficult to record and apply mathematical methods to Chemistry problems.

The students’ attitudes regarding the interest of Chemistry course are also neutral. The content of Chemistry curriculum, the Chemistry lessons time, the methods of teaching Chemistry, and lack of laboratory experiments might be some of the reasons that form such attitudes. This is supported by Freedman (1997) who says that a positive attitude towards Science is related to the laboratory programme. Chemistry in most schools is taught theoretically without hands on activities and thus lack of practice decreases students’ interest for Chemistry lessons. The majority of the students recognize that Chemistry knowledge is useful to interpret aspects of their everyday life.

Most people in the science education community tend to agree to a greater or smaller extent that negative attitudes towards Chemistry and Science cause a crucial problem. Further research in attitudes should contribute to the explanation of the persisting problem of alienation from Chemistry by young people. If carefully focused and designed, attitude research could go a step further and provide bases on which correct decisions will be taken about aspects for classroom practice. This might get more learner choosing to study Chemistry, feeling that subject really offer them something useful and interesting. Such positive attitudes, cognitive skills, and knowledge will help the future citizens to make judgments and decisions on issues related to Chemistry.

Peer Expectation and Career Inspirations
The National Council for Science and Technology (NCST) was established in 1988 to determine priorities for scientific and technological activities in Kenya. It oversees the development of science and technology and excellence in research. This is because Kenya wants to be fully industrialized by the year 2030. Concerted efforts have constantly being made by the government to encourage more girls to take interest in science subjects because few girls opt for these subjects in school. Girls also tend to perform poorly in Mathematics, Physics and Chemistry.

According to Chambers (2004), the norms and values of a particular peer group make a difference to the school attainment and involvement of students. A student whose friends work hard is likely to work hard and be tuned to teacher’s values. This is supported by Marrett (1996) observes that learners tend to stick to peer group expectations if they have to fit with their peers; most girls have constantly believed that Mathematics and Sciences are for boys. Fennema and Sherman (1977) note that peer group is an important reference for adolescent socialization and therefore perpetuates sex-role differentiation through gender patterns, subject preference and career intentions. The study, on which this paper is based, therefore, sought to investigate the extent to which peer expectations influenced students’ attitudes towards Chemistry.

In Kenya, evidence shows that peer group influences the learning of Mathematics and Sciences. Carolyne (1996) seems to agree with this when she remarks that poor performance in Mathematics and Sciences is due to attitudinal influence in peer culture. On the other hand, Singh (1994) confirms that if one thinks the subject is hard, it becomes hard, but if one is positive about it, it becomes simple (p. 19-20). Most students would be ready to study Chemistry to any level if they are exposed to all career prospects in Chemistry. There is thus need for proper counselling to wipe off the erroneous notion the students already have that it is only in the classroom that a Chemist recommendation could get a job. Teachers should also make them understand the central role Chemistry plays amongst the Sciences and the various disciplines/courses in the tertiary institutions where Chemistry is a prerequisite.

STATEMENT OF THE PROBLEM
Despite the efforts made by researchers to improve secondary school Chemistry curriculum, recent findings indicate that the level of Chemistry achievement among other subjects has remained persistently low (Ministry of Education [MOE], 2005). Researchers have identified many variables affecting student achievement especially girls. These include student’s social-economic status, availability of learning resources, cultural context, family size, vocabulary of scientific terms and computation. The study therefore endeavoured to fill the gap by investigating the attitude that students have towards
Many students in Kenya choose to drop science subjects when given a choice and, even those who take them, performance is below average (Changeiywo, 2000; Aduda, 2003). The poor performance is evident from results, which compares the students’ performance in science subjects. The findings show that the mean scores in Biology and Physics lies between 27-32%, while Chemistry lies between 25-26%. The overall performance is below average, worst of all is Chemistry. This difference in performance may be a result of the attitudes held by students towards Chemistry. Perhaps the poor performance in science subjects is the one that prompted the government through the Ministry of Education Science and Technology (MOEST), with the assistance of the government of Japan through Japan International Cooperation Agency (JICA), to undertake a programme to Strengthen Mathematics and Sciences in Secondary School Education (SMASSE) (Changeiywo, 2000). This programme has been implemented in Bureti District but students’ performance in science still remains low (KNEC, 2005).

In response to the challenge posed by the poor performance and low enrolment in science, several studies have been carried out in Kenya to investigate the possible causes (Eshiwani, 1984; Kyalo, 1984; Mondoh, 1986; Wachanga, 2005). The majority of the studies centred on the instructional methods used by the teachers in teaching sciences and Mathematics. However, Haimowitz (1989) notes that the cause of most failures in schools might not be due to inadequate instruction but perhaps by active resistance by learners. Head (1988) reinforces this argument by pointing out that students do not like sciences in most cases and therefore it is imperative that their feelings are considered alongside their thought.

Mwamwenda (1995) also argues that the achievement of students in a subject is determined by their attitudes towards the subject rather than the inability to study. All these arguments point to the important role that attitudes play in determining the achievement of any success. This therefore suggests that favourable attitudes towards sciences should be developed if success is to be attained. To be able to do this, a clear understanding of factors which influence formation of attitudes is essential. This study therefore sought to investigate the attitudes held by learners towards Chemistry.

In addition, it needs to be recognized that the efforts made by the schools to promote equal opportunities, are limited by factors outside school, which have a powerful impact on students attitudes and aspirations. These include the influence of the family and the attitudes generally held in the local community and by society at large. There are also realistic choices that need to be made by individuals based on how they feel that things typically operate at the same moment, rather than how they might operate in an ideal world.

LIMITATIONS OF THE STUDY
Although the descriptive survey design employed in the study enabled data collection on many variables, there were increased chances of sampling errors. Despite the fact that the design allowed for a large number of subjects, the number used was small since more subjects could attract increased costs. The few boys’ schools in the District and the proportionate sampling technique may not have provided a truly representative sample and since the design was non-experimental, independent variables might not have been fully controlled.

MATERIALS AND METHODS
The study was conducted in Bureti District in South Rift Valley Province. Thirty percent of the Secondary schools in the District are provincial schools while the rest are district secondary schools. The District has a total of 55 secondary schools of which 40 are co-educational, eleven are girl’s schools, and four are boys’ schools. The main concern of the author was the academic performance of students in the Kenya Certificate of Secondary Education (KCSE) national examination. Bureti District has continued to pose poor results in Chemistry in National examinations.

The study sought to obtain information on students’ attitudes towards Chemistry through questionnaires. As such, descriptive survey method was chosen because it is suited to the study of individual’s attitudes. The study population comprised 189 Form Four students in public secondary schools and 10 Chemistry teachers in ten Secondary schools within Bureti District of Rift Valley Province, Kenya. A Chemistry teacher of the selected schools was part of the study because they have a task of preparing and creating a proper teaching and learning environment. Form Four students were selected because they have been in the school long enough to exhibit the necessary affective variables. The experience they have gained could enable them think abstractly.

Since it was practically impossible for the author to access all the schools in the District, only accessible population of secondary schools was used. The use of different types of schools was adopted so as to provide a representative sample of the school population from Bureti District. Stratified random sampling was used to get students from different settings. This was because there are claims that students in these different settings perform differently.
in academic work. In the study, the sample size comprised 10 Secondary schools, 10 Chemistry teachers and 189 students. The total number of respondents was 199.

Data was broken into broad categories for analytical purposes (parametric and non-parametric). It was then prepared for analysis through coding. Editing and cleaning of the data collected preceded analysis. Data was analyzed using descriptive statistics, which included use of frequency tables, means, standard deviation and percentages, while hypotheses were tested using analysis of variance.

RESULTS AND DISCUSSION
Students’ Attitudes towards Chemistry
Chemistry as a Favourite Subject
The study sought views from students on whether or not Chemistry was their favourite subject. Here, the author intended to explore the attitudes that students have towards chemistry.

Table 1: Chemistry is my Favourite Subject

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Yes</td>
<td>141</td>
<td>75</td>
</tr>
<tr>
<td>No</td>
<td>48</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100</td>
</tr>
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</table>

From Table 1, it is clear that 141 students (75%) had positive attitudes towards Chemistry while 48 students (25%) had negative attitudes. Students with positive outlook towards Chemistry had a number of reasons that made them have such a disposition. Many students expressed that they liked Chemistry because of their teacher. Such teachers were described generally as being encouraging cheerful, and helpful. They were said on average, to pay attention to weak as well as bright students. Since teacher attributes were said to have enhanced students liking of the subject. The teacher is therefore a factor in influencing student’s attitudes towards the subject. Like one student said “…I like Chemistry because our teacher helps us where we need help or clarification. I work hard not to disappoint him.”

From the findings it also appeared that most students appreciated the importance of Chemistry for their careers in future. Like one student put it this way, “I want to be an engineer, so I need Chemistry.” This is an encouraging revelation, as Chemistry is increasingly becoming a gateway to a number of key careers in the world of work. Most students said they liked the subject because of its practical nature. Like one student put it, “I enjoy practical lessons in Chemistry because I get to know how it is applied in real life situation.”

Some students 48(27%) came out strongly against the subject. They had varying reasons for their attitudes: 15 students expressed misgivings about some of their teachers. Such teachers were described as boring, mostly in a hurry and do not finish the syllabus. In other instances the attitudes of some teachers have discouraged some girls from liking the subject. Some were said to be reinforcing stereotyping by passing comments or statements to the effect that girls were not expected to do well in Chemistry. Like one female student in a co-educational school put it: “our Chemistry teacher pays more attention to boys”.

Most surprisingly is that the teacher in the study preferred to teach boys to girls. The author commented that the teachers in the study were less likely to encourage girls to do better. In other instances, the survey conducted by Blackboard (Daily Nation, 2000 13) has revealed that teachers in secondary schools prefer teaching boys Mathematics and Sciences to girls. The female teachers interviewed said that boys are more interesting and work harder than girls.

The teacher’s concentration on bright students also contributed to the students’ negative attitude to the subject. One girl said “…I know our teacher does not want us in her lessons because she always says some of us are dull and we cannot improve. She is just like that”. Loss of interest in the teacher somehow leads to loss of interest in the subject taught by that teacher. This definitely puts the students at a disadvantage as it erodes their interest in education. Some expressed discomfort at the mention of Chemistry and expressed dislike of calculations and practical. One girl said “I like subjects which just need memorizing.” Others said Chemistry is a broad subject and difficult to understand. This explains lack of confidence by students in Chemistry. This poor performance and difficulties in grasping the concepts erodes the confidence that they might have in the subject.

Chemistry as a Gate way to a Number of Key Careers
This section was included in order to reveal whether students acknowledge that Chemistry plays a role in their choice of careers.

Table 2: Chemistry is a Gate way to a number of key careers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>Agree</td>
<td>132</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100</td>
</tr>
</tbody>
</table>

It was noted from the Table 2 that 57 students (30%) said that Chemistry is not a gate way to a number of key careers. The implication here could be that failure to accept and recognize the usefulness of Chemistry in schools and in the society could contribute to the low achievement in the subject by the students.

On the other hand, 132 students (70%) had an encouraging revelation, as Chemistry is increasingly becoming a gate way to a number of key careers in
the world of work. It would appear that most students appreciated the importance of Chemistry for their careers in the future and would be ready to study Chemistry to any level if they are exposed to all career prospects in Chemistry. For example, one girl put it this way: “I want to be an engineer, so I need Chemistry”. There is thus the need for proper counselling to wipe off the erroneous notion the students already have that it is only in the classroom that a chemist could get a job. It is also necessary to make them understand the central role Chemistry plays amongst the sciences and various courses in the tertiary institutions where Chemistry is required as a prerequisite.

Self-confidence when Learning Chemistry
This section was intended to reveal confidence that students have in themselves when learning Chemistry.

Table 3: I have a lot of Self-confidence in Chemistry

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>Agree</td>
<td>147</td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100</td>
</tr>
</tbody>
</table>

From the Table 3, it is evident that 42 students (23%) revealed that they lack self confidence when it comes to learning Chemistry while 147 students (77%) had self confidence in learning Chemistry. They liked the subject, study at their own time without being asked to do so. They could perform well in tests and examination in the subject.

The implication here is that, 147 students (77%) with self-confidence stand a better chance of performing better than 42 students (23%) who had no confidence in them. When learning Chemistry, lack of confidence leads to giving up the possibility of passing Chemistry. Some students could not manage to work out problems considered difficult without the assistance of the teacher. For instance, one student said “I cannot force myself to understand Chemistry because it is for naturally gifted people”. These results are consistent with findings of a research in Australia (Carin & Sund, 1990) which show that self concept is one of the most important variables affecting children’s attitudes towards science as well as their general attitudes towards the school.

Other research findings in Kenya also reveal that self-concept correlates positively with achievement (Maritim, 1979; Mwamwenda, 1995). In fact, a student’s self-concept has been found to act as a predictor of the grade attained by that student. This supports Juntas’ (1984) findings, that lack of motivation and confidence made pupils prefer to be given solution to problems than work them out for themselves. In other instances, it was noted that the confidence of some students in Chemistry has been eroded due to lack of successful experiences in the Chemistry tests before. As one student said, “I have given up the idea of passing Chemistry because it is too difficult”. Thus it can be argued that enhancement of positive self-confidence student in Chemistry will possibly enhance the students performance by fostering the development of favourable attitudes towards the subject.

Teachers’ Responses
Student’s negative attitudes towards Chemistry could be a hindrance to effective teaching. The author intended to get the views of teachers on students’ attitudes. From the results, 50% of the teachers responded positively. This could imply that a negative attitude towards Chemistry could be a contributing factor to poor performance. It could lead to lack of confidence, inflexibility in exploring scientific ideas and unwillingness to persevere in performing Chemistry tasks. Negative attitude again could lead to lack of interest and curiosity regarding Chemistry thus impacting negatively on the performance. Negative attitudes could result from student’s background. It plays a major role in student’s performance in Chemistry. It could mean that a bad beginning would affect students negatively and they would find it difficult to change their attitudes even if they meet good teachers later on.

Attitudes associated with Science appear to affect student’s participation in science as a subject and impact performance in science (Linn, 1992). Other researchers have also revealed that positive attitude towards Science influence student’s performance and consequently enrolment. Further research examining psychological effects found that students self-concept of his ability to perform science positively correlated with achievement (Oliver & Simpson, 1985). The researcher intended to get some information from the teachers on what reduces students’ activity in the classroom. The table below shows some of the factors highlighted by the teachers, their frequencies and percentage.

Table 4: What Reduces Students’ Activity in Class

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching method</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Language barrier</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Laziness</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Peer influence</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Teacher work load</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Teaching aids</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

From the teachers’ responses above, 30% of the teachers revealed that peer influence reduces pupils’ activity in the classroom. Two teachers (20%) revealed that teaching methods could reduce pupils’ activity in the classroom in that there are teaching methods, which are teacher centred, and those which are student centred. Zadra (2000) argues that correct use of appropriate teaching methods is critical to the
successful teaching and learning of Chemistry substances theoretically. But to master chemical reactions, they need to mix the chemicals and observe the subsequent reactions.

The girls’ lack of effort and zeal towards Chemistry may be stemming from the notion that the subject is regarded a male domain, which is reinforced by their peer’s especially the pressure that bright students in general experience from their peers from coeducational and single sex schools. This could mean that some of the failure experienced or dismal performance of some girls could be out of fear of succeeding at a subject that raises male overtones in a coeducational school, girls would feel that they are not expected to do well in chemistry, thus considered unfeminine.

At classroom level, it appears peer pressure is most significant. When girls do better than boys, especially in coeducational schools, they appear to offend boys and some boys thus openly pass comments of discouragement thus considered unfeminine. While in single-sex (girls) schools those that do extremely well are looked at in high esteem, studies conducted in the USA show that peer pressure is one of the main influences in girls attitudes towards Mathematics and Sciences (Leder, 1992). What was encouraging though in this, was that many girls demonstrated awareness of messages of defeating gender stereotyping in schools, in particular that there are no differences between boys and girls academically.

**Correlation Analysis**

The researcher wanted to establish the relationship between the type of school (Girls school, Boys school and Co-educational schools) and the student’s attitude towards Chemistry. The results showed that the means for Girls Schools are relatively lower than those for Boys Schools and Co-educational schools. These could be attributed to the negative attitude that most girls have towards the subject. According to the findings above, the attitudes that students have towards Chemistry to some extent depends on the type of school.

In addition to students’ negative attitudes being a hindrance to effective teaching, further hindrances, which depend on the type of school, included heavy teaching loads, big and overcrowded classes, lack of textbooks and learning materials. Teachers said that heavy loads were tiresome and prevented them from working harder, for instance, organizing special lessons for slow learners and offering individual help to those in need. A Pearson correlation was calculated to establish the relationship between the school type and the students’ attitudes towards Chemistry.

A weak Pearson correlation coefficient was found. This implied that there exists a relationship between the school type and the feelings related to Chemistry and Chemistry achievement. This was probably due to Chemistry background of students, variety of facilities and instructional methods provided for both school students. This indicates that the school type is influential on students’ achievements and their feelings in Chemistry. To test if the relationship established was significant or not, Analysis of Variance (ANOVA) was conducted.

It is shown, F (24,164) =4.124, P<0.05, implies that there is a significant relationship between the school type and the attitudes towards Chemistry.

A Pearson correlation was also calculated to establish the relationship between self-confidence and attitude towards Chemistry. A Pearson correlation found was low \( r (2) = 0.340, P = 0.000 \). Students’ self-confidence in Chemistry was found to relate to the attitude. When students think that they cannot do anything right and they are convinced that there is absolutely no way they can pass Chemistry, they get affected emotionally and fail the subject. Self-concept has been reported to correlate positively with the achievement (Mwamwenda, 1995). A possible explanation for the relationship between self-concept, attitudes and achievement has been advanced by Deboer (1987), that a student with positive self-concept in a subject will most likely develop positive attitudes towards that subject and as a result spend more time and energy in the subject thus gaining mastery of the subject resulting in success. To test whether or not the relationship established between students’ self-confidence and the attitudes towards Chemistry is significant or not, Analysis of Variance (ANOVA) was conducted. The results showed that F (4,184) = 3.902, P<0.05. Thus, there is a significant relationship between students’ self-confidence and the attitude towards Chemistry.

**CONCLUSION AND RECOMMENDATIONS**

This paper has revealed that beliefs and views that students hold appear deep-rooted and reinforced everyday at school, in class and in the communities and thus continue to shape negative attitudes that most of them have. Looking at the findings in general, it was found that students themselves contributed to their own failure in Chemistry. Their negative attitudes, lack of interest and lack of confidence were all contributing factors. The findings also revealed that some of the causes of students’ negative attitudes towards learning Chemistry include wide coverage of syllabus, low awareness of career opportunities in the subject, lack of exposure to well equipped laboratory as well as poor teaching methods. In view of the findings and conclusions drawn in the study, the research suggests the following recommendations:
1) Students should be guided and counselled. Role models in science should be encouraged to visit schools and give talks to the students, especially girls. They could, in their talks shed light on the problems that they encountered themselves and how they overcome them in pursuing careers that were male dominated.

2) Full participation in classroom should be encouraged ensuring positive classroom dynamics with more learner involvement.

REFERENCES


