



Students' and Teachers' Attitude and Performance in Chemistry in Secondary Schools in Kwale County, Kenya

John O. Ogembo¹, Habil Otanga^{2*} & Rehema Nthenya Yaki³

¹PhD student, Department of Educational Communication and Technology
Kenyatta University, Nairobi

²Department of Educational Psychology, Kenyatta University, Mombasa Campus

³PhD student, Department of Educational Psychology, Kenyatta University, Nairobi

* Corresponding Author

Abstract

The purpose of this study was to examine the extent to which students' and teachers' attitudes hinder good performance in chemistry among students in secondary school. The sample consisted of 482 form three students and nine chemistry teachers from nine secondary schools. Data were collected through a questionnaire and interview schedule. Results showed that chemistry teachers' negative perception of their learners' abilities was strongly linked to persistent poor performance in chemistry. The study recommended that the Ministry of Education should enhance supervision of curriculum implementation in schools, enhance teacher motivation and increase facilities.

Key words: Attitudes, Chemistry, academic achievement, learner motivation

1.0 Introduction

Attitude is an important concept in learning. Among learners, it denotes interest or feeling towards studying particular subjects. When motivational factors such as interest, attitude and aspiration are inculcated in the learners, they tend to spend more time studying the particular subject. Students understand better when they spend more time studying and will therefore achieve to expected standard (Twoli, Maundu, Muindi, Kiio & Kithinji, 2007). This is only possible when they have a positive attitude towards a particular subject.

Teachers' Attitudes and Students' Motivation

Educationists and employers know that it is essential to motivate learners and employees so that they can work hard to produce good results in whatever they do (Kithinji 2007, as cited in Twoli et al., 2007). Teacher's attitude and motivation play a pivotal role in the teaching and learning process. They play a significant role in shaping the classroom environment which has an impact on a student's self efficacy which in turn influences a student's behaviour. All of these factors which can be loosely categorized as environment, personal factors, and behaviour interact and play off each other in a cyclical way (Woolfolk, 2007). According to Kwale SMASSE (2004), although science and mathematics teachers may have positive attitude, they are beset with problems that frustrate their efforts to teach effectively and efficiently. They play a significant role during the learning process and can directly or indirectly influence students' attitudes toward science which in consequence can influence students' achievement. Teachers are, invariably, role models whose behaviours are easily mimicked by students. What teachers like or dislike, appreciate or disapprove and how they feel about their learning or studies could have a significant effect on their students. By extension, how teachers teach, how they behave and how they interact with students can be more paramount than what they teach (Kwale SMASSE, 2004).

Students' Attitude and Performance

In relation to science subjects, Halladyna and Shaughnessy (1982) concluded that a number of factors have been identified as related to students' attitude. Such factors include; teaching methods, teacher's attitude, influence of parents, gender, age, cognitive styles of pupils, career interest, societal view of science and scientists, social implications of science and achievement. Empirical studies have revealed the influence of methods of instruction on students' attitude towards science. Kempa and Dube (1974) worked on the influence of science instruction; the result was that attitude becomes more positive after instruction. Long (1981) also concluded that diagnostic-prescriptive treatment promotes positive attitude. Hough and Peter (1982) further found out that groups of learners who scored significantly high in science achievement test also scored significantly high in attitude test. Gibbons, Kimmel and O'Shea (1997) opined that students' attitudes about the value of learning science may be considered as both an input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower performance. This means that those students who do well in a subject generally have more positive attitudes towards that subject and those who have more positive attitudes towards a subject tend to perform better in the subject (Olatunde, 2009). Akinmade (1992), confirmed that students' attitude toward science are the basis for higher achievement in science.

Students' beliefs and attitudes have the potential to either facilitate or inhibit learning. Burstein (1992) in a comparative study of factors influencing mathematics achievement found out that there is a direct link between students' attitudes towards mathematics and student outcomes. Studies carried out have also shown that the teachers' method of teaching mathematics and his personality greatly accounted for the students' positive attitude towards mathematics and that, without interest and personal effort in learning mathematics by the students, they can hardly perform well in the subject (Olatunde, 2009).

Students' attitude toward the learning of chemistry is a factor that has long attracted the attention of researchers. Ojo (1989) and Adesokan (2002) asserted that in spite of realization of the recognition given to chemistry among the science subjects, it is evident that students still show negative attitude towards the subject, thereby leading to poor performance and low enrolment. According to Bassey, Umoren and Udida (2008), students' academic performance in chemistry is a function of their attitude. Papanastasiou (2001) reported that those who have positive attitude toward science tend to perform better in the subject. The affective behaviours in the classroom are strongly related to achievement, and science attitudes are learned (George & Kaplan, 1998).

2.0 Statement of the Problem

The poor performance in sciences especially in chemistry has continued to be a major concern for the Government of Kenya and other education stakeholders. This trend has been more pronounced in rural areas such as Kwale County. The poor performance in effect jeopardises learners' chances for upward social mobility. At the national level poor performance has led to low transition into careers in science and technology. In an effort to reverse the trend, the government adopted a number of interventions targeting pupils, teachers and the overall teaching and learning environment. Despite these interventions, the poor performance in chemistry in Kwale County continues with lower mean than the national averages being recorded year after year. The continued poor performance in chemistry has been attributed to a number of attitudinal factors including students' attitude towards chemistry, teachers' attitude towards students' abilities and poor teaching methodologies among others. However, it is not clear which of these factors are responsible for the poor performance of chemistry in Kwale County. The study therefore sought to isolate the factors responsible for Kwale County students' poor performance in chemistry.

3.0 Research Questions

The study sought to answer the following questions:

- i. What are the students' attitudes towards chemistry?
- ii. To what extent do students' attitudes towards chemistry affect performance?
- iii. How do chemistry teachers perceive their learners' ability in chemistry?
- iv. To what extent does teachers' perception of the learners' ability affect performance in chemistry?

4.0 Results and Discussion

The research design used for this study was a descriptive cross sectional survey design. The design was used since it enabled the researcher collect data across the sampled population using the same instruments at the same time. The survey design also enabled the researcher obtain information concerning the determinant factors for performance and assess the opinions of chemistry teachers and students on how these factors contribute to performance in chemistry. A sample of nine public schools was selected through stratified sampling. A total of 491 respondents; nine chemistry teachers and 482 students were selected for the study. A questionnaire and interview schedule was used for data collection.

4.1 Students' Attitudes towards Chemistry

Eleven items measured students' attitude towards chemistry. To achieve this objective, the study sought to inquire whether students considered chemistry as an important subject or not, whether or not they enjoyed both the theory and practical lessons of the subject, who influenced their choice of the subject and the amount of time they invested in studying the subject. The summary of the analysis is presented in Table 1.

Results from Table 1 show that students generally scored positively for the items with a mean rating of 67.92% on the elements of attitude. This is an indication that students have a positive attitude towards chemistry.

4.2 Effects of Students' Attitude towards Chemistry on Performance

The results in Table 2 shows that students who scored 75% and above had the highest score (40.5) on the elements of attitude followed by those who scored between 45% and 59% (38.67), then 60% to 75% (38.59), followed by those who scored 30% to 44% (37.53) and lastly those who scored less than 30% (36.97) in that order. The ANOVA results $F(4, 470) = 4.535, p = 0.001$ in Table 3 indicate that the observed mean difference was significant at 0.05 level of significance. This therefore means that the students who scored high marks in chemistry also tend to have a positive attitude towards the subject. Hough and Piper (1982) from their study similarly found that groups of students who scored significantly high in science achievement test also scored significantly high in attitude test. The study finding agrees also with that of Serin and Mohammadzadeh (2008) and Oluwature and Oloruntegbe (2010) who found out in their studies that there was a significant relationship between students' attitude towards science and their science achievement. This assertion had also been proved by Bassey et al., (2008) who found out in their study on secondary school students' attitude and performance in chemistry in Akwa Ibom state - Nigeria that there is a significant positive relationship between students' attitude towards chemistry and their performance in chemistry. Similarly, Kan and Akbas (2006), in their study on affective factors that influence chemistry achievement found out that students attitude towards chemistry course on its own is a significant predictor of achievement in chemistry and explains a significant proportion of variance of chemistry achievement.

4.3 Teachers' perception of learners' ability in chemistry

To test for chemistry teachers' perception of their learners' abilities and thus infer on its impact on their performance in the subject, six statements were used. A summary is presented in Table 4. The results in Table 4 show that chemistry teachers' attitude towards their learners' ability in the subject was negative. For instance, 78% of the chemistry teachers believed that their chemistry students choose the subject because they lacked a better option; a

majority consider that the students have poor mathematical and English language background to enable them perform well in chemistry among others. This negative attitude towards their learner ability could be affecting teachers' output and therefore negatively impacting students' performance.

A comparative analysis of the students and teachers attitudes is contradictory. Findings show that while students have a positive attitude towards the teacher and teaching and learning practices, the teacher on the other hand manifests a negative attitude towards their learners' abilities. The teachers may therefore be said to exhibit a lack of understanding of their students. They may be going about their duties mechanically with the notion that the student is incapable of performing well in the subject due to their weak background and perceived negative attitude towards the subject. This poor attitude may be one of the major causes of students' poor performance in chemistry as the teachers may not be giving their best during the teaching and learning process. According to Kithinji (2007), as cited in Twoli, et al., (2007), teacher's attitude and motivation play a pivotal role in the teaching and learning process. The motivation of the learner to achieve may be enhanced or damaged by the teacher's attitude towards the students and how he or she interacts with them (Anderson, Ryan & Shapiro 1989).

4.4 Effects of Teachers' Perception of the Learners Ability on Performance in Chemistry

The results in Table 5 show that the effect was greatest on students whose scores improved significantly in the last 3 end of term chemistry tests since they had the highest score (27.40) on the elements of attitude followed by students whose scores had improved slightly (26.70), then those whose scores declined slightly (25.79), followed by those whose scores in chemistry remained the same (24.74) and lastly those whose performance declined significantly (23.60) respectively. The effect was significant, $F(4, 475) = 4.415, p = 0.002$ as presented in Table 6. The students whose performance had improved significantly were perceived positively by their chemistry teachers. The teachers' negative attitude towards their learner ability could be affecting the chemistry teachers output and therefore the performance of the students negatively. This research findings echo Edomwonyo-otu and Aava (2011) who found out that teachers' attitude reflects on the way they teach and this ultimately has adverse effects on students' performance. Attitude of students can be influenced by the attitude of the teacher and his method of teaching (Olatunde, 2009). Contrastingly, Obadara (2008) found no significant relationship between teachers' attitude to teaching and students' academic performance.

5.0 Conclusion

From the foregoing discussion, it can be concluded that the poor performance of students in chemistry in Kwale County can be attributed to the teacher's negative perception of their learners' abilities. It is therefore recommended that the school management/administration should expand existing facilities like classrooms to lower the class population and hence enhance subject teacher class control, provide more teaching and learning facilities to adequately cater for the large student population, provide for innovative ways to help motivate chemistry teachers like taking them for more capacity building courses and providing them with other incentives, hire more teachers with the help of the government to help reduce teachers work load and enable the teachers have increased contact hours with their learners' hence meaningful teacher-student interaction, organise more motivational talks by chemistry professionals to help manage the perceived negative attitude of students towards the subject and work closely with the teachers and parents in counselling the students to help counter the existing negative peer influence. Chemistry teachers on their part should organise excursions to chemistry-based industries and chemistry symposia as a way of motivating the students to have positive attitude towards the subject, adopt a more practical approach to the teaching and learning of the subject particularly improve in the use of charts and other instructional resources in the teaching of the subject and expose their students to more practicals particularly group/individual student based practicals as a way of motivating the learners.

References

- Adesokan, C. O (2002). *Students attitude and gender as determinants of performance in JSS Integrated Science*. Unpublished B.Ed Project Chemistry of Nigeria.
- Akinmade, C. T. (1992). The swing away from science. The Nigerian Chapter. *Journal of the Science Teachers' Association of Nigeria*, 24 (122), 126-129.
- Anderson, L.W., Ryan, D. W. & Shapiro, B. J. (1989). *The IEA classroom environment study*. Oxford: Pergamon Press.
- Bassey, W. S, Umoren, G. & Udida, L. A. (2008). Cognitive styles, secondary school students' attitude and academic performance in Chemistry in Akwa Ibom state- Nigeria. <http://academicdirect.org>
- Burstein, L. (1992). The analysis of multilevel data in educational research and evaluation. *Review of Research in Education*, 8, 158-223.
- Edomwonyi-otu, L. & Aava, A. (2011). The challenge of effective teaching of chemistry. A case study. <http://leipt.academicdirect.org/A18/001-008.htm>
- George, R. & Kaplan, M. D. (1998). A structural model of parent and teacher influences on students' attitudes of eight grades: Evidence from NELS. *Science* 82(1) 93-109.
- Gibbons, S. Kimmel, H and O'Shea, M. (1997). Changing teacher behaviour through development: Implementing the teaching and content standards in science. *School Science and Mathematics*, 97(6), 302-310.
- Halladyna, T. & Shaughnessy, J. (1982). Attitudes towards science: A qualitative synthesis. *Journal of Research in Science Teaching*, 66(4), 547-563.
- Hough, L.W. & Peter, M. K. (1982). The relationship between attitudes towards science and science achievement. *Journal of Research in Science Teaching*, 19(1), 33-38.
- Kan, A. & Akbas, A. (2006). Affective factors that influence chemistry achievement (Attitude and self efficacy) and the power of these factors to predict chemistry achievement. *Journal of Turkish Science Education*, 3(1).
- Kempa, R. F. & Dube, K. (1974). Science interest and attitude traits in students subsequent to the study of chemistry at the O'Level of the general Certificate of Education. *Journal of Research in Science Teaching*. 11(4) 361-370.

Kwale SMASSE (2004). Gender issues in mathematics and science education. A paper presented in cycle 1 of Kwale district INSET-2004.

Long, J. C. (1981). The effects of a diagnostic-prescriptive teaching strategy on student achievement and attitude in biology. *Journal of Research in Science Teaching*, 18(6), 515-523.

Obadara, O. E. (2008). Influence of teacher factors on academic performance of secondary school students in Ogun state, Nigeria. *African Journal for the Study of Educational Issues* 4.

Ojo, M. O. (1989). The differential effectiveness cooperative competitive and individual's goal structures on students' performance in chemistry. Unpublished doctoral thesis, University of Ibadan, Nigeria.

Olatunde, Y. P. (2009). Students' attitude towards mathematics and academic achievement in some selected secondary schools in Southwestern Nigeria. *European Journal of Scientific Research*, 36, 336-341.

Oluwatelure, T. A. & Oloruntegbe, K. O. (2010). Effects of parental involvement on students' attitude and performance in science. *African Journal of Microbiology Research*, 4, 1-9.

Papanastasiou, E. C. (2001) Willingness to follow math-related careers among seniors in math classes: The case of Cyprus. *Science Education International*, 13(2) 20-21.

Serin, O. & Mohammadzadeh, B. (2008). The relationship between primary school students' attitude towards science achievement and their science achievement. World education-centre.org/index.

Twoli, N. Maundu, J. Muindi, D. Kiio, M & Kithinji, C. (2007). *Instructional methods in education: A course book for general teaching methods*. Nairobi: Kenya Institute of Education

Woolfolk, A. (2007). *Educational psychology*. Boston: Pearson.

TABLES

Table 1

Descriptive statistics of students' attitude towards chemistry

Statement	N	SD (%)	D (%)	NS (%)	A (%)	SA (%)
Chemistry is useful in my future life.	482	1.9	3.1	9.3	32.2	53.5
I do not like chemistry.	482	42.1	28.4	15.4	10.2	3.9
I enjoy chemistry theory lessons.	480	6.0	9.4	12.1	41.5	31.0
I enjoy chemistry practical lessons.	482	3.3	3.9	6.0	40.0	46.7
Chemistry is a difficult subject.	482	23.2	24.7	16.6	19.7	15.8
I like my chemistry teacher.	481	3.7	6.4	7.1	32.4	50.3
I often study chemistry on my own.	482	10.4	14.5	13.3	35.3	26.6
My friends influenced me to choose chemistry.	481	42.0	27.7	12.3	9.6	8.5
My chemistry teacher influenced me to choose chemistry.	481	36.8	23.7	13.1	11.6	14.8
I enjoy doing other science subjects (biology and physics) more than chemistry.	482	15.4	16.4	13.7	25.5	29.0
I like studying chemistry most of my free time.	481	15.8	23.1	16.6	29.1	15.4

Table 2

Descriptive statistics for performance in relation to attitude towards chemistry

Scores	N	Mean	Std. Dev	Std. Error	95% confidence interval for mean		Min	Max
					Lower bound	Upper bound		
<30	173	36.97	5.27	0.40	36.18	37.76	19.00	52.00
30-44	127	37.53	4.45	0.39	36.75	38.31	28.00	53.00
45-59	81	38.67	4.66	0.52	37.64	39.70	25.00	52.00
60-75	66	38.59	4.99	0.61	37.36	39.82	26.00	51.00
>75	28	40.50	4.69	0.89	38.68	42.32	31.00	49.00
Total	475	37.84	4.96	0.22	37.39	38.29	19.00	53.00

Table 3

ANOVA for attitude towards chemistry by performance

	Sum of squares	df	Mean square	F	p
Between groups	433.69	4	108.42	4.53	0.001
Within groups	11237.46	470	23.91		
Totals	11671.16	474			

Table 4
Teachers' perception of students' ability in chemistry

Statement	SD (%)	D (%)	NS (%)	A (%)	SA (%)
My students like coming to me with chemistry problems for assistance.	0	33	22	22	22
Most students choose chemistry in my school because they have no alternative.	11	11	0	22	56
Majority of my students spend very little time studying chemistry.	0	0	11	33	56
Most of my students consider chemistry to be a difficult subject.	22	22	0	56	0
The students' English language competence affects their performance in chemistry negatively.	0	0	0	56	44
The students' mathematical competence affects their performance in chemistry negatively.	11	22	0	44	22

Table 5
Effect of teachers' attitude towards students' ability on chemistry performance over time

Trend of performance in the last 3 tests	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower bound	Upper bound		
					Declined Significantly	45		
Declined Slightly	96	25.79	5.80	.59	24.62	26.97	8.00	35.00
Remained	130	24.74	6.03	.53	23.69	25.78	8.00	35.00
Improved Slightly	167	26.70	5.54	.43	25.85	27.55	11.00	35.00
Improved Significantly	42	27.40	5.38	.83	25.73	29.08	16.00	35.00
Total	480	25.76	5.95	.27	25.22	26.29	7.00	35.00

Table 6
ANOVA for effect of teachers attitude towards students' ability on trend in performance in chemistry

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	607.077	4	151.76	4.41	0.002
Within Groups	16326.89	475	34.37		
Total	16933.96	479			