Learners' Attitudes and Performance in Science Subjects in A-Level in Secondary Schools, in Mbarara, Uganda

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Abstract

This research study aimed at investigating the learners' attitudes and performance in science. The main objective of the study was to establish the relationship between learner's attitudes and performance in science subjects based on age and gender. Cross-sectional research design was adopted for the study. Schools were randomly drawn from Mbarara district in Uganda. This gave a sample size of 300 form five and six secondary students. A questionnaire was used in collecting data for the study. The data was analyzed using SPSS to generate Pearson's Chi Square test, Spearman Rank Correlation and bivariate to test the hypotheses of the study. The findings of the study revealed that attitude, age and gender had significant relationship with students' performance in science subjects. Therefore, students' attitudes should be very central to teachers, because affective dispositions are powerful predictors of students' performance

Key words: Learners' attitudes, Performance and Science Subjects

1. Background to the Study

There is a rapid transformation of the world's industry, technology, communication, agriculture and medicine. As a result, there is an increasing need for science at individual as well as the wider socio-economic and political level, both locally and internationally as a way of predicting the ever occurring events in the world. The need to understand and be able to use science in all

spheres of life has placed greater demand for people to study science (Anwer, Iqbal & Harrison, 2012). Science is recognized widely as of great importance internationally for economic well-being of nations and the need for scientifically literate citizens (Fraser & Walberg, 1995).

With the level of transformation taking place in Uganda, young people are called to take a stance on socio-scientific issues, to become more critical and problem solving so as to meet the challenges of the day. There is no doubt that science and technology are a driving force in preparing students for the globalised world of work, new technologies and a knowledge-based society. According to Sofowora and Adekomi (2012), scientifically literate individuals understand the needs of the society to participate in the technologically oriented economy. However, attitude of an individual toward science determines its advancement and application

The government of Uganda has supported and implemented various aspects to promote science education. These include among others, construction of new and rehabilitation of science laboratories, supply of science text books and resource materials and in-service training of science teachers. The Government has constructed 54 laboratories or more in secondary schools under African Development Bank III (ADB) support to education in Uganda. Moreover,405 multi-purpose rooms were constructed with support of World Bank; and 4287 Science and Mathematics teachers have been trained through Secondary Science and Mathematics Teacher programme (SESEMAT). In addition, the Ministry of Education and Sports provided at least 5,000 science kits to 1,341 schools across the country in the move geared at enhancing the teaching of science subjects (The Daily Monitor 6 May 2010).

In 2005 the Government of Uganda made science subjects compulsory for secondary school students at ‘O’ level and preferentially funded university students taking science courses. Under

this new policy, science subjects were made compulsory for all secondary school students, and almost 75% of science students received the majority of government scholarships to universities and other tertiary education institutions. Nevertheless, the numbers of students taking Science related subjects in Uganda at A-level and among universities and colleges are few. In fact the numbers of students taking Science related subjects among universities is too small, representing only 22% (Uganda National Academy of Sciences, 2010). If this general trend is not changed, Uganda may not attain the Vision 2030 for it will lack the critical mass of people needed to manage the society envisaged in that dream. Some of the reasons for this trend lie in the student's attitude towards science.

Placement and promotion into universities or tertiary institutions are major judgements that largely depend on a student's performance. Also, academic performance is the single indicator of the quality of time a student spent at school (Kyoshaba, 2009). Science is an umbrella covering many subjects including chemistry, biology, physics and mathematics. But the major challenge facing science educators in Uganda is the poor performance in science subjects among the secondary school students. Indeed the performance in some schools is still very low mainly in these subjects. Table 1 highlights the comparison in academic performance of secondary schools in Uganda Advanced Certificate of Education (UACE) respectively from 2011 to 2013.

Table 1:
Comparison in performance in science subjects in UACE from 2011-2014

Subjects	**2011**	**2012**	**2013**
Mathematics	48%	55.7%	38.4%
Physics	48.7%	48.5%	41.5%
Chemistry	32.2%	37.4%	33.0%
Biology	39.1%	36.0%	24.3%

Table 1 indicates the percentage level of student academic performance in science subjects in Uganda Advanced Certificate Education in secondary schools between 2011 and 2013. The table shows that academic performance in science subjects has deteriorated.

There is a range of factors that affect the quality of performance of students (Waters & Marzano, 2006; Considine & Zappala, 2002). These factors include; learners' attitudes towards teachers, socio-economic status of learners (Ghazali, 2008; Farooq, Chaundhry & Berhanu, 2011), educational background of parents (Kiamanesh, 2004), types of school (Buckingham, 2000), gender (Woodfield & Earl-Novell, 2006; Ali *et al.*, 2009), peer influence (Schneider & Coleman, 1993; Steinberg *et al.*, 1996), poor teaching methods, lack of instructional materials, lack of functional, laboratories, poor students' teacher morale (Nkonge, 2010) and lack of qualified teachers. These factors may be grouped into student factors, family factors, school factors and peer factors (Crosnoe, Johnson & Elder, 2004). This study however, is concerned with learners' attitudes towards learning whose empirical data are scarce in relation to performance especially in Uganda context.

Attitude is an important concept in social judgments and behaviours and thus, is one of the most important concepts in decision making (Venkatesh *et al.*, 2003). In fact, studies Adesokan, (2002) indicate that attitude is one of the determinants of academic performance. An individual's attitude toward a person has a direct bearing on the person's reaction to the person. It can therefore be argued that learners' attitude towards science subjects determines their performance in the very subjects. Johnson and Johnson (1979) stated that some attitudes help students to function effectively in school while others interfere with school life and there is general belief that it is far more important to promote positive attitudes in students.

Many learners who perform dismally tend to exhibit problems with learning and school personnel (McCall *et al.,* 1992), and they may exhibit hostility toward learning (Mandel & Marcus, 1988). Research supports the finding that underachievers display more negative attitudes toward school than high achievers (Gottfredson *et al.,* 2009). Positive school attitude is not only important for preventing adverse events such as dropping out of school, but also is, positively associated with good performance (McCoach, 2000). Learners have to acquire the right types of attitudes towards learning and other people for them to improve on their performance.

1.1 Statement of the problem

Significant resources are spent on promoting science and technology at different levels of educational institutions in Uganda. It is disheartening to learn that such efforts do yield the intended results. Few students take science related subjects and those who take them continue to perform dismally. Generally, poor education outcomes have detrimental effects on individuals, country's economic and social development. However, the recognition of the problem of poor performance in science subjects has not translated into the development of more effective actions to improve the grades of the students. There is a concern to the government, teachers, parents, community and educationists regarding students' performance in science subjects in Mbarara district. The current study sought to investigate learners, attitudes and how it impacts performance in secondary schools in Mbarara district, Uganda. It suggested ways to boosting learners' attitudes in order to improve performance.

1.2 Objectives of the study

i. To determine if there were significant differences between learners' attitudes and performance in science subjects based on age

ii. To determine if there were significant differences in learners' attitudes and performance in science subjects based on gender

iii. To establish the relationship between learners attitudes and performance in science subjects

2 Methodologies

The sampling frame consisted of 300 learners of Advanced level in secondary schools in Mbarara district, Uganda. A cross-sectional research design was adopted for the study. Stratified and simple sampling techniques were used to select a sample of respondents from form five and form six students. Data from the respondents was collected through questionnaire and data analysis was done with the help of STATA (version 16 SE). Categorical variables were summarized as frequencies and corresponding percentages while continuous variables were summarized as frequencies, means and standard deviations. Pearson's Chi Square test, Spearman Rank Correlation and bivariate analysis were used to determine the relationship between variable. (P-value =0.05).

2.1 The Study Findings

The gender and age brackets of the respondents were ascertained descriptively. They were of importance because the researchers sought to establish whether gender and age of the respondents had any influence on performance in science subjects. The results are presented in table 2.

Table 2:

Demographic Details of the Respondents

Demographic characteristics		**N**	**Percentage**
Gender	Male	144	48
	Female	156	52
Age	14-16 years	1	0.3
	17-19 years	261	87.0
	20 and above years	38	13.0

The respondents of the study comprised of mixed groups. Table 2 shows that majority of the respondents were females, constituting 52% while males were 48%. 87.0% of the respondents were aged between 17–19 years, 0.3% were aged between 14-16 years and 13% were 20 years and above. This information is summarised in table 2.

The first objective sub question was to determine if there were significant differences between learners' attitudes towards learning and performance based on age. Results are shown in table 3:

Table 3:
Attitudes and Learners' Performance Based on Age

Age	**Levels of attitude**	**Performance**				
		Very poor %	Poor%	Average %	Good %	Very good%
14-16 years	Negative	100.0	0.0	32.7	0.0	0.0
	Neutral	0.0	0.0	1.9	0.0	0.0
	Positive	0.0	0.0	65.4	100.0	0.0
17-19 years	Negative	52.6	36.8	33.9	32.4	26.9
	Neutral	9.9	7.8	7.7	6.4	6.7
	Positive	37.5	55.3	58.4	61.1	66.3
>20 years	Negative	40.9	34.3	29.1	29.5	0.0
	Neutral	24.7	11.7	7.8	10.4	0.0
	Positive	34.4	54.0	63.2	60.1	100.0

The study showed that among learners aged 14-16 years, the number of students with negative attitudes reduced with the improvement of performance in science subjects and the relationship

was strong (r=0.76, p =0.001). Among the learners aged between 17-19 years, frequency learners with negative attitudes reduced with the improved performance in science subjects (r= -077, p= 0.001) while among learners with neutral attitudes, the relationship between learners attitudes and performance were not significant (r= 0.26 p= 0.523). There was a significant relationship between learners with positive attitudes and improved performance (r = 0.76, p = 0.001). Similar trends were also reported among learners aged 20 years and above. The number of learners with negative attitudes reduced as performance improved.

The study also sought to determine if there were significant differences in learners' attitudes based on gender. The results are shown in the table 3 below:

Table 3:
Attitudes and Learners' Performance Based on Gender

Gender	**Levels of attitude**	**Performance**				
		Very poor %	Poor%	Average %	Good %	Very good%
Male	Negative	45.6	36.7	32.4	33.0	26.8
	Neutral	16.0	8.1	7.5	6.8	2.9
	Positive	38.3	55.2	60.1	60.2	70.3
Male	Negative	59.3	35.8	34.5	31.5	26.6
	Neutral	7.1	9.3	7.8	6.8	7.7
	Positive	33.6	54.9	57.8	61.7	65.7

The study showed that there is a strong relationship between gender and performance (r => 0.65, p<0.05). The results also revealed a positive relationship between attitudes of female respondents and performance in science subjects (r=0.87, p=0.000). However, the percentage of female students' scores with negative attitudes reduced markedly (r= -094, p= 0.000). This implied that more girls with negative attitudes scored very poorly compared to girls with positive attitudes. Female learners scoring higher marks increased markedly (r= 0.93, p = 0.000) at positive attitude. Similar trends were observed among the male students. However, the relationship

between performance and attitudes of learners lowered among male students with negative attitudes (r= -0.075, p= 0.002). Among learners with positive attitudes, the number of male learners doing well also increased (r = 0.81, p =0.002) but the increase was much lower than that of females. This implies that the performance of male learners is not strongly related to attitudes as in the case of female learners.

The study also sought to determine whether there is relationship between attitudes of learners and performance in science subjects. To achieve this objective, Spearman Rank Correlation was performed and results presented in figure 1:

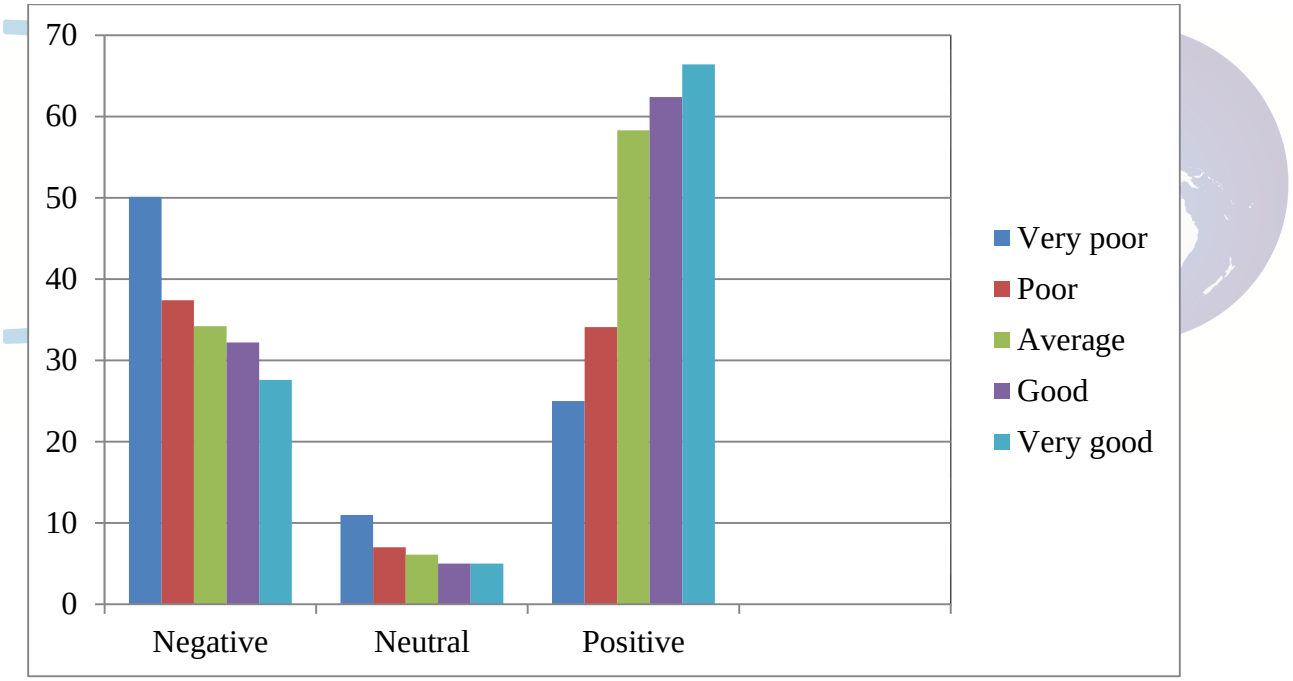

Figure 1: Relationship between attitudes of learners and performance in science subjects

The study revealed that there was a strong positive relationship between attitudes of learners and performance (*r* = 0.67, p= 0.001). Learners with negative attitudes performed very poorly (50.1%), poor performance (37.4%), average (34.2%) and only (27.6%) performed very well.

Among students with positive attitude (66.4%) performed very well, (62.4%) performed well, (58.3%) were average and only (34.4%) performed very poorly. Performance of learners with neutral attitudes was not significantly different ($p<0.05$).

2.2 Discussion of the Findings

The attitudes of learners determine their performance in school and life after school. In their study Erdogan, Bayram and Deniz (2008) found that there is a positive relationship between students' attitudes towards learning and their academic performance. When learning is able to provide interesting activities for students and the way those activities are engaged, and even the participation of students in school decisions have influence on how students feel about learning and how they react to school life (Singh, Granville & Dika, 2002). Similarly and Lindgren (1980) demonstrated that students with lower performance and higher rate of school failure have more negative attitudes

Based on the first objective, which was to determine if there is any significant difference between learners' attitudes and performance in sciences based on age, the results show that learners aged 17 and above years generally had positive attitudes and performed better than those aged below 17. Age has also been associated with achievement. These results are supported by Crosser (1991), Kinard and Reinherz (1986) and La Paro and Pianta (2000) who presented evidence that older children fare better academically than their younger ones. Also Uphoff and Gilmore (1985 argued that the more mature students in a class fare better than younger classmates. On the contrary, The Uganda National Examinations Board (2013) reported that the mean scores in science subject of younger students in form two were higher than those of their older students within the same class. This collaborate the findings of studies conducted by DeMeis and Stearns, 1992) and Dietz and Wilson (1985). The studies found no significant

relationship between age and academic performance. There is need to note that Uganda National Examinations Board (2013) report is based on mean scores of form two yet the data of the current study were collected from form five and six respondents. This may account for differences in the findings.

The second objective was to determine if there is any significant difference in learners' attitudes and performance in science subjects based on gender. The results revealed a positive relationship between attitudes of female respondents and performance. Females with positive attitudes performed better than their counterparts who had negative attitudes. A similar trend was observed among male learners. However, the relationship between performance and attitudes of learners lowered among male students with negative attitudes. Among learners with positive attitudes, the number of learners doing well also increased, but the increase was much lower than of females. This implied that the performance of male learners is not strongly related with attitudes as compared to that of females. The results agreed with the findings of a study by Dunn (1968) which showed that there a progressive tendency to express dislikes for academics in schools in grades five, seven and nine in elementary schools. The girls valued academic activities more than boys. Many studies have shown that girls perform better in school than boys in all major subjects (Wong et al., 2002). Again female students tend to graduate from high school with higher grade point averages (GPAs) than their male counterparts (Perkins, Kleiner, Roey & Brown, 2004). There are stereotypic attitudes in many societies that boys are expected to do better in school than girls. However, the findings of this study revealed that there is a wave of change from the old school of thought that tended to believe that female learners were naturally weak. Although some studies on gender differences in performance have revealed that boys perform better than girls (Kaahwa, 2012), others have indicated that this trend seems to be

changing because girls are closing the gap even in science scores, subject known to be for male students (Namusisi; 2010; Cech, 2012).

From the last objective aimed at determining if there was any relationship between attitudes of learners and performance in science subjects. The results revealed that there was a strong positive relationship between attitudes and performance. The study finding was in agreement with that of Oluwatelure and Oloruntegbe (2010) who concluded that there was a significant relationship between students' attitude towards science and their science achievement. Similarly, Kan and Akbas (2006), in their study on affective factors that influence chemistry achievement found out that students' attitude towards chemistry is a significant predictor of achievement in chemistry. Learners with negative attitudes performed very poorly. In the study by Awang, Jindal-Snape and Barber (2013) there is a strong association between learners' attitudes towards education activities and their performance and vice versa. The authors added that learners who show negative attitudes towards education activities are found to exhibit off-task behaviour. Again in agreement with the findings of this study, Hendrickson (1997) found that attitude was one of the best predictors of student grade point average. This implies that learners' attitudes should be very important to educators, because affective dispositions are powerful predictors of students' performance.

2.3 Conclusion and Recommendations

The findings showed that most female learners had positive attitudes and consequently performed better compared to male learners. The study generally revealed that positive attitude contributes to positive results. Attitudes are learnt and can be changed through persuasion using a variety of techniques. Attitudes, once established, help to shape the experiences the individual

has with teachers. Therefore, students' attitudes should be very central to educators, because affective dispositions are powerful predictors of students' performance.

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