

INFLUENCE OF SELECTED PSYCHOSOCIAL FACTORS ON LEARNERS' PERFORMANCE IN SCIENCE SUBJECTS: A CASE OF PUBLIC SECONDARY SCHOOLS IN MOYALE SUB-COUNTY, KENYA

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ABSTRACT

The study examined influence of selected psychosocial factors on learners' performance in science subjects. Using a descriptive survey design, the analysis of variance (ANOVA) revealed a statistically significant influence of science anxiety on learners' performance $F(4, 95) = 134.511, p < 0.05$; parental involvement on learners' performance $F(4, 95) = 93.997, p < 0.05$; peers influence on learners' performance $F(4, 95) = 260.022, p < 0.05$; and teacher preparedness on learners' performance $F(4, 95) = 213.083, p < 0.05$. Further analysis of the effect size on the results showed science anxiety significantly influences learners' performance in science subjects ($\eta^2 = .850$); parental involvement significantly influences learners' performance in science subjects ($\eta^2 = .798$); peers influence significantly influences learners' performance in science subjects ($\eta^2 = .916$); and teacher preparedness significantly influences learners' performance in science subjects ($\eta^2 = .900$). Therefore this finding provide sufficient evidence to conclude that very high science anxiety had an influence on learners' performance by lowering learners' performance in science subjects; very high parental involvement had an influence on learners' performance by increasing learners' performance in science subjects; average peers influence had an influence on learners' performance by increasing learners' performance in science subjects; and very high teacher preparedness had an influence on learners' performance by increasing learners' performance in science subjects. Thus, the study recommends the school should strive to develop adequate learning environment where learners are free to consult when in need, provide reading materials and arouse interest in learners to work hard.

Key Words: Learners' Performance, Parental Involvement, Science Subjects, Science Anxiety, Peers Influence, Poor Performance, Psychosocial factors Teacher Preparedness.

1.0 INTRODUCTION

The challenge of unimpressive performance in science subjects is worldwide as revealed by research in United States of America-USA (Valverde & Schmidt, 1997), Canada (Landry, 1998) and Portugal (Fonseca & Conboy, 2006). Mullis, Martin, Foy and Arora (2011) describe performance of USA learners as significantly below that of Singapore and Chinese Taipei. Programme for International Learner Assessment-PISA (2012) report that more than 20 per cent of young Europeans were not attaining basic skills in science subjects. A related report attributed poor performance in sciences in Australia to lack of learner interest and poor teacher preparation (TIMSS, 2007).

Poor performance in sciences is common Africa. Dhurumraj (2013) identified technical science language and poor mathematical and problem solving skills as the main causes of poor performance in science subject in South Africa. In Nigeria, factors responsible for poor performance in sciences include poor background of learners, poor method of teaching, lack of experienced teachers, inadequate laboratory facilities and classroom environment (Aminu, 2011).

Psychosocial factors (psychological and social factors) may hinder learners' performance in science subjects (Oyenuga & Lopez, 2012; Higgins, 2011). According to the Kenya Institute of Curriculum Development-KICD (2012) science subjects put emphasis on exploring elements of nature through systematic analysis. The subjects also look at how people derive use from the surrounding, protect it and use it dutifully. Achor (2012) underlines the value of science in the progress of humanity and technological advancement of any country including Kenya. Peter (2014) indicates some important roles of science education in the lives of secondary school learners such as preparing learners for future careers in science and technology and helping learners develop scientific attitudes such as curiosity, creativity, open-mindedness and honesty.

In Kenya, a study by Muraya and Kimamo (2011) attributes poor performance in science subjects to; negative learner attitude, inappropriate teaching approaches, deficient teacher command of content; insufficient instruction materials. Other factors include: lack of interest in sciences (Wabuke, Barmao & Jepkorir, 2013), poor planning of personal study time (Kurgat, 2008) and poor syllabus coverage in science subjects (Amadalo, Shikuku & Wasike, 2012). Hence, from the above mentioned factors, it is evident that psychosocial factors by the learner and significant others involved in learning such as parents, peers and teachers may influence learners' performance in science subjects (Peter, 2014). However, psychosocial factors such as science anxiety, peers influence, parental involvement and teacher preparedness have not been adequately investigated.

Poor performance in science subjects also shows that a large proportion of learners who graduate from secondary school at form four in Kenya do not achieve the basic knowledge level of the secondary science course. This study therefore sought to examine the influence of selected psychosocial factors on learners' performance in science subjects in public secondary schools, Moyale Sub-County.

1.1 Research Hypothesis

The following research hypotheses were tested:

Ho₁: There is no statistically significant influence of science anxiety on learners' performance in science subjects in public secondary schools, Moyale Sub-County.

Ho₂: There is no statistically significant influence of parental involvement on learners' performance in science subjects in public secondary schools, Moyale Sub-County.

H₀₃: There is no statistically significant peers influence on learners' performance in science subjects in public secondary schools, Moyale Sub-County.

H₀₄: There is no statistically significant influence of teacher preparedness on learners' performance in science subjects in public secondary schools, Moyale Sub-County.

1.2 Theoretical Framework

1.2.1 Bandura's (1977, 1986) Social Cognitive Learning Theory

Bandura's (1977, 1986) Social Cognitive Learning Theory (SCT). SCT states that a learner's action is a response to the choice to act based on cognitively processed information about the self, surrounding, and the possible consequence of the action. In contrast to the behaviorists, socio-cognitive theory states that the behavior of a learner mutually influences others and is equally influenced by other individuals' actions in the surrounding. SCT refers this mutual relationship between the learner and the environment as reciprocity.

According to this theory learners may learn by observing the behavior of significant people such as parents, peers and teachers. Learners' behavior is also shaped when behavior is rewarded or punished (Bandura, 2001). Cognitive learning involves acquisition of knowledge devoid of replication or routine, accepted wisdom, result prospects and consciousness of rewards or penalties (Bandura, 1977). In other words, if a learner gets a low mark without adequate remark from the teacher stating why the bad mark happened, the learner may not progress for lack of positive criticism. Observation learning occurs when a learner acquires behavior by watching the behavior of others. The traits or attributes learnt through observation may be intentional or accidental. That means that if a learner is modeled by someone they identify with (parent, peer or teacher), he/she is probably going to the behavior of the model. Modeling is common vehicle for observation learning. The theory guided this study by indicating that every learner requires a supportive environment to learn. Learners gain educational knowledge when they use modeling. Learners are molded on how to operate science equations first by watching how their teachers or parents complete them successfully. The peers are also important because they allow the learner to get used to each other's approaches and ask for assistance to solve problems where necessary. Modeling is very advantageous to learners who have high science anxiety, low self-confidence, incompetent or those who are dependent on others in science (Vygotsky, 1978).

Learners also need a pleasant environment both at home and school to enhance performance in science. From the background information, it is clear that learners in public secondary schools experience psychosocial factors which are likely to influence their performance in science. It is important to look into the influence of psychosocial factors on performance in science based on Social Cognitive Learning Theory.

1.2.2 Freud's (1977) Psychoanalytic Theory

Psychoanalytic theory by Freud (1977) states that the unconscious disagreement between the ego and id desires is the cause of anxiety. Ego is anxious because it is under threat of over-stimulation that is out of its control.

The urges, generally sexual or aggressive by nature struggle for expression but the ego cannot let it because it unconsciously fears that punishment will follow. Sarason (1984) explains the concept of anxiety as being influenced by psychoanalytic theory which posits that the development of anxiety begins in the family setting from very early in life. Therefore, the child's behavior is under constant evaluation by his/her parents. Since the child is dependent on parents, he/she cannot challenge the

parents upon punishment. Instead, the child develops a sense of guilt and anxiety stimulation. An anxious learner usually pays attention to his/her own anxiety responses in learning circumstances than the task.

The school situation provokes anxiety basically because of the stimulus similarities between the parents and the teachers. Both are authority figures with powers to perform assessment functions and to offer rewards and punishments. The emphasis put on good performance by teachers and parents create high level of anxiety which obstruct good performance. This study used the psychoanalytic theory to describe influence of science anxiety on learners' performance in science.

2.0 LITERATURE REVIEW

Psychosocial factors are defined as psychological and social factors that may facilitate or hinder learning a subject or a course (Oyenuga & Lopez, 2012; Higgins, 2011). The school, the home and learner's interest are notably strong variables that influence teaching and learning of science subjects. Zins Blood-worth, Weissberg and Walberg (2004) observe the importance of psychosocial in student's learning. Learners should be less anxious to gain knowledge in class, to identify social support around them, to make possible their education and to regulate feelings and control emotions. The school provides an environment where teaching and learning take place (Okenyi, 2005). Furthermore, the school allows interaction among parents, teachers, learners and materials. These interactions create an environment referred to as the school environment.

A study by Simiyu (2010) examined the impact of test anxiety on school achievement in Kanduyi division, Bungoma County. The study sampled 115 learners from three secondary schools randomly selected from 14 schools. Academic performance was obtained from learner scores in the continuous assessment tests (CAT). The results show that anxiety was caused by intimidation from authority figures. The study also found peers influence to be the cause of test anxiety. This study sought to find out whether home and classroom experience may decrease or increase learners' performance.

Studies by Muiru, Thingur, Njagi and Ngunu (2014) and Koech (2010) found very little split of roles between teachers and parents in most rural schools. The two studies observe that parents of Kenya had very little interest in what their children do in school and that parent's role has been reduced to that of paying school fees.

Another study carried in Uasin Gishu Sub-County by Koech (2010) established that parental involvement in private and public schools significantly differed in their level of involvement. The study observed that the level of involvement was low or limited particularly in the area of volunteering since both parents and teachers did not see the reason to do so. In a related study, Muiru et al., (2014) carried out another survey on relationship between home and school in primary schools in Kisii County, Kenya. The study concluded that most parents were not involved in school administrative activities.

A study by Ampofo and Benedict (2015) peers were found to influence learners' performance. In contrast Korir and Kipkemboi (2014) found no significant influence between negative peer pressures on learners' performance. In addition, Korir and Kipkemboi (2014) found that school environment and peer influence is significant predictor of learners' performance. Adolescents acquire behavior that is acceptable or not by watching their peers' responses to how they act, wear and say. Peers offer the much needed views in the form of feedback since their words and deeds may promote or discourage some behaviors. Anxiety may develop as a result of adolescents' attempt to foretell how peers will respond, and as earlier mentioned anxiety plays a big role in peers influence. That is, self-conscious fear about how others will respond to potential

actions is the most common way of influence among peers. When an adolescent adopts an unacceptable view and departs from the expected or customs of the peer group, he or she is likely to be rejected. Rejection is a difficult situation to deal with at adolescence. This study set out to find out if learners' performance in science subjects might be predicted by maintaining quality peer grouping.

A study by Kimosop (2015) established that 48.6 percent of teacher respondents never accomplished the learning objectives, 66.6 percent kept schemes of work but many never used them. Majority 86.7 percent never wrote lesson plans. Walaba (2008) reveals that academic performance is influenced by adequate teacher preparations; thus, teachers' laxity greatly affects learners' performance. Teachers' preparation is necessary for orderly teaching. Kimosop (2015) observes that to succeed a good teacher must have a thorough command of the subject matter and above average general knowledge. Effective instruction requires proper preparation. Teaching comprises various aspects that include class control, lesson presentation and structure of content, learning activities, assessment and feedback. This study sought to find out whether classroom experience might decrease or increase learners' performance.

Despite the importance of association between psychosocial factors and learners' performance, this issue had not yet been addressed in the reality of Moyale Sub-County, Kenya by a means of a study that properly involved both variables. In order to counter the lack of studies in this area, this study aimed at examining influence of selected psychosocial factors (science anxiety, parental involvement, peers influence and teacher preparedness) and further elaborate on their influence to learners' performance in sciences in Kenyan classroom and schools.

3.0 METHODS

This study adopted a descriptive survey design to obtain information from the selected sample on the influence of selected psychosocial factors on learners' performance in science subjects. Descriptive survey design describes attributes of a specific person or group as it is, and no attempt was made to change the behavior or conditions (Kothari, 2004). No variable were manipulated (Ali, 2005) since learners' performance due to the influence of psychological factors already existed in the respondents and not due to any treatment.

3.1 Sampling and Data Collection Tools

A sample of 296, computed using the formula proposed by Bertlett, Kotrilik and Higgins (2001) and emphasized by Mugenda and Mugenda (2003), was selected from a total population of 1292 representing both male and female principals, science teachers, parents and form three learners. A stratified random sampling technique was used to obtain a sample of 108 from Gurumesa and 188 from Butiye education zones. This was followed by proportionate random sampling subjected to each stratum to get the required sample using a computer table of random sampling. To achieve construct validity, the questionnaire was apportioned into subsections based on each variable as discussed through the literature review. Internal validity was conducted by pilot-testing the questionnaire and the alpha index of 0.68 was considered sufficient in this study.

3.2 Data Analysis

The completed questionnaires were gathered, coded, summarized and quantitatively analyzed using both descriptive and inferential statistics. Testing of hypothesis was done using analysis of variance (ANOVA) with the data further subjected to eta squared (η^2) to determine the effect size. An ANOVA was selected because it can test the difference between two or more means (Ary, Jacobs & Razavieh, 2002). For this study, an ANOVA was used to analyze data, because the study is

designed with more than one independent variable or more than two levels of an independent variable (Ary et al., 2002). The level of significance used was $<.05$. Furthermore, eta squared η^2 was chosen because it allows for testing of the statistical power of the results. Statistical power is the probability of obtaining a test statistic large enough to reject H_0 when H_0 is false (Warner, 2008).

The questionnaire return rate was 69.4 percent. The quantitative analysis was carried out using SPSS version 23.0. The hypothesized influence of science anxiety, parental involvement, peers influence and teacher preparedness was statistically controlled for by including each as an independent variable in the ANOVA, thereby testing its main influence on the dependent variable learner performance in science subjects as well as its interaction with other independent variables.

3.3 Assumptions of the ANOVA

The study was designed to allow random sampling of elements and the independence of sampling components from each other and from the target population. Data was considered reliable since the assessment tools had generated item reliability of 0.863 which is above the 7.0 recommended by both Garson (2002) and Waldeck (2013). In this study the dependent variable was measured using a 5-point Likert scale (below 35=*Very Low Performance*, 36-45=*Low Performance*, 46-60=*Average Performance*, 61-75=*High Performance*, 76-100=*Very High Performance*). In addition, the four independent variables were each subdivided into statements into a 5-point scale of (1=*Never* 2=*Rarely*, 3=*Sometimes*, 4=*Often*, 5=*Always*).

A test of normality test using Normal Q-Q plots was used to estimate the normality of the dependent variable since the sample of teacher respondents was 14 (that is, less than 30).

3.4 Hypothesis Testing

ANOVA was used to examine the influence of science anxiety, parental involvement, and peers influence and teacher preparedness on learners' performance in science subjects.

The first hypothesis of this study was;

H₀₁: There is no statistically significant influence of science anxiety on learners' performance in science subjects in public secondary schools.

The main influence of science anxiety yielded an F ratio of $F(4, 95) = 134.511$, $p < 0.05$ indicating that the main influence was significant. Further the effect size was also tested. The eta squared (η^2) on dependent variable, learner performance, with science anxiety as the independent variable revealed a large effect size of $\eta^2 = .850$, which implies that 85 percent of the variance in learners' performance (science scores) was predictable from science anxiety. The study hypothesized that poor performing learners had a higher level of science anxiety. The result reveals that learners with high science anxiety tend to have low performance in sciences.

The second hypothesis of this study was;

H₀₂: There is no statistically significant influence of parental involvement on learners' performance in science subjects in public secondary schools.

The main influence of parental involvement yielded an F ratio of $F(4, 95) = 93.997$, $p < 0.05$ indicating that the main influence was significant. Further the effect size was also tested. The eta squared (η^2) on dependent variable, learner performance, with parental involvement as the independent variable revealed a large effect size of $\eta^2 = .798$, which implies that 79.8 percent of the variance in learners' performance (science scores) was predictable from parental involvement. The study hypothesized that poor performing learners had a lower level of parental involvement. The

result reveals that learners with high parental involvement tend to have high performance in sciences.

The third hypothesis of this study was;

H₀₃: There is no statistically significant peers influence on learners' performance in science subjects in public secondary schools.

The main influence of peers influence yielded an F ratio of $F(4, 95) = 260.022$, $p < 0.05$ indicating that the main influence was significant. Further the effect size was also tested. The eta squared (η^2) on dependent variable, learner performance, with peers influence as the independent variable revealed a large effect size of $\eta^2 = .916$, which implies that 91.6 percent of the variance in learners' performance (science scores) was predictable from peers influence. The hypothesis that high performing learners in sciences had high peers influence was accepted with the understanding that approximately 91.6 percent of the variance in learner performance in science can be predicted from peers influence scores.

The fourth hypothesis of this study was;

H₀₄: There is no statistically significant influence of teacher preparedness on learners' performance in science subjects in public secondary schools.

The main influence of teacher preparedness yielded an F ratio of $F(4, 95) = 213.083$, $p < 0.05$ indicating that the main influence was significant. Further the effect size was also tested. The eta squared (η^2) on dependent variable, learner performance, with teacher preparedness as the independent variable revealed a large effect size of $\eta^2 = .900$, which implies that 90.0 percent of the variance in learners' performance (science scores) was predictable from teacher preparedness. The hypothesis that high performing learners in sciences had high teacher preparedness was accepted with the understanding that approximately 90.0 percent of the variance in learner performance in science can be predicted from teacher preparedness scores.

4.0 SUMMARY OF KEY FINDINGS AND DISCUSSIONS

First, the eta squared revealed a statistical significant influence of science anxiety on learners' performance $F(4, 95) = 213.083$, $p < 0.05$, $\eta^2 = .850$. Thus the finding provides sufficient evidence to confirm that science anxiety influenced learners' performance in science subjects. Therefore, science anxiety had a large influence on learners' performance in science subjects. The results agree with other studies (Sahin, Calskan & Dilek, 2015; Juan & Visser, 2017; Lotz & Sparfeldt, 2017; Cetin, Erduran & Kaya, 2010; Kaya, 2013). However, the study found that learners' science anxiety did not increase by discouraging comments from peers about sciences contrary to the study by Punia, Miglani & Singh (2016). The study demonstrated that unsuccessful completion of laboratory experiment was the major cause of science anxiety with mean of 2.47 (SD = 1.275). Perhaps this might be related to inadequate teacher preparedness specifically lack of exposure to practical lessons.

Equally, the eta squared revealed a statistically significant influence of parental involvement on learners' performance $F(4, 95) = 93.997$, $p < 0.05$, $\eta^2 = .798$. Thus the finding provides sufficient evidence to confirm that parental involvement influenced learners' performance in science subjects. Therefore, parental involvement had a large influence on learners' performance in science subjects. The results concur with other studies (Chemagos, Odongo & Aloka, 2016; Maria, 2013; Kaya & Yildirim, 2014). However, the finding that parents communicated with teachers about their children performance through use of phone call contradicts the finding of Mutodi and Ngirande (2014). The study revealed parental involvement was mainly by parents/guardians enforcing strict rules at home

with mean of 3.61 (SD = 1.254). Perhaps this is because most families were religious and strict to all rules of Islam.

Additionally, the eta squared showed a statistically significant influence of peers influence on learners' performance $F(4, 95) = 260.022, p < 0.05, \eta^2 = .916$. Thus the finding provides sufficient evidence to confirm that peers influenced learners' performance in science subjects. Therefore, peers had a large influence on learners' performance in science subjects. The result is in line with other studies (Korir & Kipkemboi, 2014; Lubinski, Benbow & Kell 2014; Sahin, 2014; Cialdini & Goldstein, 2004; Duckworth & Yeager 2015; Neidell & Waldfogel, 2010; Cohen & Lotan, 2014; Koh's, 1998; Marder, Joinson, Shankar & Thirlaway, 2016; Mallow, Kastrup, Bryant, Hislop, Shefner, & Udo, 2010). However, the finding on whether learners' opinion did matter in learning sciences negates the finding of Ampofo & Benedict (2015). The finding showed that peers influence was mainly by negative attitude towards science subjects with mean of 3.50 (SD = 1.330). The finding also showed that even girls who were gifted in sciences were less interested because of negative thoughts. The negative attitude towards sciences may emanate from sarcastic and demeaning behavior of science teachers, unsuccessful experiments and or parent's discouraging comments about science.

Likewise, the eta squared showed a statistically significant influence of teacher preparedness on learners' performance $F(4, 95) = 213.083, p < 0.05, \eta^2 = .900$. Thus the finding provides sufficient evidence to confirm that teacher preparedness influenced learners' performance in science subjects. Therefore, teacher preparedness had a large influence on learners' performance in science subjects. The result is in line with other studies (Korir and Kipkemboi, 2014; Sahin, 2014; Derado, Garner & Tran, 2016; Meltze & Otero, 2015; Kimosop, 2015; Kimani, Njagi & Kara, 2013; Cochran-Smith, Villegas, Abrams, Chavez-Moreno, Mills & Stern, 2015; Alqahtani, Kanasa, Garrick & Grootenboer, 2016; Jadama, 2014; Juan & Visser, 2017; Steinberg, Allensworth & Johnson, 2014; Mallow, Kastrup, Bryant, Hislop, Shefner, & Udo, 2010). The finding revealed that all science teachers observed appeared less appeared less to teach. The finding also showed that of the sampled teacher 21 percent had Diploma, 59 percent had Bachelors and 20 percent had other qualifications. Perhaps the other 20 percent hold the answers to the question of teacher unpreparedness. The finding therefore prompts several questions for instance who are the other 20 percent? What are they teaching, what opinion of science do they portray? Are they anxious? Are they prepared?

Developed nations have developed clear policies to deal with psychosocial factors in learners' performance in science subjects. Among other measures in the USA include formation of the National Science Foundation to coordinate and oversight science education (Schroeder, Scott, Tolson, Huang & Lee, 2007). In an effort to promote science achievement, the State of Texas established the Texas Science Initiative program to promote thorough, effective science education and produce well trained teachers for science lesson (Schroeder et al., 2007). With such programs in place, it becomes easier to develop better policies in dealing with psychosocial factors.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to examine the influence was to examine the influence of selected psychosocial factors on learners' performance in science subjects in public secondary schools, Moyale Sub-County;

The study provides sufficient evidence to found to conclude that very high science anxiety influenced learners' performance by lowering learners' performance in science subjects. In addition, there is adequate to confirm that very high parental involvement influenced learners' performance by increasing learner's performance. Moreover, the finding confirms that average peers influenced

performance by increasing learners' performance. Similarly, there is proof to conclude that very high teacher preparedness influenced learners' performance by increasing learners' performance.

Therefore, the principals and teachers must conduct the difficult conversation on how to work with learners from diverse backgrounds. Teachers must be honest about the likely causes of biases concerning learner groups such as gender, income level and religion.

Since the school is the second home to a learner. The principals, teachers and parents should strive to develop ample learning environment where learners are free to consult them when in need, provide reading materials and arouse interest in learners to work hard.

Since the results found that teachers were less prepared to teach, there is need to develop high quality pre-service teacher preparation programs to equip teachers with the knowledge and skills necessary for effective teaching in the 21st heterogeneous classrooms. Based on conclusion, the success of high quality pre-service preparation program is hinged on strong support from national and county government policies. There is need for future research to focus on ways to reduce science anxiety and make science more interesting and less stressful to learners, particularly to female learners.

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