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Students' Preferences on Science Subjects: Does this Affect their Performance? A Case of Udzungwa Secondary School, Kilolo, Iringa, Tanzania

Siwel Y. Nyamba, Kizito K. Mwajombe
Department of Agricultural Education and Extension
P.O Box 3002, Chuo Kikuu, Morogoro, Tanzania

ABSTRACT

This study sought to investigate factors influencing students' preferences on science subjects. The study arose from the fact that over years students have shown marked differences on their interest to study science subjects. Specifically, the study aimed to (1) determine students' preferences for science subjects (2) examine both teachers' and students' perception on students' preferences on science subject (3) establish the relationship between students' preference and performance on science subject (4) identify the effect of preference on performance then suggest ways to improve such relationship in order to enhance better academic performance (5) reinforce students' interests or preferences on science subject. The study employed a cross sectional research design whereby a total of 60 students from a collective list of form II, III and IV students were surveyed. Data collection was achieved through the use of a questionnaire. Factor analysis of the instrument revealed that there were several factors for the differential choices (preferences). To conclude, the major findings of the study showed that among many other reasons, the common reasons for students' Preferences and poor performance on science subjects at ordinary level secondary schools included: age of learners, sex, ignorance, shortage of learning materials, gender bias by subject teachers, and lack of guidance to students on the future importance of science. Thus, the study made the following recommendations: (1) Being at an average of 16 years, means their mind is still amative, so guidance and or counseling becomes essential in most aspects, particularly those aspects with effect on their future, so, they should not be given too much freedom to opt on issues that could affect their future (2) It was also deemed necessary that, the government should make all subject compulsory so as to avoid the possibility of losing some potential future scientists who might have dropped optional subjects (3) On the other hand, schools are to be guaranteed of enough teaching/learning facilities like books, laboratory tools and other facilities to make learning conducive.

Keywords: *Students' preferences, Science subject performance*

I. INTRODUCTION

The term preference has been conceptualized differently in various literatures, however in this context it refers to: liking, interest or wants on something. It could also be referred as the real or imagined choice between alternatives and the possibility of rank ordering of these alternatives [1]. More generally, preference can be seen as a source of motivation to learning processes [2]. Therefore, the phrase "students' preference on science subjects" refers to students' interest, desire, likes or willingly wanting to study science subjects [3]. Consequently, if students get interested with some subjects it is likely that their performance could be good and the reverse is true. For many years, the education systems throughout the world have placed a great emphasis on science subjects with a notion that they are associated with a number of career opportunities and that they are related to social development of any society [4]. In Tanzania for example, Higher Education Students' Loan Board (HESLB) provides higher rates of loans to students enrolled in science subject as compared to those in art subjects. At Udzungwa Secondary School, students' performance on science subjects for some years is observed to be generally poor. For optional science subjects the dropout ratio was found to be extraordinarily high; in some of the years over two third of the students dropped optional science subjects. Therefore, this study was an exertion to investigate factors influencing students' interest on science subjects and the way their preference affects their performance in science subjects. In other words, there was a need to uncover reasons behind differential preferences on science subjects and the impact it bears. The findings from the study are meant to provide inputs to education planners and other stakeholders to make any necessary adjustment at school or national levels.

II. OBJECTIVES OF THE STUDY

In general, the study sought to investigate factors influencing students' preferences on science subjects and subsequently suggested ways of improving their preference hence improved performance. Specifically, the study aimed to (1) determine students' preferences on science subjects at udzungwa secondary school (2) describe both teachers' and students' perception on students' preferences on science subject (3) establish the relationship between students' preference and performance on science subject (4) reinforce students' interests or preferences on science subject (5) identify the effect of preference on performance then suggest ways to improve such relationship in order to enhance better academic performance.

III. BRIEF LITERATURE REVIEW

Factors Affecting Subject Choice

Various researches on pupils' preferences suggest that, partly, preference is formed through personal characteristics and aspirations and partly through institutional influence [5]. Institutional influence on the pattern of subject choice was reflected in differences between single sex and co-educational schools [6]. Gender differences in subject choice largely reflected observable background factors including advice received [7]. However, the strength of these differences have been declining over time [5]. It was also found that, greater inter-school variability in student subject preferences amongst older students suggesting that school-related factors become more important with age [8]. School size was also found to have an effect on post 16 years students' subject choices [9]. Likewise, other researchers identified substantial variations between schools in the proportion of students studying different subjects [10], [11], [12].

IV. STUDY METHODOLOGY

Description of the Study Area and Study Design

This study was conducted at Udzungwa Secondary School which is positioned in Dabaga ward in Kilolo district. Kilolo district is one of the seven districts of Iringa region of Tanzania. Its geographical coordinates are 8° 0' 0" South, 35° 51' 0" East, and borders Morogoro region to the north and east, Mfindi district to the South and Iringa rural district to the West. The school is on the south-east part about 60km away from Iringa town.

Research Design and Sampling

A cross-sectional research design was used to collect data at a single point of time**.** The study populace involved all form II, III and IV students in the school. A simple random sampling technique was then used to get 60 respondents from the three classes. Procedural wise, a list of all students from the three classes was prepared before each individual member being assigned a unique number (1-500). The subsequent stage involved pressing repeatedly the random memory number key in the scientific calculator while each time selecting a sampling unit whose number kept in touch to the limits of the sampling frame. Finally, the chosen individuals represented other students in the research process though answering the questionnaire. In case of teachers, all the 8 science subject teachers were involved in the research hence the number was small enough to manage.

Data Collection and Analysis

The study employed a questionnaire as the main data collection tools. The collected primary data were verified, coded, compiled and analyzed using Statistical Package for Social Science (SPSS) to yield some descriptive statistics like percentages and frequencies as illustrated in the results and discussion below.

V. STUDY RESULTS AND DISCUSSIONS

The prime goal of this study was to investigate some factors influencing students' preference on science subjects at ordinary level secondary schools and sought out recommendations or ways towards rectification of the identified situation. Evidence from the study has shown that students' performance in science subjects at Udzungwa Secondary School was poor and that dropout rate was found persistently increasing over years as illustrated below:

Table 1: Letter Grade Distribution for Students' Performance in Five Consecutive Years

Subject	Grade	2002	2003	2004	2005	2006
Mathematics	A	00	01	00	01	02
	B	02	04	18	06	08
	C	06	08	09	28	16
	D	19	30	37	17	41
	F	82	91	64	114	117
Total		**109**	**134**	**140**	**166**	**184**
Chemistry	A	00	00	00	10	02
	B	01	00	00	04	07
	C	06	04	17	14	14
	D	70	68	34	41	40
	F	32	62	45	28	28
Total		**109**	**134**	**96**	**88**	**91**
Physics	A	00	02	01	03	01
	B	03	04	06	09	16
	C	18	15	08	19	20
	D	21	08	07	08	08
	F	08	09	11	10	09
Total		**50**	**38**	**33**	**49**	**54**
Biology	A	00	00	00	01	01
	B	14	07	03	10	16
	C	24	41	46	32	08
	D	09	52	32	41	43
	F	62	34	56	82	116
Total		**109**	**134**	**140**	**166**	**184**

Source: NECTA Results

The total number of students taking physics and chemistry each year in Table 1 revealed the dropout levels

An interview with students showed that, 50% criticized the decision by the government to make some subjects being optional at ordinary level secondary schools. In their views, reasons for criticism based in the fact that being optional, some students tend to invest less effort on such subjects, hence poor performance and increased dropout rates. In an informal discussion with science subject teachers, they also argued that, being optional had a contribution to the poor performance in such subjects by some students.

Table 2: Distribution of Students' Opinions on whether they Concur with Some Science Subjects being Optional (n=60)

VARIABLE	FREQUENCY	PERCENT
YES	30	50
NO	30	50
TOTAL	**60**	**100**

Source: Survey Data

Both teachers and students in the school mentioned the following factors to be the factors influencing students' preference and or performance on science subjects. Such factors included: Students' characteristics, teachers' characteristics, availability of learning/teaching materials, and lack of knowledge on the importance of science. Other factors named include cognitive ability and discouragement as described underneath.

a. Students' Characteristics

The study revealed some learners characteristics such as age, sex, together with their biological changes to be amongst the factors influencing students' performance on science subjects.

i. Students' Age

Results in Table 2 below illustrates that majority of students (76.7%) were of the age of 14-16 years (adolescent age), that is, at such age these youngsters need a great care and guide in order for them to come up with correct decisions, otherwise they may go wrong in most decisions they make. School performance to most school girls at such age was not important as they felt that, after completion of school they would find a husband who will provide them with economic support hence reluctance in their study [13].

Table 3: Distribution of Students according to their Age (n=60)

AGE	Frequency	Percent
Below 14 Years	2	3.3
14-16 Years	46	76.7
1-20 Years	12	20
TOTAL	**60**	**100**

Source: Survey Data

ii. Students' Sex

In case of sex, both students and teachers suggested that, performance in science subjects differed between boys and girls, so sex difference proved to have an influence on performance. Their argument had a support from other literatures, for instance, in west, girls tended to fall behind boys at the later stages of secondary school in science subjects [14].

Table 4: Distribution of Teachers by their Opinions on the Difference in Academic Performance in Science Subjects between Boys and Girls (n=8)

VARIABLE	FREQUENCY	PERCENT
YES	7	87.5
NO	1	12.5
TOTAL	**8**	**100**

Source: Survey Data

b. Teachers' Characteristics

The study also revealed some teachers' characteristics such as age, sex, capability and level of encouragement they overlay to their students to have an influence on students' performance on science subjects as described underneath.

i. Teachers' Age and Sex

Teachers' age and sex were also found to affect students' preference and performance on science subjects. In an informal discussion, Age was found to affect teachers-students relationships, for instance, young teachers were reported to suffer from inability to maintain their code of professional contact/social distance with their students as a result this adversely affected their effectiveness in teaching as well as leading students lose their respect hence less preference to subject taught by such teachers thus poor performance**.** If this is the case, Udzungwa Secondary School might have suffered the consequences due to the

fact that 100% of its science teachers are Youths (20-40 years) as shown on Table 5. On the other hand, teachers' sex might also be an issue to discuss, this is because in the process of interview when students were asked which group of teachers they preferred to teach them on science subject, their response by and large were both male and female teachers. Unfortunately, all eight science subject teachers in the school were male. This might have discouraged some school girls not prefer taking science subject as they would have thought that women cannot afford to pass science subject, hence increased dropout levels.

Table 5: Distribution of Teachers by their Age and Sex

AGE	SEX	FREQUENCY
27 Years	Male	1
30 Years	Male	1
33 Years	Male	3
38 Years	Male	1
40 Years	Male	2
TOTAL		**8**

Source: Survey Data

In some instances, the culture of a particular society was also named to have an influence on students' preference and performance in science subject. That is to say the cognitive ability and academic performance among many other reasons have also been contributed by the culture of a particular society. For example, when a society does not believe that women can equally do as good as what men can. For instance, in many societies women who competed on equal footing with men on academic tasks particularly those of technical and scientific nature are perceived to be less feminine.[14] This contention discouraged and still might discourage girl students from trying to compete in these fields. Discouragement was also found to emanate from teachers who either knowingly or unintentionally used phrases that could cause students to label themselves unable of doing something. For instance, when the teacher shouts 'I knew that you could not do' such statement may a discouragement the individual in question.

c. Availability of Teaching/Learning Materials

Lack of teaching/learning materials was another factor named by teachers to have an influence on students' preference and performance due to the fact that when students lack exposure practical teaching tools or learning materials it becomes an obstacle to their effective learning hence poor performance. For instance, results in Table 6 illustrates responses from teachers who were interviewed that, 62.5%, 100% and 25% of teachers agreed that there were shortage of teaching materials in their departments.

Table 6: Distribution of Teachers' Opinions on whether there are Shortages of Teaching/Learning Materials in their Departments

VARIABLE	MATHEMATICS	PHYSICS	CHEMISTRY
YES	25	62.5	100
NO	75	37.5	00
TOTAL	**100**	**100**	**100**

Source: Survey Data

Generally, the study has identified the following factors to be the cause for students' preference, dropout and poor performance in science subjects: students' age, sex and cognitive abilities, teachers' age, sex and discouragement. Other factors identified were lack of teaching materials and subject being optional.

VI. CONCLUSION

The study findings revealed that, there is a close relationship between subject preference and performance. On one side, preference was found to be a factor for performance while on the other hand subject performance influenced preference, so the two variables were found to be interdependent, each being predisposed to become dependent or independent variable of the other. Conclusively, preference and poor performance in science subject were linked to the following factors: students' characteristics, subjects being optional, teachers' characteristics, and lack of proper counseling and guidance for students and shortage of teaching or training materials.

VII. RECOMMENDATIONS

Specifically the study made the following recommendations:

i. Since majority of students were at adolescent period, at which their mind is still amative, guidance and counseling deemed necessary in many aspects particularly those which might have an effect on their upcoming. This should mean to desist students from too much freedom on decisions particularly if such decisions could have future adverse effect.

ii. If feasible, the government should make all subjects compulsory at all ordinary level secondary schools. This could shun the possibility of losing some future

scientists who are forced to drop some subject in the course of their study simply because they are optional. Experience shows that, one can for example fail a subject in form II examination then do extremely well the same subject in later stages, so there should be a room to those failing in form II no to give up rather be encouraged to put more efforts so that perhaps they do better in the course of their studies.

iii. Schools should be guaranteed of enough teaching or learning facilities including; books, laboratory chemicals, label tools and other facilities to make learning environment conducive.

iv. Teachers should all-time endeavor to encourage rather than discouraging students especially the poor and average performers so that they develop a spirit of hard working rather than being dispirited.

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