Novelty Journals

ISSN 2394-9686

International Journal of Novel Research in Education and Learning
Vol. 8, Issue 1, pp: (1-8), Month: January - February 2021, Available at: www.noveltyjournals.com

TEACHERS' PERCEPTIONS ON STUDENTS' PARTICIPATION IN FIELD TRIPS ACTIVITIES AND ACHIEVEMENT IN PHYSICS IN VIHIGA COUNTY OF KENYA

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Abstract: **The school curriculum consists of formal, informal and non-formal dimensions. Formal dimension refers to official timetabled subjects such as Physics. Informal dimension is the school environment that influences a learner's behaviour. Non-formal dimension refers to out of class activities such as field trips activities. The common assumption is that participation in field trip activities enhances perception and achievement in Physics subject. However, secondary schools in Kenya tend to emphasize the formal curricula and non-formal specifically field trip activities are given least emphasis. The contribution of field trip activities on students' perception and achievement in Physics subject had yet to be established. In Vihiga County, participation in trips field activities has been reported to be as low as 25%, meaning that field trip activities were neglected and literature indicated students' achievement in Physics in the county was low. Physics County mean grade was lower compared to the national mean grade of C (minus). The purpose of the study was to establish the teachers' perception of student participation in field trip activities and achievement in Physics. The objective of the study was to establish teacher's perception of field trip activities. Constructivist theory of learning informed the theoretical framework of the study. The independent variable of the study was scope of participation in field trip activities and dependent variables was achievement in Physics. The study used a descriptive cross-sectional survey and correlational designs. The study population was 1200 Form Four Physics students and 100 teachers of Physics. A sample size of 311 students and 35 Physics teachers was selected from 114 schools through stratified simple random sampling technique. Instruments for data collection were Teacher Perception Questionnaires (TPQs), Physics Achievement Test (PAT) and Teacher Interview Schedule (TIS). Reliability of the instruments was established through test-retest method and each of the five instruments yielded a value above .7 which was accepted. Validity of the instruments was established through expert judgment by Physics teachers, research supervisors and science education lecturers in Maseno University. Qualitative data was presented by frequencies, percentages, means and standard deviations. Inferential statistics of correlation and independent t-test were used to analyse data. Descriptive data was analysed by use of thematic categories based on objectives of the study. The results showed that participants of field trip activities had high perception mean scores towards Physics than non-participants (t (224) = 6.35, p <.05). There was no significant difference in Physics achievement Test (PAT) for participants and non-participants, t (224) = 0.538, p <.05). It was concluded that participation in field trip activities contributed to students' achievement in Physics at secondary schools. The findings of this study are useful to teachers, principals, curriculum developers, policy makers, researchers, and book writers for they provide insights on the influence of field trips on students' achievement in Physics Therefore it is recommended that the Ministry of Education Science and Technology (MoEST) develops policy guidelines for integration of field trip activities in science subjects at secondary and primary schools.**

***Keywords*: Perceptions, field trip activities and achievement in Physics.**

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1. INTRODUCTION

1.1 Background to the Study

Physics plays a critical role in scientific progress as well as technological development in the contemporary society (EU, 2004). Physics equips the youth with basic skills of innovation, creativity and prepares them for their future careers in areas of science and technology. However, many students don't pursue the subject and those whose attempt it fail in national examination. Low performance and poor interest by students in science subjects start at primary and proceed to secondary schools and is more pronounced in Physics subject (Sjoberg & Schreiner, 2005). According to Sjoberg, *et al*. (2005), Physics is difficult and requires innovative teaching methods like field trip activities to improve achievement and interest in the subject.

Rahman and Spafford (2009), revealed in Western Australia that biology field trip boost students' academic performance and interest. According to Rahman, *et al*. (2009) field trip and fieldwork impact positively on student long-term memory due to their full filing activities. The researchers argued that field trips assist in developing problem solving skills, social relationships and hands-on skills; though, teachers in the study disagreed that the activities are helpful in selecting careers. In Pakistan, Bashir and Hussain (2012) found that participants of field trips in secondary schools had higher academic achievement than non-participants of the activities. The study involved 200 students in Islamabad-Pakistan who were divided into experimental group and control group. Bashir *et al.* (2012) concluded that participation in field trips and club activities enhanced academic achievements for government and private schools as well as for boys and girls.

In a study that investigated the teaching experience of pre-and in-service teachers on use of field trips in teaching in Israel, instructors and teachers found that support, collaboration and careful preparation of learning activities yielded positive outdoor teaching experience of performance, interest and perceptions (Morag, 2006). However, the study highlighted that the teachers faced challenges such as lack of confidence, class management and inadequate student motivation. Namugaya, *et al*. (2017), argued that field trips can be used to improve achievement and interest among learners. The researchers recommended use of field trips activities in improving achievement and interest.

Wambugu and Changeiywo (2008) classified Physics as a difficult, not popular, and avoidable by students, characterized with poor grades and low interest among students in Kenya. The challenges cited include low achievement, methodological issues, and lack of personnel, political, economic and cultural factors (Okere, 2000). The challenges affect delivery of the school curriculum and lead to negative attitudes and poor perceptions about Physics subject among most learners and hence their poor performance in national examinations. Ndirangu (2003) argued that Physics education in developing countries is viewed as abstract and having remote relationship to technology and engineering. Ndirangu (2003) suggests use of field trips activities to teach the deemed abstract content.

The Kenya national performance in Physics lies between 20 per cent and 40 per cent (Wachanga, Changeiywo & Barchok, 2005). This performance is equivalent to grade two (2) and three (3) points out of a twelve-point grading system used by the Kenya National Examination Council (KNEC). Low achievement in Physics is documented in Kenya Certificate of Secondary Education (KCSE) Kenya National Examination Council reports (KNEC, 2009, 2010, 2011, 2012, 2013, 2014 & 2017). The reports indicate that the candidates' overall performance in science subjects is low compared to the other subjects of the curriculum. Compared to Biology and Chemistry, Physics subject registers low means nationally as shown in Table 1.

Table 1: KCSE Candidature by subject between 2009 and 2017

Year	Total No. of Students	No. of Physics Students	%	No. of Biology Students	%	No. of Chemistry Students	%
2009	337,404	104,188	30.9	299,302	88.7	328,922	97.5
2010	354,951	109,072	30.7	315,063	88.8	347,378	79.9
2011	409,887	120,070	29.3	363,8171	88.8	403,070	98.3
2013	445,800	119,862	26.9	397,314	89.1	439,941	98.6
2014	482,216	130,752	27.1	430,583	89.3	477,393	99.0
2016	571,654	149,790	38.1	509,982	89.2	566,836	99.1
2017	610,841	160,186	26,2	545,666	89.3	606,518	99.2

Source: Kenya National Examination Council (KNEC), 2017

From Table 1, it is evident that the total candidature at Kenya Certificate of Secondary Education (KCSE) increased gradually between 2009 and 2017 from 337,404 to 610,841. An increase in candidature is also noted in the three science subjects, however, the candidature in Physics remained at about 30 percent of the total KCSE candidature with exception of the year 2016 which was 38 percent. The low numbers of Physics candidates compared to the other two science subjects signifies the subject is not popular among secondary school students in Kenya hence rises a concern to education stakeholders.

Reasons advanced for low achievement and enrolment in the Physics include students' poor attitude towards Physics, low perception by learners that the subject is abstract and difficult and poor teaching methods used by teachers (Thiong'o, *et al*, 2014). Since it is noted that students perceive Physics to be abstract and enrolment is low in the subject, consequently, the current study was out to determine whether students' perception of the subject influenced their achievement in Physics.

A Quality Assurance and Standards report 2011 from Vihiga County (QAS Report, 2011) indicate that participation in field trip activities were on the decline and stands at 25 percent of the total secondary school student population compared to 60 percent in previous years. The statistics indicate that the number of students enrolled for Physics at KCSE is on the decline. Poor performance and low enrolment in Physics does not auger well for Kenya which need technologists for sustainable economic development. .

In a survey, Okere (2000) found that field trips were not being used in teaching Physics in secondary schools in Meru district. Okere (2000), asserted that field trip is a powerful tool for building interest among students since they are able to see the relevance of the subject in relation to their future careers. There is little evidence that empirical studies on influence of field trip activities on students' academic achievement in Physics have been undertaken in Kenya and in particular Vihiga County.

2. METHODOLOGY

This study employed a descriptive and correlation ex-post factor survey design based and Physics achievement test, Perception Questionnaires and Interview Schedule to collect data. The target population for the study comprised of Physic teachers and form four Physic students in Vihiga County. The sample of the study was selected through stratified simple random sampling. A total of 311 students and 53 teachers were selected from hundred secondary schools. The instruments used to collect data were Teacher Perception Questionnaire (TPQ), Teacher Interview Schedule (TIS), Student Perception Questionnaire (SPQ) and Physics Achievement Test (PAT). Quantitative data was analyzed by use of frequencies, percentages, means, medians, standard deviations and Pearson product Moment correlation at significance level of 0.05 while qualitative data was grouped and analyzed based no related themes.

3. RESULTS OF STUDY

Participation in field trip activities

Non-use of field trip activities schools sampled for the study stood at 31% (n = 99) thirty one per cent of the students sampled had never gone for field trips. The results indicated that field trip activities as an active method of teaching Physics is neglected by schools despite the schools having buses and many sites to visit in the were neighbourhood of the school. The results are in agreement with these results is Okere (2000) who surveyed the status of Physics teaching and examinations in Kenyan secondary schools and found that teachers hardly used field trips and project method in their teaching though sites to visit were available around their schools.

Performance on Physics Achievement Test (PAT)

Both participants and non-participants were exposed to Physics Achievement Test (PAT). The results indicated that non-participants of field trips had slightly higher mean score (M = 18.64) on Physics Achievement Test (PAT) compared to participants (M = 18.07). The independent t-test was performed to compare participants and non-participants on PAT mean scores and the means scores achievement were not significantly different, t (224) = 0.538, p <.05). This indicated that the both participants and non-participants of field trip activities performed poorly on PAT.

Traingulate the results of the study, six (n = 6) Physics were interviewed to get more information on whether field trip activities influenced students' learning and academic achievement in Physics. Physics teachers' responses were as follows:

Do field trip activities influence students' learning and academic achievement of Physics?

Teacher A said that:

> "*When a learner observes real application of what is taught in a classroom ….obviously his/her thinking about the content or subject matter will be more focused than before…. this can easily allow for further questioning of the content and lead to deep understanding of subject matter……definitely this will enhance Physics learning and improve performance.".*

Teacher B observed that:

> *"Field trip activities make teaching and learning more interesting, easier, and more diverse, more fun for teachers and students…….compared to the convectional classroom teaching employed by many teacher in schools"*

Teacher C noted that:

> *"Field trip activities add variety to teaching methods……it engages the learner in active construction of knowledge by providing vivid displays of phenomena which easily excite the learner and provoke useful and meaningful learning. This kind learning is long lasting due to the memorable objects observed….. Thus better performancein exams"*

Teacher D emphasized that:

> "*Field trip activities…. One, add variety to teaching. ….. Second, they motivate for students. ……Thirdly, sometimes it is the best way to teach abstract content hence influencing learning and achievement of Physics".*

Teacher E said that;

> *"Field trip activities influence academic performance of learners, not real sure……but, maybe along after the field trip has taken place…….that is because field trip learning general motivates hence students can study hard and perform well in Physics..."*

Teacher F noted that:

> "*Field trip activities are useful in enhancing Physics subject matter skills and they bring about creativity and innovation particularly with limited laboratory resources".*

The following themes emerged from the teacher's responses: field trip activities enabled students visualize science concepts and hence improved perceptions towards Physics subject; made students to question what is observed hence provoking deep learning; promoted meaningful learning of abstract content; encouraged creativity and application of Physics laws and principle. This results concur with Michie (1998), Fido and Gayford (1982) who argued that taking out students for field trip activities general give students' first-hand experience of application of Physics and the activities an effective pedagogy which supplements classroom teaching.

Students' Perception of field Trip Activities

Student perception of field trip activities was measured using Student Perception Questionnaire (SPQ). The study revealed that field trip activities participants' group perception mean score (M = 4.06, SD = 0.78) and the non-participants' group perception mean score (M = 3.36, SD = 1.32) were found to be significantly different, (t (222) = 4.473, p <.05). The t-value of 4.473 obtained was greater than the critical value at 222 degrees of freedom at p-level of .05. The difference in the perception in group mean scores was attributed to exposure to field trips activities which enabled student inquire more about content learned.

Field trip activities participants had scored low mean score on Physics Achievement Test (PAT) (M = 18.07 but recorded the high perception mean score (M = 56.34). Participants' perception mean score (M = 56.34, SD = 7.22) was high than those of non-participants' (M = 49.96, SD = 8.06). An independent t-test performed on the two perception mean scores found a significant different (t (224) = 6.35, p <.05). This showed that participants of field trip activities highly regarded the field trip activities as contributors to their learning of Physics as compared to non-participants. According to Hartley (2014) field trip or field work activities well organised and undertaken developed positive attitude and perceptions towards science among learners.

Correlation between Student's Achievement and Perception

Participants and non-participants PAT and Perception means scores (SPQ) were subject to Pearson moment correlations (Table 2).

Table 2: Variable, Numbers, Means, Standard Deviations and Correlation Coefficients for Participants and Non-Participants on PAT and SPQ- Field Trips Activities

Variable	Participants		Non-participants	
	PAT-participant	SPQ-participant	PAT-non	SPQ-Non
Number	n = 72	n = 72	n = 154	n = 154
Mean	18.07	56.34	18.64	49.96
Standard Deviation	7.78	7.22	6.65	8.06
PAT participant	1	.238*		
SPQ-participant	.238*	1		
PAT-non			1	.198*
SPQ-participant			.198*	1

*Correlation is significant at the 0.05 level (1-tailed).

PAT-non- PAT scores for non-participants

SPQ-non- Perceptions scores for non-participants

Table 2, shows that non-participants of field trip activities had slightly high mean scores on Physics Achievement Test (M = 18.64, SD = 6.65) than participants of field trip activities who had a low mean score (M = 18.07, SD = 7.78). There is a significant variation in means scores by non-participants of field trip activities as demonstrated by significant differences in standard deviations obtained on SPQ (n = 154, M = 49.32, SD = 8.06) and on PAT (n = 154, M = 18.64, SD = 6.65).

There is insignificant difference in standard deviations for participants of field trip activities which shows slightly better consistent performance on both PAT (n = 72, M = 18.07, SD = 7.78) and SPQ (n = 72, M = 56.34, SD = 7.22). Slightly positive significant correlations were recorded for both groups on PAT and SPQ. However, the non-participants' Pearson correlation (r (154) = .238, p =.05) was slightly better than that of participants (r (72) =.198, p = .05). In agreement with the findings are Ng and Nguyen (2006) who noted that non-formal activities especially academic oriented motivate learners because they provide real life contexts which make Physics more relevant.

Teacher's Perception of Field Trip Activities

Eight (n = 8) Physics teachers were interviewed on variuos aspects of field trip activities in school.

Question: Why do you take students for field trip activities?

Teacher A responded by saying that:

"*Field trip activities whether inside the school or outside the school breaks monotony of classroom teaching. The activities promote understanding of Physics concepts among students. The activities encourage group discussion on what is observed during the visit… "*

Teacher B said that:

"Field trip to an industry will enable learners see and observe operation of motors and other machines which are not available in school. It is more interesting for students to be taken to an airport or air strip or even a port. The students see real applications of Bernoulli's principles, Archimedes' principles taught in the Physics syllabus..

Teacher C observed that:

"For example a simple field trip activity to a Kenya power electric transformer in the neigbourhood of a school will enable students visualize concepts like hysteresis and eddy currents which are quite abstract in reality. This is possible because students will be able to listen to the noise from the transformer caused by the two factors……furthermore, a visit to the transformer makes students also realize that what is taught in the classroom and laboratories has immediate application in the society".

Teacher D noted that:

"Field trip activities enable learners to recall previous learned knowledge easily and this assists in connecting with new knowledge to be acquired…thus helping learners cultivate interest in the subject".

Question: Are field trip activities well supported by school administration?

Teacher E observed that:

"*…school administrators normally support field trip activities to the neighbourhood of the school which require no or minimal expenditure …, however, field trip activities to far places…. little or no support is given …..in fact we are normally remained that there is no budgetary allocation for the activities …. teachers are normally advised to ask parents of the students to fund the activities".*

Teacher F had to say that:

"It is difficult to organize a Physics field trip to a far place like a power generation station or airport …unless you ask parents to fund the field trip….. when parents are asked to fund the activities they hardly cooperate... so teachers hardly apply field trips in their teaching …"

Question 5. What can be done to improve the field trip activities in secondary schools?

Teacher G suggested that:

"Ministry of education should set aside some funds for taking Physics students out for at least one field trip either to an airport or industry. This will enable the students observe applications of most of the Physics laws and concepts covered in the syllabus. Physics laws and concepts are abstract and teacher explanation is inadequate. To make-up for the situation, I normally show students what is found round the school environment as long as it assists to achieve the syllabus objectives".

Teacher H argued that:

"Use cheap and available field trip activities that can be found in the school environment to serve the purpose and the learning objectives stated in the syllabus. This will give students an opportunity to link theory and practice. Take students to "posho" mills, local garage, workshops and local hospitals"

All the teachers (n = 7) interviewed had been teaching for over three years and had involved their students in field trip activities. The teachers' views generally that field trip activities improved perceptions and helped learners to engage in Physics are consistent with those of (Ng & Nguyen, 2006).

Table 3, gives statements of perceived challenges teachers face and the respective percentage of teachers' responses.

Table 3: Percentage and Mean Score of Teachers' Responses to Perceived Challenges for involving Students in Field trip Activities

Perceived Challenges	Percentage (%) responses SA	A	U	D	SD	Mean Score
1.I lack knowledge to integrate field trip activities in classroom learning	0.0	3.8	9.4	39.6	47.2	4.30
2.I lack sites for students to visits,	7.5	13.2	11.3	47.2	20.8	3.60
3.The school administration is supportive	7.5	28.3	13.2	34.0	17.0	3.25
4.Sites of visit have restriction on number of students to visit,	15.1	22.1	13.2	28.3	20.8	3.17
5.I lack time for field trip activities	7.5	37.7	3.8	34.0	17.0	3.15
6.National examinations lack field trip activities questions	18.9	32.1	13.2	30.0	7.0	2.72
7.I lack means of transport to take students for field trip activities,	20.8	35.8	7.5	26.4	9.4	2.68
8.The school schedule is tight,	17.0	45.3	7.5	20.8	9.4	2.60
9.I experience financial constrains to undertake field trip activities,	24.5	54.7	5.7	9.4	5.7	2.17

Source: Researcher.

SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

Table 3 shows that over 85 per cent (M = 4.30) of the total teacher population believed that they knew how to integrate field trip activities in teaching while less than 13 per cent agreed or were undecided about integration of the activities.

Over 65 per cent of the total teachers disagreed that sites to visit by students lacked a round their schools (M = 3.60). School administrators were non-support for field trip activities by over 60 per cent of the teachers, however, slightly over than 35 per cent of the teachers indicated that administrators were supportive while over 10 per cent of the teachers were undecided. Over fifty (50) per cent (18.7 plus 32.1) of the teachers disagreed that field trip activities are not set in national examinations while 37 per cent agreed that the activities are set. These finding concur with Sarker and Frazier (2008) who found that teachers had insufficient knowledge to integrate field trips activities into classroom, teachers were unfamiliar with local resources available, lack of time to organize the activities and failure of schools administrators to fund the activities.

4. CONCLUSIONS

Field trip activities assist students to learn abstract content, however, the study did not find a significant relationship between students' achievement on (PAT) and exposure to field trip activities. This was attributed to poor exposure to Physics field trip activities of students in the four years of secondary education. There was a slightly positive correlation coefficient between participants' perception mean scores and Physics achievement mean scores as compared to non-participants on the same scores. Therefore, it was concluded that the field trip activities improved students' perception towards Physics, hence improvement achievement of the subject. Field trip activities participants' perception scores were higher than those of non-participants, there is need to sensitize stakeholder in education sector about the efficacy of the activities in improving perception towards Physics. This could be done through print and electronic media as a way of sharing suggestions on how to effectively organize and utilize field trip activities in schools.

Suggestions for Further Research

This study used quasi-experimental and ex-post facto design there is need for further research using quasi-experimental design involving pre- and post-test design. Comparative studies for field trip activities with other methods of teaching Physics should be carried out to a certain effectiveness of the strategy.

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