



Effectiveness and Utilization of Field Trip as a Method of Teaching and Learning Chemistry in Senior Secondary Schools in a Council Area of Imo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study assessed the effectiveness and utilization of field trip as a method of teaching and learning chemistry at senior secondary schools in Owerri Municipal Council Area of Imo State, Nigeria. The population of the study was all the 4664 chemistry students in the government-owned secondary schools in the Council. Simple random sampling technique was used to select five schools and 20% of the numbers of chemistry students in each of the sampled schools were used to obtain the sample size of 288 chemistry students. Four research questions were posed for the study. The research was descriptive survey design and questionnaires were used to elicit relevant data while mean rating was used for the analyses of the data obtained for the study. The results gave grand means of 3.14, 1.70, 3.51 and 3.21 for research questions 1, 2, 3 and 4 respectively. These findings showed that field trip is interactive, motivating and provides opportunity for chemistry students to widen their practical knowledge of industrial application of chemistry; chemistry teachers do not utilize field trip in teaching and learning of chemistry; lack of chemistry and chemical process-based industries, time constraint, transportation cost/risk, and the organizing

process are the factors that influence effective utilization of field trip. Based on the findings, it was recommended that school field trips should reinforce the curriculum and they should be arranged at every level of the Department at various times, criterion based set of guidelines for planning and conducting successful field trips should be developed; workshops and seminars should be organized for teachers on the importance of field trip and its utilization in the teaching and learning of chemistry. Again, when considering a field trip, teachers are advised to first consult with their administrator regarding existing school board policies and follow that recommended procedure. School authorities should assist in the provision of funds or transportation for field trips.

Keywords: Field trip; schools; effectiveness, chemistry; teaching and learning.

1. INTRODUCTION

1.1 Background of the Study

The purpose of learning is to develop knowledge and have a command on what students are studying at present so that they will be able to apply the knowledge in their future lives also. For this purpose, different sorts of activities like seminars, discussion, presentations, workshops, local conferences, lectures and field trips are essentials to be conducted especially the activity of field trip which are commonly conducted to the students by giving opportunity for self experience, observation and self long lasting learning.

According to the stimulus-response (S-R) theory or behaviourism, as propounded by Ivan Pavlov, John B. Watson, Edward L Thorndike and B.F. Skinner, behaviours are learnt through interaction with the environment. In other words, it assumes that all behaviour is either reflexes produced by a response of certain stimuli in the environment or a consequence of that individual's history, including especially reinforcement and punishment together with the individual's current motivational state and controlling stimuli [1]. This calls for the learners to explore their environment, hence field trip.

Chemistry is the branch of science that deals with the study of structure and composition of matter. It is a science about matter and the structure. Materials are, of course, a part of matter in the universe, but more specifically they are substances whose properties make them useful in structures, machines, devices or products. Today, humans make use of literally thousands of materials that are derived from nature, but they also use many more synthetic materials that do not come directly from natural sources.

All these amazing developments have come about because of increasing knowledge and

understanding of the properties of materials (Chemistry). In the late 1800s we began to understand the arrangement of atoms and crystal structures and their behaviour in various conditions. Today our knowledge and understanding of materials make it possible to develop and design materials to meet property requirements; challenging our creativity and ingenuity even further [2], culminating into the establishment of industries.

Chemistry is synonymous to industries, since the processes of production in industries involve chemistry and chemical processes. Concepts taught in chemistry are finally applied in industries, For instance: saponification is applied in soap and detergent industries; fermentation in breweries; electrolysis in aluminium extrusion/roofing sheet manufacture; hydrogenation in margarine production; recrystallization in drug production; fractional distillation in petroleum refining, polymerization in plastic/ nylon, and so on.

According to Obeka [3], field trip is an outdoor type of laboratory activity or field work undertaken by teachers and students in certain aspects of a subject to give students the opportunity to acquire knowledge. Field trips can be defined as a type of experiential learning that gets students out of the traditional classroom setting into a new mode of learning where they can see concrete illustration of classroom theories. These interactions take place in a new learning environment and result in a meaningful teaching and learning process.

The use of field trip as a method of teaching helps to bring about an effective learning of chemistry. Field trip is an interactive method of teaching chemistry which gives both male and female students equal opportunities to widen their practical and cultural experiences by varying their learning environments. Field trips are an excursion outside the classroom, laboratory, or greenhouse and can be used to

complement materials taught or be a primary teaching activity for students in a semester-long, field-oriented course in order to learn and apply content taught from previous coursework. Field trips may span one morning or afternoon, or stretch for a week or more in overseas. Many students enjoy traveling to various field sites, and consider these events the highlight of their college experience [4].

According to Nawi and Azmi [5], field trips can be a valuable tool in making learning more engaging and provide unique opportunities for learning certain concepts, including legal concepts by putting them into a more realistic and relevant context. Research studies have shown that there is a significant increase in participants' factual knowledge and conceptual understanding after participation in a well- designed field trip. Several important elements should be emphasized in designing a successful field trip.

With new improvements in visualization technology that are making their way to personal computers, there could be "virtual" field trip which can allow the students to pan around the area and zoom in on interesting objects, enabling computer to present a realistic simulation of the field area and allows the student have more control over the presentation. This advanced interactive technology is intuitive to control, relatively cheap and easy to add to existing computer programs and documents [6].

1.2 Statement of the Problem

Teaching and learning of chemistry have reduced to classroom practice only due to little or no emphasis on field trip which exposes the students to real application of chemistry and bring it home to day to day activities. Students are used to quoting theories and laws without knowing how to apply them. This is because many efforts have not been made by the chemistry teachers to improve field trip study. It is advocated that field trips are one of the most important things educators can provide for their students as they not only expand students' learning and experiences, but also increase students' knowledge and understanding of the world in which they live. Despite ample evidence shown through research on the effectiveness of field trips which emphasizes on hands-on, real life, and practical applications of learning, the dilemma that is faced by educators lies in providing proof of student learning, for the current trend in education tends to emphasize mainly on assessments [7].

Therefore, the teaching of chemistry should be done with lots of facilities and experience so as to improve chemistry. Thus, the researcher tends to assess the effectiveness and utilization of field trip as a method of teaching and learning chemistry at senior secondary schools in Owerri Municipal Council Area of Imo State, Nigeria.

1.3 Purpose of the Study

The main purpose of the study is to assess the effectiveness and utilization of field trip as a method of teaching and learning chemistry at senior secondary schools in Owerri Municipal Council of Imo State, Nigeria.

Specifically, the study intends to:

1. assess the various ways field trips will be important for the chemistry students to have a better adjustment in the educational institutions and society as well as in their interest in chemistry;
2. determine the extent to which chemistry teachers utilize field trip in teaching and learning of chemistry;
3. determine the factors that influence the effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State;
4. suggest various ways for effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State.

1.4 Research Questions

The following research questions were drawn up to guide the study:

1. What are the various ways field trips will be important for the chemistry students to have a better adjustment in the educational institutions and society as well as in their interest in chemistry?
2. To what extent do chemistry teachers utilize field trip in teaching and learning of chemistry?
3. What are the factors that influence the effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State?
4. What are the various ways for effective utilization of field trip in the teaching and learning of chemistry in Owerri Municipal Council, Imo State?

2. METHODOLOGY

2.1 Research design

The research design that was adopted in this research work is a descriptive survey design which aims at gathering information about variables (such as opinions, feelings, attitude of people) without any treatment or manipulation of any variable [8]. The design was considered appropriate because information were collected through questionnaire where students' opinions were used to assess the effectiveness and utilization of field trip as a method of teaching and learning of chemistry in senior secondary schools in Owerri Municipal Council, Imo State, Nigeria.

2.2 Area of the study

This research was carried out in Owerri Municipal Council Local Government Area, which is one of the twenty seven (27) Local Government Areas in Imo State, South East of Nigeria. It is in the Owerri political zone of Imo State and also where the Government House of Imo State is situated. The inhabitants of Owerri Municipal are mostly civil servants and business men and women with moderate economic background. The council has an urban setting.

2.3 Population of the study

The population for this study comprised of all the four thousand six hundred and sixty four (4,664) senior secondary students offering chemistry as a subject in the 2019/2020 academic session in the ten (10) government owned secondary schools in Owerri Municipal Council Area of Imo State. The schools, in alphabetical order are:

1. *Boys' Secondary School, New Owerri;*
2. *City College, Owerri;*
3. *Comprehensive Development Secondary School, Owerri;*
4. *Emmanuel College, Owerri;*
5. *Government Secondary School, Owerri;*
6. *Government Technical College, Owerri;*
7. *Ikenegbu Girls' Secondary School, Owerri;*
8. *Imo Girls' Secondary School, Owerri;*
9. *Urban Development Secondary School, Owerri;*
10. *Young Scientists' College, Owerri.*

2.4 Sample and sampling techniques

Simple random sampling technique was used to select five (5) schools from the total population.

Twenty percent (20%) of the number of chemistry students in each of the sampled schools were chosen and used as the sample size for the study; which gave the total of two hundred and eighty eight (288) students. The sample schools and their numbers of students are:

1. Boys' Secondary School, New Owerri (54 students);
2. Emmanuel College, Owerri (70 Students);
3. Imo Girls' Secondary School, Owerri (75 Students);
4. Urban Development Secondary School, Owerri (67 Students);
5. Young Scientists' College, Owerri (22 Students).

2.5 Instrument for data collection

The instrument used for data collection was questionnaire constructed by the researchers, designed on a four-point modified Likert scale of Strongly Agreed (SA)/ High Extent (HE), Agreed (A)/ Moderately Extent (ME), Disagreed (D)/ Low Extent (LE) and Strongly Disagreed (SD)/ Very low Extent (VLE), based on the research questions, and subjected to validity.

2.6 Administration of instrument

Copies of the questionnaire were presented to the respondents in the various selected senior secondary schools directly by the researchers. In order to administer the instrument appropriately to the students, systemically sampling technique was employed by the use of the class register, in which the researchers sampled out students bearing surnames covering all the English Alphabets available.

The researchers instantly collected back the scripts upon the completion of filling the instruments to ensure 100% collection.

2.7 Data analysis

The data collected were analyzed using mean statistics, with nominal values of 4, 3, 2 and 1 points summarized as follows:

Strongly Agreed (SA)/ High Extent (HE) = 4 points

Agreed (A)/ Moderately Extent (ME) = 3 points

Disagreed (D)/ Low Extent (LE) = 2 points

Strongly Disagreed (SD)/ Very Low Extent (VLE) = 1 point

Total = 10 points

The mean scale was obtained thus:

$$\bar{X} = \frac{\sum FX}{N}$$

where; \bar{X} = mean
 \sum = Summation
 FX = Nominal value
 N = Number of items

Therefore,

$$\bar{X} = \frac{4 + 3 + 2 + 1}{4} = \frac{10}{4} = 2.50$$

2.8 Decision rule

The mean score is 2.50; this shows that any response of value 2.50 and above was accepted while any response of value below 2.50 was rejected.

3. RESULTS AND DISCUSSION

3.1 Results

The results obtained are presented in tables based on each research question and discussions were made on the results.

3.1.1 Research question One

What are the various ways field trips will be important for the chemistry students to have a better adjustment in the educational institutions and society as well as in their interest in chemistry?

The results on the various ways field trips will be important for the chemistry students to have a better adjustment in the educational institutions and society as well as in their interest in chemistry are shown on Table 1.

The results on Table 1 have a grand mean of 3.14 which is greater than the decisive value of 2.50, therefore is accepted. This implies that field trip is interactive, and gives chemistry students opportunity to widen their practical knowledge. Going on field trips will make chemistry students have a better adjustment in the educational institutions and society; motivates them through sight and knowledge of industrial application of chemistry, and enhances understanding of processes and abstract concepts.

This is in line with the findings of Erosomole and Ekholenetale [9] who discovered that field trip

experience improves students' understandings of chemistry concepts, enhances students' understandings of chemistry and significantly influences their achievement. The findings also corroborated those of Muhaimin [4] who saw field trip as a useful tool in education, providing experiential learning outside of the four walls of a classroom whose idea is to contextualize knowledge in order to develop a deeper understanding.

3.1.2 Research question Two

To what extent do chemistry teachers utilize field trip in teaching and learning of chemistry?

The results on the extent chemistry teachers utilize field trip in teaching and learning of chemistry are shown on Table 2.

The results on Table 2 have an average mean of 1.70 which is far below the decision rule of 2.50. Therefore, it is rejected. This implies that the students had not gone on an excursion to places of chemical interest; their chemistry teachers could have referred to chemistry as the basis of industrial processes and told them the importance of field trips during his lessons but had not taken them to any such industries. This could be as a result of the problems associated with field trips especially teacher factors such as inadequate knowledge and exposure. This result also is in agreement with the findings of Ehirim et al. [10] and Omiko [11] who observed that most of the present day science and technology teachers are transmitters of dead tradition. They prefer to use the chalk and talk method without engaging the students in activities that would enable them acquire the scientific and technological skills needed for industrialization. Teachers therefore should introduce the use of field trips in their teaching and learning of chemistry to motivate students through increased interest and curiosity.

3.1.3 Research question Three

What are the factors that influence the effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State?

The results on the factors that influence the effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State are shown on Table 3.

Table 1. Students' responses, weight, mean and decision as regard to research question 1

S/N	Questionnaire Items	SA 4- points		A 3- points		D 2- points		SD 1- points		Total responses	Mean X
		No	Score	No	Score	No	Score	No	Score		
1.	Field trip is interactive, and gives chemistry students opportunity to widen their practical knowledge.	152	608	76	228	48	96	12	12	288	3.28
2.	Going on field trips will make chemistry students have a better adjustment in the educational institutions and society.	88	352	148	444	52	104	0	0	288	3.13
3.	Use of field trips motivates students through sight and knowledge of industrial applications of chemistry.	88	352	132	396	68	136	0	0	288	3.07
4.	Going on field trips enhances understanding of processes and abstract concepts.	88	352	140	420	48	96	12	12	288	3.06
	Total	416	1664	496	1488	216	432	24	24	1152	12.54

Grand mean = 3.14 (Accepted)

Table 2. Students' responses, weight, mean and decision as regard to research question 2

S/N	Questionnaire Items	HE 4- points		ME 3- points		LE 2- points		VLE 1- points		Total responses	Mean X
		No	Score	No	Score	No	Score	No	Score		
5.	We have gone on an excursion to places of chemical interest.	0	0	4	12	92	184	192	192	288	1.35
6.	Our chemistry teacher refers to chemistry as the bases of industrial processes but has not taken us to any such industries.	16	64	84	252	72	144	116	116	288	2.00
7.	Our chemistry teacher tells us the importance of field trip during his lessons	0	0	128	384	4	8	156	156	288	1.90
8.	Our chemistry teacher has organized field trip for sight of chemical processes.	0	0	0	0	152	304	136	136	288	1.53
	Total	16	64	216	648	320	640	628	628	1152	6.78

Grand mean = 1.70 (Rejected)

Table 3. Students' responses, weight, mean and decision as regard to research question 3

S/N	Questionnaire <i>Items</i>	SA 4- points		A 3- points		D 2- points		SD 1- point		Total responses	Mean X
		No	Score	No	Score	No	Score	No	Score		
9.	Lack of chemistry and chemical process-based industries affect going on field trip	228	912	60	180	0	0	0	0	288	3.79
10.	Field trip consumes time and encroaches into the periods of other subjects.	140	560	148	444	0	0	0	0	288	3.49
11.	Transport cost and risk could hamper field trip exercise.	128	512	104	312	56	112	0	0	288	3.25
12.	Organizing field trip is tedious and may be a failure at the end.	140	560	148	444	0	0	0	0	288	3.49
	<i>Total</i>	636	2544	460	1380	56	112	0	0	1152	14.02

Grand mean = 3.51 (Accepted)

Table 4. Students' responses, weight, mean and decision as regard to research question 4

S/N	Questionnaire <i>Items</i>	SA 4- points		A 3- points		D 2- points		SD 1- point		Total responses	Mean X
		No	Score	No	Score	No	Score	No	Score		
13.	Chemistry teachers should be versatile and identify the chemical process-based industries irrespective of the scale.	140	560	148	444	0	0	0	0	288	3.49
14.	Field trip should be embarked upon at specific periods, though not regularly.	138	552	148	444	2	4	0	0	288	3.47
15.	Transport cost for field trip could be embedded into the school fees.	26	104	84	252	72	144	106	106	288	2.10
16.	The Organizers of field trips should make the necessary contacts with the areas of interest and state the objectives of the trip clearly to the students.	228	912	60	180	0	0	0	0	288	3.79
	<i>Total</i>	532	2128	440	1320	74	148	106	106	1152	12.85

Grand mean = 3.21 (Accepted)

The results on Table 3 with a grand mean of 3.51 which is greater than the decision rule of 2.50 is accepted. This implies that there are factors that influence the effective utilization of field trip in teaching/learning of chemistry in Owerri Municipal Council, Imo State, and these included: lack of chemistry and chemical process-based industries; time consumption culminating into encroachment into the periods of other subjects; transportation cost/risk; and the organizing process of field trip which could be tedious.

The finding is in agreement with that of Ezechi [12] who observed that funding, time constraints, transportation problems, difficulty in obtaining parental permission, lack of encouragement by the school authority are problems hindering the use of field trips in teaching and learning of chemistry.

3.1.4 Research question four

What are the various ways for effective utilization of field trip in the teaching and learning of chemistry in Owerri Municipal Council, Imo State?

The results on the various ways for effective utilization of field trip in the teaching and learning of chemistry in Owerri Municipal Council, Imo State are as shown on Table 4.

The results on Table 4 have a very high grand mean of 3.21 and are accepted. This shows that there are various ways for effective utilization of field trip in the teaching and learning of chemistry in Owerri Municipal Council, Imo State. These include: Chemistry teachers should be versatile and identify the chemical process-based industries irrespective of the scale (small, medium or large); field trips should be embarked upon at specific periods, though not regularly in order not to sacrifice the time for other topics and subjects; and the organizers of field trips should make the necessary contacts with the areas of interest and state the objectives of the trip clearly to the students prior to the journey as this will maximize the aim of the trip and saves time. However, the students did not accept that transport cost for field trips could be embedded into their school fees. They could be of the view that embedding transport cost of field trip into their school fees would hike the school fees, implying that such costs should be the responsibility of the school management or other stakeholders. The findings are related to those of

Nawi and Azmi [5] who advocated that planning and organizing a successful field trip involved a great deal of preparations; would definitely benefit participants and should be made an integral part of teaching and learning strategy.

4. CONCLUSION

From the foregoing, it could be concluded that: Going on field trips is very important for the chemistry students to have a better adjustment in the educational institutions and society as well as in their interest in chemistry; motivates them through sight and knowledge of industrial application of chemistry, and enhances understanding of processes and abstract concepts. Field trip is not effectively utilized by the teachers in their teaching and learning of chemistry and this could be attributed to such factors including: lack of chemistry and chemical process-based industries; time constraint; transportation cost/risk; and the organizing process of field trip which could be tedious. However, there are various ways for effective utilization of field trips in the teaching and learning of chemistry and such ways should be embraced.

5. RECOMMENDATIONS

1. School field trips should reinforce the curriculum and they should be arranged at every level of the Department, and develop a criterion based set of guidelines for planning and conducting successful field trips that will enable students see the importance and usefulness of it in providing learning experiences that cannot be duplicated in the classroom itself even with advanced communication technology.
2. Workshops and seminars should be organized for teachers on the importance of field trip and its utilization in the teaching and learning of chemistry.
3. When considering a field trip, teachers are advised to first consult with their administrator regarding existing school board policies and follow those recommended procedure. Good planning must precede field trips. School authorities should assist in the provision of funds or transportation for field trips. Chemistry teachers should learn to plan carefully and educate the students before hand on what is expected of them so as to avoid accident or any mishap.

- Careful attention should be given to trip selection, pre-visit preparation, the trip itself, appropriate follow up, and evaluation. Time should be provided for students to share general observations and reactions to field trip experiences. Share specific assignments students completed while on the field trip. Create a classroom bulletin board displaying materials developed or collected while on the field trip.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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