ASSESSMENT ON INFLUENCE OF SCHOOL MAPPING ON ALLOCATION OF SCIENCE LABORATORIES IN SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA

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Abstract
The study is titled "Assessment on Influence of School Mapping on Allocation of Science Laboratories in Secondary Schools in Kaduna State, Nigeria. The design of the study is descriptive survey design. The study's population consisted of principals, teachers and supervisors numbering 10,931 comprising of 541 principals, 10,294 teachers and 96 supervisors from twelve (12) educational zone in Kaduna State. Purposive sampling technique was used. The sample size used in the study was 378 which consisted of 40 Principals, 326 Teachers and 12 Supervisors. Self-developed structured questionnaire titled "Assessment of school Mapping on Allocation of School Facilities in Secondary Schools in Kaduna State, Nigeria" was used as instrument for data collection. The instrument was duly validated by supervisors and statisticians for content and construct validity. The instrument was pilot tested and the reliability coefficient index power stood at 0.7 using Pearson Product Moment Correlation coefficient. Analysis of Variance (ANOVA) was used as instrument for data analysis. The study found that school mapping has aided the provision of science laboratories in secondary schools in Kaduna State. In the light of the foregoing, it is recommended that there should be regular assessment of the status of the existing science laboratories in secondary schools in Kaduna State.
Keywords: **Science, Laboratories, School Mapping and Allocation**

Introduction

Laboratory has been conceptualized as a room or a building specially built for teaching by demonstration of theoretical phenomenon into practical terms. The laboratory is the work place of the science teacher. It is a place where practical activities are planned and carried out. It contains the resources, equipment and apparatus for science teaching ranging from easily consumable supplies to full range of facilities needed for effective teaching and learning of science. Owoeye and Yara (2011) are of the view that laboratory is made mandatory in line with the popular adage that say "seeing is believing" reality in the school setting. Students tend to understand and recall what they see than what they hear or were told. Laboratory is essential to the teaching of sciences and the success of any science course is much dependent on the laboratory provision made for it. Affirming this, Ogunniyi in Owoeye and Yara (2011), stated that there is general consensus among science educators that the laboratory occupies a central position in science instruction. It could be described as a place where theoretical work is practicalised, whereas practical in any learning experience involves students in activities such as observing, counting, measuring, experimenting, recording, observation and carrying out field work. These activities are totally different from the theoretical work which involves listening to talks and taking down notes from such talks (United Nations Education, Scientific and Cultural Organizations (UNESCO, 2008).

Laboratory facilities, according to Umeh (2006) refers to facilities that can be used to enhance or improve educational programmes and promote teaching and learning. Umeh (2006) "further categories science laboratory facilities into human or material. The human resources have to do with personnel such as lecturers/teachers, laboratory technologist/assistants and students". The science laboratory material resources are those materials available to the science teacher for teaching and learning. They include textbooks, computers, thermometers, fire extinguishers, first aid kits, oven, incubators, chalkboards, model/mock-ups, television, radio and other electronic devices (Musah & Umar, 2017). The facilities may

be available and adequate but may not be put to use by the teachers. Umeh(2006) is of the view that audio visual aids in most of computer lab in Yobe state are not utilized in schools due to lack of knowledge on the proper use of such resources for teaching.

The provision of adequate laboratory facilities made science learning easier because students can actually learn through practical and interactive approaches. Laboratory works stimulates learners' interests as they are made to personally engage in useful scientific activities and experimentation; promotes that science is not only products or process; affords the learner the basic skills and scientific method of problem solving. Furthermore, knowledge obtained through laboratory work promotes long term memory. Laboratory helps to provide a forum wherein the learner is given the exercise to subjects, his beliefs, ideas, statements, theoretical propositions etc (Pareek, 2013). The science laboratory has a direct effect on both students' attitudes and academic performance as per the instructional theory of learning interaction. It is generally believed that constant practice leads to proficiency in what the learner learns during classroom instruction; hence, the dictum "practice makes perfect" (Hager in Pareek, 2013). The quality of teaching and learning experience depends on the extent of the adequacy of laboratory facilities in secondary schools and the teacher's effectiveness in the use of laboratory facilities with the aim of facilitating and providing meaningful learning experiences in the learners.

With regard to students being allowed to use the equipment directly in the school laboratory, Pereek (2013) found that about 70% of the teachers responded that they were not allowed to use. Only 22% of the principals stated that laboratory was not being used by secondary stage students. This was true as 73% of the students had not done any experiment on their own, whereas the rest of the students had performed experiments such as litmus paper, use of pH paper, and lime water test. When the principals were asked about the alternative arrangements that were made to overcome the problem of non-availability of science laboratory in school, 17% of them responded that they use higher secondary school laboratory or arrange demonstrations and 30% of them carried out experiments in the class. He further established that by very low extent do students involved in conducting the laboratories activities while 33.33% of the teachers had responded that it is high, 20.83% of the teachers have opined that it is moderate and the remaining (30%) teachers opined that the involvement of the students has been low.

Laboratory facilities are provided for the students, when these students are not allowed to directly use the facilities as found by the previous study (Pereek, 2013), on the account of misuse, the purpose of such facilities can never be actualized. Adekunle (2014) reported similar to this, he found that computer lab is not being used for instructional purposes rather than covered on the notion that the students will misuse the facilities. He maintained the main reason for not allowing students to used laboratory related faculties poor management system. For science teachers to play their roles in teaching science, laboratory facilities should be available and used appropriately to improve the performance of students. Researchers such as Oladare, Abiodun and Bajulaiye (2006); Akpan (2006), stated that there are inadequate resources for teaching and learning of science subjects in public secondary schools in Nigeria. They further stated that where there are little resources at all, they are not in good condition, while the few ones that are in good condition are not enough to go round and also the few available materials are dysfunctional. Empirical studies conducted in relation to resource utilization in education have revealed that essential facilities are not always available in schools. This inadequacy of teaching resources has been of serious concern to educators (Kennedy, 2009). Lyons (2012), states that learning is a complex activity that involves interplay of students‟ motivation, physical facilities, teaching resources, skills of teaching and curriculum demands. The process of managing and organizing resources is called resource utilization. The utilization of resources (laboratory facilities) in education brings about fruitful learning outcomes since resources stimulate students learning as well as motivating them.

School mapping is therefore a systematic rational process of determining the location, spacing and rationalization of educational institutions of various types and levels to ensure the setting up of a school

network that will meet in the most efficient and equitable way possible, the future demands of education. The school map and the school plant are therefore the physical expression of a society's educational goals, objectives, programmes and projects. The determination of institutional network and the development of school plant must be the consequence of defined educational goals, objectives, programmes and projects. When the reverse is the case, it amounts to putting the cart before the horse (Obasi & Ohia, 2017). School mapping is the systematic process of determining the future needs for education, School facilities at the different levels and types and their continuous rationalization within a definite geographical area. School mapping is periodically carried out to determine the existing school network, the distribution of educational facilities and to project into the future, the demands that would be made on them as a result of the dynamic nature of a given society. This is primarily with reference to population behavior and occupational changes. School mapping is carried out basically to ensure equity, access and economic efficiency. School mapping is an important planning technique to arrive at rational decision regarding distribution of educational facilities across different geographical locations. The term "school mapping" seemingly implies the exercise that is confirmed to location of schools and distribution of school facilities. School mapping could be considered as a process of identifying the educational need of a given society through investigation and survey exercise and it is a set of techniques and procedures used to plan the demand for school places at the local level and to decide the institutional level. It is the geographical location of schools. It is not only concerned with the drawing of maps, but deals with school location, planning, the distribution of sizes, spacing of schools and school facilities.

School mapping is seen as the planning tool in the education sector which provides an analytical framework for the implementation of education plans. They offer methods and techniques to estimate future needs and to identify ways to meet them. They can help to overcome the limitations of centralized planning through the correct understanding of local realities, the necessary consultation of relevant stake holders to facilitate a better fit between educational supply and demand. School mapping techniques (diagnostic, projections, use of norms and standards) and other relevant tools such as geographical information system (GIS) software, hardware, for the elaboration of a prospective school map. The subject of school facilities had received considerable attention from the public as well as educators. Educators are faced today with a growing challenge of distributing the nation's educational facilities due to paucity of fund; at the same time, educators were held accountable for students' achievement School Facilities Distribution Task Force (2003). Technically speaking, school facilities, refer to those material things that help or aid the teaching and learning process in school. School facilities could be viewed from two perspectives, namely, those facilities needed specifically for the academic or curriculum development of the students and those facilities that are either generalist in nature or that help the physical or non-curricular (including co- curricular development of the students. Examples of the former classification include teaching aids like books, filmstrips, chalk, marker pen, stationery, syllabus, scheme of works, charts audio-visual materials, writing board etc. The latter include seat/desks, sizeable classrooms, functional libraries, well equipped laboratories, electricity, water, offices, play field, hostels, gardens, space for future expansion. School facilities have been observed as a potent factor to quality education.

Location of schools is function of school mapping. School mapping is therefore, the process of estimating and diagnosing school requirements and identifying the ideal communities and sites where new schools are to be located and where additional educational resources are to be provided. Many secondary schools have no library, where they exist; they are filled up with outdated textbooks. Classroom as a facility is one of key measures of quality as it determines the student-teacher ratio of any educational system. The availability and state of the classroom plays a key role in facilitating or engendering the teaching-learning process (Ahunanya & Ubabudu, 2006). School mapping therefore paves way for provision of well-equipped classroom with modern learning facilities. One of the most effective vehicles by which the process of inquiry can be learnt is the laboratory where the students' experience first-hand inquiry process. Instructional theory of learning interaction hypothesized that the laboratory had a direct effect on both students' attitudes and academic performance. This has given rise to the expectation that laboratory

facilities should be adequately provided to secondary schools for effective teaching and learning. School mapping therefore creates avenue for this to happen; it is the deliberate effort to ensure efficiency in school location and rationalization. This aspect has a more direct implication because it ensures that educational institutions are located where they can be optimally utilized by the end users.

The dictum that "teaching is inseparable from learning but learning is not separable from teaching" is that teachers do the teaching to make students learn, but students can learn without the teachers. School facilities have an impact on teachers' effectiveness and students' performance. This is so because they determine to a very large extent the smooth functioning of any social organization or system including education. Their availability, adequacy and relevance influence efficiency and high productivity. From the foregoing, it has been observed that school organizations face a lot of challenges on school mapping and school plant facilities citing, provision and distribution/allocation in the education sector in Kaduna State. To fill the gap, the researcher conducted this research on the Assessment on Influence of School Mapping on Allocation of Science Laboratories in Secondary Schools in Kaduna State, Nigeria.

Objective of the Study

The study has the following specific objective.

1. Ascertain the influence of school mapping on allocation of science laboratories in secondary schools in Kaduna state, Nigeria.

Research Question

The following research question is formulated to guide the study.

1. How does school mapping influence the allocation of Science Laboratories in secondary schools in Kaduna state?

Research Hypothesis

The study has the following Null Hypothesis

1. There is no significant difference in the opinions of respondents on the influence of school mapping on allocation of science laboratories in secondary schools in Kaduna state, Nigeria;

Methodology

The study is a descriptive survey research."It is usually employed by collecting data and describing in systematic manner the characteristic features or facts about a given population from a few people or items considered to be representative of the entire group". This design is considered appropriate because it provides modalities for gathering information from the respondents using questionnaire. In the same vein, survey design is a very useful means of obtaining data through the use of questionnaire. This research design was therefore appropriate for this study since questionnaire was used as instrument for data collection. The study's population consisted of principals, teachers and supervisors numbering 10,931. This comprises of 541 principals, 10,294 teachers and 96 supervisors from twelve (12) educational zone in Kaduna State. The study has a sample size of 378 which comprise of 40 principals, 326 teachers and 12 supervisors. This sample size was obtained by relaying on the research advisor (2006). Simple random sampling technique was used to select 4 education zones of out of the twelve education zones in the state; namely Kachia, Kaduna, Sabon Tasha and Zonkwa education zones; which represent 30% of the twelve Education Zones. Ten principals were chosen from each of the education zones, while 3 supervisors were chosen from each the zones. However, the reason why purposive sampling technique was employed to select the respondents in the study was due to the fact that the technique is judgmental in nature, being a non-probabilistic sampling technique instrument. Proportionate sampling distribution was further deployed to share the sample size among the teachers according to their population.

The instrument used for the study was self-designed questionnaire meant to elicit responses from respondents on Assessment of School Mapping on allocation of School facilities in Secondary Schools in

Kaduna State, Nigeria. The questionnaire was in six sections A-F. Section A was designed to seek personal information of the respondents such as; status, gender, qualification. Section B-Fare item statement on assessment of school mapping on allocation of school facilities in secondary schools in Kaduna State, Nigeria. The questionnaire was on 5 Likert scale rating of Strongly Agree (SA), Agree, (A), Undecided (UD), Disagree (DA), Strongly Disagree (SD). The validity of the instrument was determined by the researcher's supervisors and other experts in the field test and measurement. The initial draft copies of the questionnaire, objectives of the study, research questions and hypotheses were given to the supervisors. These experts critically examined the items in relation to content relevance, appropriateness of statements, the clarity of words, and length of statements in relation to the objectives of study. They also make other necessary comment(s) towards ensuring that the instrument was adequate and relevant to the study. However, useful input such as reframing of the items, deleting of irrelevant items and simplifying some ambiguous items made were incorporated to arrive at the final certified copy of the instrument. The pilot study involves the preliminary investigation of a research with relatively small sample before the main study. This is usually done to pre-test the research instrument and correct all observed anomalies before the main study. The purpose of a pilot study is to enhance the reliability, validity and the practical application of the questionnaire (Cohen, 2008). A pilot study was conducted in three secondary schools within Kaduna metropolis. 30 questionnaires were used for the study. A test retest method was used at interval of two weeks. The schools used are, Government Day Secondary School Kakuri, Government Day Secondary School Narayi and Government Day Secondary School Kakau. The data collected from the pilot study was subjected to statistical analysis of Pearson Product Moment Correlation Coefficient (PPMCC) at 0.05 level of significance. A reliability coefficient of 0.67 was obtained. Reliability coefficient of 0.7 and above is generally considered to be good and reliable. The study adopted the 0.64 as the minimum threshold for accepting the reliability strength of the instrument as set. Hence, the instrument was adjudged as adequate for the parent study.

The researcher used both descriptive and inferential statistics for the data analysis. In analyzing the collected data, descriptive statistic of frequency count, percentages used to analyze the bio data of the respondents, weighted mean of 3.0 analyze responses of the respondents to the research questions. Inferential statistics of Analysis of Variance (ANOVA) was used to analyse the five hypotheses at 0.05 level of significance. Supporting the appropriateness of statistical tools to be used for this study, t-test is used for determining significant difference between two mean while ANOVA should be used for mean more than two.

Results

Research Question One: How does school mapping influence the allocation of Science Laboratories in secondary schools in Kaduna state?

Table 4.3: Mean Scores Respondents on Influence of School Mapping on Allocation of Science Laboratories in Kaduna State, Nigeria

S/N	Item statement	Respondents	SA	A	UD	D	SD	N	MEAN
1	School mapping makes it easy to identify school without science laboratory	Principals	12	5	-	4	10	40	3.2
		Teachers	158	20	2	23	102	318	3.9
		Supervisor	-	4	2	2	4	12	3.3
2	School mapping aids the provision of science laboratory equipment	Principals	20	7	-	10	3	40	4.5
		Teachers	20	220	8	25	17	318	3.4
		Supervisor	2	1	-	-	9	12	3.3
3	Obsolete science laboratory facilities are quantified through school mapping	Principals	15	10	-	12	3	40	4.9
		Teachers	170	16	5	19	110	318	1.8
		Supervisor	2	8	-	2	-	12	3.0
4	School mapping guide the ministry of education official on areas of	Principals	13	16	-	10	1	40	3.5
		Teachers	40	25	5	227	26	318	2.4

	needs in term provision of Lab.	Supervisor	6	2	-	2	2	12	3.5
5	School mapping provides information on the state of science laboratory in our schools	Principals	15	10	1	-	14	40	3.3
		Teachers	108	113	7	47	45	318	4.7
		Supervisor	9	1	2	-	-	12	4.2
6	Adequate laboratory facilities are provided to schools through school mapping.	Principals	16	10	-	12	2	40	4.7
		Teachers	154	42	5	23	78	318	3.6
		Supervisor	5	5	-	2	-	12	4.6
7	Adequate laboratory chemicals are provided to schools through school mapping.	Principals	10	15	1	0	14	40	3.4
		Teachers	127	128	7	35	23	318	4.2
		Supervisor	8	2	-	2	-	12	3.5
8	The state of maintenance of science laboratory is known through school mapping	Principals	8	12	1	10	9	40	3.3
		Teachers	81	164	6	44	25	318	3.9
		Supervisor	1	3	-	-	8	12	3.3
9	School reduces gap in the provision of science laboratory between rural and urban schools	Principals	25	-	-	5	-	40	3.5
		Teachers	17	32	5	170	78	318	2.1
		Supervisor	20	12	-	2	6	12	3.4
10	School mapping enables school administrator to review the states of science laboratory in their schools	Principals	12	16	-	2	10	40	4.0
		Teachers	93	96	5	118	58	318	3.0
		Supervisor	3	7	-	2	-	12	3.1

Table 4.3 shows the responses of respondents on influence of school mapping on allocation of Science Laboratories in Kaduna state, Nigeria. Items1 was on whether School mapping makes it easy to identify school without science laboratory. The result shows that principals had mean score of 3.2, teachers 3.9 and supervisors 3.3 which is above the decision mean, the item statement was therefore accepted by the respondent. Item 2 was on whether School mapping aids the provision of science laboratory equipment. The result revealed the mean score of 4.5, 3.4 and 3.3 for principals, teachers and supervisor respectively, which implies acceptance. Item 3 was on whether obsolete science laboratory facilities are quantified through school mapping. The result revealed 4.9, 1.8 and 3.0, as the mean score for principals, teachers, and supervisors accordingly implying acceptance. Item 4 was on whetherSchool mapping guide the ministry of education official on areas of needs in term provision of Lab. The item statement was accepted by the respondents with the mean score 3.5, 2.4, and 3.5, respectively. Item 5 was further accepted by the respondents with the mean score of 3.3 for principals, 4.7 for teachers, and 4.2 for supervisors. Item 6 had the mean score 4.7, 3.6, and 4.6 for principals, teachers, and supervisor accordingly. Item 7 was also accepted by the respondents with the mean score of 3.4 and 3.5. Item 8 revealed that principals had 3.3, teachers had 3.9 and supervisors had 3.3 as their mean score. Item 9 had mean score of 3.5, 2.1, and 3.4 for principals, teachers, and supervisors Item 10 principals had 4.0, teachers had 3.0 and supervisors 3.1. It was established that school mapping has aided the provision of science laboratories in secondary schools in Kaduna State.

Hypothesis Testing

Hypothesis One: There is no significant difference in the opinions of respondent on the influence of school mapping on allocation of science laboratory in secondary schools in Kaduna State, Nigeria.

Table 4.8: Summary of Analysis of Variance (ANOVA) Statistics on Influence of School Mapping on Allocation of Science Laboratory in Secondary Schools in Kaduna State, Nigeria

Science Laboratory	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.292	2	4.431	4.200	0.006
Within Groups	394.505	368	1.055		

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Between Groups	13.292	2	4.431	4.200	0.006
Within Groups	394.505	368	1.055		
Total	**407.797**	**370**			

Table 4.8 showed the F-ratio value of 4.200 at 2 df 368 and at 0.05 alpha level of significance. The probability level of significance P value (0.006) is less than 0.05. This means there is no significant difference in the opinions of respondent on the influence of school mapping on allocation of science laboratory in secondary schools in Kaduna State, Nigeria. Therefore, the null hypothesis was rejected.

Discussions

The findings of the study revealed that School mapping has aided the provision of science laboratories in secondary schools in Kaduna state. In addition, it was established that School mapping makes it easy to identify school without science laboratory. School mapping aids the provision of science laboratory equipment. It also shows that Obsolete science laboratory facilities are quantified through school mapping, School mapping guide the ministry of education official on areas of needs in term provision of Lab., School mapping provides information on the state of science laboratory in our schools and Adequate laboratory facilities are provided to schools through school mapping. A study conducted by John and Ogondiek (2018) was on School Mapping and Micro-Planning in Educational Development: The Tanzania Educational Management Perspectives revealed that the implementation process of school mapping and micro-planning did not involve the rationalization of existing facilities, the creation, shifting, closure or amalgamation of institutions. The council failed to optimally utilize teaching and non-teaching staff, buildings, equipment and furniture and did not provide on job training to employees. The council increased enrollment and attendance of students and decreased incidents of students dropping out. The council lacked effective stakeholders' participation, economic and funding uncertainties and increased teacher work-loads.

Obasi and Madu (2018) investigated school mapping and the universalization of basic education in Imo State revealed among others that the level of primary school mapping since the implementation of UBE programme was low because it was carried out only on sampled subzones. The low level of mapping was also found out byObasi and Madu (2015) on secondary school mapping in Rivers State. Such condition will obviously have negative effects. This was pointed out bytheNational Population Commission (2011) that insufficient schools to satisfy demand can lead to overcrowded classrooms. However, the finding is completely different from what Ellah (2012) found out in his study. He found out that in Otukpo Local Government Area, children of public primary school have low radius per child meaning the pupils cover short distances to school, which indicated access of high level nature to school places. The scholar further made a point that for the massive expansion of education which the UBE programme is designed for to be achieved, the success relies on access of high level nature to school places. The study also revealed some of the problems that militate against effective primary school mapping in Imo State. They are: poor funding, lack of technical facilities like Global Positioning System, lack of trained manpower to operate the equipment, non-involvement of educational planners, over politicization of the process, lack or poor policy framework/guidelines, lack of proper assessment from the Ministry of Education and difficult terrain (hilly, riverine, rural areas). The finding corroborated that of Sabir (2013) who in his study found out that lack of knowledge of the concerned officials to carry out the activity, the absence of the clear-cut policy direction on what, how and when this activity should be undertaken, and no available resources in terms of manpower, infrastructure, and facilities essential to conduct school mapping are some of the factors militating against school mapping in the study area.

In the same vein, Ochai and Olatunde (2015) in their study found out that there are several ways politics influence the location of public secondary schools. The influence include: political godfather influencing the location of schools, establishing school to promote in-genuine philosophy to stay in power, immortalization of national heroes using institutions of learning, and location of school based on political consideration. These factors inhibit the proper mapping and rationalization of educational facilities.

Conclusion

School mapping, to a great extent, act as a bridge between the fixing of overall objectives and their translation into definite actions at the local level. It is bridge between the planning of education and its administration. It is a complex of operation that allows for the interaction between different levels of administration. School mapping does two basic things: (i) The rationalization of education resources (ii) Securing greater equality of educational opportunity. However, from the findings of this study, it was concluded that school mapping is a crucial tool in the hands of government and ministry of education officials which serves as compass for providing useful information for planning and implementation of educational policy and programmes. Much could be achieved if school mapping is handled by experts with uncommon dedication, using the right resources and at appropriate time.

Recommendations

Based on the findings made by the study, the following recommendations are put forth:

1. There should be regular assessment of the status of the existing science laboratories in secondary schools in Kaduna State. This will help government to easily identify schools that need expansion, renovation, upgrading, refurnishing of science laboratory equipment.

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