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Influence and Problems of Linking Chemistry Teaching and Learning to Students' Day-to-Day Experiences: Implication for Sustainable Development

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ABSTRACT

This work investigated the influence of linking science teaching and learning to students' day-to-day experiences and confronted problems during the exercise. It was revealed that there were some chemistry concepts which students found difficult to comprehend as a result of either their abstractness or poor pedagogical method usage. The above perhaps contributed to the poor students' performance in science almost every year in external examinations. With this, sustainable development would be far-fetched. This made the researcher to enter into a research which was carried out in Aguata education zone. One hundred and sixteen (116) science teachers drawn from eighteen (18) randomly selected public secondary schools in the zone formed the sample for the work. Structured questionnaire was used for data collection which was content validity by experts in the field and reliability also sought and established at 0 .87. Means and standard deviation (SD) were used to answer research questions while t-test analytical tool was used to test the hypothesis at 0.05 confident level. The results obtained revealed that linking science concepts to learners day-to-day experiences has a lot of impacts on teaching and learning science though some problems were identified to have intervened with the use of this strategy. Conclusion and recommendations were made based on the findings.

Keywords: Influence, problems, chemistry, teaching, learning and students.

INTRODUCTION

The power of science according to Ezeliora (2009)[1] is what creates as a whole an enabling infrastructure that delivers food, medicine, war weapons and other materials that are hall-

mark of modern life and economic development. Besides, science is all about finding out about things around us, an endeavour which leads to discovery and seeks to explain man's environment [2]. These qualities and characteristics of science are what are necessary for the achievement of Millennium Development Goals (MDGs) and visions and strategies of National Economic Empowerment and Development Strategy (NEEDS). It is now obvious that science in relation to its technology has become part and parcel of the world culture and there is need to develop a scientifically and technologically literate, responsible and self reliance citizenry for national economic development and improvement. Science education is a viable, veritable and vibrant tool for the youth or citizenry empowerment and national development. It has been identified and used as one of the foundations upon which the socio-economic and industrial development of any nation in the world is built. This is why development of any nation is measured by the extent of growth brought to it through the enterprise of science and technology education. The development of developed nations of the world like U.S.A., England, Japan, China to mention but a few, is ascribed to advances and un-related scientific research efforts in science and technology [3]. Therefore if Nigeria as a developing nation wants to be fully developed, emphasis has to be continually placed on science education at all levels of education system. There is strong need for proper dissemination of science education in senior secondary schools where the actual foundation for career courses like engineering medicine, med-lab, pharmacy etc. are laid.

It has been clearly shown that performances of our science students in schools these days are not impressive. Many factors have been advanced to be responsible for this. One of the factors according to Okoli and Onwuachu (2009),[4] is the type of education provided by Nigeria system. Nigeria education is purely "academic education" which only prepares its recipients for white collar jobs. This type of education that is certificate conscious emphasizes on passing of prescribed examination. The facts remain that there are some science concepts that are seen by students to be very difficult to comprehend. The difficulties arise from several sources as revealed in the works of some scholars like abstract nature of concepts [5]; communication style (method) [2]; lack of instructional materials [6]. Of the many factors responsible for difficulty of some chemistry concepts, there is one that has not attracted much attention. This is the communication style (teaching style).This has to do with science teachers' inability to link his/her science teaching to learner day-to-day home activities or experiences. This is why Fahmy (2000), [7] stated that the most interesting aspect of science is that it applies to our daily lives. Science teachers should during teaching pose the following questions to students as a way of linking known to unknown or experiences to concepts.

- What makes soap go sour?

- What makes the dough rise on mixing with yeast?
- Why does gun power bum rapidly?
- Why does coca-cola drink release gas when it is opened?
- What makes some unripe fruits sour to tastes?
- Why does fresh palm wine foam rapidly?

Science teachers while teaching should also relate different science reactions that take place in the laboratory to learners' daily experiences and home activities examples are shown in the table I.

Table 1

S/N	DAY-TO-DAY EXPERIENCES	CHEMICAL REACTIONS OR CONCEPTS
1	Eye irritation by cut onions cells.	Burning sensation of H_2SO_4 acid on material. Is.
2	Cleansing action of soap and detergents.	Precipitation, crystallization and separation processes.
3	Use of alum in home for coagulation of dirt in water treatment.	Process of precipitation separation by decantation and filtration.
4	Deposits of brown colouring observed on iron nails and metallic materials.	Rusting and Oxidation reaction, corrosion of metals.
5	Local garri processing	Fermentation, Dehydration and evaporation
6	Striking of a match and dissolving of detergent in water.	Endothermic and exothermic reactions
7	Local gin production from starchy food materials.	Fermentation distillation.
8	Local black soap preparation	Saponification and Hydrolysis.
9	Use of kerosene to remove stain in white cloth.	Chromatography

Looking at the table 1, one can see that science teaching and learning is daily life affairs. It is part of our daily activities at home or environment. Hence [4] in line with Njoku's (2006)

[8] assertion, posited that chemistry teachers should cite home and environmental experience of students while teaching.

PROBLEM OF THE STUDY

The problem that motivated this work is the fact that some science tea.- hers evade; some chemistry concepts in the syllabi in the name that they are too difficult to teach and more so students would not comprehend them. This, teachers attitude has lead to some serious acts on the part of students. Students in an attempt to pass their exams, resort to expo, going to miracle centres and even hiring resource persons to write exams for them. All these are academic frauds and is seriously jeopardizing both their self-development and that of the nation. There is need therefore to search for a more effective teaching strategy that will motivate students interest in learning and tailor down the concepts to their level for conceptual understanding. This would help to reduce this academic fraud. Based on this, the researchers want to try out and find the perception of science teachers on the impact (influence) of linking science teaching to students' day-to-day experiences.

RESEARCH QUESTIONS

Two research questions guided the study:

- What are the impacts of linking chemistry concepts to day-to-day learners' activities and experiences on teaching-learning of science.
- What are the possible hindrances to the use of the above strategy in teaching chemistry.

RESEARCH HYPOTHESIS

One research hypothesis was formulated to guide the study.

- The mean rating scores of male and female science teachers on the impact of linking chemistry concepts to learners' day-to-day activities on teaching and learning of science will not differ significantly.

METHOD

A survey research design was used for the study. The study covered all the science teachers in thirty-two (32) public secondary schools in Aguata Education Zone. Stratified random sampling base on location was used to select (18) schools from the zone and all the 116 science teachers from the selected schools were used. There were sixty-four (64) male and fifty-two (52) female science teachers. Science teachers were given one week training by the researchers on how to teach science by linking concepts to students' day-to-day

experiences in home and environment. Science teachers were paid for attending such training to motivate them. Instrument used for data collection was a teacher constructed questionnaire. The questionnaire comprises of three parts. Part "A" of the questionnaire asked for personal data of the teachers. Part "B" contained (16) items on the impact of linking science concept to day-to-day learners activities on teaching and learning of science, while part "C" elicited information on the possible constraint that militate against the use of the strategy. The instrument was validated by two experts in science education and measurement and evaluation. Reliability was also ensured through pilot study of Awka zone using 10 science teachers. The reliability co-efficient using Cronbach Alpha was 0.81.The questionnaire was administered by the researcher and collected on the spot. Data collected was analyzed using mean and standard deviation. T-test was used to analyze the hypothesis at 0.05 significant levels. Based on four point scale of strongly agreed, agreed, disagreed and strongly disagreed, a mean of 2.50 and above was regarded as one in which teacher agreed to bear an impact or constraint to the use of strategy while mean of less than 2.50 was regarded as not an impact or constrain of the used strategy.

Table 2

S/N		X	SD	Decision
1	It helps to make learning of science concrete and real.	2.70 2.81	1.06 .08	Agreed
2	It helps to increase teachers' capacity.	3.61	1.11	Agreed
3	It helps the teacher to combine perfectly different pedagogical method and strategies.	2.83	1.52	Agreed
4	It arouses and sustains students' interest in chemistry.	3.36	1.93	Agreed
5	It makes for meaningful learning and retention of knowledge gained.	2.78	1.43	Agreed
6	It helps to nurture young scientists.	2.99	2.41	Agreed
7	It helps to clear misconception in the learners.	3.01	1.33	Agreed
8	It enhances creativity in students and teachers.	3.07	1.74	Agreed
9	It enhances development of spirit of inquiry and curiosity.	3.84	1.57	Agreed
10	It serves as a bridge between classroom teaching and environmental experiences.	2.91	.97	Agreed
11	It reduces the difficulty associated with some concepts in science.	2.64	1.52	Agreed
12	It makes for active involvement of the learner mentally.	3.41		Agreed
13	It activates the three domains of learning.	3.59	1.83	Agreed
14	Creates motivational learning environment.	2.86	1.74	Agreed
15	Helps the learner to transfer gained knowledge.	3.04	2.01	Agreed

16	It helps to bridge the gap between abstract concepts and reality.	2.96	1.98	Agreed
17	It makes for more permanent learning	2.79	1.35	Agreed

Table 2 above indicated there is agreement that all the statements in the instrument are impacts of linking chemistry concepts to day-to-day learners' activity on teaching and learning of chemistry. The mean ratings are quite above the acceptable value.

Table 3

Science teachers mean rating score and standard deviation on the possible constructive to the linking of science concept to learners day-to-day activities.

S/N		X	SD	Decision
1	Lack of teaching materials	3.51	1.49	problem
2	Excess teaching load does not permit the use of strategy. The	3.94	1.81	problem
3	Insufficient time for teachers to engage in the use the strategy. Of	4.21	1.59	problem
4	Most science are not specialist in science education.	3.04	1.73	problem
5	Teachers' poor knowledge of these linkages.	2.27	.83	N.P
6	Some teachers are not ready to make this link.	2.17	1.93	N.P
7	Teachers are not granted in-service training service for acquisition of knowledge on how to link concepts to experience	2.63	1.73	N.P
8	Students' poor knowledge background.	3.01	1.17	problem
9	Students' unwillingness to work on their own.	2.41	1.51	N.P
10	Poor pay package for teachers.	2.30	1.89	N.P
11	It requires extra time.	3.27	1.01	problem

Note: N.P. is not problem

From the table above, it was clear that items 1, 2, 3,4, 8 and 11 are the major constraints to the employment of linking chemistry concepts to learners' day-to-day experience but all other ones are not problems to the use of the strategy in question as can be seen in their mean scores

Table 4:

T-test summary of male and female chemistry teachers on the impact of linking science concepts to students' day-to-day experiences.

S/N	Gender	N	Mean	SD	df	t-cal	t-crit
1	Male	64	3.69	0.81	114	1.28	1.96
2	Female	52	3.41	0.73			

Table 4 shows that the t-calculated is less than the t-critical, hence the null hypothesis is accepted that there will be no significant difference in mean rating scores of male and female teachers on the impact of linking science concept to day-to-day experiences of the learner on teaching and learning of science.

DISCUSSION

The results of this work have shown clearly that teaching science concepts by linking it to the learners past home and environmental activities and experiences is the best portion. Evidence is revealed on table 2 as many science teachers agreed that all the statement in the questionnaires are major impacts of this strategy. This tallied perfectly with the assertion of [6] that linking science teaching and learning especially science to day-to-day activities of the learner make for better understanding of the concept, enhance creativity and establish connection between theory and practice. The results are also in line with the idea of [8] that method and strategy used by a teacher will have a profound influence on the ease with which the learners tackle the tasks before him. The result also revealed that in as much as the strategy is powerful in enhancing meaningful learning in science, its application might be hindered by so many factors:

- Lack of instructional materials.
- Poor knowledge of teaching method on the part of teachers.
- Excess load on teachers, and
- Lack of time.

These are in consonant with what Udogu (2009) [6] earlier observed that lack of instructional material in school among other things is a big hindrance to effective teaching and learning of chemistry..

CONCLUSION

The way out of the problem of teaching difficult science concepts in school is not far-fetched. Science subjects are not all that difficult to learn. Science teachers should as a matter of fact debunk that idea of abstractness of some science concepts through relating or linking science teaching to the life experiences of the student as well as through use of familiar environmental examples. This could go a long way to remove the minds of science students from cheating in exams, and show more interest in science study since they would always have conceptual understanding of what they are studying.

RECOMMENDATIONS

Science teachers should try as much as possible to focus their science teaching using examples from everyday life experiences. This will make science teaching more flexible and exiting to students instead of working toward coverage of syllabus for examination purpose. Workshops should be organized for science teachers all over on linking chemistry to everyday activities in the learners' environment.

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