The Effects of Activity-Based Instructional Approach on the Academic Performance of Student in Integrated Science Education in Katsina State College of Education Nigeria

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Abstract
The study investigate the effects of activity based introduction approach on the academic performance of student integrated sciences which focuses on the level of success in using this method and its affectivity in teaching and learning integrated sciences education. The study is attempt to land out the significant differences between activity based instructional strategy and conventional method of teaching (lecture method). The research is a pilot study restricted to the department of Integrated Science Education in Katsina State College of education Nigeria. The sample comprise thirty (30) students of NCE II randomly selected. The groups were place into two categories, experimental and control groups. The experimental groups were taught using Activity-based approach and the control groups were taught using conventional methods. Quisi-experimental design is used using pre-test posttest control group deign. The data collected were analyzed using t-test statistic at $P\leq0.05$ level of significant. The instrument used for data collection is integrated science process skills (ISPS) test. The results obtained shows that there is significant differences between the two approaches which entails the use of Activity-base is effective and efficient methods of teaching and learning science on general. Recommendations were made for the effective use of Activity-based approach in teaching and learning integrated science education.

Introduction
Pedagogy is the instructional methods methods for strategy teachers adopt to facilitate instructional delivery for the achievement for the achievement of stated curriculum objectives. Instructional delivery for the achievement of stated curriculum objectives. Instructional strategy is the major factor in delivery effectiveness for it determines the success of the lesson. The instructional method that the teachers adopt in teaching a lesson is a vital because this can make students like or dislike the subjects. Teachers need to adopt teaching methods that will influence students’ interest, enthusiasm and understanding positively in the subject leading to acquisition of the pre-requisite knowledge, skills, value and scientific attitudes.

However the methods a teacher employ depends on the number of factors ranging from the nature of subjects, age, the students, specific objectives, teacher and environmental variable as stated by Etuibon
(2014). There are varieties of instructional methods from which a teacher may select the effectiveness for instructional delivery. This range from demonstration, conventional, discussion, field trip to more innovative methods like co-operative learning, concept mapping which actively involves students in learning, Ajewole (2010).

The best method of teaching integrated science education is that methods that engage students participation in activities. Active participation in learning concept in integrated science will provide students with their own personal experience that will facilitate learning which many never be forgotten. The activity base approaches enriches the teaching learning process by ensuring the students actively participate in the lesson rather than just being passive listeners in the classroom Eboka, (2014) Mastropiere & Scruggs (1995) lamented that many students benefit from learning science through activity base approach that reduces the relevance on textbooks, lectures, knowledge of vocabulary and prevail paper test this kind of approach seek to promote that allow them to discover and experiment with science through discovery and inquiring teachers involve students in creating and expanding their knowledge and understanding about content area being studied.

The philosophy of integrated science emphasize and stresses the effectives use of activity base strategy as a tentative method of teaching integrated science in the Nigeria colleges of education as stated by national commission for colleges of education (NCCE) accompanied by science teacher’s association of Nigeria (STAN). The minimum standard for science 2012 edition NCE curriculum outline the philosophy and objective of integrated science.

The philosophy of the Nigeria certification education (NCE) integrated science is anchored on the following areas:

- Fundamental unit of science
- The use of scientific methods as a common approach in problem solving
- The role and function of science in every day life
- To prepare students for further students is integrated science.

Objectives NCE (2015) minimum standard

- Enabling the students gain concept of the fundamental unity of science
- Installing the student with community of approach to problems of a scientific method.
- Increasing students understanding of the role and definition of science in every day life and in the world in which they live.
- Making students well informed and scientifically literate.
- Enabling student acquire and demonstrate the intellectual commence and professional skills to the teaching of integrated science.
- Developing students ability to impart and encourage in their pupils the spirit of inquiring into living and non living things in the environments.
- Developing the ability and motivation is students to work and think in an independent way/ manner
- Enabling students to carry out scientific investigation emphasizing co operation development of appropriate scientific process and skills and improves their written and oral communication skills
- To develop in students the interest to pursue higher studies in integrated science.

Integrated science is the unity of all knowledge the conceptual unity of the sciences, a unified process of scientific inquiry and an interdisciplinary study as defined by Brow, (1977). The development of process skills and basics skills is an emphasized objective of Nigerian integrated science projects capable for teachers to make use if activity base approach to assist the students to observe carefully and thoroughly, report completely and accurately what is observe. Organize information acquired generalize on the basic of acquired information predict as a result of generally design experiment to check production use models to explain phenomena and continue the process of inquiring when new data do not conform to prediction these can absolutely be acclaimed through the effective use of activity base approaches in teaching learning integrated science.

Foecke, (2004) in an article on the education of teachers of integrated science observe that how can we expect teachers who have specialized packages and by methods which may have stressed lecture and memorization and avoided direct involvement from this background and teach science in an integrated and inquiry – oriented manner?.

Pine G. (1989), Define Activity:- based method as a technique adopted by a teachers to emphasize his or her method of teaching through activity in which the students participate rigorously and bring about efficient learning experiences. It’s a child centered approach. It is method in which the child is actively involved in participating mentally and physically learning by doing is the main focus in this method. Learning by doing is imperative in imperative in successful learning. Since its well proved that more the senses are stimulated more a person learns and longer he/she retains

The corporation of schools of Chennai (2003) which was developed and originated by the pioneer of the method David Horsburgh out line the affectivity of the activity based strategy and lamented that. Activity:- based approach required actives problem solving by students in finding patterns in the information through their own investigation and Analysis. With continued practice in these processes, students learn not the content of the lesson but also develop many other skills.

Horsburgh D. (2003) out line the importance of activity based method or the main
purposes of carrying out activity based approach in the teaching and learning science in generate are:

- It exchange creative aspect of experience.
- It give reality for learning.
- Use all available resources
- Provide varied experiences to the students to facilitate the acquisition of knowledge, experience, skills and values
- Builds the students self confidence and develop understanding through works in his/her group.
- Experiences develop interest, enriches vocabulary and provide stumulus for reading.
- Develop happy relation ship between students, teachers and students.
- An activity is said to be language of the child a child who lacks in verbal expression can make up through use of ideas in the activity.
- Subject of all kind can be taught through activity
- Social relation provides opportunity to mix with others.

**Objective of the study:**

1. To determine the effectiveness of the significant difference between activity-based approach and conventional method (lecture method) of teaching and learning integrated science.
2. To determine the skills acquired between activity-based approach and conventional method of teaching and learning integrated science.
3. To investigate the role played by the teachers in using activity based approach in instruction of integrated science in the classroom.

**Research questions:**

1. What are the effects of using activity based method and conventional method of teaching.
2. What is the effect of gender when exposed to activity based approach in teaching and learning integrated science.
3. What is the role of a teacher in organizing effective use of activity base approach in teaching and learning integrated science.

**Research Hypothesis**

H₀₁. There is no significant difference between activity based approach and conventional (lecture) method of teaching and learning integrated science.
H₀₂. There is no significant difference between the skill obtained in activity based approach and conventional lecture method in teaching and learning integrated science education.

**Operational Definition**

- Nigerian integrated science project (NISP): Capable of desiring and produced science teaching and learning materials in order to make learning effective and efficient.
- Nigeria integrated science teacher education project (NISTEP): capable of producing high efficient science teachers through designing the modern approach of pedogoyical teaching and learning through optimum supporting system.
Basic science process skills (BSPS) and integrated science process skills (ISPS): Science process approach (SAPA) group science process skills under two headings. The first is called the basic science process skill (BSPS) such as observation measuring and using number and classifying (BSPS) provide the intellectual group work in scientific inquiring walters & soyibo, (2001). These skills are those which must be acquired in the first level of primary and secondary education and letter is called integrated science process skills (ISPS), Such as controlling variable, formulating hypothesis and experimenting. These skills are structured.

Research Methodology:

In the study pretest and posttest experimental control group design was used. The main study sample comprised 30 students in a total of them of them constituted the control group. When creating the experimental and control group, it was aimed not to cause any district differences between the groups to ensure this SPST had been done before the study and them choices were made randomly in the classes that had similar performances to one another. The study was conducted the one of Katsina State College of education Nigeria. The study was conducted during the two semesters.

The science process skills test (SPST) was used to measure the integrated science skills the test developed by Nigerian integrated science project (NISP) and Nigerian integrated science teacher education project (NISTER) in collaboration with Nigerian national commission for colleges of education (2002).

With its 33 items. The ISPST which has 11 eleven dimension 5 items related to formulating hypothesis 6 items related to identifying variable 6 items related to define operationally 6 items related to interpretation of data 3 items related to formulating models and 7 items related to experimenting.

Pre-test post-test control group design, which is one of the methods of the experimental design is applied all participants attendant the four hours lectures per week in a science course. While the students in the control group were being taught the conventional method (lecture method). The one in the experimental group were supplied some hands activities prepared by the researcher to improve their science process skills. Through out the studies to topics to be studies is in the conformity in the green book of the national commission for colleges of education (NCCE) Curriculum revised 2014.

Table number of activities aiming to improve the skills in all the groups.

(ISPST) Skills
The students did 150 hands on activities for a complete semester in order to improve their science process skills they worked in group of at least 3 and maximum of 5 students. The groups were nitrogenous with respect to their science achievement. The students in the experimental group were trained about activity-based teaching method and hands on activities. During the student, the student were asked some open-ended questions to attract their orientation to the topic and activities and they were asked to answer them working co-operators. At that stage, the students were obtain supported by researchers the group were demanded their funding and results attain in writing or verball of when ever they finished working together they write some group report and different students in the work groups provided oral explanations to the rest of the students about each one of those reports the finished were discussed all together to have some specific results to consolidate things.

All NCE II students the number of the hands on activities the content knowledge relate to the science process skill and instructional time were held constant. Dependent variables of the study were the students achievement scores of ISPST. Independent variables of the study were the different types of instruction employed. When students pretest ISPST for experimental and control group score and post test for experiment and control groups core were used to test the research question.

### Table 1 Experimental groups

<table>
<thead>
<tr>
<th>(ISPST) Skills</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulating hypothesis</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Identification of variables</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Operational definition</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Interpretation of data</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Formulating models</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Experimentation</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Measurement</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Classification</td>
<td>4</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Recording</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Communication through charts,</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>graphs and models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of tables of data and graph</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
and to determine the treatment effects on students. The data collected was analyzed using analysis of variance and it test statues of P< 0.05

Result Analysis

The raw scores of students of Experimental and Control Groups were arranged and then analyzed by suing means score, standard deviation and t-test statistical tools. The analysed data have been interpreted in the following ways:

Table 2: Means Scores, Standard Deviation and t-Critical of Experimental of control groups on Pre-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Means</th>
<th>SD</th>
<th>df</th>
<th>t-cal</th>
<th>t-crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>30</td>
<td>21.13</td>
<td>4.78</td>
<td>58</td>
<td>0.48</td>
<td>1.684</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>21.2</td>
<td>6.79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tabulated value for 58 degree of freedom at 0.05 level of significance, since the calculated t (0.48)is less than the critical value (1.684), H₀ may be rejected.

Table 2: Means Scores, Standard Deviation and t-Critical of Experimental of control groups on post-test

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Means</th>
<th>SD</th>
<th>df</th>
<th>t-cal</th>
<th>t-crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>30</td>
<td>35.87</td>
<td>6.86</td>
<td>58</td>
<td>7.90</td>
<td>1.684</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>30.93</td>
<td>7.43</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tabulated value for 58 degree of freedom at 0.05 level of significance, since the calculated t (7.90)is less greater than the critical value (1.684), H₀ may be retained.

Recommendation:

Learning by students through activity-based teaching strategies on experience you get is at great importance because the education sector, with many goals and the advantages and benefits. The recommendations are as follows:

- The teachers should increase the students attention and willingness to respond to the educational settings.
- Guide the development trend of students and their needs and develop their talents and the direction of education is correct.
- The teachers should employ and emphasize on improvisation which capacitated the acquisition of basic and process skills.
- Teachers should provide opportunities for students to self-study, where the benefit of the teaching learning situation in their future.

- Adequate supply of learning and teaching materials should be provided so as to enhance learning and teaching effectively.

- Adequate funding should be provided by the government.

- Non-governmental organization should assist the situation through provision of materials and other learning materials.

- Encourage for work in group for co-operative learning process.

- Encourage the students to take responsibility of their own learning.

- Students role towards the development of activity based learning strategies are.

Their personal interest

- Participate in educational objectives
- Developing god organizational skills
- Involve in the programme flow
- Demonstrate enthusiasm in seeking new knowledge
- In collaboration with others

The teachers role in the development and use of activity based teaching strategies are:

- Planning and preparation for
- Identify outcome
- Having noted the outcomes of learning using proper strategies
- Mechanisms within the group
- Promote co-operation in carry out activities

Conclusion

Activity based teaching strategies describes a range of pedagogical approach to learning teaching its core premises include the requirement that learning should be based on doing some hand experiments. The idea of activity based approach is rooted in the common notion that children are active learners rather than passive recipients of information. If child is provided the opportunity to explore by their own and provide an optimum learning environment then the learning become joyful and long lasting.

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