

# **EFFECTS OF SCAFFOLDING STRATEGY ON LEARNERS' ACADEMIC ACHIEVEMENT IN INTEGRATED SCIENCE AT THE JUNIOR SECONDARY SCHOOL LEVEL**

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## **Abstract**

This paper assessed the effects of using scaffolding strategy on the academic achievement of students in integrated science in the Junior Secondary School (JSS). Four hundred and fifty (450) students in JSS 2 were randomly selected from four Junior Secondary Schools in two Local government Areas of Ekiti State respectively. The sample was divided into two groups, two schools serving as a group. The first group was taught using scaffolding strategy (SCS), while the second group was taught using the traditional (chalk and talk) method (TRM). Two research questions were raised; correspondingly two hypotheses were formulated and tested using t-test analysis. Results showed that students exposed to scaffolding strategy performed significantly better than their counterparts who were exposed to traditional method. Also, students of schools in urban locations had better academic achievement than their counterparts in rural locations.

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**Keyword:** Scaffolding, strategy, academic achievement, integrated science, junior secondary school

## **Introduction**

Man raises questions and answers them in order to give meaning to events in nature. These meanings are associated with certain objects distinct from others depending on the attributes of such objects and events. For example, when a solution of common salt and water is heated to dryness, the salt particles are left behind. The question raised is where has the water gone? Another example is when students of integrated science are exposed to a topic such as saving your energy and evaluation carried out. What could account for high failure rate in the academic achievement of these students?

In attempt to answer such questions, more questions are raised and answered in a systematic manner. The act of systematic collection of information in order to give meaningful explanation to happenings and events in nature could be referred to as science.

Abdulahi, (1982) defined science as a conscious and systematic search for an organized knowledge about events. Integrated science subject is offered at the junior secondary school level in Nigeria System of Education. It seeks to lay the foundation for the development of knowledge, skills and attitudes that will make the learner capable of understanding and manipulating events and happenings in the environment. The subject also affords the students the opportunity to learn about themselves. The teaching of integrated science involves innovations in order to meet the challenges of the global society. When innovative approaches are produced in both teachers and learners, learners will be encouraged while improved learning outcome becomes realistic and attainable. To attain the above, teachers of integrated science must be acquainted with appropriate teaching strategies and also develop the ability to creatively use different approaches.

Scaffolding is a communication process where presentation and demonstration by the teacher is contextualized for the learner. The performance of the study is coached, articulate and elucidated by the learner as support is gradually being removed. Scaffolding is described as a temporary support made available for students' learning until the students can perform independently of that support (Verhagen &Collis 1996). Scaffolding can be seen as a temporary framework that supports a building under construction. When the structure is strong enough to stand on its own, the scaffolds are removed. Ertmer and Cennamo (1995) stated that scaffolds in building cannot completely explain the principle of retreat of support in learning. He emphasized that when learning;

- The support does not reach the ground because some entry knowledge is expected.
- That the support to learning cannot be precise to the right level as can be done with a building.
- Retreating of support only occurs in the last stage of building, while learning retreat of support occurs gradually during learning process.

Lipscom, Swanson and West (2004) opines that scaffolding is a natural approach to ensure the learning of the student. The teacher therefore offers assistance with only those skills that are beyond the students' capability.

Gaskins, Rauch, Gensemer, Cunielli, O'Hara, Six and Scott (1997) explained scaffolding as a form of coaching and modeling support to students as they develop new skills or learn new concepts and when the children achieve competence, the support is removed. The student then

continues to develop the skills or knowledge on his/her own. They further stated that scaffolding allows students to perform tasks that would normally be slightly beyond their ability without the assistance and guidance from the teacher.

In order to carry out scaffolding strategy the teacher must first identify and determine:

- i) what students can accomplish independently;
- ii) what students can accomplish with guidance (in other words, teacher determines the students' zone of proximal development; and
- iii) teacher then provides the instructions that are just enough to support the learner in task beyond reach without teacher's support.

Levels of scaffolding support may vary such that, a great deal of support is given when the teacher models the targeted task, giving individual verbal explanations that identify the element of the content and strategy. Little support would be when the teacher only provides cues to some aspects of the task in response to what students have already mastered. Beed, Hawkins and Roller (1991) have described levels of support that lie between these two extreme as:

1. assisted modeling: students are encouraged to participate in the completion of the task.
2. element identification: the teacher identifies the elements of the intelligent behavior as the students complete task.
3. strategy naming: the teacher refers to the name of the strategy and students employ it on their own.

On the other hand Winnips (2001) defines scaffolding as “providing support to student learning and then retreating that support so that the student becomes self-reliant”. “He suggested the analogy of learning to swim with a punctured swimming tube” you learn to swim as the tube slowly deflates.

Scaffolding as explained by Winnips to education world focuses on active learning and students' choice. He ascertained that the technique works well with technology based learning, in which students need to be more self-reliant. Scaffolding allows them to work being self reliant while receiving adequate support. He further stressed that the type of instruction given would determine the result of scaffolding.

Traditionally, educational support in the classroom has been provided by continuous interaction with the teacher, but as computer aided learning becomes more prevalent, experts say, the incorporation of scaffolding into the learning process becomes imperative. The use of scaffolding in contents where knowledge is fixed, demand that the teacher provide the support before hand. Whereas in content where knowledge is developmental, such as

integrated science there is the demand that the teacher provides more discussion and on going guidance as the task is being carried out by the learner.

The purpose of this study is to determine the relative effectiveness of scaffolding strategy on the academic achievements of J.S.S. 2 students in two Local Government Areas of Ekiti State. The influence of school location on achievement was also investigated.

### **Research Questions**

The study focused on the following research questions.

1. Is there any difference in the academic achievement of JSS 2 students exposed to scaffolding strategy and those not exposed?
2. Will school location have any influence on the academic achievement of students exposed to scaffolding?

### **Research Hypotheses**

Two null hypotheses tested in the study were:

**H<sub>01</sub>** There is no significant difference in academic achievement of JSS 2 students exposed to scaffolding strategy and their counterparts who were not exposed.

**H<sub>02</sub>** There is no significant difference in academic achievement of students exposed to scaffolding in rural and urban location.

### **Research Method**

The research design adopted is quasi-experimental of the pre-test, post-test control group type. The subjects for the study were drawn from six government junior secondary schools randomly selected from two Local Government Areas out of the 16 local Government Areas of Ekiti State. All the 450 students consisting of 225 students of schools located in urban area and 225 students of schools located in rural area formed the subject of the study. Each school was further split randomly into both experimental and control groups with mix abilities and gender.

The instrument used for the study was designed from the topic energy in JSS 2 integrated science curriculum perceived to be difficult by students. Achievement test was constructed on the topic by the researchers. Experienced integrated science experts validated the instrument. The achievement test consisted 20 multiple choice questions, 20 short answer items and 5 easy questions drawn from standardized questions of JSS3 examinations with reliability coefficient of 0.72 obtained from the pilot study.

The topic energy and all sub-topics under it were taught to the experimental group using scaffolding strategy (SCS) and the control group was taught using the traditional method (TRM). The use of scaffolding involves all steps and strategies as dictated by Winnips (2001). The data collected were subjected to t-test analysis.

## Results and Discussion

The results of the study are presented as shown below.

**Table 1:** t-test table for post-test scores of students on SCS and TRM.

Variable	N	$\bar{X}^2$	SD	t-cal	t-tab
SCS	225	55.70	15.33		
TRM	225	38.60	9.28	11.98	1.64

Significant at 0.05 level of probability.

The table showed statistically the effect of the treatment on students' academic achievement in integrated science. Since the value of the t-cal (11.98) is greater than t-tab (1.64). The null hypothesis of no difference was rejected. This means there is difference between the groups from the mean scores of 55.70:38.60. Students exposed to scaffolding performed better than their counterparts who were not.

**Table 2** t-test table for students' post-test scores on SCS according tourban and rural locations.

Variable	N	$\bar{X}^2$	SD	t-cal	t-tab
Urban	110	68.60	10.23		
Rural	110	32.85	7.41	29.69	1.66

Significant at 0.05 level of probability.

The table 2 above shows that t-cal (29.69) is greater than t-tab (1.66). Null hypothesis of no significant difference is rejected, meaning there is difference between the two groups considering the mean of 68.60:32.85. Urban students performed significantly better than their rural counterparts.

## Discussion

The result of the analysis of hypothesis 1 revealed that students taught with scaffolding strategy performed better than their counterparts taught with chalk and talk method (TRM). The study confirmed the effectiveness of scaffolding as stated by Winnips (2001) that learning becomes easy when students receive adequate support. It is also in support of Verhagen and Collies (1996) that scaffolding is a temporary support for students learning until the student can perform task independent of that support. It also agrees with Gaskins, et al.(1997) and Lipscomb et.al (2004) as explained that scaffolding is in form of coaching or modeling that supports students as they develop new skills or learn new concept. When the students achieve competence, the support is removed and the student continues to develop the skills or knowledge on his/her own. The result also ascertained the submission of Gasket al. (1997) which stated that students should be allowed to perform tasks that would normally be slightly beyond their ability without assistance and guidance from the teacher. Appropriate teacher support can allow students to function at the cutting edge of the individuals' development. It also corroborate the submission of Ertmer and Cennamo (1995)that scaffolding remains a viable instructional strategy to

ensuring self reliance in students as explained by the principle of retreating of support, when they compare scaffolding in the building construction.

Similarly, the findings also corroborate the findings of Akande (1987) and Alake (2007a) that school location has significant influence on students' performance. It was observed that students in urban locations were more self-reliant than their counterparts in rural location. The reasons for the variation could be linked with the fact that students in urban locations have access to ICT facilities that facilitate independent learning as opined by Abidoye (2005).

### **Conclusion and Recommendations**

The implication of the result of this study is that it is better to teach students using scaffolding strategy (SCS) than the traditional method (TRM). Teachers are therefore employed not to stick to one particular method of teaching but should endeavour to use variety taking cognizance of the topic and the needs of the students. As opined by Gbodi and Laleye (2006) that the use of video taped instruction could serve as a grave impetus for promoting science teaching and learning. School authorities, Local and State Government should endeavour to provide some ICT facilities to the rural locations in order to encourage independent learning by students.

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