

# Effects of E-Learning Instructional Strategy on National Teachers' Institute Integrated Science Students' Attitude in North Central Nigeria

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**Abstract:** This paper looked at how an e-learning instructional strategy affects the attitude of National Teachers' Institute integrated science students in north central Nigeria. A quasi-experimental control group design was employed. Out of a population of 179 students, 78 were selected as the study sample, and study centres were chosen through purposive sampling. Results showed a significant difference in mean rank attitude scores between the group taught with e-learning and the group taught with the conventional method, and the experimental group also showed a positive change in attitude towards integrated science. Based on this, it was recommended that NTI lecturers adopt e-learning instructional strategy in teaching integrated science and that lecturers be trained on how to make use of it. The study concluded that students exposed to e-learning instructional strategy performed better academically, retained the concepts taught for longer, and showed a more positive attitude toward integrated science than those taught by the lecture method.

**Keywords:** E-Learning Instructional Strategy, Integrated Science Students, Attitude, National Teachers' Institute, Bachelor Degree Programme, North Central Nigeria.

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## I. INTRODUCTION

E-learning instructional strategies are no longer just an alternative in higher institutions; they now drive real progress. They close gaps in access, modernize how teaching and learning take place, and give students the digital skills they need to compete. This goes beyond the classroom. E-learning also feeds into the wider economic and social goals of a nation by supporting workforce development, reducing educational inequality, encouraging creativity and entrepreneurship, and strengthening a country's ability to compete in a knowledge economy.

The main aim of an e-learning instructional strategy is to make higher learning possible and to put the learner, not the lecturer, at the centre of teaching (Shibley, 2017). Wilson (2020) grouped e-learning instructional strategies into six models. One of these is the live session, in which the lecturer still leads the lesson but adds digital tools, pushing educators to bring technology into the classroom where conditions allow.

Attitude matters a great deal here because it shapes how students engage, how well they take up new approaches, and how effective the whole learning experience turns out to be. A good attitude generally leads to better engagement and better outcomes, and this is separate from achievement in the cognitive sense. Ezeugwu et al. (2021) note that attitude plays a role in learning: when a student records success in an activity, that student tends to keep performing well. So wanting to take part in tasks connected to integrated science is really a sign of a student's attitude toward the subject.

Integrated science is what students meet at the NCE and undergraduate levels before moving on to core subjects like physics, chemistry, and biology. Ukpai et al. (2016) describe it as a way of presenting scientific concepts that highlights the unity of scientific thought rather than drawing sharp, early lines between the different science fields.

The conventional method works differently. Here the lecturer is the main, and sometimes only, source of information in class, and the flow of knowledge runs one way, from an active lecturer to passive students. It is often called the talk-and-chalk approach, where the teacher holds

all the knowledge and controls the lesson from start to finish. Ayuba (2020) found that most integrated science lecturers still rely on this method, and linked it to the poor academic performance recorded among students. Because e-learning instructional strategy has the potential to change both learning outcomes and attitude in integrated science, this study set out to investigate its effect on the attitude of NTI integrated science students in north central Nigeria.

#### ➤ *Purpose of Research*

The purpose of this study is to find out the effects of e-learning instructional strategy on the attitude of National Teachers' Institute integrated science students in North Central Nigeria. Specifically, the study set out to:

- Find out the effects of e-learning instructional strategy and the conventional method on NTI integrated science students' attitude towards integrated science in North Central Nigeria;
- Find out whether the effect of e-learning instructional strategy on NTI integrated science students' attitude differs by gender in North Central Nigeria.

#### ➤ *Research Questions*

The following research questions guided the study:

- What is the difference in the mean attitude scores of students taught integrated science concepts using e-learning instructional strategy and those taught using the conventional method?
- What is the difference in the mean attitude scores of male and female NTI students taught integrated science concepts using e-learning instructional strategy?

#### ➤ *Hypothesis*

Based on the research questions above, the following null hypotheses were formulated and tested at the 0.05 level of significance:

- Ho1: There is no significant difference in the mean attitude scores of students taught integrated science concepts using e-learning instructional strategy and those taught using the conventional method.
- Ho2: There is no significant difference in the mean attitude scores of male and female NTI students taught integrated science concepts using e-learning instructional strategy.

## II. BACKGROUND OF LITERATURE

A number of earlier studies helped shape the direction of this work. Adakole (2014) studied the effect of e-learning instructional strategy on the attitude of chemistry students at the National Open University of Nigeria, using a quasi-experimental design with a population of 453 students and a sample of 80 chosen through purposive sampling. That study was carried out at the Open University's Lagos and Ilorin centres and dealt with chemistry students only, whereas the

present study is set at NTI centres in North Central Nigeria and focuses on integrated science, though both studies share an interest in attitude as the key variable.

Ebin et al. (2017) looked at students' attitudes and achievement in relation to e-learning at Ajara Comprehensive School and Araromiilogbo Senior Secondary School in Oko-afo, Badagry, Lagos, using 128 students picked at random from two secondary schools. Like the current study, attitude was a focus there too, but that work was carried out at the secondary school level in Lagos, while the present study concerns NTI degree students in North Central Nigeria.

Namhyun (2021) examined learners' attitude toward e-learning in connection with perceived system quality, e-learning usefulness, self-management of learning, and self-efficacy, using a survey of 236 college students and multiple regression to test the hypotheses. Several differences separate that study from the present one: Namhyun's work considered attitude alone, while the current study also looks at achievement and retention; the population there was 236 against 179 here; the earlier study was based in chemistry rather than integrated science; and gender was not treated as a moderating variable there, unlike in this study.

## III. MATERIALS AND METHODS

This study adopted a quasi-experimental research design, following Kerlinger (1973), and specifically used the non-randomized pretest-posttest control group design. The sampled population was divided into experimental and control groups. The target population was made up of all National Teachers' Institute Bachelor Degree Programme (BDP) study centres in North Central Nigeria, comprising 179 students in total — 72 males and 107 females — spread across 33 study centres (National Teachers' Institute, 2024). A sample of 78 students was chosen, in line with the central limit theorem, which Tuckman (1975) says requires a minimum sample of 30.

Two instruments were used for data collection: the Integrated Science Attitude Questionnaire (ISAQ) and the Integrated Science Achievement Test (ISAT). ISAQ was adapted from the Students' Attitude in Biology Questionnaire developed by Maccoun (2016), and responses were scored on a four-point scale (Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1). For negatively worded items the scoring order was reversed, running from 1 to 4, so that the direction of attitude was correctly captured. To check content and face validity, draft copies of the instruments were given to two supervisors for scrutiny before they were administered.

Data collected were analysed using the Statistical Package for Social Sciences (SPSS) version 2.0, combining descriptive and inferential statistics. Research questions one and two were answered with mean rank, while questions three to six were answered using mean and standard deviation. The hypotheses were tested with t-test and ANCOVA, with the significance level set at  $p \leq 0.05$ .

#### IV. RESULTS

Table 1 Summary of Mann Whitney Results of Attitude Score of Students Taught Integrated Science Concepts Using E-Learning and Conventional Method

| Group        | N  | Mean Rank | Sum of Ranks | Mann-Whitney U | Z     | Sig@0.05 | Remark      |
|--------------|----|-----------|--------------|----------------|-------|----------|-------------|
| e-Learning   | 42 | 56.76     | 2384.00      | 31.000         | 7.281 | 0.000    | Significant |
| Conventional | 36 | 19.36     | 697.00       |                |       |          |             |

The Mann Whitney test produced mean rank attitude scores of 56.76 for the e-learning group and 19.36 for the conventional group, with sum of ranks of 2384.00 and 697.00 respectively. The Mann Whitney U value came to 31.000 against a Z score of 7.281, and the p-value of 0.000 was below the 0.05 significance level. In other words, attitude

development differed a great deal between the two groups after being taught integrated science concepts. Hypothesis one, which stated that there was no significant difference in the mean attitude scores of students taught with e-learning and those taught conventionally, was therefore rejected.

Table 2 Summary of Mann Whitney Results of Attitude Scores of Male and Female Students Taught Integrated Science Concepts Using E-Learning

| Gender | N  | Mean Rank | Sum of Ranks | Mann-Whitney U | Z     | Sig@0.05 | Remark          |
|--------|----|-----------|--------------|----------------|-------|----------|-----------------|
| Female | 20 | 24.83     | 496.50       | 153.500        | 1.683 | 0.092    | Not Significant |
| Male   | 22 | 18.48     | 406.50       |                |       |          |                 |

Mean rank attitude scores of 24.83 for females and 18.48 for males were recorded, with sum of ranks of 496.50 and 406.50 respectively. The Mann Whitney U value was 153.500 and the Z score 1.683, with a p-value of 0.092, above the 0.05 significance level. This means attitude did not differ much between female and male students within the e-learning group after being taught integrated science concepts. Hypothesis two, which stated that there was no significant difference in the mean attitude scores between male and female NTI students taught with e-learning, was therefore retained.

in attitude recorded here may be linked to how e-learning allows students to come up with new ideas, explain concepts to each other, and strengthen understanding through interaction.

#### V. DISCUSSION

Findings from this study showed that e-learning instructional strategy had a significant effect on the attitude of NTI integrated science students in North Central Nigeria. Students in the experimental group, who were taught integrated science using e-learning, recorded higher mean attitude scores than those in the group taught with the conventional method, and the Mann Whitney results confirmed that this difference favoured the experimental group. This supports Adakole (2014), who reported that e-learning instructional strategy changed the attitude of chemistry students more than conventional methods did. Ibenegbu et al. (2014) also noted that e-learning instructional strategy builds interdependence among students, encourages peer tutoring, and improves comprehension; the present study adds to this by suggesting that the active participation and self-directed problem solving that come with e-learning help deepen students' understanding of integrated science concepts even further.

In a related finding, students in the experimental group who were taught with e-learning kept higher mean attitude scores than those in the control group, and again the Mann Whitney results showed this difference to be significant. This agrees with Ebisin et al. (2017), who found that students remembered science concepts for longer when taught with e-learning rather than by traditional methods. The improvement

#### VI. CONCLUSION

This study grew out of a need to address the decline, over the years, in students' attitude toward integrated science at the study centres. To respond to this, the study investigated the effect of e-learning instructional strategy on the attitude of NTI degree students toward integrated science in North Central Nigeria. On the whole, the findings suggest that e-learning instructional strategy can be used to strengthen students' attitude toward the subject in this setting.

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