

## Adaptive Learning Teaching Methods on Students' Performance in ICT Education Course in University of Calabar

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### Abstract

*This study investigated the effect of Adaptive Learning Instructional Strategy on undergraduate students' academic performance in ICT in Education in University of Calabar. Two research questions and corresponding null hypotheses guided the study. The study adopted a quasi-experimental design. The population of the study consists of all the 200-level undergraduate students, who are offering the course ICT in Education (EDU 203.1) in Faculty of Educational Foundation Studies for the 2020/2021 academic session in University of Calabar. The sample of the study comprised two hundred and sixty-eight (268) students selected using the multi-stage and purposive sampling procedures. The instrument used for data collection was a researcher-made performance test titled; Adaptive Learning Instructional Strategy for ICT in Education Performance Test (ALISICTEPT). The instrument was subjected to face content and content validation with a reliability coefficient of 0.84. Mean, Standard deviation and t-test and were the statistical tools used in the study. The findings revealed that the adaptive learning Strategy significantly affected the experimental group students' ICT in Education as well as their usability of learning through the proposed environment. The study concluded that adaptive learning is one of the 21<sup>st</sup>-century innovative strategies that support a learner-centred system of learning. It combines digital information with physical information in real-time and with user participation. The study recommended amongst others that instructors should adopt the use of adaptive learning instructional strategy in teaching ICT in Education courses and other ICT-related courses so that students could produce better and dependable results.*

**Keywords:** Innovative strategy, adaptive learning, academic performance, discussion method, ICT in Education.

### INTRODUCTION

Meaningful and useful education is something all students need regardless of the career choices they will eventually make. According to Imoke, Nkanu and Bisong (2021)

education for every living being in contemporary times is a necessity that is borne out of the everchanging dynamics of our daily livelihoods. The issue is how best to integrate Information and Communication Technology (ICT) into the classroom. This has made students become more productive researchers when they are helped to learn carefully and construct their own knowledge in the process of learning. Today's schools need to better prepare students for the 21<sup>st</sup>-century workforce. To do so, students need to experience a reformed learning environment that engages them meaningfully in activities in which they use computers as tools to solve real-world problems. This in turn deepens and enriches their understanding of requisite core content and skills. Most often, the younger generations bring increasingly high levels of competence into the learning environment. How prepared are teacher educators? What are the competency levels of educators? Are technology infusion and integration of 21<sup>st</sup>-century innovative teaching strategies in universities equal to this task? In spite of much research on learning and instruction, there is still much that cannot be understood and much more that could be done to improve learning and instruction.

Oshemughen (2013) explains the real situation of teaching Computer Education in Nigerian universities as ineffective. This is because the federal government has only given little attention to the provision of learning facilities, especially in the field of computer education. This discourages students from developing a high level of interest in learning Computer in Education as a course. He added that in assessing the effectiveness of teaching Computer in Education in higher institutions in this present era, appropriate teaching strategies must be used, and functional facilities must be on the ground that have quality control, efficiency, and students' educational result. Learners may be motivated in learning particular concepts as a result of the teaching approach adopted by the instructors, especially in the university education system. Unfortunately, some university instructors are not cognizant of this fact which may result in poor performance of students in that particular course.

However, when learners are properly motivated, their interest will be aroused in learning the course which will eventually foster their academic performance. Spector (2016) submitted that there is particularly a challenge in educational contexts. Students are no longer interested in schoolwork and do not have any connection with the web. It is obvious that today's learners are always glued to their phones either as they are chatting, pinging, skypeing, blogging, tweeting, or snapchatting and so on. They are digital natives; they do not learn about technology they are born into it. They seem so distracted from class work and to them the classroom is becoming too boring, as such, there is a need to introduce innovative strategies to the classroom, such as adaptive learning, augmented learning, blended learning, collaborative learning, etc.

Adaptive learning is one of the 21<sup>st</sup>-century innovative strategies that support a learner-centred system of learning. Adaptive learning environments have been concerned with creating customized solutions designed to digitize a specific part of the curriculum used by teachers. Adaptive learning technologies are based on the use of the most relevant and up-to-date student data, and collaborative teams are formed instantly at the request of teachers. This leads to the development of adaptive hypermedia systems and personalization of learning experiences and the creation of a personal learning environment in higher education. Adaptive learning can make learning more efficient and effective. Learning can be improved by using adaptive, information-oriented models for adaptation and computerization of learning among learners (Ahmad, Zainuddin & Yusoff, 2018).

Students are encouraged to take an active role in the learning process when they are given the opportunity to do so through the use of the discussion teaching method, which is an interactive and participatory approach to education. Discussions, as opposed to more traditional teaching methods based on lectures, foster a collaborative learning environment in which students are encouraged to express their ideas, question fundamental ideas, and develop their ability to think critically. Not only does this method of teaching make it easier for students to remember what they have learned, but it also improves their capacity to analyze, evaluate, and apply the information that they take in.

Academic performance has to do with the achievement of objectives in various types of knowledge and skills. Here objectives are established based on the age, prior learning and capacity of individuals with regard to education, socialization and qualification. Presenting evidence of learning should be an important landmark in the journey toward lifelong learning and capabilities. Academic performance among learners is considered a criterion for deciding the effectiveness of educational programs; also, that is why in the evaluation of an education system, researchers often consider academic performance and search for factors affecting academic performance (Mudulia, 2016). It is against this backdrop that this study strives to investigate the effect of Adaptive Learning Instructional Strategy on Undergraduate Students' Academic Performance in ICT in Education in University Calabar.

## **STATEMENT OF THE PROBLEM**

Undergraduate students at the University of Calabar are using adaptive learning, which is an instructional strategy for information and communication technology in education. This application of adaptive learning as an instructional strategy has become an emerging topic in the field of pedagogy. In spite of this, there is a paucity of comprehensive research on the effect that adaptive learning has on the academic performance of students within the context of this setting. The goal of this study was to investigate whether or not adaptive learning is an effective instructional strategy for boosting the academic performance of undergraduate students in ICT in Education course at the University of Calabar.

## **AIM AND OBJECTIVES OF THE STUDY**

The aim of this study was to investigate the effect of Adaptive Learning Instructional Strategy on undergraduate students' academic performance in ICT in Education in University of Calabar. Specifically, the study sought to:

1. determine the effect of Adaptive Learning Strategy on students' mean performance scores in ICT in Education.
2. examine the effect of Discussion Method on students' mean performance scores in ICT in Education.

## **RESEARCH QUESTIONS**

The following research questions guided the study

1. What is the effect of Adaptive Learning Strategy on students' mean performance scores in ICT in Education?
2. What is the effect of Discussion Method on students' mean performance scores in ICT in Education?

## **HYPOTHESES**

The following null hypotheses were formulated to guide this study:

- H0<sub>1</sub>**. Adaptive Learning Strategy has no significant effect on the students' mean performance in ICT in Education.
- H0<sub>2</sub>**. Discussion teaching method has no significant effect on the students' mean performance in ICT in Education.

## **SIGNIFICANCE OF THE STUDY**

The findings of this study will be of immense benefit to lecturers as adaptive learning can become a new pedagogy of teaching and learning which is learner-centred actively providing the lecturers with the opportunity of acting as facilitators, coaching and mentoring in the classroom. It can also create a platform that supports knowledge transfer between lecturers and students. The research work will also task the lecturers to see the need to embrace this new approach to teaching, which will make learning more effective and result-oriented.

Instructional designers can take advantage of the findings of this study as a guide on how to design instructional models that are flexible, which can be used in teaching ICT in Education and every other related course in the Faculty of Education. The strategies can help in inspiring students learning by making them creative thinkers and problem solvers in the course of their learning.

To curriculum planners, the study will serve as a guide for them to plan the school curriculum for the higher institution. It can help planners to incorporate some of the 21<sup>st</sup>-century innovative strategies into the university curriculum, which will help in the realization of a better academic goal.

## **METHODOLOGY**

This study adopted a quasi-experimental design. The study was carried out in Cross Rivers State which is one of the states in the South-South part of Nigeria. The population of the study consisted of all the 200-level undergraduate students taking ICT in Education course (EDU 203.1) in the Faculty of Educational Foundation Studies for the 2020/2021 academic session in University of Calabar. These include four hundred and fifty-eight (458) students offering the course ICT in Education. The sample size of this study consisted of two hundred and sixty-eight (268) 200-level students in the Department of Curriculum and Teaching (126), Guidance and Counselling Department (64) and Department of Educational Foundations (78) in the Faculty of Educational Foundation Studies, University of Calabar who offered the Course ICT in Education for 2020/2021 academic session. Multistage and purposive sampling procedures were used in selecting the sample for the study. The reason for using these three departments is that the ICT in Education course is domicile in the faculty where these three Departments are and as such, they have an idea of what the course is all about. The instrument for data collection was a researcher-made performance test on a Computer in Education Course titled; Adaptive Learning Instructional Strategy for ICT in Education Performance Test (ALISICTEPT). The face and content validity of the instrument were determined by three experts in the Departments of Educational Psychology, Guidance and Counselling and Curriculum and Teaching, University of Calabar. The reliability coefficient of the ICTEPT was determined with the Kuder Richardson Formula 21 (KR-21) technique which yielded a

coefficient of 0.84. The method of data collection was done in phases. The researcher sought permission from the Heads of Department and Computer in Education course lecturers to use the students as well as some facilities in the selected departments. The next phase involved the readiness assurance process for the experimental group. The performance test was administered to students in experimental and control groups as pretests to determine the baseline knowledge. The researcher prepared an instructional package that suits the Adaptive Learning Instructional Strategy and exposed them to different technologies to personalize the learning experience. The instructional packages were sent to the students' WhatsApp platforms to study and interact. During the class, the students were allowed to take ownership of their lesson, they interacted among themselves, discussed the content and answered questions based on the content they have studied on the platforms. Also, the students in the control group were taught using the discussion method teaching strategy. Post-test was administered at the end of three weeks. The data collected were analyzed using mean and standard deviation to answer research questions. The null hypotheses were tested using a t-test at 0.05 alpha levels. The statistical package for the social sciences (SPSS) was used for the analysis.

## RESULTS

**Research Question 1:** What is the effect of Adaptive Learning Strategy on students' mean performance scores in ICT in Education?

**Table 1: Effect of Adaptive Learning Strategy on students' mean performance scores in ICT in Education**

Strategies		Pretest	Posttest	Mean gain
Adaptive Learning Strategy	Mean	38.63	72.97	
	N	64	64	34.34
	Std. Deviation	8.50	12.48	

Table 1 showed that students taught with Adaptive Learning Strategy had a mean score and a standard deviation of 38.63 and 8.50 during the pre-test. After the post-test, the same students had a mean score of 72.97 and a standard deviation of 15.44 respectively. This indicated that the Adaptive Learning Strategy has an effect on students' (pre-test and post-test mean) performance scores in ICT in Education.

**Research Question 2:** What is the effect of discussion method on students' mean performance scores in ICT in Education?

**Table 2: Effect of discussion method on students' mean performance scores in ICT in Education**

Strategies		Pretest	Posttest	Mean gain
Discussion method	Mean	38.41	65.21	
	N	78	78	26.79
	Std. Deviation	12.71	11.13	

Table 2 showed that students taught with the discussion method had a mean score and a standard deviation of 38.41 and 12.71 respectively during the pre-test. After the post-test, the same students had a mean score of 65.21 and a standard deviation of 11.13 respectively. This indicated that the discussion method has an effect on students' (pre-test and post-test mean) performance scores in ICT in Education.

**Hypothesis 1:** Adaptive Learning Strategy has no significant effect on the students' mean performance in ICT in Education

**Table 3: T-test analysis on the students' means performance in ICT in Education**

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	34.34	14.45	1.81	-19.012	63	.000

Table 3 showed the degree of freedom of 63 at 0.05 level of significance, the t-calculated value of -19.012 and p-value of 0.001 less than 0.05. Hence the null hypothesis is rejected. This indicate that Adaptive Learning Strategy has a significant effect on the students' mean performance in ICT in Education.

**Hypothesis 2:** Discussion teaching method has no significant effect on the students' mean performance in ICT in Education

**Table 4: T-test analysis on the students' means performance in ICT in Education**

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	-26.79	17.49	1.98	-13.533	77	.000

Table 4 showed the degree of freedom of 77 at 0.05 level of significance, the t-calculated value of -13.533 and p-value of 0.001 less than 0.05. Hence the null hypothesis is rejected. This indicated that the discussion teaching method has a significant effect on the students' mean performance in ICT in Education.

## DISCUSSION OF FINDINGS

The analysis of the results presented in Table 1 showed that Adaptive learning Strategy has effect on the on students' (pre-test and post-test mean) performance scores in ICT in Education. The pair t-test analysis presented in Table 3 showed that Adaptive learning Strategy significantly affected the experimental group students' ICT in Education as well as their usability of learning through the proposed environment. Meeting students' individual differences, preferences, needs and intelligences may be the reason of such a significant difference. In addition, the adaptive environment was designed to provide personalized content, activities, means of communication, feedback and assessment in light of each individual student's ICT level which directed the student to his/her appropriate learning path. These findings support the earlier studies carried out on investigating the significance of adaptive learning environments. For example, the results reached by Balme (2019) Kudzai (2014) and Izundu (2015) are very consistent with the present study since they supported the use of adaptive learning strategy. Again, the finding also corroborates the finding of Francis, Etta and Eteng (2023) that Augmented Reality was effective enough to help students gain the learning competencies required for learning ICT in Education. In addition, when examining the effect of an adaptive learning strategy it has a positive effect on students' learning performance and engagement, which is closely related to the results of the present study. Furthermore, adapting the application of the Adaptive learning Strategy in class activities was very effective in improving the ICT skills of students since such activities fostered students' participation; consequently, they outperformed their counterparts of the control group in their ICT in Education. These findings are also in agreement with

that of Bangert (2009) whose findings revealed that there are three elements of a community of inquiry, which are; the cognitive presence which has to do with the extent to which the learner contributes to their learning by constructing his or her own knowledge which is created through interaction and not transferred from educator to the learner, also the social presence which has to do with the extent to which learners interact with their colleague during the learning process and finally the teaching presence which involves teachers preparation of the learning environment and the organization of the learning content. The study also reported that the CoI survey instrument was a suitable tool to determine and enhance the educational quality of faculties. Moreover, it was reported that structures related to the cognitive, social and teaching presence and the CoI framework were a useful model in the description, explanation, and development of online education for learners. The findings also disagreed with that of Sarfo and Ansong-Gyimah, (2010) who conducted a study on the students' perception of the use of information and communication technology for learning by pre-service teachers in Ghana using third-year students in the college of education. The findings revealed that the majority of the pre-service teachers had a positive perception towards the use of information communication technology for their learning while other had a counter opinion on the use of information and communication technology for their learning.

Table 2 revealed that discussion method has an effect on the students' (pre-test and post-test mean) performance scores in ICT in Education. The result of the hypothesis in table 4.9 shows that the effect of discussion method on students' (pre-test and post-test mean) performance scores in ICT in Education was significant. This finding is in line with the findings of Irinoye, Bamidele, Adetunji and Awodele (2015) and Zainal, Yahya and Rahman (2014) who reported a statistically significant effect on the performance mean score of students taught using discussion method. The discussion method espouses the teacher's guidance using purposeful questions aimed at directing learners' attention to important ideas and assisting them with hard-to-grasp concepts in ICT in education in a manner that other methods do not offer. This is because discussion creates opportunities for students to reflect on the storyline or the text language and this promotes comprehension. For teaching and learning of ICT in education to exert a positive impact on students' performance, classroom instruction should include posing questions during lessons. Abeysekera and Dawson (2015) in a study also reported on designing and teaching a third-year course with 30 students enrolled in education for enterprise in the economics faculty at the University of South Africa. The results revealed that videos contribute to the mastering of the concepts representing strong teaching present in the online component. The online technology in the individual space was inspiring and fostered independent and self-directed learning which corresponds to both emotional and learning presence, based on these the students had a positive perception of the use of video for learning.

## CONCLUSION

Adaptive learning is one of the 21<sup>st</sup>-century innovative strategies that support a learner-centred system of learning. Adaptive learning environments have been concerned with creating customized solutions designed to digitize a specific part of the curriculum used by teachers. Adaptive learning technologies are based on the use of the most relevant and up-to-date student data, and collaborative teams are formed instantly at the request of teachers. This leads to the development of adaptive

hypermedia systems and personalization of learning experiences and the creation of a personal learning environment in higher education. Adaptive learning can make learning more efficient and effective. Learning can be improved by using adaptive, information-oriented models for adaptation and computerization of learning among learners.

## RECOMMENDATIONS

Based on the findings of this study the following recommendations were made;

1. Instructors should adopt the use of adaptive learning instructional strategy in teaching ICT in Education Course so that students can produce better and dependable results.
2. Faculty of Education in conjunction with the University should organize conferences, seminars and workshops for lecturers in the Faculty of Education to expose them to the design and implementation of the current and innovative instructional strategies to promote students' performance in schools in the University.
3. Proper attention should be given to new pedagogies in the educational sector since the 21<sup>st</sup> century has brought in new innovations in the system.

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