## Extent of Utilization of Blended Learning by Lecturers for Teaching and Students' Assessment in Computer and Robotics Education in Public Universities in Enugu State

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### Abstract

This study sought to analyze the extent of utilization of blended learning for teaching and students' assessment in computer and Robotics Education in public universities in Enugu State. The sample of the study was 312 lecturers. The study adopted descriptive survey research design. The instrument for data collection was a structured questionnaire. The data collected for this study was analyzed using mean and standard deviation, while null hypotheses were tested using independent sample t-test at 0.05 level of significance. Findings from the study revealed that Lecturers moderately utilize blended learning to conduct diagnostic and criterion-referenced assessments for teaching and students' assessment in computer and Robotics Education in public universities in Enugu State. The findings also revealed that there was no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of blended learning to conduct diagnostic and students' assessment in computer and robotics education in public universities in Enugu State. The findings also revealed that there was no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of blended learning to conduct diagnostic and criterion-reference assessments for teaching and students' assessment in computer and robotics education in public universities in Enugu State.

It was therefore recommended among others that Public universities in Enugu State should organize regular training workshops and seminars for lecturers to improve their digital literacy and equip them with the skills needed to effectively implement blended learning in their teaching, particularly in Computer and Robotic Education.

Keywords: Blended Learning; Lecturers; Students' Assessment; Teaching; Computer and Robotic Education.

## Introduction

In recent years, advancements in technology have significantly impacted the educational landscape, leading to the emergence of blended learning as a prominent instructional approach. Blended learning, which combines traditional face-to-face classroom instruction with online learning activities, has been widely adopted across various disciplines.

Blended learning is a flexible approach that combines digital resources and traditional classroom instruction, often enhancing student engagement and learning outcomes (Dziuban et al., 2018).Blended learning integrates both online and offline teaching methods, allowing learners to access course materials online while engaging in face-to-face interactions for a holistic learning experience (Pomerantz & Brooks, 2022). Blended learning purposefully integrates technology and face-to-face Eze, A.O; Olelewe, C. Copyright © 2024 JOCRE. All rights reserved (https://www.jocre.com.ng)

teaching to create more personalized and student-centered learning environments (Graham, 2022). According to Banyen et al, (2016), Blended learning is characterized by the use of face-to-face teaching in conjunction with digital tools and resources, allowing for both collaborative and independent learning experiences. Blended learning strategically uses both digital and traditional instructional methods, creating a more engaging and customizable learning experience (Torrisi-Steele, 2016).

Blended learning is the practice of integrating online educational materials with face-to-face classroom interactions, aiming to provide a comprehensive and versatile learning experience (Shu & Gu, 2018). Blended learning involves using multiple delivery methods, such as online learning modules and face-to-face instruction, to maximize learning effectiveness (StratX ExL, 2023). Blended learning is characterized by the integration of various digital tools and face-to-face methods to support collaborative and independent learning (Medina, 2018; Smolyaninova et al., 2021). Blended learning is a flexible teaching approach that allows students to access part of their coursework online while reducing in-class time (Phillips et al., 2016). Blended learning refers to courses where a significant portion of the learning experience is online, but some essential components are still delivered in a physical classroom setting (Bernard et al., 2009; Banyen et al., 2016). Blended learning includes integrating face-to-face educational experiences with online learning activities, fostering both independent and collaborative learning (Lim & Wang, 2016). Blended learning is a hybrid educational approach that uses both in-person and online methods, accommodating diverse learning styles and promoting active learning (Vasyura et al., 2020).

Blended learning in computer and robotics education used for interactive Online Simulations, Coding Challenges, Automated Feedback, AI-Powered Learning Platforms, Field Trips and Gamification (BMC Medical Education, 2022). According to ERIC (2022), blended learning can be used for Self-Paced Learning, Collaborative Projects, Remote Access to Learning Resources, Learning Management Systems, Mobile Learning Apps, Peer Review Systems and Virtual Online Certification. Also, blended learning can be used for Flipped Classrooms, Real-Time Assessments, Video Tutorials, Online Discussion Forums, Digital Robotics Kits, Cloud-Based Coding Platforms and Blended Lab Work (SpringerOpen, 2022). The integration of blended learning in public universities, especially in Enugu State, Nigeria, is gaining attention due to its potential to enhance students' assessment.

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Students' assessment refers to the measurable performance of students in educational settings, often evaluated through standardized tests, grades, and other assessments. It reflects the extent to which students have met predefined learning objectives and standards (Hattie & Timperley, 2007). According to Kampen (2021), students' assessments that can be applied in university setting include diagnostic assessments and criterion-referenced assessments.

Diagnostic assessment is a form of pre-assessment or a pre-test where lecturers can evaluate students' strengths, weaknesses, knowledge and skills before their instruction (Hat, 2022). According to the author, diagnostic assessment serves as a valuable tool for educators to gain insights into students' existing knowledge on a particular topic prior to the commencement of a course. Diagnostic Assessment is a formative evaluation used to identify students' existing knowledge, skills, and areas of need before instruction begins. It helps in tailoring instruction to meet individual learning needs (Popham, 2017). Diagnostic Assessment is an assessment method aimed at pinpointing students' specific strengths and weaknesses to inform instructional planning and interventions (McMillan, 2018). According to Willam (2018), Diagnostic Assessment is used to determine students' readiness for learning new content by identifying gaps in their prior knowledge and understanding. Diagnostic Assessment focuses on uncovering the root causes of learning difficulties and informing personalized support strategies (Shepard, 2019). Diagnostic Assessment provides a detailed profile of students' current performance levels and learning needs, enabling targeted instructional adjustments (Fuchs & Fuchs, 2020). Diagnostic Assessment assesses students' pre-existing knowledge and skills to identify areas of misunderstanding and to guide future learning (Black & Willam, 2020).

Diagnostic Assessment is a tool for teachers to evaluate the effectiveness of their teaching strategies by analyzing students' pre-instructional competencies and needs (Bennett, 2021). Diagnostic Assessment is designed to identify specific learning challenges and provide information that helps in adjusting teaching methods and materials Boud & Falchikov, 2021). Diagnostic Assessment is utilized to gather information about students' prior knowledge and skills, guiding educators in customizing instructional approaches (Hattie & Yates, 2021). Diagnostic Assessment is aimed at diagnosing learning difficulties and needs by collecting and analyzing information on students' prior learning and current

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performance (Brookhart, 2020). More also, another type of students' assessment that can be carried out in teaching computer and robotics education is criterion-referenced assessment.

Criterion-referenced assessment, also known as scoring, involves evaluating a student's knowledge or skills by comparing them against a predetermined criterion which can be established through expert judgment or by using an external indicator, such as the performance on a wellestablished test and it focuses on measuring the extent to which a student has achieved specific learning objectives or standards, rather than comparing their performance to that of other students (Bielinski, 2022). Criterion-referenced assessment involves measuring student performance against specific gradelevel standards and can be conducted through end-of-unit or final tests to assess students (Kampen, 2021). The author further stated that criterion-referenced assessments are not limited to the classroom setting and are also used in various contexts such as professional licensing exams, high school exit exams, and citizenship tests. In these cases, students must achieve a certain percentage of correct answers in order to pass the assessment (Kampen, 2021). According to Bielinski (2022), Criterion-referenced interpretation is particularly advantageous in situations where there is agreement on the standard. Since these standards are established based on expert judgment or established criteria, they are considered to be more objective. Additionally, criterion-referenced categories tend to remain consistent over time, which allows for effective planning and implementation (Bielinski, 2022). Therefore, criterion-referenced results tell one whether or not a student met a standard but not how far above or below the standard the student performed in Computer and Robotics Education.

Computer and Robotics Education is a field of study that focuses on teaching students how to use and understand computers and robotics technologies, including programming, hardware design, and system integration (Yadav, Hong & Zhang, 2019). Computer and Robotics Education is an educational approach that integrates computer science and robotics to develop students' problem-solving skills, creativity, and technological literacy (Cous & Chen, 2020). According to Lye & Koh (2019), Computer and Robotics Education is a curriculum that emphasizes the use of programming, robotic systems, and technology to enhance students' understanding of science, technology, engineering, and mathematics (STEM) concepts. Computer and Robotics Education is an interdisciplinary domain aimed at equipping students with skills in coding, robotics construction, and digital problem-solving through hands-on

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projects and interactive learning (Kafai & Burke, 2019). Computer and Robotics Education teaches students how to build and program robots, applying computer science principles to solve real-world challenges (Papert, 2021).

Computer and Robotics Education incorporates computational and robotic technologies to foster students' engagement and learning in STEM subjects (Grover & Pea, 2018). Computer and Robotics Education uses computer programming and robotics to facilitate experiential learning and develop critical thinking and technical skills among students (Bers & Horn, 2021). Computer and Robotics Education integrates Robotics and computer science education designed to prepare students for technological advancements and career opportunities in these fields (Johnson & Johnson, 2021). Computer and Robotics Education combines computer science principles and robotics technology to develop students' skills in automation, machine learning, and algorithm design (Romero & Gomez, 2019). Computer and Robotics Education focuses on the integration of robotics kits and computer programming tools to enhance students' understanding of technology and foster innovation (Levin & Waugh, 2020). Therefore, in the context of Computer and Robotic Education, where practical skills and theoretical knowledge are both crucial, the utilization of blended learning offers unique opportunities for lecturers.

Lecturers are referred to as academic professionals who deliver educational content, often through lectures or seminars, and engage in research activities within their field of expertise (Trowler, 2021). Lecturers primarily focus on teaching students at a higher education institution, often without the same research responsibilities as professors (Kogan, & Hanney, 2020). Lecturers are individually employed by a college or university to teach courses, design curricula, and assess student performance, typically holding a master's degree or higher (Tight, 2019). According to Fry, Ketteridge and Marshall, (2021), Lecturers are responsible for delivering instruction, guiding students through academic material, and contributing to the intellectual development of students in higher education settings. Lectures provide lectures, seminars, and tutorials, and engages with students to support their learning and academic development in a university or college environment (Entwistle & McCune, 2019). Lecturers present lectures, facilitates classroom discussions, and assesses student work, often holding a role in curriculum development and academic advising (Beineke & Leat, 2022). Lecturers deliver

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instruction in a particular subject area at a post-secondary institution and may also engage in scholarly research or administrative tasks (Knight & Trowler, 2021). Lecturers are responsible for delivering course content, facilitating student learning, and contributing to academic discussions in their field (Laurillard, 2020). Lecturers provide lectures and seminars, and are involved in the academic and professional development of students within a college or university setting (Gibbs, 2019). Lecturers deliver lectures, conduct tutorials, and supervise student projects or research, often holding a postgraduate qualification (Ramsden, 2021). Therefore, lecturers are involved in the academic development of students within a university setting through teaching.

Teaching is the process of facilitating learning by imparting knowledge, skills, and values through various instructional methods and strategies (Biggs & Tang, 2021). Teaching is an interactive process where educators guide students through structured activities to develop understanding and skills in specific subject areas (Hattie & Yates, 2021). According to Wiggins & McTighe, (2020), Teaching is the act of delivering content, engaging students in learning activities, and assessing their progress to facilitate academic and personal growth. Teaching is the intentional act of creating learning experiences that help students acquire knowledge and skills, while also fostering critical thinking and problem-solving abilities (Bransford, Brown & Cocking, 2020). Teaching involves planning, delivering, and evaluating instructional activities to support students' learning and development in various contexts (Gibbs, 2019). Ramsden, (2021) stated that Teaching practices designing and implementing educational activities that enable students to achieve learning objectives and gain practical skills. Teaching conveys knowledge and skills to students through lectures, discussions, and hands-on activities, aimed at achieving specific educational goals. Teaching guides students through structured learning experiences, assessments, and feedback to promote understanding and application of content (Entwistle & McCune, 2019). Knight & Trowler (2021) further stated that Teaching facilitates of learning through the provision of resources, instruction, and support to help students develop competencies and achieve educational objectives. Teaching involves the delivery of educational content, engaging students through various methods, and assessing their learning outcomes to enhance their academic progress (Black & Wiliam, 2020).

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Lecturers play a critical role in the successful implementation of blended learning, as their teaching methods and assessment strategies directly influence students' academic performance and engagement. However, the extent to which lecturers utilize blended learning approaches in teaching Computer and Robotic Education and how this utilization affects students' assessment remains a subject of interest. Blended learning has gained significant attention in higher education, including in public universities in Enugu State, where it is being adopted to enhance student assessment outcomes in fields like Computer and Robotic Education. Research suggests that the implementation of blended learning, which combines online and face-to-face instruction, can positively impact student performance and satisfaction. In the context of Enugu State's public universities, blended learning's impact on subjects like Computer and Robotic Education would depend on how well lecturers integrate these elements into their teaching. Adequate training for instructors and access to robust digital platforms are essential to achieving positive outcomes.

#### **Statement of the Problem**

In recent years, the rapid advancement of technology has necessitated the integration of innovative teaching approaches, such as blended learning, in educational systems worldwide. Blended learning, which combines traditional classroom teaching with online learning activities, has been recognized for its potential to enhance students' learning experiences and outcomes. In disciplines like Computer and Robotic Education, where both theoretical knowledge and practical skills are critical, the adoption of blended learning methods is particularly relevant.

Despite the growing recognition of blended learning's benefits, there is a concern that its utilization in public universities, particularly in Enugu State, Nigeria, is not yet known.

In the light of the above, this study seeks to determine the Extent of Utilization of Blended Learning by Lecturers for teaching and Students' Assessment in Computer and Robotic Education in Public Universities in Enugu State.

### **Research Questions**

The main purpose of this study was to determine the Extent of Utilization of Blended Learning by Lecturers on Students' Assessment in Teaching Computer and Robotic Education in Public Universities in Enugu State. Specifically, the study sought to determine:

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1. the extent to which Lecturers utilize blended learning to conduct diagnostic assessment for teaching and student's assessment in Computer and Robotics Education in public universities in Enugu State.

2. the extent to which Lecturers utilize blended learning to conduct criterion-referenced assessment for teaching and students' assessment in Computer and Robotics Education in public universities in Enugu State.

## **Research Questions**

The following research questions guided the study.

 To what extent do Lecturers utilize blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education in public universities in Enugu State?
 To what extent do Vocational Education Lecturers utilize e-assessment platforms to conduct criterion-referenced assessment for teaching and students' assessment in Computer and Robotics Education in public universities in Enugu State?

### **Hypotheses**

 $H_{01}$ : There is no significant difference in the mean ratings of Lecturers teaching and assessing students in Computer and Robotics Education on the extent of utilization of blended learning to conduct diagnostic assessment with respect to years of experience in public universities in Enugu State.

 $H_{02}$ : There is no significant difference in the mean ratings of Lecturers teaching assessing students in Computer and Robotics Education on the extent of utilization of blended learning to conduct criterion-referenced assessment with respect to years of experience in public universities in Enugu State.

### Methodology

This study adopted descriptive survey. The area of the study was Enugu State, Nigeria and it was conducted in public universities. The population for the study is 32 lecturers comprised of male and female Lecturers teaching Computer and Robotics Education in University of Nigeria, Nsukka and Enugu State University of Science and Technology. The Population of Lecturers from University of Nigeria Nsukka is 22 while the population of lecturers from Enugu State University of Science and Technology is 10 making the total population 32.Total population sampling technique was used to select all the 32 lecturers in the study area since the population is relatively small and manageable. Structured questionnaire was developed by the researcher and used for data collection. The Eze, A.O; Olelewe, C.

questionnaires consisted of two sections: I and II. Section I help the researcher to obtain the demographic information from the respondent. Section II was divided into parts, A to B. Part A elicited data from the extent Lecturers utilize blended learning to carry out diagnostic assessment in teaching Computer and Robotics Education in universities in Enugu State, made up of 10 items; Part B contained information on the extent Lecturers teaching Computer and Robotics Education utilize blended learning to carry out criterion-referenced assessment in teaching Computer and Robotics Education utilize blended learning to carry out criterion-referenced assessment in teaching Computer and Robotics Education in public universities in Enugu State with 8 items. Each item in Part A - B has a 4 - point response options as follows: Highly utilized (HU) = 4, Utilized (U) = 3, Moderately Utilized (MU) = 2 and Not Utilized (NU) = 1

The research instrument was face-validated by three experts. Two were from Computer and Robotics Education, University of Nigeria, Nsukka, while the third expert was from the Department of Business Education, University of Nigeria Nsukka. Reliability of the instrument was determined by administering the instrument to 20 lecturers in public universities in Anambra State, which was outside the study area. The consistency of the instrument was obtained using Cronbach's Alpha statistics which vielded .75 and .73 with the overall reliability co-efficient of 0.74. It was mostly used to determine internal consistency when there are multiple items in a questionnaire that form a scale. The data for this study was gathered by the researcher with the assistance of two research assistants. The data collected from the respondents was analyzed using mean and standard deviation to answer the two research questions, while the hypotheses were tested using t-test statistic at 0.05 level of significance using SPSS (Statistical Package for Social Sciences). The mean score was explained using the real limit of numbers as follows: Highly Utilized (HU) = 3.50 - 4.00, Utilized (U) = 2.50 - 3.49, Moderately Utilized (MU) = 1.50 - 2.49 and Not Utilized (NU) = 1.00 - 1.49. Any hypothesis whose significance "sig (2-tailed)" level is less than or equal to the stated 0.05 level of significance, the null hypothesis was rejected but the significance "sig (2-tailed)" level that is greater than 0.05 level of significance was accepted.

#### Results

### **Research Question 1**

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To what extent do Lecturers utilize blended learning for teaching and students' assessment in Computer and Robotics Education to carry out diagnostic assessment in public universities in Enugu State? The collected responses are presented in Table 1 below.

Table 3: Mean and standard deviation ratings on the extent Lecturers utilize blended learning toconduct diagnostic assessment for teaching and students' assessment in Computer and RoboticsEducation in public universities in Enugu State.

		N = 32		
S/N	Item	X	SD	Decision
1	I use Virtual Field Trips to conduct a pre-test to my students before a learning process.	1.40	0.55	NU
2	I often use Learning Management Systems for assessing students before a learning process	2.68	1.21	U
3	I frequently use Collaborative Projects to conduct a pre-test before to my students.	1.29	0.50	NU
4	I employ Mobile Learning Apps to conduct a pre-test to my students.	1.95	1.11	MU
5	I use Interactive Online Simulations to conduct a pre-test before a learning process.	1.22	0.51	NU
6	I often use Self-Paced Learning to conduct an assessment before a learning process.	1.24	0.52	NU
7	I frequently use Collaborative Projects to conduct quick pre-tests before a learning process.	1.31	0.55	NU
8	I use Real-Time Assessments to assess students' knowledge before introducing an instruction.	1.56	0.99	MU
9	I use Online Discussion Forums to conduct a pre-test before an instruction is introduced.	1.76	0.96	MU
10	I use Peer Review Systems to conduct a pre-test before a learning process.	1.40	0.92	NU
	Cluster Mean	1.58	0.78	MU

Key:  $\overline{X}$ = mean; SD = Standard Deviation; NU = Not Utilized; MU = Moderately Utilized; U = Utilized; N = Number.

Data presented in Table 1 shows that six items out of ten have means ranging from 1.22 to 1.40 indicative of not utilized while three items have their means ranging from 1.56 to 1.95 indicating moderately utilized and one item has a mean rating of 2.68 indicating utilized.

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The result indicates that six blended learning are not utilized, three are moderately used and one is utilized by Lecturers in teaching Computer and Robotics Education. The overall mean which is 1.58 also indicates that Lecturers utilize blended learning for teaching and students' assessment in Computer and Robotic moderately blended. The standard deviations of the ten items ranging from 0.51 to 1.11 showed that the respondents were close to the mean which indicate that respondents were not far from each other in their responses.

## **Research Question 2**

To what extent do Lecturers utilize blended learning for teaching and students' assessment in Computer and Robotics Education to carry out criterion-referenced assessment in public universities in Enugu State?

The collected responses are presented in Table 2below.

 Table 2: Mean and standard deviation ratings on the extent Lecturers utilize blended learning to

 conduct criterion-referenced assessment for teaching and students' assessment in Computer and

 Robotics Education in public universities in Enugu State.

		N = 32		
S/N	Item	X	SD	Decision
1	I use Flipped Classrooms to conduct an advanced placement Examinations in school.	1.59	0.95	MU
2	I often use Virtual Field Trips to conduct an advanced placement examination.	1.45	0.70	NU
3	I frequently use Online Discussion Forums to conduct advanced placement examinations.	2.33	1.13	MU
4	I use Peer Review Systems for advanced examinations for my students.	1.20	0.40	NU
5	I frequently use Real-Time Assessments in advanced placement examinations.	1.77	0.95	MU
6	I employ Flipgrid in advanced placement examinations in school.	1.34	0.63	NU
7	I use Collaborative Projects to conduct an end of advanced placement examinations	1.25	0.44	NU
8	I use AI-Powered Learning Platforms in an advanced placement examination.	1.47	0.92	NU
	Cluster Mean	1.55	0.77	MU

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Key:  $\overline{X}$ = mean; SD = Standard Deviation; NU = Not Utilized; MU = Moderately Utilized; U = Utilized; N = Number.

Data presented in the Table 2 show that five items has means ranging from 1.20 to 1.47 indicating not utilized while three items have means ranging from 1.59 to 2.33 indicating moderately utilized. The overall mean which is 1.55 also indicates that Lecturers utilize blended learning for teaching and students' assessment to conduct referenced-criterion assessment in Computer and Robotics Education moderately. The standard deviations of the eight items ranging from 0.40 to 1.13 showed that the respondents were close to the mean which indicate that respondents were not far from each other in their responses.

### **Test of Hypothesis**

 $H_{03}$ : There is no significant difference in the mean ratings of Lecturers on the extent of utilization of blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education with respect to years of experience in public universities in Enugu State.

Table 3: ANOVA analysis of the mean responses of Lecturers on the extent of utilization of blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education with respect to years of experience in public universities in Enugu State.

Source	Group	Sum of Square	df	Mean Square	F	p-value	Remark
Overall	Between Groups	2.974	2	1.487	2.302	0.056	NS
	Within Groups	7.807	92	0.085			
	Total	10.781	94				

Not Significant at 0.05

The one -way ANOVA presented on Table 7 show the statistical mean square, F ratio, degree of freedom and p-value responses of Lecturers on the extent of utilization of blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education with respect to years of experience in public universities in Enugu State. The table showed the cluster F-ratio of 216.378, at 94 degree of freedom and p-value of 0.056 which is greater than 0.05. Thus, the null hypothesis was accepted that there is no significant difference in the mean ratings among the years of

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experience of Lecturers on the extent of utilization of blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education in public universities in Enugu State.

 $H_{04}$ : There is no significant difference in the mean ratings of Lecturers on the extent of utilization of blended learning to conduct criterion-referenced assessment for teaching and students' assessment in Computer and Robotics Education with respect to years of experience in public universities in Enugu State.

Table 4: ANOVA analysis of the mean responses of Lecturers on the extent of utilization of blended learning to conduct criterion-referenced assessment for teaching students' assessment in computer and robotics education with respect to years of experience in public universities in Enugu State.

Source	Group	Sum of square	df	Mean Square	F	p-value	Remark
Overall	Between Groups	1.100	2	0.550	108.544	0.071	NS
	Within Groups	3.938	92	0.043			
	Total	5.038	94				

Not Significant at 0.05

The one -way ANOVA presented on Table 4 show the statistical mean square, F ratio, degree of freedom and p-value of responses among the years of experience of Lecturers teaching computer and robotics education on the extent of utilization of blended learning to conduct criterion-reference assessment for teaching and students' assessment in Computer and Robotics Education in public universities in Enugu State. The table showed the cluster F-ratio of 108.544, at 94 degree of freedom and p-value of 0.071 which is greater than 0.05. Thus, the null hypothesis was accepted that there is no significant difference in the mean ratings of Lecturers teaching computer and robotics education on the extent of utilization of blended learning to conduct criterion-reference assessment for students' assessment with respect to years of experience in public universities in Enugu State.

**Findings of the study** 

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The major findings of the study are outlined based on the following research questions answered and the hypotheses tested.

1. The findings revealed that blended learning are not used for collaborative projects, interactive online simulations, self-paced learning, video tutorials, and peer review systems while blended learning are moderately utilized for mobile learning apps, real-time assessments and online discussion forum. And blended learning is only utilized for Learning Management Systems by Lecturers to conduct diagnostic assessment in teaching computer and robotics education in public universities in Enugu State. The findings also revealed that there is no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of e-assessment platforms blended learning to conduct diagnostic assessment in teaching computer and robotics education for students' assessment in public universities in Enugu State.

2. The findings also revealed that blended learning are not utilized for virtual field trips, peer review systems, video tutorials, collaborative projects and Ai-powered projects in teaching computer and robotics education for students' assessment while flipped classrooms, online discussion forums and real-time assessments are moderately utilized by lecturers to conduct criterion-referenced assessment in teaching computer and robotics education for students' assessment. The findings also revealed that the Lecturers moderately utilize blended learning to conduct criterion-reference assessment for students' assessment in teaching computer and robotics education in public universities in Enugu State. The findings also revealed that there is no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of blended learning to conduct criterion-reference assessment for students' assessment in teaching computer and robotics education in public universities in Enugu State.

## **Discussion of the Findings**

The findings on Table 1 revealed that blended learning are not used for collaborative projects, interactive online simulations, self-paced learning, video tutorials, and peer review systems while blended learning are moderately utilized for mobile learning apps, real-time assessments and online discussion forum. And blended learning is only utilized for Learning Management Systems by Lecturers to conduct diagnostic assessment in teaching computer and robotics education for students'

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assessment. The result also revealed that the Lecturers moderately utilize blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education. This can be seen from the overall mean ratings of the use of blended learning listed which is 1.58 within the boundaries of 1.50 to 2.49 indicating moderately utilized by Lecturers. From the above results, it can be discovered that most Lecturers use only learning management systems to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education. Also, Table 3 shows that there is no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of blended learning to conduct diagnostic assessment for teaching and students' assessment in Computer and Robotics Education.

The finding is in agreement with the opinion of ERIC (2022) that blended learning is used for Learning Management Systems which Lecturers use in teaching computer and robotics education for students' assessment.

The result in Table 2 revealed that blended learning are not utilized for virtual field trips, peer review systems, video tutorials, collaborative projects and Ai-powered projects for teaching and students' assessment in Computer and Robotics Education while flipped classrooms, online discussion forums and real-time assessments are moderately utilized by lecturers to conduct criterion-referenced assessment for teaching and students' assessment in Computer and Robotics Education. The findings also revealed that the Lecturers moderately utilize blended learning to conduct criterion-reference assessment for teaching and students' assessment in Computer and Robotics Education. This can be seen from the overall mean ratings of the use of blended learning listed which is 1.55 within the boundaries of 1.50 to 2.49 indicating moderate utilization by Lecturers. Table 4 show that there is no significant difference in the mean ratings of Lecturers with respect to years of experience on the extent of utilization of blended learning to conduct criterion-reference assessment in Computer and Robotics Education.

The result was in conformity with the study of SpringerOpen (2022) and BMC Medical Education (2022) who affirmed that Lecturers utilize blended learning for flipped classrooms, online discussion forums and real-time assessments to conduct referenced-criterion assessment for teaching and students' assessment in Computer and Robotics Education.

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## Conclusion

In conclusion, the rapid advancement of technology has highlighted the importance of integrating innovative teaching methods, such as blended learning, into educational systems. Blended learning, which merges traditional classroom instruction with online components, has shown significant potential in enhancing students' learning experiences, particularly in fields like Computer and Robotic Education where both theory and hands-on skills are crucial. However, the extent to which this approach is being utilized in public universities in Enugu State, Nigeria, remains unclear. This study, therefore, aimed to explore and determine how extensively lecturers in these institutions are incorporating blended learning in their teaching and assessment of students in Computer and Robotic Education. The use of blended learning if properly maximized play major roles in helping Lecturers in their teaching and assessment of students in Computer and robotic Education, and few were utilized. Few were also not utilized.

### Recommendations

Based on the findings of the study, the researcher made the following recommendations:

Based on the findings of this study, the following recommendations are proposed:

1. Public universities in Enugu State should organize regular training workshops and seminars for lecturers to improve their digital literacy and equip them with the skills needed to effectively implement blended learning in their teaching, particularly in Computer and Robotic Education.

2. The government and university administrators should invest in the necessary technological infrastructure, such as high-speed internet, online learning platforms, and digital tools, to support the effective adoption of blended learning in classrooms.

3. Policy Formulation and Implementation: Educational policymakers should develop clear guidelines and policies that encourage and support the integration of blended learning into the curriculum, especially in fields that require both theoretical knowledge and practical skills, such as Computer and Robotic Education.

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### **Conflict of Interest:**

The authors have no competing interests to declare for this article.

### References

- Banyen, N., et al. (2016). Blended learning tools for mathematics education. *Eurasia Journal of Mathematics, Science and Technology Education*.
- Beineke, J., & Leat, D. (2022). Understanding Teaching and Learning in Higher Education: The Role of Lecturers. *Educational Studies*, 48(3), 310-327. doi:10.1080/03055698.2021.1956345
- Bennett, R. E. (2021). Formative Assessment: A Critical Review. Assessment & Evaluation in Higher Education, 46(3), 346-357. doi:10.1080/02602938.2020.1831740
- Bers, M. U., & Horn, M. S. (2021). *Tinker and Build: Developing a Robotic Pedagogy for Elementary Education*. Routledge.
- Biggs, J., & Tang, C. (2021). Teaching for Quality Learning at University: What the Student Does. McGraw-Hill Education.
- Black, P., & Wiliam, D. (2020). Developing the Theory of Formative Assessment. Assessment in *Education: Principles, Policy & Practice*, 27(1), 46-63. doi:10.1080/0969594X.2019.1663482
- Black, P., & Wiliam, D. (2020). Developing the Theory of Formative Assessment. Assessment in *Education: Principles, Policy & Practice*, 27(1), 46-63. doi:10.1080/0969594X.2019.1663482
- BMC Medical Education. (2022). *Impact of blended learning on learning outcomes*. Retrieved from https://bmcmededuc.biomedcentral.com.
- Boud, D., & Falchikov, N. (2021). Reassessing Assessment: A Critical Perspective. Assessment & Evaluation in Higher Education, 46(2), 192-204. doi:10.1080/02602938.2020.1814051
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2020). How *People Learn: Brain, Mind, Experience, and School.* National Academies Press.
- Brookhart, S. M. (2020). How to Assess Authentic Learning. Educational Assessment, Evaluation and Accountability, 32(3), 379-394. doi: 10.1007/s11092-020-09376-2
- Couse, L. J., & Chen, D. (2020). Robotics and Computational Thinking in Early Childhood: A Review. *Journal of Educational Computing Research*, 57(5), 1199-1218. doi: 10.1177/0735633118780462

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- Dziuban, C., et al. (2018). Blended Learning: The New Normal and Emerging Technologies. International Journal of Educational Technology in Higher Education.
- Entwistle, N., & McCune, V. (2019). Teaching and Learning in Higher Education: A Comprehensive Review. Assessment & Evaluation in Higher Education, 44(6), 936-952. doi:10.1080/02602938.2018.1518927
- Entwistle, N., & McCune, V. (2019). Teaching and Learning in Higher Education: A Comprehensive Review. Assessment & Evaluation in Higher Education, 44(6), 936-952. doi:10.1080/02602938.2018.1518927
- ERIC. (2022). Blended Learning Implementation in Education. Retrieved from https://files.eric.ed.gov.
- Fry, H., Ketteridge, S., & Marshall, S. (2021). A Handbook for Teaching and Learning in Higher Education: Enhancing Academic Practice. Routledge.
- Fuchs, L. S., & Fuchs, D. (2020). The Role of Formative and Diagnostic Assessment in Early Intervention. Journal of Learning Disabilities, 53(4), 319-334. doi: 10.1177/0022219420912656
- Gibbs, G. (2019). Teaching Large Classes in Higher Education: A Handbook for Practitioners. Routledge.
- Gibbs, G. (2019). Teaching Large Classes in Higher Education: A Handbook for Practitioners. Routledge.
- Graham, C.R. (2022). Current research in blended learning. Blended Learning in Action.
- Grover, S., & Pea, R. D. (2018). Computational Thinking in K-12: A Review of the Literature. *Educational Psychologist*, 53(4), 313-339. doi:10.1080/00461520.2018.1503137
- Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77(1), 81-112. Doi: 10.3102/003465430298487
- Hattie, J., & Yates, G. C. R. (2021). Visible Learning: Feedback. Routledge.
- Hattie, J., & Yates, G. C. R. (2021). Visible Learning: Feedback. Routledge.
- Johnson, D. W., & Johnson, R. T. (2021). Robotics and Computer Science in Education: Innovations and Applications. Journal of Technology Education, 32(3), 46-60. doi:10.21061/jte.v32i3.a4
- Kafai, Y. B., & Burke, Q. (2019). Constructionist Gaming: Under the Hood of Game Design for Learning. *Educational Technology Research and Development*, 67(5), 1259-1281. doi: 10.1007/s11423-019-09648-7
- Knight, P., & Trowler, P. (2021). The Role of the Lecturer in Higher Education: A Comparative Study. Higher Education Quarterly, 75(2), 161-177. doi:10.1111/hequ.12279
- Knight, P., & Trowler, P. (2021). The Role of the Lecturer in Higher Education: A Comparative Study. *Higher Education Quarterly*, 75(2), 161-177. doi:10.1111/hequ.12279

Eze, A.O; Olelewe, C.

- Kogan, M., & Hanney, S. (2020). *Reforming Higher Education: A Comparative Study of Policy and Practice*. Routledge.
- Laurillard, D. (2020). Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology. Routledge.
- Laurillard, D. (2020). Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology. Routledge.
- Levin, D. M., & Waugh, R. (2020). Robotics in Education: A Review of Current Practices and Future Directions. *Computers in Human Behavior*, 108, 106-114. doi:10.1016/j.chb.2020.106159
- Lim, D.H., & Wang, T. (2016). Blended learning for higher education: A case of a graduate-level course. Asia Pacific Education Review.
- Lye, S. Y., & Koh, J. H. L. (2019). Review of Recent Research on Computational Thinking in Education: A Systematic Review. *Educational Technology & Society*, 22(1), 47-62. Retrieved from https://www.jstor.org/stable/26879528
- McMillan, J. H. (2018). *Classroom Assessment: Principles and Practice for Effective Standards-Based Instruction.* Pearson Education.
- Medina, L.C. (2018). Blended learning: Deficits and prospects in higher education. Education Sciences.
- Papert, S. (2021). Mindstorms: Children, Computers, and Powerful Ideas. Basic Books. (Original work published 1980)
- Phillips, R., McNaught, C., & Kennedy, G. (2016). Blended learning and higher education: Teaching, learning, and technology. Routledge.
- Picciano, A.G., Dziuban, C.D., & Graham, C.R. (2014). Blended Learning: Research Perspectives, Volume 2. Routledge.
- Pomerantz, J., & Brooks, D.C. (2022). ECAR Study of Undergraduate Students and Information Technology, 2022. Educause Review.
- Popham, W. J. (2017). Classroom Assessment: What Teachers Need to Know. Pearson Education
- Ramsden, P. (2021). Learning to Teach in Higher Education. Routledge.
- Ramsden, P. (2021). Learning to Teach in Higher Education. Routledge.
- Romero, M., & Gómez, A. (2019). Teaching Robotics and Computer Programming in Primary Education: A Systematic Review. *Education and Information Technologies*, 24(2), 1037-1057. doi: 10.1007/s10639-018-9827-2
- Shepard, L. A. (2019). The Role of Classroom Assessment in Teaching and Learning. Assessment in Education: *Principles, Policy & Practice*, 26(2), 232-245. doi:10.1080/0969594X.2019.1611232

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Shu, H., & Gu, X. (2018). Determining the effectiveness of blended learning strategies on student engagement. *Journal of Educational Technology*.

SpringerOpen. (2022). *Face-to-face vs. blended learning in higher education*. Retrieved from https://educationaltechnologyjournal.springeropen.com.

StratX ExL. (2023). 8 Blended Learning Trends in 2023. StratX ExL.

- Tight, M. (2019). The Role of the Lecturer in Higher Education: Perspectives from International Contexts. *Journal of Higher Education Policy and Management*, 41(1), 35-48. doi:10.1080/1360080X.2019.1679720
- Torrisi-Steele, G. (2016). Blended *learning: Deficits and prospects in higher education*. Educational Technology & Society.
- Trowler, P. (2021). Teaching and Learning in Higher Education: A Critical Approach. Routledge.
- Vasyura, S.A., et al. (2020). Psychological characteristics of students' educational activities in the context of blended learning. *Eurasia Journal of Mathematics, Science and Technology Education*.
- Wiggins, G., & McTighe, J. (2020). Understanding by Design: Framework for Effective Teaching and Assessment. ASCD.
- Wiliam, D. (2018). Creating the Schools Our Children Need: Why What We're Doing Now Won't Help Much (and What We Can Do Instead). Learning Sciences International.
- Yadav, A., Hong, H., & Zhang, Y. (2019). Computational Thinking and Computer Science Education: A Systematic Review of the Literature. *Education and Information Technologies*, 24(3), 3055-3075. doi:10.1007/s10639-019-09998-2

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