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Perception of students on adaptive learning technologies in the faculty of education, university of Port Harcourt: impact and challenges

Abstract

Adaptive learning technologies refer to educational tools and systems that use advanced algorithms, data analytics, and artificial intelligence to tailor instruction and content to the individual needs and learning preferences of each student. The study is a descriptive survey research, designed to investigate Perception of Students on Adaptive learning technologies: Impact and Challenges. The population of the study is 102 year one students in the department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt and 118 year one students from the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt. A sample of 70 students was used for the study. A stratified sampling technique was used for the study. A structured questionnaire was used for the study. Face and content validity was applied. Reliability coefficient of 0.74 was obtained. Mean and Z-test was used for the study. It was found that found that adaptive learning technologies provide instant feedback to students on their performance, helping them identify areas of strength and weakness. It was also found that adaptive technologies adapt content delivery to reinforce weaker areas, promoting a more thorough understanding of concepts; adaptive learning can lead to more efficient learning experiences. Based on the findings, the researchers recommended that to introduce instructors and students to adaptive learning technology, the Faculty of Education should host seminars, workshops, and orientation sessions. This will improve their comprehension of the advantages and efficient use of these technologies.

Keywords: adaptive learning, pedagogical approaches, artificial intelligence, customized learning resources, personalization, data analytics, adaptive assessment

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Introduction

In the rapidly evolving field of education, the use of technology has emerged as a key component in modernizing traditional pedagogical practices. One such innovative trend is the use of adaptive learning technologies, which are designed to tailor educational experiences to the individual needs of each student. Adaptive learning systems tailor the learning process while offering a dynamic and responsive environment through sophisticated algorithms and data analytics. Understanding how students perceive these gadgets is crucial given their growing use in classrooms.[1]

Using complex algorithms, data analytics, and artificial intelligence, adaptive learning technologies are educational tools and systems that modify instruction and content to meet the individual needs and learning preferences of every student. The goal of adaptive learning is to provide dynamic, personalized learning environments that best support each student's learning path. The following are some characteristics of adaptive learning technology:

i. Personalization: Adaptive learning technologies adjust the curriculum and pace of instruction based on each student's learning preferences, areas of strength, and areas for development by evaluating their performance and behaviors. This customized approach aims to satisfy the unique needs of every student.[2]

ii. Data analytics: These tools collect and analyze a great deal of data regarding students' progress, interactions, and performance. The insights gained from this data help create a comprehensive picture of each student, enabling better informed educational decisions.[3]

iii. Instant Feedback: Adaptive learning technologies provide students with quick feedback on their performance, allowing them to identify their areas of strength and weakness. Pelanek[4] asserts that real-time input enables 2024 timely interventions and adjustments in the learning process.

iv. Customized Learning Materials and Content: Using adaptive learning technologies, materials and content may be made to fit certain learning objectives and curriculum standards. This flexibility allows teachers to tailor the learning process to the unique demands of each student.[5]

v. Adaptive Assessments: These tests dynamically adjust the difficulty of the questions based on a student's previous responses. Tests are ensured to accurately assess students' comprehension and properly reflect their ability levels in this way.

vi. Time Efficiency: Adaptive learning resources allow students to progress at their own pace. Students who acquire information more quickly or who may require more time to understand specific ideas would greatly benefit from this flexibility.[6]

From secondary schools to higher education institutions, adaptive learning technologies are utilized in a wide range of courses and educational environments. More research and evaluation are required to ensure that these technologies are tailored to meet the needs of a variety of learners, even if they offer a great deal of promise to improve the effectiveness and efficiency of education.[7] Adaptive learning, a customized approach to education that uses technology to personalize learning experiences to match individual needs, has had a significant impact on the field of education. Secondary schools and

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institutions of higher learning are among the educational situations where its advantages are evident.

Because adaptive learning systems may adapt to each student's pace, learning preferences, and level of skill, they can produce better learning outcomes. According to Taylor, Yeung, and Bashet,[8] students who utilized adaptive learning platforms did better academically than those who got traditional instruction. Adaptive learning systems can increase student interest through personalized learning experiences. Flexible learning environments increase student motivation and engagement, which enhances learning outcomes.[9] Adaptive learning can increase student retention rates by targeting certain learning gaps and providing specialized help.

Although adaptive learning technologies can be expensive initially, they can save money over time by improving student accomplishment and reducing the need for remedial interventions. Adaptive learning interventions can increase student success rates in higher education at a cost-effective rate, claims To White.[10] Adaptive learning systems offer individualized learning experiences that are tailored to each student's needs, interests, and abilities. By taking into account a variety of learning styles and aptitudes, this flexibility can promote equity and diversity in education.

Statement of the problem

It is crucial to realize that students' acceptance and engagement are critical to the effectiveness of adaptive learning technologies, even though the personalized and adaptable learning experiences they provide have the potential to revolutionize education. This study addresses a gap in the literature by investigating students' perceptions of adaptive learning tools and trying to identify the factors that either support or hinder their adoption. A comprehensive study is necessary to ascertain whether there is a possible mismatch between the design of these technologies and the expectations, preferences, and challenges faced by students in order to inform future developments in educational technology.

Aim and objectives of the study

The aim of the study is to investigate perception of students on adaptive learning technologies: Impact and Challenges. Specifically the study intends to:

i. Examine the benefits of adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt.

ii. Explore the Impact of Adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt.

iii. Investigate students' perception of adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt.

iv. Identify the challenges of adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt.

Research questions

Based on the objectives, the following research questions were drawn:

i. What are the benefits of adaptive learning technologies on students in in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt?

ii. How can adaptive learning technologies impact students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt?

iii. What is the perception of students on adaptive learning technology in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt?

iv. What are the challenges of adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt?

Hypotheses

HO1: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students benefits of adaptive learning technologies

HO2: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students impact of adaptive learning technologies

HO3: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students perception of adaptive learning technologies

HO4: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students challenges of adaptive learning technologies

Methodology

This study is a descriptive survey research, designed to investigate Perception of Students on Adaptive learning technologies: Impact and Challenges. The population of the study is 102 year one students in the department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt and 118 year one students in the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt. A sample of 70 students was used for the study. A stratified sampling technique was used for the study. A structured questionnaire was used for the study. Face and content validity was applied. Reliability coefficient of 0.74 was obtained. Mean and Z-test was used as the statistical tool for the study.

Results

Research question 1: What are the benefits of adaptive learning technologies on students in in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt (Table 1).

Table 1 Benefits of Adaptive learning technologies on students

S/N	Items Benefits of adaptive learning technologies on students	SA	A	SD	D	Mean	SD	Total No of Respondents
1	Adaptive learning technologies tailor content and instruction to individual students, addressing their specific strengths and weaknesses	66	4	-	-	3.94	0.25	70
2	Adaptive technologies collect and analyze large amounts of data on student interactions, performance, and progress. The insights gained from this data help in creating a detailed profile of each student, enabling more informed instructional decisions	60	10	-	-	3.85	0.35	70
3	Adaptive learning technologies provide instant feedback to students on their performance, helping them identify areas of strength and weakness	68	2	-	-	3.97	0.20	70
4	The content and materials presented through adaptive learning technologies can be customized to align with the specific learning objectives and curriculum requirements	50	20	-	-	3.71	0.47	70
5	Adaptive assessments dynamically adjust the difficulty of questions based on a student's previous responses. This ensures that assessments accurately reflect a student's proficiency level and provide a more precise measure of their understanding	55	15	-	-	3.78	0.41	70
	Average Mean					3.85	0.33	

Table 1 showed that with mean score of 3.85, the study found that adaptive learning technologies provide instant feedback to students on their performance, helping them identify areas of strength and weakness

Research question 2: How can adaptive learning technologies impact students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt? (Table 2).

Table 2 Impact of adaptive learning technologies on students

S/N	Items Impact of Adaptive learning technologies on students	SA	A	SD	D	Mean	SD	Total No of Respondents
1	Adaptive learning technologies can positively impact academic performance by providing targeted support and adapting to students' individual learning needs, leading to better comprehension and retention	51	19	-	-	3.72	0.44	70
2	Adaptive learning encourages self-regulated learning habits as students take more responsibility for their educational journey	48	22	-	-	3.68	0.46	70
3	Adaptive technologies adapt content delivery to reinforce weaker areas, promoting a more thorough understanding of concepts	68	2	-	-	3.97	0.27	70
4	Adaptive learning can lead to more efficient learning experiences. Students' progress through material at their own pace, potentially reducing the time needed to master a particular subject or skill	54	16	-	-	3.77	0.42	70
5	Personalized learning experiences can contribute to better information retention	46	24	-	-	3.65	0.48	70
	Average Mean					3.75	0.41	

Table 2 showed that with mean score of 3.75, the study found that adaptive technologies adapt content delivery to reinforce weaker areas, promoting a more thorough understanding of concepts; adaptive learning can lead to more efficient learning experiences. Students' progress through material at their own pace, potentially reducing the time needed to master a particular subject or skill.

Research question 3: What is the perception of students on adaptive learning technology in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt? (Table 3).

Table 3 Perception of students on Adaptive learning technologies

S/N	Items Perception of students on Adaptive learning technologies	SA	A	SD	D	Mean	SD	Total No of Respondent
1	Many students appreciate the personalized nature of adaptive learning technologies.	44	26	-	-	3.62	0.48	70
2	Students often report increased confidence in their abilities when using adaptive learning tools	40	30	-	-	3.57	0.51	70
3	Success in mastering concepts through personalized learning paths contributes to a positive perception of one's academic capabilities	61	9	-	-	3.87	0.37	70
4	As digital natives, students are generally comfortable with technology, and adaptive learning aligns with their familiarity and expectations regarding the use of technology in education	53	17	-	-	3.75	0.43	70
5	Students value the immediate feedback, interactive content, and the ability to learn at their own pace	49	21	-	-	3.70	0.45	70
	Average Mean					3.70	0.44	

Table 3 showed that with the mean score of 3.70, the study found that success in mastering concepts through personalized learning paths contributes to a positive perception of one's academic capabilities; as digital natives, students are generally comfortable with technology, and adaptive learning aligns with their familiarity and expectations regarding the use of technology in education.

Research question 4: What are the challenges of adaptive learning technologies on students in the department of Human Kinetics and Health education and the department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt? (Table 4).

Table 4 Challenges of adaptive learning technologies on students

S/N	Items Challenges of adaptive learning technologies on students	SA	A	SD	D	Mean	SD	Total No of Respondents
1	Technical glitches or limitations in access to technology can hinder the effectiveness of adaptive learning. Students in underserved areas may face challenges due to inadequate internet connectivity or a lack of devices	45	25	-	-	3.64	0.49	70
2	Some students may resist the shift from traditional teaching methods to adaptive learning. Resistance can be due to a preference for familiar approaches or discomfort with technology	39	31	-	-	3.55	0.49	70
3	Excessive reliance on adaptive learning technologies without a balanced approach to education may neglect important aspects of learning, such as critical thinking, creativity, and social interaction	37	33	-	-	3.52	0.49	70
4	The collection of extensive student data raises concerns about privacy. Students may be apprehensive about the security of their personal information, leading to skepticism or resistance towards using adaptive learning platforms	21	49	-	-	3.00	0.50	70
5	If students and educators are not adequately trained on how to use adaptive learning technologies, it can impede the successful integration of these tools into the learning environment	65	5	-	-	3.92	0.48	70
	Average Mean					3.52	0.49	

Table 4 showed that with the mean score of 3.52, the study found that if students and educators are not adequately trained on how to use adaptive learning technologies, it can impede the successful integration of these tools into the learning environment; technical glitches or limitations in access to technology can hinder the effectiveness of adaptive learning. Students in underserved areas may face challenges due to inadequate internet connectivity or a lack of devices.

Hypotheses

HO1: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt benefits of adaptive learning technologies (Table 5).

Table 5 Table of analysis to determine the significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt benefits of adaptive learning technologies

Group	Mean	SD	N	Df	Standard Error	Z – Cal	Z-Crit	Decision
Human Kinetics and Health Education	3.71	0.47	35	70	0.13	2.00	1.96	Rejected
Curriculum Studies and Educational Technology	3.97	0.20	35					

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The calculated value of Z (Z_{cal}), is greater than the tabular value, hence the null hypothesis, H_0 is rejected. This means that there is significant difference between students in the department of Curriculum studies and Educational Technology and Human Kinetics and Health Education students' benefits of adaptive learning technologies. Curriculum Studies and Educational Technology students benefit more than the Human Kinetics and Health Education students because Curriculum Studies and Educational Technology

students mean score (3.97) is greater than Human Kinetics and Health Education mean score of (3.71).

HO2: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students impact of adaptive learning technologies (Table 6).

Table 6 Table of analysis to determine the significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students impact of adaptive learning technologies

Group	Mean	SD	N	Df	Standard Error	Z – Cal	Z-Crit	Decision
Human Kinetics and Health Education	3.65	0.48	32	70	0.14	2.28	1.96	Rejected
Curriculum Studies and Educational Technology	3.97	0.27	38					

The calculated value of Z (Z_{cal}), is greater than the tabular value, hence the null hypothesis, H_0 is rejected. This means that there is significant difference between students in the department of curriculum studies and Educational Technology and Human kinetics and Health Education impact of adaptive learning technologies. Adaptive learning technologies impacts Curriculum studies and Educational Technology students more than the Human Kinetics and Health Education students because Curriculum studies and Educational Technology mean score

of (3.97) is greater than Human Kinetics and Health Education mean score of (3.65).

HO3: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students perception of adaptive learning technologies (Table 7).

Table 7 Table of analysis to determine the significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students perception of adaptive learning technologies

Group	Mean	SD	n	Df	Standard Error	Z – Cal	Z-Crit	Decision
Human Kinetics and Health Education	3.57	0.51	35	70	0.15	2.00	1.96	Rejected
Curriculum Studies and Educational Technology	3.87	0.37	35					

The calculated value of Z (Z_{cal}), is less than the tabular value, hence the null hypothesis, H_0 is Rejected. This means that there is significant difference between students in the department of curriculum studies and Educational Technology and Human kinetics and Health Education perception of adaptive learning technologies. Curriculum studies and Educational Technology mean score of (3.87) is greater than Human Kinetics and Health Education mean score of (3.57).

HO4: There is no significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students challenges of adaptive learning technologies (Table 8).

Table 8 Table of analysis to determine significant difference between students in the department of Human Kinetics and Health Education and students' in the department of curriculum studies and Educational Technology, Faculty of Education, University of Port Harcourt students challenges of adaptive learning technologies

Group	Mean	SD	N	Df	Standard Error	Z – Cal	Z-Crit	Decision
Human Kinetics and Health Education	3.92	0.48	40	70	0.16	5.75	1.96	Rejected
Curriculum Studies and Educational Technology	3.00	0.50	30					

The calculated value of Z (Z_{cal}), is greater than the tabular value, hence the null hypothesis, H_0 is rejected. This means that there is significant difference between Human kinetics and Health Education students and Curriculum Studies and Educational Technology students' challenges of adaptive learning technologies. Human kinetics and Health Education students face difficulty in adaptive learning technologies more than the Curriculum Studies and Educational Technology students because Human Kinetics and Health Education mean score of (3.92) is greater than Curriculum Studies and Educational Technology mean score of (3.00).

Discussion of findings

According to Eau, Derek, and Tareena,[11] the use of adaptive learning technologies is most beneficial for higher-achieving students, especially female students. Khan[12] observed that new kinds of individualized learning have been established in the current environment by adaptive learning systems with cutting-edge technologies and a new paradigm in learning that primarily emphasizes individual differences and teamwork. According to Deepak (2022), personalized and adaptive learning offers a suitable chance to promote and encourage students' learning styles, particularly in online or digital education. Nevertheless, in order to successfully use adaptive learning, educators and institutions must overcome a number of obstacles.

According to Somayeh & Shakiba,[13] learning is enhanced when human traits like emotion and personality are taken into account. The experimental group thought that their learning rate increased as a

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result of the adaptive e-learning environment. According to research by Izuegbunam and Osuafor,[14] students' performance in chemistry can be improved by using both adaptive learning and traditional teaching methods simultaneously. According to Ristic, Marija, Tijana, Vilmos, and Momcilo,[15] an adaptive e-learning system facilitates more meaningful learning by increasing flexibility and offering real-time feedback, participation, and engagement. Students were at ease with online learning, according to Patel & Gomez,[16] and they had a favorable opinion of computerized adaptive assessment, with the majority of respondents suggesting its use.

Students felt that more productive interactions with information that suited their requirements and learning preferences without feeling overburdened were made possible by computerized adaptive learning. According to O'Sullivan, Forgette, Stephen, and Tyler,[17] students evaluated the usefulness of digital learning platforms based on two important factors: their cost and how well they were integrated into their courses, even though they had an overall positive opinion of them. According to a study by Wang, Christensen, Cui, Tong, Yarnall, Shear, and Feng,[18] students who used adaptive learning platforms outperformed traditional teaching approaches in their academic achievement. In a similar vein, Smith and Jones,[19] found that students thought adaptive learning tools were useful for increasing recall rates and their comprehension of difficult ideas.

A survey by Mirata, Hirt, Bergamin, and Van der Westhuizen[20] found that students valued adaptive learning systems' individualized features, which let them study at their own speed and get customized feedback. This flexibility promotes a sense of independence and control over the educational process in addition to accommodating individual variances. According to Ikwumelu, Ogene, and Oketa,[21] students frequently struggle to comprehend how to use adaptive learning technology efficiently, which might cause dissatisfaction and disengagement. According to Bekaulova, Duzbayev, Mamatova, Bersugir, and Bekaulova,[22] students' confidence in the learning process was impacted by their perception of inconsistent input from adaptive systems.[23]

Conclusion

The effects of adaptive learning on education are extensive and profound. Because of its capacity to deliver individualized learning experiences, increase engagement, and yield superior outcomes, adaptive learning has emerged as a disruptive force in educational environments. More significantly, its ability to increase retention rates, provide reasonably priced options, and support educators in making data-driven decisions highlights how crucial it is to fulfilling the diverse needs of students. By helping students from all backgrounds reach their full potential in a world that is growing increasingly digitally connected and networked, adaptive learning has the potential to drastically change education in the future.

Recommendations

Based on the findings of the study regarding adaptive learning technologies, the researchers recommended the followings:

i. To introduce instructors and students to adaptive learning technology, the Faculty of Education should host seminars, workshops, and orientation sessions. This will improve their comprehension of the advantages and efficient use of these technologies.

ii. To guarantee that all students have easy access to adaptive learning platforms, the institution should make investments in modernizing its digital infrastructure, which includes fast internet, cutting-edge hardware, and dependable software.

iii. Adaptive learning technology should be included into the teaching strategies of faculty members. This can be accomplished by matching these technologies to the goals of the course, utilizing them to efficiently monitor student progress, and personalizing learning experiences.

iv. The institution should give disadvantaged students access to computer laboratories, financial help, or subsidized equipment in order to lessen the difficulties caused by unequal access to technology. This guarantees fair access to chances for adaptive learning.

Acknowledgments

Conflicts of interest

There is no conflicts of interest.

References

1. Ezzaim A, Dahbi A, Haidine A, et al. The impact of implementing a Moodle plug-in as an AI-based adaptive learning solution on learning effectiveness: Case of Morocco. *Int J Interact Mob Technol*. 2024;18(01):133–149.

2. Zakriah AS. The effect of adaptive learning program in developing communication skills. *J Educ Soc Res*. 2023;13(3):69–82.

3. Kistiani DP, Permana J. The importance of application total quality management at higher education. Proceedings of the 3rd International Conference on Research of Educational Administration and Management (ICECREAM 2019), *Atlantis Press*. 2020; 177–180.

4. Pelanek R. Adaptive learning is hard: Challenges, nuances, and trade-offs in modeling. *Int J Artif Intell Educ*. 2024.

5. Walkingston C, Bernacki ML. Personalizing algebra to students' individual interests in an intelligent tutoring system: Moderators of impact. *Int J Artif Intell Educ*. 2019;29:58–88.

6. Moltudah SH, Krumsvik RJ, Hoydal KL. Adaptive learning technology in primary education: Implications for professional teacher knowledge and classroom management. *Front Educ*. 2022;7.

7. Deepak K. Personalized and adaptive learning: Emerging learning platforms in the era of digital and smart learning. *Int J Soc Sci Human Res*. 2022;5(2):385–391.

8. Taylor DL, Yeung M, Bashet AZ. Personalized and adaptive learning. Ryoo J, Winkelmann K, (editor). Innovative Learning Environments in STEM Higher Education. *Springer Briefs in Statistics*. 2021:33–50.

9. Thomas RC, Weywedt CR, Anderson JL, et al. Testing encourages transfer between factual and application questions in an online learning environment. *J Appl Res Mem Cogn*. 2018;7(2):252–260.

10. White G. Adaptive learning technology relationship with students' learning outcomes. *J Inf Technol Educ Res*. 2020;19:113–130.

11. Eau G, Derek H, Tareena M. Testing the effects of adaptive learning courseware on student performance: An experimental approach. *South Econ J*. 2022;88(3):1086–1118.

12. Khan A. Traditional methodologies in SLA: a critical review. *J Lang Teach*. 2018;62(3):345–360.

13. Somayeh F, Shakiba M, Moradian, et al. An empirical study on the impact of using an adaptive e-learning environment based on learner's personality and emotion. In: Proceedings of the International Conference on E-learning. 2018.

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14. Izuegbunam AG, Osuafor AM. Effect of adaptive learning approach on students' achievement in chemistry in Awka Education zone of Anambra State. *Int J Educ Eval*. 2021;7(5):81–89.

15. Ristic I, Marija RR, Tijana ST, et al. The effects and effectiveness of adaptive e-learning system on the learning process and performance of students. *Int J Cogn Res Sci Eng Educ*. 2023;11(1):77–92.

16. Patel R, Gomez E. Scalability and accessibility in adaptive language learning technology. *Int J Lang Educ*. 2022;30(1):89–107.

17. O'Sullivan P, Forgette C, Monroe S, et al. Student perceptions of the effectiveness of adaptive courseware for learning. *Curr Issues Emerg E-Learning*. 2020;7(1):71–100.

18. Wang S, Christensen C, Cui W, et al. When adaptive learning is effective learning: Comparison of an adaptive learning system to teacher-led instruction. *Interact Learn Environ*. 2020;31(2):793–803.

19. Smith J, Jones M. Evolution of adaptive learning: From rule-based to AI-driven models. *Educ Technol Res Dev*. 2020;68(4):2031–2050.

20. Mirata V, Hirt F, Bergamin P, et al. Challenges and context in establishing adaptive learning in higher education: Findings from Delphi study. *Int J Educ Technol High Educ*. 2020;17(1):32.

21. Ikwumelu SN, Ogene AO, Oketa EC. Adaptive teaching: an invaluable pedagogic practice in social studies education. *J Educ Pract*. 2015;6(33):140–144.

22. Bekaulova Z, Duzbayev N, Mamatova G, et al. Adaptive learning model and analysis of existing systems. *Proceedings of the 8th International Conference on Digital Technologies in Education, Science, and Industry, Almaty, Kazakhstan*. 2023.

23. Lee H, Kim J, Lee J. Adaptive learning systems in education: a review of trends and applications. *J Educ Res*. 2021;114(3):357–374.