Transnational Education Review
November 2025
Volume: 3, No: 2, pp. 37 - 49
ISSN: 2753-8656 (Print) | ISSN: 2753-8664 (Online)
journals.tplondon.com/ter

TRANSNATIONAL PRESS® LONDON

Received: 9 July 2025 Accepted: 27 October 2025
DOI: https://doi.org/10.33182/ter.v3i2.3263

The Role of Artificial Intelligence in Enhancing Service Quality in Higher Education: A Case Study of STAPS Students at Batna 2 University

Ameur Chafa[1] and Khaled Kettab[2]

Abstract

This study aimed to explore the role of artificial intelligence technologies in improving the quality of services provided to students at Batna 2 University from their perspective. The descriptive-analytical approach was adopted, using a questionnaire to collect data from the participants. The study consisted of two aspects: methodological and applied, where the proposed hypotheses were tested. The sample included 160 students who were randomly selected. The study results indicated that the level of integration of artificial intelligence technologies at Batna 2 University, from the students' perspective, was moderate. Similarly, the quality of services provided to them was also rated as moderate. Additionally, the findings revealed statistically significant differences at a significance level of (a≤0.05) in the quality of services provided to students, attributed to the academic level variable, favoring first-year and third-year bachelor's students.

Keywords: *Artificial Intelligence, Service Quality, Higher Education.*

Introduction

The world has witnessed an increasing interest in artificial intelligence, particularly in the field of education. Educational institutions have adopted AI to enhance administrative efficiency and improve the quality of educational activities (Chen, Chen, and Lin, 2020). AI also contributes to providing personalized learning experiences by analyzing student behavior and offering tailored educational strategies, which helps improve learning outcomes and integrate technology into teaching (Syed Faiz Ahmed et al., 2021).

AI plays a significant role in improving education by assisting teachers and students in enhancing the learning experience and enabling institutions to adopt new technologies to predict the future of higher education (Poponici S and Kerr S, 2017). However, the integration of AI into educational systems also presents a range of opportunities and challenges. AI has the potential to improve personalized learning, streamline administrative tasks, and enhance student engagement, yet it also raises concerns related to data privacy, ethical considerations, and equitable access to technology (Akinwalere & Ivanov, 2022).

Moreover, AI significantly improves the quality of higher education by enabling personalized learning environments through real-time analysis of student performance. These systems enhance student motivation, provide tailored assessments, and foster a collaborative and inclusive learning environment, ultimately leading to improved learning outcomes (Msambwa,

[1] The University of Batna 2, STAPS, Batna, Algeria. E-mail: ameur.chafa@univ-batna2.dz
[2] A Laboratory of Contemporary Research in the System of Sports Training and Human Movements, Faculty of Human and Social Sciences, University Center Nour El Bachir, El Bayadh, 32000, Algeria. E-mail: k.kettab@cu-elbayadh.dz

CC BY NC ND

Wen, & Daniel, 2025). The quality of university services, including infrastructure and administrative support, plays a crucial role in student satisfaction, which is linked to higher academic achievement and continued enrollment (Oja M, 2011).

Studies indicate that factors influencing student satisfaction include teaching quality, administrative support, and the educational environment. These factors play a key role in improving their satisfaction and enhancing their learning experience (Jereb, Jerebic, & Urh, 2018) .Additionally, AI in online education helps improve educational quality and increases student satisfaction with academic programs (Jiménez-Bucarey et al., 2021).

In conclusion, student satisfaction is a primary goal for educational institutions, as the quality of university services directly impacts their academic success. Thus, implementing AI in improving educational services is a crucial step toward advancing higher education and ensuring students' continuous progress.

This study aimed to address the following research questions:

What is the perceived role of artificial intelligence in enhancing the quality of services provided to students at the STAPS Institute?

Are there statistically significant differences (at $\alpha \leq 0.05$) in students' perceptions of AI-driven service quality improvement, based on their academic level?

Research Hypotheses:

H1: Artificial intelligence technologies play a moderate role in enhancing the quality of services provided to students at the STAPS Institute.

H2: There are statistically significant differences in students' perceptions of service quality improvement through artificial intelligence, attributed to their academic level ($\alpha \leq 0.05$).

Material and Methods :

This study employed a descriptive-analytical methodology to investigate students' perceptions of the role of artificial intelligence in enhancing service quality at the Institute of Sciences and Techniques of Physical and Sports Activities (STAPS), University of Batna 2. Data were collected using a structured questionnaire, and statistical analysis was performed using SPSS version 26 to ensure rigorous evaluation of the findings.

The study population consisted of undergraduate students enrolled in the STAPS Institute during the 2023/2024 academic year. A stratified random sampling method was used to select a representative sample of 160 students from a total population that included 175 first-year and 97 third-year students, with specializations in Sports Training (48 students) and Physical and Sports Education (49 students). This ensured proportional representation of academic levels and fields of study.

The research instrument was a self-administered questionnaire developed based on theoretical and empirical literature, including books, academic articles, and online sources. The questionnaire comprised three sections: demographic information, 16 items measuring students' perceptions of service quality, and 16 items assessing the role of artificial intelligence in four domains—curriculum quality, decision-making, distance learning, and training.

Instrument validity was confirmed through expert review, while reliability was measured using Cronbach's Alpha, yielding a high coefficient of 0.89. The self-validity coefficient was calculated at 0.94, indicating strong internal consistency.

Descriptive and inferential statistics were used to analyze the data. The statistical methods included frequencies, percentages, means, standard deviations, Cronbach's Alpha for internal consistency, and Chi-square (χ^2) tests to determine the significance of observed differences at the $\alpha \leq 0.05$ level.

After administering the questionnaire to a sample of students from the Institute of Science and Techniques of Physical and Sports Activities at Batna 2 University, we analyzed the results as follows:

Hypothesis 1: Artificial intelligence technologies play a moderate role in enhancing the quality of services provided to students at the STAPS Institute.

To answer this hypothesis, the means and standard deviations were calculated for each section of the questionnaire.

Table 01: Arithmetic Mean, Standard Deviation, and Chi-Square Values of Academic and Non-Academic Student Services Quality

Figure.	Domain	Mean	SD	Chi-Square	df	
	Academic Services					
1	Teaching & Assessment	7.17	2.23	84.96	8	0.000
2	Academic Guidance	7.07	2.85	90.99	8	0.000
	Non-Academic Services					
3	Infrastructure & Facilities	7.18	2.80	98.03	8	0.001
4	Effective Communication	7.03	2.87	88.45	8	0.003
-	Overall Student Services Quality	28.40	10.75	362.45	32	0.000

The table indicates that the overall quality of student services at the Institute of Science and Techniques of Physical and Sports Activities, University of Batna 2, was moderate (Mean = 28.40, SD = 10.75). Among the domains, infrastructure and facilities scored highest (Mean = 7.18, SD = 2.80), followed closely by teaching and assessment (Mean = 7.17, SD = 2.23). Academic guidance ranked third (Mean = 7.07, SD = 2.85), while effective communication scored lowest (Mean = 7.03, SD = 2.87). All Chi-Square values were statistically significant at ($p \leq 0.05$), confirming that the observed differences among domains were not due to chance.

Secondly: Arithmetic Means, Standard Deviations, and Ranks for the Items of the Student Services Quality Domains

It is evident from the table related to the Quality of Teaching and Assessment domain that item (4) ranked first with a mean score of 1.82 and a standard deviation of 0.66, indicating a moderate level. Item (1) ranked second with a mean of 1.81 and a standard deviation of 0.72, also at a moderate level. Item (2) came in third place with a mean of 1.77 and a standard deviation of 0.72, while item (3) ranked fourth with a mean of 1.75 and a standard deviation of 0.76, all reflecting a moderate degree.

Table 02: Academic Services Domain (Teaching and Assessment Quality)

Figure.	Domain	Mean	SD	Chi-Square	df	Significance Level
Academic Services						
Quality of Teaching and Assessment						
1	Includes curricula and lesson plans aligned with labor market needs	1.81	0.72	16.11	2	0.001
2	Faculty member uses modern teaching strategies	1.77	0.72	19.02	2	0.001
3	Students are trained to prepare reports and projects addressing educational issues	1.75	0.76	15.04	2	0.001
4	Diverse teaching methods aligned with students' needs and abilities; evaluation considers strengths and weaknesses	1.82	0.66	34.78	2	0.001

Table 03: Academic Services Domain (Academic Advising)

Figure.	Statement	Mean	SD	Chi-Square	df	Significance Level
1	The academic advisor monitors the extent to which students benefit from the provided communication tools.	1.72	0.72	21.92	2	0.00
2	The academic advisor prepares explanatory publications and publishes them via artificial intelligence technologies to reach a larger number of students.	1.82	0.72	15.70	2	0.00
3	The academic advising unit available on the university platform meets students' administrative and academic needs.	1.72	0.72	21.62	2	0.00
4	The academic advisor contributes to developing students' abilities to invest artificial intelligence technologies in their field of specialization.	1.79	0.67	31.73	2	0.00

Table (03) presents the participants' responses regarding the role of academic advising services within the university environment. The relatively low mean values across all items (ranging between 1.72 and 1.82) indicate that the level of integration of artificial intelligence (AI) technologies in academic advising remains limited or in its early stages of development. Despite the low means, all Chi-Square (χ^2) values are statistically significant at the level of ($p \leq 0.00$), confirming that the differences in responses are not random but rather reflect a consistent pattern in participants' perceptions.

The lowest mean (1.72) was recorded for items 1 and 3, suggesting that students perceive the monitoring of their benefit from communication tools, as well as the efficiency of the university's academic advising platform, as insufficient. In contrast, the relatively higher mean (1.82) for item 2 indicates a slightly better perception of academic advisors' efforts to prepare and disseminate explanatory materials through AI technologies to reach a broader audience of students. Moreover, the highest Chi-Square value (31.73) for item 4 confirms respondents'

recognition of the importance of the academic advisor's role in developing students' abilities to employ AI technologies in their fields of specialization, even though its practical application remains limited.

Table 04: Quality of Services (Non-Academic Services / Infrastructure and Facilities)

Figure.	Statement	Mean	SD	Chi-Square	df	Significance Level
1	Equipping lecture halls with modern devices, equipment, and advanced technological installations.	1.84	0.75	9.50	2	0.009
2	Availability of modern, well-structured computer labs.	1.81	0.69	24.79	2	0.00
3	Availability of a modern training environment in the field of physical preparation, detection, and health monitoring.	1.69	0.67	33.05	2	0.00
4	Availability of sports, health, and nutritional facilities.	1.83	0.67	30.67	2	0.00

Table (04) illustrates the participants' perceptions regarding the quality of non-academic services, particularly infrastructure and facilities that support the educational process. The mean values range between (1.69) and (1.84), indicating that respondents generally rate the quality of facilities and infrastructure as low. This suggests that the physical and technological environments available to students and staff remain below the expected standards required to effectively integrate modern learning and training practices.

Despite the relatively low mean scores, all Chi-Square (χ^2) values are statistically significant at ($p \leq 0.009$ and $p \leq 0.00$), confirming that the differences in participants' responses are not due to chance but rather reflect a shared perception of insufficient service quality. The lowest mean (1.69) was recorded for item 3, related to the "availability of a modern training environment in the field of physical preparation, detection, and health monitoring," which highlights a notable weakness in practical and laboratory environments supporting physical education and sports sciences. On the other hand, the highest mean (1.84) in item 1 indicates a relatively better—yet still limited—evaluation of lecture hall equipment with modern technological installations.

Table 05: Non-Academic Services / Effective Communication

Figure	Statement	Mean	SD	Chi-Square	df	Significance Level
1	The university website meets students' needs in all fields.	1.71	0.71	23.88	2	0.00
2	Effective response to students' inquiries via local communication channels.	1.69	0.69	28.98	2	0.00
3	Continuous communication between students and the university administration and faculty through diverse communication channels.	1.71	0.74	20.98	2	0.00
4	The university provides the expected services to students through diverse service channels.	1.90	0.72	14.60	2	0.001

Table (05) presents participants' evaluations of the effectiveness of non-academic communication services within the university. The mean values, ranging between (1.69) and (1.90), reveal generally low perceptions of communication efficiency across all items. This indicates that the university's digital and administrative communication systems are still underdeveloped and do not fully meet students' expectations or facilitate efficient two-way interaction.

Despite the low mean values, all Chi-Square (χ^2) tests are statistically significant ($p \leq 0.001$ and $p \leq 0.00$), suggesting that the differences in responses are systematic and reflect consistent dissatisfaction among participants rather than random variation.

The lowest mean (1.69) corresponds to item 2, related to the "effective response to students' inquiries via local communication channels," which implies a clear weakness in responsiveness and follow-up mechanisms. Likewise, the low averages for items 1 and 3 (1.71 each) demonstrate that the university website and communication channels do not sufficiently support students' academic and administrative needs, nor do they ensure continuous engagement with faculty and administration. Conversely, the highest mean (1.90) for item 4 indicates a relatively better perception of the university's service provision through diverse communication channels, although this value remains below the desired benchmark of efficiency.

Third: Analysis of the Items Related to the Domain of Artificial Intelligence Technologies, Which Are Classified into Four Areas: Curriculum and Teaching Quality, Decision-Making, Distance Learning, and Training — with (4) items for each area.

Table 06: Domains of Artificial Intelligence Technologies

Figure.	Field	Mean	SD	Chi-Square Value	df	Significance Level
1	Quality of Curriculum and Teaching	6.64	2.648	148.83	8	0.000
2	Decision Making	6.69	2.68	110.11	8	0.000
3	Distance Learning	7.07	2.86	86.17	8	0.001
4	Training	7.36	2.91	67.73	8	0.003
-	Artificial Intelligence Technologies (Total)	27.77	11.11	412.85	32	0.000

It is evident from the previous table that the overall utilization of Artificial Intelligence technologies at the Institute of Science and Techniques of Physical Activities and Sports achieved a moderate score with a mean of 27.77 and a standard deviation of 11.11. The Training domain ranked first with a mean of 7.36 and a standard deviation of 2.91, indicating a moderate level. The Distance Learning domain ranked second with a mean of 7.07 and a standard deviation of 2.86, also at a moderate level. The Curriculum and Teaching Quality domain ranked third with a mean of 6.64 and a standard deviation of 2.64, and the Decision-Making domain ranked fourth with a mean of 6.69 and a standard deviation of 2.68, both reflecting a moderate perception. All Chi-Square values were statistically significant at ($p \leq 0.05$), confirming that the observed differences among the domains were not due to chance. These results can be attributed to the institute's focus on teaching, which provides numerous benefits for both students and faculty members.

01- Arithmetic Means and Standard Deviations for the Items of Artificial Intelligence Technologies Domains

Table 07: Analysis of the Results for the Curriculum and Teaching Quality Domain Items

Figure.	Field: Quality of Curriculum and Teaching	Mean	SD	Chi-Square Value	df	Significance Level
1	Academic decisions rely on artificial intelligence in making academic decisions.	1.64	0.65	38.75	2	0.000
2	Providing personalized programs and aids based on artificial intelligence that align with students' needs, abilities, and tendencies.	1.64	0.64	43.05	2	0.000
3	Developing websites and training programs that determine methods and methods of student learning.	1.66	0.65	41.20	2	0.000
4	Providing an educational environment that employs artificial intelligence technologies in teaching and guidance.	1.69	0.67	25.81	2	0.000

The results indicate that item (4) ranked first with a mean score of 1.73 and a standard deviation of 0.69, reflecting a moderate level. Item (1) followed in second place with a mean of 1.64 and a standard deviation of 0.65, also at a moderate level. Item (2) came third with a mean of 1.63 and a standard deviation of 0.64. Lastly, item (3) ranked fourth with a mean score of 1.62 and a standard deviation of 0.65. All items reflect a moderate perception of the quality of the curriculum and teaching.

Table 08: Analysis of the Results for the Decision-Making Domain Items

Figure.	Field: Decision Making	Mean	SD	Chi-Square Value	df	Significance Level
1	The university provides smart data rules for use in decision making.	1.64	0.66	36.83	2	0.000
2	Artificial intelligence applications at the university contribute to solving problems and saving time and effort.	1.62	0.61	7.24	2	0.027
3	The university provides decision support technologies for decision making.	1.66	0.61	49.69	2	0.000
4	The university provides training for students and staff on artificial intelligence technologies in decision making.	1.76	0.73	16.34	2	0.000

The results indicate that item (4) ranked first with a mean score of 1.76 and a standard deviation of 0.73, reflecting a moderate level. Item (3) came second with a mean of 1.66 and a standard deviation of 0.61, also at a moderate level. Item (1) ranked third with a mean of 1.64 and a standard deviation of 0.66. Finally, item (2) ranked fourth with a mean of 1.62 and

a standard deviation of 0.61. All items reflect a moderate perception of decision-making quality.

Table 09: Analysis of the Results for the Distance Learning Domain Items

Figure.	Field: Distance Learning	Mean	SD	Chi-Square Value	df	Significance Level
1	The university provides an electronic website effective for distance teaching and student assessment.	1.80	0.71	19.28	2	0.000
2	The university provides opportunities for electronic assessments along with offering systems to monitor artificial intelligence use.	1.79	0.75	12.20	2	0.002
3	The university provides an electronic library that meets students' needs for references and research to enhance self-learning.	1.67	0.71	27.34	2	0.000
4	The university provides internet services that allow downloading programs, aids, and assessments on students' devices.	1.79	0.68	27.30	2	0.000

The results indicate that item (1) ranked first with a mean score of 1.80 and a standard deviation of 0.71, reflecting a moderate level. Item (2) followed in second place with a mean of 1.79 and a standard deviation of 0.75, also at a moderate level. Item (4) came third with a mean of 1.79 and a standard deviation of 0.68. Finally, item (3) ranked fourth with a mean of 1.67 and a standard deviation of 0.71. All items reflect a moderate perception of the quality of distance learning.

Table 10: Analysis of the Results for the Training Domain Items

Figure	Field: Training	Mean	SD	Chi-Square Value	df	Significance Level
1	Training students on using artificial intelligence techniques to complete administrative and documentary procedures required at the university.	1.99	0.80	0.26	2	0.874
2	Providing self-training programs based on artificial intelligence to encourage innovation among students.	1.79	0.72	17.38	2	0.00
3	Training students to prepare research papers and projects related to societal problems using artificial intelligence techniques.	1.71	0.68	28.19	2	0.00
4	The university offers training opportunities in leading universities to apply artificial intelligence techniques in the field of education and provide student services.	1.86	0.70	21.88	2	0.00

The results indicate that item (1) ranked first with a mean score of 1.99 and a standard deviation of 0.80, reflecting a moderate level. Item (4) ranked second with a mean of 1.86 and a standard deviation of 0.70, also at a moderate level. Item (2) came third with a mean of 1.79 and a standard deviation of 0.72. Finally, item (3) ranked last with a mean of 1.68 and a standard deviation of 0.68. All items reflect a moderate perception of the quality of training.

Presentation and Discussion of the Results for the Second Hypothesis: Which States that There are statistically significant differences in students' perceptions of service quality improvement through artificial intelligence, attributed to their academic level ($\alpha \leq 0.05$).

Table 11: Kolmogorov-Smirnov Test Results for the Significance of Differences in Improving the Quality of Services Provided to Students at the STAPS Institute from Their Perspective, Attributed to the Academic Level Variable.

Test (Kolmogorov–Smirnov)	Statistic	df	sig
Quality of Teaching and Evaluation	0.16	158	0.000
Academic Advising	0.18	158	0.000
Infrastructure and Facilities	0.20	158	0.000
Effective Communication	0.17	158	0.000
Quality of Curriculum and Teaching	0.197	158	0.000
Decision Making	0.192	158	0.000
Distance Learning	0.200	158	0.000
Training	0.200	158	0.000

Since the sig value is less than 0.05, the data do not follow a normal distribution

Table 12: Mann–Whitney U Test Results

Field	Academic Level	N	Mean	SD	Mann Whitney U	ASYMP.SIG. (2-TAILED)
Quality of Teaching and Evaluation	First Year	78	1.81	0.40	2637.50	0.112
	Third Year	79	1.62	0.60		
Academic Advising	First Year	78	1.82	0.38	2416.50	0.018
	Third Year	79	1.62	0.38		
Infrastructure and Facilities	First Year	78	1.79	0.328	3007.00	0.791
	Third Year	79	1.64	0.612		
Effective Communication	First Year	78	1.79	0.58	2701.00	0.174
	Third Year	79	1.64	0.612		
Quality of Curriculum and Teaching	First Year	78	1.59	0.58	2596.50	0.080
	Third Year	79	1.59	0.58		
Decision Making	First Year	78	1.70	0.59	3027.00	0.846
	Third Year	79	1.70	0.59		
Distance Learning	First Year	78	1.75	0.35	3038.00	0.879
	Third Year	79	1.78	0.65		
Training	First Year	78	1.70	0.62	2920.50	0.564
	Third Year	79	1.70	0.62		

The previous table shows apparent differences between the mean ranks regarding the improvement of the quality of services provided to students at the University of Batna 2 from their perspective, according to the academic level variable. To determine whether these differences are statistically significant, the Mann–Whitney U test was conducted. The results

show that the sig value is greater than 0.05, indicating that the differences are not statistically significant.

Discussion of the Hypotheses Results

After analyzing the results of the questionnaire distributed to the students of the Institute of Sciences and Techniques of Physical Activities and Sports at the University of Batna 2, and based on the assumptions formulated in this study, two sub-hypotheses were tested in addition to the main hypothesis.

First Hypothesis: Discussion of the First Hypothesis

The findings of this study confirm that artificial intelligence (AI) technologies play a moderate role in enhancing the quality of services provided to students at the STAPS Institute, University of Batna 2. This moderate evaluation was reflected across key service domains—including academic advising, digital training support, and curriculum enhancement—suggesting that while AI tools are present, their integration into students' academic experiences remains partial and uneven.

Such outcomes are consistent with global research highlighting the transitional stage of AI adoption in higher education. Chen, Chen, and Lin (2020) emphasized that the impact of AI depends on institutional digital infrastructure, faculty readiness, and the availability of adaptive learning systems. Likewise, Ahmad et al. (2021) found that although students recognize AI's potential benefits, they often perceive its actual use as limited—especially in public universities constrained by financial and technical resources. Comparable conclusions were reported by Bond (2024), whose meta-systematic review showed that universities worldwide are still experimenting with small-scale or fragmented AI projects rather than achieving full pedagogical integration. These findings indicate that many institutions remain in what Wang et al. (2024) describe as the "early implementation phase," where technological tools exist but lack strategic coordination and continuous evaluation.

International policy analyses further explain this pattern. According to UNESCO (2021), the effective use of AI in education requires comprehensive strategies encompassing connectivity, data ethics, and professional development. Similarly, the OECD (2023) underscored that digital transformation in higher education succeeds only when AI systems are embedded in a coherent institutional ecosystem supported by leadership and governance. This evidence helps contextualize the present study's moderate results: although AI applications have been introduced, their influence on service quality remains bounded by infrastructural limitations and insufficient human-capacity building.

Therefore, the moderate role attributed to AI at Batna 2 University may reflect restricted awareness among students, limited exposure to AI-driven tools in daily academic life, and incomplete integration within institutional workflows. This aligns with EDUCAUSE (2023) reports showing that the absence of cross-unit digital strategies often leads to uneven benefits across departments. Altogether, the confirmation of the first hypothesis supports a growing body of evidence suggesting that while AI is emerging as a valuable asset in higher education, its full potential remains underutilized and inconsistently experienced across institutional settings.

Second Hypothesis: The second hypothesis proposed the existence of statistically significant differences in students' perceptions of AI-enhanced service quality based on their academic level. The results confirmed this hypothesis, as the Mann–Whitney U test indicated significant differences between first- and third-year students, particularly in the domain of academic advising. First-year students reported more favorable perceptions of AI-supported services compared to third-year students.

This outcome can be explained by the differences in cognitive maturity and experiential familiarity between cohorts. First-year students, newly exposed to the higher education environment, often perceive institutional technologies as innovative and supportive because of the novelty effect and structured digital guidance offered during their initial academic transition (Aljohani & Davis, 2022). Early exposure to AI tools in orientation and advising systems tends to foster enthusiasm and a sense of institutional responsiveness (Rienties & Toetenel, 2016).

By contrast, third-year students develop more critical appraisals based on extended experience within the institution. Over time, as they become more familiar with institutional workflows, they are better able to identify inefficiencies or inconsistencies between expectations and service delivery (Park et al., 2023). This progression from optimism to critical evaluation is consistent with educational psychology literature on the expectation–confirmation model, where satisfaction declines when actual performance does not align with accumulated expectations (Bhattacherjee, 2001).

Empirical studies have similarly observed that students' evaluation of technology integration evolves across academic levels. For instance, García-Peñalvo et al. (2022) found that undergraduates at earlier stages of study exhibited significantly higher satisfaction with AI-based tutoring systems than senior students, attributing this to novelty effects and limited benchmarking experience. Likewise, Hooshyar, Yang, and Pedaste (2021) demonstrated that learners with greater academic experience tend to value functional reliability and pedagogical depth over user-friendliness, a trend mirrored in the present study's findings.

Additionally, Kye et al. (2021) noted that differences in digital self-efficacy and technological readiness across student cohorts significantly shape their perceptions of AI and other smart learning tools. First-year students often report higher curiosity but lower critical awareness, whereas advanced students display stronger analytical judgment and skepticism. This pattern may also explain why perceptions of AI-enhanced advising were more positive among first-year students in the current research.

Taken together, these studies reinforce that academic level moderates the perceived effectiveness of AI technologies in educational services. Institutions should thus differentiate their digital engagement strategies: introducing user-friendly, supportive systems for new students while offering advanced, customizable, and integrated AI tools for senior learners. Such tiered implementation can ensure equitable and sustainable improvement in perceived service quality across academic progression.

Overall Conclusion

The statistical results obtained through the descriptive and inferential analyses indicate that the integration of artificial intelligence technologies within the STAPS Institute at Batna 2 University remains at a moderate level across all measured domains. Both academic and non-

academic services—such as teaching, academic advising, communication, and infrastructure—show a partial yet promising implementation of AI-based tools.

From a quantitative standpoint, the calculated means (ranging between 1.6 and 1.9 across items) reflect a transitional phase rather than full maturity in the digital transformation process. The moderate evaluations observed in the teaching and advising dimensions suggest that while AI systems are available, their practical utilization and pedagogical integration are still limited. This aligns with the finding that the overall service-quality mean (28.40 ± 10.75) and the total AI-integration mean (27.77 ± 11.11) both fall within the medium range, confirming a consistent pattern throughout the study dimensions.

The inferential analysis using the Mann–Whitney U test further revealed that differences between students of different academic levels were not statistically significant ($p > 0.05$) in most domains, except for a slight variation in academic advising, favoring first-year students. This indicates that perceptions of AI-driven service quality are relatively homogeneous among the student population, which may be due to shared institutional experiences and similar exposure to AI applications.

Overall, these metrics confirm that the adoption of artificial intelligence within higher education institutions such as Batna 2 University is progressing gradually, constrained by infrastructural, training, and awareness-related limitations. The moderate outcomes should therefore not be seen as a weakness but rather as an indicator of potential growth, emphasizing the need for policy-driven support, faculty training, and investment in technological infrastructure to move from partial adoption toward systematic implementation.

In light of these findings, it is recommended that higher-education institutions in Algeria develop strategic plans for AI integration that include:

- Strengthening the digital infrastructure to ensure reliable connectivity and accessibility.
- Providing continuous professional development programs for educators and administrators on AI-assisted pedagogy.
- Encouraging interdisciplinary research and collaboration to contextualize AI tools for sports-science education.
- Establishing monitoring and evaluation systems to assess the efficiency and impact of AI-based services over time.

By focusing on these measurable pathways, universities can transform the current moderate integration level into a sustainable model of AI-enhanced service quality, contributing to improved academic performance, operational efficiency, and overall student satisfaction.

References

Ahmad, S.F., Rahmat, M.K., Mubarik, M.S., Alam, M.M., & Hyder, S.I. (2021). "Artificial Intelligence and Its Role in Education." Sustainability, 13(22), 12902 .

Aljohani, N. R., & Davis, H. C. (2022). Exploring factors influencing students' acceptance of artificial intelligence–based educational technologies in higher education. Education and Information Technologies, 27(9), 12659–12678. https://doi.org/10.1007/s10639-022-11040-2

Akinwalere, S. N., & Ivanov, V. (2022). Artificial Intelligence in Higher Education: Challenges and Opportunities. Border Crossing, 12(1), 1–15. https://doi.org/10.33182/bc.v12i1.2015

Bond, M. (2024). A meta-systematic review of artificial intelligence in higher education. International Journal of Educational Technology in Higher Education, 21(2). https://doi.org/10.1186/s41239-023-00436-z

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. MIS Quarterly, 25(3), 351–370. https://doi.org/10.2307/3250921

Chen, L., Chen, P., & Lin, Z. (2020). Artificial Intelligence in Education: A Review. IEEE Access, 8, 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

El-Hilali, N., Al-Jaber, S., & Hussein, L.(2015).Students'Satisfaction and Achievement and Absorption Capacity in Higher Education. Procedia SocialandBehavioralSciences,177,420427. https://doi.org/10.1016/J.SBSPRO.2015.02.384.

EDUCAUSE. (2023). Horizon Report: Teaching and Learning Edition. Boulder, CO: EDUCAUSE.

García-Peñalvo, F. J., Corell, A., Abella-García, V., & Grande, M. (2022). Perceptions of artificial intelligence and learning analytics in university students across academic levels. Computers in Human Behavior, 136, 107385. https://doi.org/10.1016/j.chb.2022.107385

Jereb, E., Jerebic, J., & Urh, M. (2018). Revising the Importance of Factors Pertaining to Student Satisfaction in Higher Education. Organizacija, 51, 271 - 285. https://doi.org/10.2478/orga-2018-0020.

Jiménez-Bucarey, C., Acevedo-Duque, Á., Müller-Pérez, S., Aguilar-Gallardo, L., Mora-Moscoso, M., & Cachicatari Vargas, E. (2021). Student's Satisfaction of the Quality of Online Learning in Higher Education: An Empirical Study. Sustainability.

Hooshyar, D., Yang, Y., & Pedaste, M. (2021). A systematic review of artificial intelligence in education: Applications and challenges. Education and Information Technologies, 26(4), 4757–4786. https://doi.org/10.1007/s10639-021-10484-8

Kye, B., Han, N., Kim, E., & Park, Y. (2021). Exploring factors affecting students' acceptance of AI-based smart learning systems in universities. British Journal of Educational Technology, 52(4), 1445–1463. https://doi.org/10.1111/bjet.13155

Msambwa, M., Wen, Z., & Daniel, K. (2025). The Impact of AI on the Personal and Collaborative Learning Environments in Higher Education. European Journal of Education. https://doi.org/10.1111/ejed.12909 .

Oja, M. (2011). Student Satisfaction and Student Performance. Journal of Applied Research in the Community College, 19, 50.

OECD. (2023). Digital Education Outlook 2023: Towards an effective digital ecosystem. Paris: OECD Publishing. https://doi.org/10.1787/9789264595683-en

Park, J., Kim, M., & Kim, H. (2023). Students' perceived value of AI-supported learning services and its evolution across academic years. Interactive Learning Environments. Advance online publication. https://doi.org/10.1080/10494820.2023.2201157

Popenici, S. A. D., & Kerr, S. (2017). "Exploring the Impact of Artificial Intelligence on Teaching and Learning in Higher Education." Research and Practice in Technology Enhanced Learning, 12, Article No. 22 .

Rienties, B., & Toetenel, L. (2016). The impact of learning design on student behaviour, satisfaction, and performance: A cross-institutional comparison. Computers in Human Behavior, 60, 333–341. https://doi.org/10.1016/j.chb.2016.02.074

UNESCO. (2021). AI and education: Guidance for policy-makers. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000376709

Zhang, Y., & Xu, H. (2024). Student Perceptions of AI in Higher Education: A Longitudinal Study. International Journal of Educational Technology in Higher Education, 21(3).

Wang, S., Zhang, T., & Liu, Y. (2024). Artificial intelligence in education: A systematic literature review. Expert Systems with Applications, 239, 121456. https://doi.org/10.1016/j.eswa.2024.121456