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An analytical study of the factors affecting the quality of e-learning in physical activity science and technology institutes in eastern Algeria

دراسة تحليلية للعوامل المؤثرة على جودة التعليم الالكتروني في معاهد علوم وتقنيات النشاطات البدنية والرياضية بالشرق الجزائري

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Abstract:

E-learning is considered one of the modern educational methods and our study aims to reveal the factors affecting its quality in physical activity science and technology institutes in eastern Algeria from the point of view of the professors of these institutes. We adopted the descriptive method, the study sample represented by 48 professors randomly selected from the institutes under study -Souk ahras, Batna, Oum El Bouaghi, Tebessa, and setif-. To collect the necessary data about the studied phenomenon, we designed a questionnaire contained 33 statements distributed over four axes. For statistical processing, we relied on the spss program. The results revealed that:
- Teacher characteristics and The digital content affect the quality of e-learning in the researched institutes.

Keywords: e-learning; physical activity science and technology institutes; influencing factors.

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Introduction:

The field of education is witnessing a series of scientific and technological developments, due to the information revolution and the emergence of modern means and technologies. The continuous growth and progress in the field of education led to the emergence of many systems and tools that facilitated the exchange and acquisition of information and knowledge, hence the trend towards the use of digital and open educational materials in the educational process (Farghal, 2023, p. 5). As an inevitable result of the increasing influence of technology. This has made schools, teachers, and learners adopt e-learning tools that allow teachers to conduct interactive learning, share materials easily, and promote student collaboration and participation. (Villanueva et al., 2024, p. 1741).

In the era of globalization, which is witnessing a huge technological revolution and a variety of modern teaching methods that use information and communication technologies (Al-Qudat, 2021, p. 27). It created competition among educational institutions and the concept of e-learning emerged, which was initially associated with the teacher, and how he presents the means he seeks to use in order to achieve interaction between him and learners in the learning environment, which in turn includes many elements, which may be graphics, sounds, text, static or animated images, in addition to the interactive feature that gives the professor a degree of control over the knowledge. E-learning also provides multiple ways to facilitate the educational process for both the professor and the student, which allowed university professors to shift from traditional educational methods that are characterized by monotony to the use of learning technology that is characterized by fun and excitement, which motivates learners to learn and increases their curiosity. (Alawneh et al., 2023, p. 26)

Silva et al. (2012, p. 215) stated that over the past fifteen years, there has been a vast increase in e-learning applications in schools, academia, and workplaces. Among these settings are the Institutes of Physical Activity Science and Technology, which are educational institutions affiliated with the Ministry of Higher Education and Scientific Research that offer training in the field of physical activity and sports for baccalaureate students (Alali et al., 2023, p. 130).

Researchers (Bourish, Bourish, 2024, p120) have pointed out that despite the positives that e-learning adds to the educational process, its implementation needs planning and organization to obtain a successful educational system, and ensuring this in higher education requires working to raise the quality of all components of the educational process, and a group of international organizations have highlighted many standards, including scorm standards that focused on the use of digital content and its compatibility with various learning management systems, as well as Lom standards that provided a systematic framework for describing digital educational resources to ensure their accessibility and organization according to the characteristics of learners. And the IMS standards focused on the technological integration of the technical environment, which is consistent with what the Quality Matters standards propose, which emphasized that the quality of e-learning is based on the interaction between the content, the teacher and the learner within the technical environment. This includes indicators, objectives, performance, and processes that by their

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nature and application ensure the maintenance of appropriate educational standards (Hosseinzadeh et al., 2019, p. 167), and there is a dearth of studies that analyze the factors that determine the quality of e-learning. (Napal et al., 2025, p. 144), In addition to the lack of studies focusing on the category of professors, as well as the lack of studies on e-learning in physical activity science and technology institutes, hence the need to ask the study question, which is:

- What are the factors affecting the quality of e-learning in physical activity science and technology institutes in eastern Algeria?

The partial hypotheses of the study are as follows:

- Learner characteristics affect the quality of e-learning in the institutes of science and technology of physical activities and sports in eastern Algeria.

- Teacher characteristics have an impact on the quality of e-learning in the researched institutes.

- The quality of the technical environment (infrastructure & technical support) affects the quality of e-learning in the institutes under study.

- The quality of digital content (content quality, design quality, media quality) has an impact on the quality of e-learning in the institutes.

The current research gains its importance from the fact that it comes at a time when many institutes have moved towards employing technologies in the educational process due to the gains they offer that contribute to the activation of education, increase its productivity level and improve its outputs. This makes it important to shed light on the Influencing elements the quality of e-learning as a modern educational technology. The results of this study will give an insight to decision-makers and specialists in e-learning at the level of physical activity science and technology institutes about the factors that affect its quality and thus the achievement of the desired goals in the field.

The study aims to determine the impact of several factors (learner characteristics, teacher characteristics, the quality of the technical environment, which is represented by infrastructure and technical support, the quality of digital content, which is represented by content quality, design quality, and media quality) On the quality of e-learning in the institutes of physical activity science and technology in eastern Algeria, from the perspective of the professors of these institutes.

Previous studies are a reference for building the theoretical framework as they shed light on the most frequently encountered variables, the methodological approaches adopted, as well as the findings of research in different educational contexts. From there, we come to a review of some of the studies in order to provide insight into the efforts related to identifying factors affecting the quality of e-learning.

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-The study of Lilian sarah hiariey and wildoms sahusilawane (2025), which sought to know the impact of several factors on the quality of e-learning and observe their impact on student learning outcomes. Their results showed that media quality and material quality positively and significantly affect the quality of e-learning, while ease of use and information quality show no effect.

- Bu shulayt Rim and Burish Sihem (2023) study, which aimed to test the role of a set of factors (administrative support, course content, course design, teacher characteristics, learner characteristics, social support and technical support) on the quality of e-learning at Maghnia University Center during the COVID-19 period. The results showed that there is a statistically significant affective relationship between administrative support, course design, and e-learning quality.

- The study of Seyyed Mohammad Ali Mirjalili (2021), which aimed to investigate the factors affecting the quality assurance of e-learning from the perspective of student teachers at Farhangian University, and its results revealed that the status of students' skills has an impact on the quality assurance of e-learning, while the status of technology infrastructure components, teachers' skill levels, the accessibility component and the administrative structure factor are not influential.

- Kesavan Vadakalur Elumalai et al. (2020) study, which aimed to study the relationship of seven independent factors (administrative support, course content, course design, course design, teacher characteristics, learner characteristics, social support and technical support) on the quality of e-learning in higher education during the Covid-19 pandemic, and their results highlighted the existence of a direct relationship between the set of variables and the quality of e-learning in the higher education sector.

Based on previous studies, the research methodology differed from one study to another, our study relied on a descriptive and analytical approach. The sample of these studies consisted of university students, except for Mirjalili's (2021) study, in which the sample consisted of student professors, this is in contrast to our study, whose sample consisted of professors. For the data collection tool was the questionnaire in all studies and this is similar to our study.

1. Terminology:

1.1 E-learning:

The concept of e-learning is used by some researchers to signify the intervention of technology in the learning process (al-faraihat et al., 2020, p. 68). It is also defined as a method of teaching using modern communication mechanisms such as networks, computers and various multimedia in order to transmit information to learners as quickly and cheaply as possible and in a way that enables the management of the educational process and the measurement and evaluation of learners' performance (Mazen & Al-Ani, 2015, p. 13). It is considered a creative approach to provide an interactive, learner-centered and well-designed environment based on the characteristics and resources of the Internet and digital

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technologies in accordance with the principles of instructional design (Sedira, Kabouya, 2025, p. 43).

1.1.2 Procedurally, we define it is an educational system that relies primarily on technological media such as digital devices and communication networks, with the aim of transferring knowledge to the learner with the possibility of managing the learning process and evaluating the student's performance with minimal time and effort.

1.2 Quality in e-learning:

Babair (2025, p. 426) indicated that quality in e-learning aims to demonstrate the ability and excellence of educational institutions in offering their study programs, and to ensure that the electronic learner obtains the same quality of education that he obtains following the educational methods based on direct meetings with professors in the classroom. It also extends to include the quality of learning methods, the quality and extent of learner interaction, electronic content, and the teaching staff to obtain knowledge and create learning, in addition to the quality of electronic learning management and the structural design of the learning environment and its integration with educational materials according to the needs of learners, also focuses on collaborative learning where courses are more interactive, attractive and easy to change learners' behaviors (Qurayshi, Rifaa, 2015, p. 227). Zheng et al. (2023, p. 2) see it as the gap between the user's psychological expectations before trying e-learning services and the user's actual experience in receiving those services.

1.2.1 Procedurally: from the above definitions, we see that E-learning quality encompasses all aspects of the e-learning process to reflect the highest levels of efficiency and effectiveness of all the active and constituent factors of e-learning to ensure the achievement of learning objectives with perfection and efficiently.

1.3 Learner characteristics:

The e-learning environment pushes the learner to obtain knowledge himself and develops the desire for self-learning by giving him the freedom to control, according to his abilities and aptitudes, the path and time spent in the learning process (Boukhtala, 2020, p. 35). Since online learning puts all control in the hands of learners, they must take responsibility for planning, organizing, monitoring and evaluating their own learning processes (Villanueva et al., 2024, p. 1742).

1.3.1 Procedural: from this, we see that the learner is the center of attention in this type of education, as it encourages self-learning and allows him to manage the learning process according to his abilities and aptitudes, in addition to developing his technological skills that this type of education requires.

1.4 Teacher characteristics:

The teacher is one of the effective elements to improve the teaching process and reach the required quality (Al-Qudat, 2021, p. 27). His role embodies motivational and directive power, as he should be able to effectively guide the educational process, motivate students to participate, and have deep experience in the field of teaching, in addition to possessing high communication skills to provide a stimulating interactive environment (Al-Bardini, Darwish, 2025, p. 250).

1.4.1 Procedurally: Given the developments brought about by the technological revolution in teaching methods and the learning environment, change comes to the role of the teacher, who is considered the most important actor in the teaching process, so that he should keep

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pace with the technological and educational requirements necessary to provide a teaching environment characterized by the required quality.

1.5 Technical environment:

The e-learning infrastructure is defined by (Abbas, Younis, 2022, p. 100) as a set of technical and human requirements necessary to deliver educational content to the learner. It consists of the preparation of trained human competencies as well as providing communication lines to help transfer this education (Qibli, Qibli, 2022, p. 340). It also includes a network that connects all educational centers to each other, and computers that are used for communication and browsing (Qaribi, Khadawi, 2021, p. 901). Educational software that provides applications for learning management, e-content management, control and monitoring systems for the network (Youssef, 2016, p. 175), as well as software that helps in dealing with educational content.

Al-Bardini and Darwish (2025, p. 250) also indicated that technical support is related to ensuring the stability and effectiveness of the e-learning infrastructure, from educational platforms to technical systems, so there must be a qualified technical team ready to deal with technical obstacles and ensure the provision of the necessary support to users.

1.5.1 Procedural: we can say that the technical environment is characterized by striving to provide a trouble-free learning experience and achieving an immediate response to any technical issue and considering that technical support and infrastructure are part of the quality of e-learning and contribute to an effective learning experience, reflecting the commitment to providing an active and sustainable technical learning environment.

1.6 Digital content :

Al-Husseini et al. (2023, p. 93) stated that e-content is a set of digital pages that include a topic or several topics that are addressed using different and interactive multimedia, and contains several components starting from educational objectives, content, activities, exercises, and evaluations of all kinds. Shama (2024, p. 29) indicated that e-learning content is a collection of information and experiences that provide value to learners, and it is a combination of texts, images, videos, audio and music that are designed in light of the principles of e-learning design. This is in addition to the need for these courses to be characterized by simplicity and logic, and the comprehensiveness of theoretical and practical aspects to meet the learning needs of students, and this reflects the quality of the content for e-learning courses, and the latter should combine flexibility in time and space without compromising the levels of knowledge and skills addressed by the content objectives, and be able to withstand technological developments and continuous changes with the ability to modify educational content and use it several times (Ahmed, Abdel Aziz, 2024, p. 149).

1.5.1 Procedurally: we mean by digital content the quality of the digital educational contents, the quality of the design of the e-learning environment, and the quality of the media used to present the contents. These factors are among the dimensions that affect the quality of e-learning.

2. Methods:

2.1 Methodology used: The study adopted the analytical descriptive method because it aimed to describe the reality of the influential factors and diagnose their level according to

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the opinions of the sample members in addition to analyzing the results and testing their statistical significance based on the hypotheses of the study

2.2 Study population and sample: The community consisted of professors of physical activity sciences and technologys who belonged to the institutes of Eastern Algeria, namely Souk ahras, Oum El Bouaghi, Batna, Setif, and Tebessa The study sample was selected using a simple random sampling method. It consisted of 48 professors from the different institutes mentioned and the following table represents the distribution of the sample members to the institutes

table 1represents the distribution of the sample members among the institutes

Institute of	**Souk Ahras**	**Batna**	**Oum El Bouaghi**	**Tebessa**	**Setif**
N	11	16	8	5	8
Total	**48**				

2.3 Study tool: We used a questionnaire to collect the necessary data, which was designed to include two parts, the first part contains one axis about the personal data, including: The institute to which they belong, specialization, and academic rank.

The second part contained four axes, where the first axis included statements about learner characteristics, the second axis contained phrases that meant teacher characteristics, the third axis included statements about the technical environment (technical support, infrastructure), and the fourth axis contained statements about digital content (content quality, design quality, media quality).

We adopted a five-point Likert scale to evaluate the responses as shown in the table below:

table 2 represents the scale

Five-point Likert scale	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Scale degrees	1	2	3	4	5
Scale categories	1 - 1.79	1.80- 2.59	2.60 - 3.39	3.40-4.19	4.20 - 5

2.3.1 The psychometric properties of the tool:

2.3.1.1 Reliability: To ensure the reliability of the tool, we relied on the apparent reliability, where we presented the questionnaire in its initial form to a group of professors in the field of science and technologies of physical and sports activities from different universities in the country, as shown in Appendix 01. Based on their valuable comments and guidance, the necessary modifications were made, which contributed to enhancing its face validity and making it suitable for application.

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2.3.1.2 Stability: To ensure the stability of the questionnaire, we adopted the internal consistency method by calculating Cronbach's alpha coefficient. The following table shows the coefficient values for each axis of the instrument as well as its value for the questionnaire as a whole:

table 3represents the values of Cronbach's alpha coefficient

Axis	Number of phrases	Cronbach's alpha coefficient value
First Axis	7	0.82
Second Axis	7	0.81
Third Axis	9	0.78
Fourth Axis	10	0.87
Questionnaire as a whole	33	0.92

From table 3, the value of the stability coefficient for all axis ranged between (0.78) and (0.87), which was acceptable, while the total value of the stability coefficient of the questionnaire was (0.92), which in turn was high, which confirms the stability of the study tool.

2.4 Statistical processing:

To analyze the study data, SPSS software was used. We used the Cronbach's alpha test. And tested the normal distribution of the data for each axis through the Shapiro-Wilk test - as shown in table 4 -, we used descriptive analyses (arithmetic mean, standard deviation), t-test (for data that follow a normal distribution), Wilcoxon test (for data that don't follow a normal distribution).

table 4shows the distribution of the data

data	Shapiro-wilk test			Decision
	Test value	df	sig	
the first axis	0.96	48	0.2	Normal distribution
the second axis	0.94	48	0.02	Not normally distributed
the third axis	0.98	48	0.57	Normal distribution
the fourth axis	0.93	48	0.007	Not normally distributed

3. Analyze and discuss the results:

3.1 Analyzing the results of the first axis: Learner characteristics

table 5representing Table representing the descriptive factors of the sample's responses to the statements of the first axis

Phrase	AM	Sd	Sample Direction	Arrangement
1- Learner participation and interaction with the teacher and peers	3.31	1.13	Neutral	2
2- Students have the basic technical skills to access and use the Moodle e-learning platform	3.38	0.93	Neutral	1
3- Students seem to be able to manage their studies when	2.98	1.12	Neutral	5

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learning online.				
4- The learner interacts with the content.	2.9	0.99	Neutral	7
5- The student has the competencies to search for educational resources when needed independently (self-learning).	2.94	1.06	Neutral	6
6- Students have the ability to address the technical issues they face so that they can use the appropriate programs according to the content (text readers, video players...) as well as the necessary tools (speakerphone, font enlargement, lighting...).	3.19	1.08	Neutral	3
7- E-learning enhances students' learning motivation.	3.02	1.19	Neutral	4

AM: Arithmetic mean- Sd : Standard deviation

Table 5 shows the results of analyzing the statements of the first axis, which contained 7 statements, where statement No. 2 ranked the first with an arithmetic mean of 3.38 and a standard deviation of 0.93, an average that falls within the neutral category, which indicates that the opinions of the sample members did not show a clear agreement about students having the necessary technical skills to use the electronic platform.

While statement N. 4 ranked the last with an arithmetic mean of 2.9 is offset by the standard deviation of 0.99, the sample's opinions also tended to be neutral on this statement, which stated that the student interacts with the content

3.2 Discussing the results of the first axis under the first hypothesis

table 6representing the descriptive factors of the sample's responses on the first axis

First axis: Learner characteristics		**One-sample t-test**				**Direction of the answer**
		t	**df**	**sig**	**Decision**	
Average hypothetical	3	0.93	47	0.35	non-significant	Neutral
AM	3.1					
Sd	0.74					

As shown in the table above, the results show that the responses were neutral on this axis, and the statistical test showed no significant differences (0.35>0.05), thus the first hypothesis related to learner characteristics is refuted.

The outcomes of our study differed from those of the Elumalai (2020) and Mirjalili (2021) who found that learner characteristics have an impact on the quality of e-learning. This difference may be attributed to the nature of the sample studied in the current research, which consisted of professors, which may make their assessment of learner characteristics different from the assessment of other samples used in previous studies.

3.3 Analyzing the results of the second axis: Teacher characteristics

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table 7representing the descriptive factors of the sample's responses to the statements of the second axis

phrase	AM	Sd	Sample Direction	Arrangement
8- The teacher has access to various electronic devices (computer, tablet, smartphone) and the services they provide (scanning documents, sharing texts and images...).	4.27	0.64	Strongly Agree	1
9- The teacher provides the opportunity to interact and open discussions with students during the lesson (google meet).	3.65	1.17	Agree	6
10- The teacher has the ability to use basic e-learning technologies (presentation programs, communication tools with students, preparation of media in various forms such as mind maps, figures, images...).	4	0.82	Agree	2
11- The professor has the ability to teach in ways that are compatible with the requirements of the e-learning environment.	3.83	0.8	Agree	4
12- The professor communicates with students to provide the necessary guidance to students through various tools (email, social media, video...).	3.85	0.79	Agree	3
13- The professor has the ability to provide timely and constructive feedback.	3.63	0.91	Agree	7
14- Ability to design online tests in various forms (multiple choice, true/false, fill-in-the-blank...)	3.69	1.18	Agree	5

Table 7 shows the analysis of the sample's responses to the statements of the second axis. Statement 8 ranked first by an arithmetic mean of 4.27 with a standard deviation of 0.64, indicating that the study sample members agree that teachers possess the various techniques necessary to deal with the various electronic tools and utilize the services they provide. Statement 13 ranked in last place with an arithmetic mean of 3.63 with a standard deviation value of 0.91, with the sample tending to agree on this statement, which stated that professors are able to provide feedback in a timely manner.

3.4 Discussing the results of the second axis under the second hypothesis:

table 8representing the descriptive factors of the sample's responses on the second axis

the second axis: teacher characteristics		Wilcoxon test				Direction of the answer
		z	n	sig	Decision	
Average hypothetical	3	-5.53	48	0.00	significant	Agree
AM	3.84					
Sd	0.63					

As illustrated in Table 8, the results showed that the sample opinion trends tended to agree on the statements of the second axis, and the statistical test showed that the differences are statistically significant so that the value of sig (0.000) was less than the value of the significance level (0.05), so it can be said that the second hypothesis stating the effect of teacher characteristics on the quality of e-learning is accepted.

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The results of our study agreed with the results of the study of Elumalai (2020) and this is due to the importance of the professor's digital competence in achieving the quality of e-learning and this is consistent with what was mentioned by Al-Husseini et al. (2023) that when choosing e-learning in all its forms as a mode of university education, the teacher must have special skills, including the skills of dealing with technological innovations

while it conflicted with the results of the study of Mirjalili (2021) This difference may be attributed to the different sampling conditions.

3.5 Analyzing the results of the Third axis: Technical environment (technical support, infrastructure):

table 9 representing the descriptive factors of the sample's responses to the statements of the third axis

phrase	AM	Sd	Sample Direction	Arrangement
15- Internet network quality and speed.	2.79	1.16	Neutral	9
16- Software to help design and synthesize educational content is available.	3.31	1.07	Neutral	4
17- Electronic aids and tools (technical devices and equipment) are available to users.	3.06	0.95	Neutral	7
18- Having specialized technical teams that can be called upon when needed.	3.13	1.10	Neutral	6
19- Ease of dealing with e-learning tools (Moodle, google meet...).	3.88	0.81	Agree	1
20- The presence of windows in various e-learning tools designed to provide the necessary assistance to the user.	3.29	0.98	Neutral	5
21- Providing digital libraries rich in scientific resources and references in the specialty.	2.98	1.12	Neutral	8
22- Accessing digital content from different devices (computer, tablet, smartphone) does not affect its status (its sequence as well as the media used to display it).	3.33	0.85	Neutral	3
23- It provides several means of communication between professors and students and between students themselves.	3.67	0.95	Agree	2

Table 9 appears that the sample's responses to the statements of the third axis are mostly oriented towards neutrality, as statement 19 took the first place with an arithmetic average value of 3.88 with a standard deviation of 0.81, indicating that the sample members agree that electronic educational platforms are easy to use, as well as statement 23 took the second place with an arithmetic mean of 3.67 and a standard deviation of 0.95, which also indicates that the sample members agree that the e-learning system allows communication between the various parties to the educational process, while statement 15 came last in the ranking with an arithmetic mean of 2.79 with a standard deviation value of 1.16, which also indicates that the sample agrees that the e-learning system allows communication between the various parties to the educational process, and the sample's tendency towards neutrality.

3.6 Discussing the results of the third axis under the third hypothesis:

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table 10representing the descriptive factors of the sample's responses to the third axis

Third axis: Technical environment (technical support, infrastructure)		One-sample t-test				Direction of the answer
		t	df	sig	Decision	
Average hypothetical	3	3.06	47	0.004	significant	Neutral
AM	3.27					
Sd	0.61					

As shown in Table 10, the results showed that the sample tended towards neutrality, while the results of the statistical test showed that the value of sig (0.004) is less than the significance level (0.05). Despite the statistically significant differences, the general trend of the sample's responses remains neutral, which means that the technical environment does not show a clear influence from the point of view of the sample members. This refutes the third hypothesis of the study.

The results of our study differed from those of Mirjalili (2021) and Elumalai (2020). This difference may be due to the different nature of the samples and different educational environments. The sample's tendency towards neutrality can also be explained by the difference in technical resources between the studied institutes, which is consistent with what cherabcha and Layadi (2024) citing Zikh and Yahi (2023) stated that the biggest challenge facing e-learning in Algeria is the limited capacity of educational institutions to establish a wide network and provide the largest number of devices and equipment.

3.7 Analyzing the results of the Fourth axis: Digital content (content quality, design quality, media quality):

table 11 representing the descriptive factors of the sample's responses to the statements of the fourth axis

phrase	AM	Sd	Sample Direction	Arrangement
24-The digital learning content is accurate and continuously updated.	3.67	0.75	Agree	5
25- Ability to display educational content in a variety of formats (text, interactive activities, videos, simulations, etc.)	4.08	0.57	Agree	1
26- Many media (images, text, shapes...) are combined to illustrate the content in a detailed and simple way.	4.04	0.71	Agree	2
27- The digital content takes into account students' abilities and suits their levels.	3.54	1.01	Agree	9
28- The clarity of the instructions guiding the student's path while navigating the educational contents on the online platform (Moodle).	3.69	0.9	Agree	4
29- The media used such as videos, images, and shapes are clear and of high quality.	3.65	0.88	Agree	7
30- There is consistency between objectives, content, and assessment methods.	3.67	0.99	Agree	6
31- Designing e-learning content encourages students to think critically and solve problems.	3.17	1.03	neutral	10
32- Digital content includes links to educational resources that delve deeper into the content when needed.	3.69	0.74	Agree	3
33- Designing educational content that accommodates the needs of students, attracts them, and facilitates the learning process.	3.56	0.94	Agree	8

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Table 11 shows the responses of the study sample on the fourth axis, where statement 25 came first in the ranking with an arithmetic mean of 4.08 and 0.57 as the standard deviation value, so that the opinions of the sample agreed on the possibility of presenting digital educational content in different forms through the e-learning system, which indicates that it includes the possibility of adopting a wide range of educational media. While statement 31 came in last in the ranking with 3.17 as an arithmetic average and the standard deviation Estimated at 1.03, the sample's responses tended towards neutrality on this statement.

3.8 Discussing the results of the fourth axis under the fourth hypothesis:

table 12representing the descriptive factors of the sample's responses to the fourth axis

fourth axis: Digital content (content quality, design quality, media quality)		**Wilcoxon test**				**Direction of the answer**
		z	**n**	**sig**	**Decision**	
Average hypothetical	3	-5.11	48	0.00	significant	Agree
AM	3.67					
Sd	0.59					

As Table 12 shows, the results revealed that the sample's responses tended to agree with the digital content factor expressed by the statements of the fourth axis so that the statistical test showed that the differences are statistically significant (0.05>0.00), and accordingly, the fourth hypothesis is accepted.

The results of our study are consistent with the findings of Wildoms & Hiariey (2025) and Bouchelit & Bouriche (2023), This indicates that the digital content is a key element in ensuring the quality of e-learning and this is consistent with what the results of the Wilert & Suchart (2021) study revealed that the course content and design is The most essential dimension of the quality of e-learning.

4. Conclusions and suggestions

The study reached a set of results that refuted the first and third hypotheses while confirming the validity of the second and fourth hypotheses, which stated that both teacher characteristics and digital content affect the quality of e-learning in physical activity science and technology institutes in eastern Algeria, according to the opinions of the studied sample. This is due to the fact that the teacher and the digital content play an important role in achieving the quality of e-learning.

In addition, the majority of the sample agreed on some factors related to the technical structure, which was manifested in the importance of providing means of communication between the teacher and students and the students themselves, as partial factors that affect the quality of e-learning in the institutes under study.

Based on the findings, we propose the following:

- The need to pay attention to the teacher due to his basic role in the e-learning process.

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- Providing continuous training courses for the teacher to benefit from all that is new in the field of e-learning.

- Providing a variety of media through which educational contents can be displayed.

- Providing models designed in an interactive manner and high-quality media.

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Appendices:

Appendix 01: List of arbitrators

Name	Specialty	Scientific rank	Affiliated organization
Boukebbous Mohamed lamine	Educational Physical Sports Activity	Lecturer A	Institute of science and technologies of physical and sports activities - Baji Mokhtar University - Annaba
Kriba farid	Theory and methodology of physical education and sports	Lecturer A	Institute of science and technologies of physical and sports activities- Baji Mokhtar University - Annaba
Chachou Ahmed Ali	Sports training	Lecturer A	Institute of science and technologies of physical and sports activities- amar thelidji university – laghouat
Dardon kanza	Educational Physical Sports Activity		Institute of science and technologies of physical and sports activities- Hassiba Ben Bouali University- Chlef
Touaghzit souhila		Professor of Higher Education	Institute of science and technologies of physical and sports activities- University of Algiers 3

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