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Article

The Knowledge Economy and Innovation in Higher Education: A Study on The Impact of Technological Applications on The Development of Educational and Training Programs

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Abstract: This research aims to highlight the importance of the knowledge economy and innovation in advancing higher education through the study of modern technological applications and their role in designing and updating educational and training programs within university institutions. The study builds upon a theoretical framework that explores the concept of the knowledge economy, its characteristics and dimensions, alongside the idea of innovation in the educational context and its barriers. Special emphasis is placed on smart education applications such as e-learning platforms and virtual reality, and their contributions to enhancing the quality of education and expanding learning opportunities. The study adopts a descriptive-analytical methodology, utilizing a questionnaire distributed among a sample of higher education students. The findings revealed significantly high mean scores for all items related to the role of technology and innovation, indicating a strong positive impact of technological applications on improving higher education outcomes, increasing student engagement, and aligning educational programs with the demands of the digital labor market.

Keywords: : Knowledge Economy, Educational Innovation, Higher Education, Smart Education, Educational Technology, Training Programs

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1. Introduction

The knowledge economy is one of the most prominent features of the modern era, having transformed from a model reliant on natural resources and heavy industry to one based on knowledge as the primary resource for production and growth. In this context, human knowledge, skills, and innovation have become the driving forces of sustainable development and societal progress. The higher education sector is viewed as the incubator for the generation, transfer, and development of this knowledge, placing it at the heart of the transformation towards an integrated knowledge economy [1], [2].

With the emergence of the information and technology revolution, there has been an urgent need to revisit the structure and methods of traditional education, particularly in higher education. This is in response to rapid changes in the labor market, the emergence of new specializations, and the rising expectations of students and society alike. It has become imperative to redesign educational and training programs to align with the requirements of the digital age, by integrating modern technology applications such as e-learning, artificial intelligence, augmented reality, and learning management systems [3].

Integrating technology into educational programs goes beyond improving presentation and communication methods. It also involves restructuring educational concepts and creating a flexible and interactive learning environment that encourages innovation, critical thinking, and teamwork. These applications also provide broader opportunities for self-learning and precise tools for assessing performance and improving the quality of education. However, this digital transformation in the higher education sector is not without challenges, whether in terms of infrastructure, faculty qualifications, or the ability to manage institutional change. It also raises numerous questions about the digital divide, ensuring equitable access to education, and the compatibility of this technology with the cultural and educational specificities of different societies [4].

2. Materials and Methods

The higher education sector is facing increasing challenges in light of the global shift towards a knowledge-based economy. Universities are now required not only to produce knowledge, but also to update their curricula and teaching methods to align with the demands of the digital labor market. In this context, the role of educational technology emerges as a central tool for bringing about a qualitative transformation in educational and training programs, through the use of interactive media, e-learning platforms, and smart applications that enable more flexible and innovative learning environments. Despite this global trend, many higher education institutions, especially in developing countries, still face multiple difficulties in adopting technology and employing it effectively.These challenges include weak technological infrastructure, limited qualified personnel, resistance to change, and low awareness of the importance of digital transformation in education. This raises questions about the impact of these applications on the development of educational programs and their ability to foster innovation and enhance the efficiency of the educational process.

In this context, there is a need to understand the reality of technology applications in higher education institutions, to uncover their impact on the quality of education and training, and to identify the obstacles that stand in the way of expanding their use, particularly in colleges specializing in management and economics, whose reality requires the preparation of professional cadres capable of dealing with smart and digital work environments.. Based on this, the research problem revolves around the following main question::

To what extent do modern technology applications contribute to the development of education and training programs in the higher education sector? What is the reality of their use and the challenges they face, particularly at the College of Engineering at Thi Qar University?

The importance of research

The importance of this research stems from a combination of theoretical and practical factors that highlight the growing need to develop the higher education sector in light of the accelerating global shift toward a knowledge-based economy. At a time when knowledge has become the primary driver of growth and development, higher education has emerged as a strategic element in building human capacity, developing skills, and fostering innovation, particularly in disciplines that intersect with economics and management. The research is increasingly important given the vital role educational technology applications have come to play in developing education and training programs. This is achieved by improving content quality, facilitating access to knowledge, and creating interactive learning environments that transcend traditional methods and respond to the demands of the digital labor market. The integration of technology and education is no longer an option; it has become a necessity for preparing graduates with 21st-century skills.

On the local level, this research is particularly significant because it sheds light on the reality of the College of Engineering at Dhi Qar University, as a model for higher education institutions in Iraq, striving to keep pace with global developments despite technical, administrative, and financial challenges.

Research objective

The current research aims to identifyKnowledge Economy and Innovation in the Higher Education Sector: A Study of the Impact of Technology Applications on the Development of Education and Training Programs.

Research hypothesis

There is a statistically significant relationship between the applications of modern technology and the development of educational programs in the higher education sector.

Definition of terms

Knowledge economy

The knowledge economy is a modern economic model built on the use of knowledge as a primary tool in production and development, with a focus on the creative human element and information and communication technology, rather than relying solely on natural resources. This economy relies on the generation, transfer, and application of knowledge across all sectors, contributing to the creation of competitive advantages and the achievement of sustainable development [5].

Innovation in Education

Innovation in education refers to introducing positive and radical changes in teaching methods and approaches with the aim of improving the quality of educational outcomes. This includes the use of new tools and technologies, or the adoption of modern teaching strategies that enhance critical and creative thinking among learners, leading to an educational system that is more effective and more suited to the needs of the times [6].

Higher education

Higher education represents the educational stage following secondary education and is considered one of the most important pillars of human and economic development, as it prepares specialized competencies and enhances scientific research. Higher education institutions also seek to respond to labor market requirements and update their programs in line with rapid technological and economic changes [7].

Educational technology

Educational technology is the effective use of modern digital tools, such as computers, the internet, and smartphone applications, to develop the learning environment, facilitate teacher-student interaction, and enhance knowledge acquisition. It is one of the means that supports the transition from traditional education to flexible, interactive, technology-based education [8].

Education and training programs

Education and training programs are defined as a set of systematic activities designed to develop the capabilities and skills of individuals in specific cognitive or professional fields, based on clear objectives and measurable outcomes. These programs aim to enhance learners' competence and enable them to keep pace with scientific and technological changes [9].

3. Results

Firstly :Knowledge economy

conceptKnowledge economy

The knowledge economy is a natural evolution in the trajectory of modern economic systems. It emerged as a result of the global shift from reliance on natural resources and unskilled labor to reliance on knowledge, creativity, and human skills as key tools for growth and development. A knowledge economy is defined as a system in which knowledge is a fundamental economic resource relied upon to generate wealth and achieve competitiveness. Knowledge is not merely a tool to support production; it has become the core of the production process in many sectors, such as education, health, communications, creative industries, and technology.

In the knowledge economy, knowledge is produced through scientific research and development, stored electronically, distributed through digital networks, and used for innovation and improving institutional and individual performance. This economy reflects a shift from traditional industries to innovation- and knowledge-based industries, such as artificial intelligence, big data, and modern educational technologies [10].

Characteristics of the knowledge economy

The knowledge economy has a number of characteristics that make it different from the traditional industrial economy. The most prominent of these characteristics are the following::

1. Material resources (such as land and physical capital) are the basis of production, while in a knowledge economy, growth revolves around the capabilities, skills, and knowledge of individuals. The human factor has become the primary driver of growth, through innovation and the use of technology..
2. Knowledge and information are transmitted rapidly across digital networks, making economic decisions based on real-time updates and contributing to accelerating production and increasing efficiency..
3. Value is created through developing new ideas and unconventional solutions, and creativity is a strategic resource..
4. The Internet and digital communication have made it possible to provide services and products around the world without the need for a physical presence, contributing to the formation of what is known as the digital economy..
5. Supporting scientific research and technological development is a fundamental pillar in countries seeking to transform into a knowledge-based economy [11].

Dimensions of the knowledge economy

The knowledge economy cannot be viewed from a single perspective, but rather is an integrated system in which several dimensions intersect, which we summarize as follows::

1. **Educational dimension**Education is the cornerstone of building a successful knowledge economy. This can be achieved by improving the quality of education, linking it to life skills and the labor market, and encouraging continuing education and open education. Universities and research centers play a vital role in generating knowledge and developing human capital.
2. **technological dimension**Technological development forms the framework within which the knowledge economy is created. Digitization, artificial intelligence, and virtual reality are all tools that enhance performance efficiency, reduce waste, and increase added value.
3. **Institutional and organizational dimension**A knowledge economy requires a flexible institutional environment that encourages innovation, stimulates entrepreneurship, guarantees intellectual property rights, and supports public-private partnerships.
4. **Economic dimension**It involves restructuring economic activities so that production is based on knowledge and innovation, diversifying sources of income, and reducing dependence on depletable resources.
5. **Cultural and social dimension**The knowledge economy is based on a society open to change, possessing a digital culture, and believing in the value of learning and innovation. It also requires equal access to knowledge [12].

secondly :Innovation and Technology in Higher Education

The concept of innovation in education

Innovation in education is defined as the use of unconventional methods, ideas, and technologies to improve the quality and efficiency of the educational process, thereby enhancing learner engagement and developing learning outcomes. Innovation in education encompasses changes in curricula, teaching methods, assessment tools, and technologies used to keep pace with the rapid transformations in knowledge societies and the digital economy.Innovation is a key element in modernizing higher education systems, as it enables overcoming traditional challenges, such as high student numbers, scarce resources, or poor student-faculty interaction, by introducing advanced

educational tools such as virtual reality, artificial intelligence, blended learning systems, and e-learning platforms.From a global perspective, higher education is no longer viewed merely as a means of obtaining a degree, but rather as an institution for the production of knowledge, research, and innovation, making innovation in this context a necessity for achieving quality and leadership [13].

Innovation as an educational concept

Innovation in the educational context is a pivotal concept in developing educational philosophy and objectives. It does not simply mean the use of technology or modern techniques, but rather refers to the ability to find new educational solutions to existing or anticipated problems. Educational innovation includes redesigning programs, curricula, and teaching methods to align with the requirements of the digital age and the needs of the labor market. Educational innovation aims to shift from the traditional education model, which focuses on rote learning and memorization, to one that emphasizes critical thinking, problem-solving, collaboration, and creativity. This concept also requires activating the role of the student as an active participant in the educational process, rather than merely a passive recipient. Studies confirm that societies that embrace a culture of innovation in education are capable of producing generations that possess 21st-century skills such as design thinking, logical analysis, and lifelong self-learning, making them better prepared to face future changes [14].

Third:**Technology applications in education**

The education sector is witnessing rapid qualitative transformations due to advances in digital technology. Education no longer relies solely on the traditional classroom model, but has expanded to include smart applications that have contributed to improving the quality of education, expanding access to it, and enhancing the efficiency of the educational process. Among the most prominent of these applications are educational platforms, e-learning, and virtual reality, which have become pivotal tools in building a modern education system.

The most important smart education applications (educational platforms - e-learning - virtual reality)

Smart education encompasses several advanced applications that are transforming traditional learning methods, with educational platforms, e-learning, and virtual reality standing out as the most influential tools. Educational platforms serve as interactive electronic systems that manage the learning process holistically. They provide digital content, facilitate communication between students and teachers, and offer tools for assessment and performance monitoring. Platforms like Google Classroom, Moodle, and Edmodo allow students to access educational materials anytime and anywhere, manage assignments and tests digitally, and engage in blended learning experiences that combine face-to-face and online instruction. Research confirms that the use of such platforms significantly enhances student organization and engagement, particularly when supported by interactive and motivating assessment strategies [15] . E-learning, another cornerstone of smart education, leverages information and communication technologies to deliver content over the internet. It creates a flexible and learner-centered environment that enables students to study at their own pace and convenience. E-learning transcends the limitations of time and space, utilizes a variety of media formats including text, videos, and simulations and fosters independent, self-directed learning. Furthermore, it expands access to education in remote or underserved regions. Many universities now use e-learning to deliver training and international certification programs without requiring extensive physical infrastructure, a trend that gained momentum during the COVID-19 pandemic. Virtual reality (VR) represents a more immersive and experiential dimension of smart education. This cutting-edge technology allows students to explore three-dimensional environments and interact with virtual elements as if they were real, making it particularly useful for disciplines involving complex or high-risk procedures such as medicine and engineering. VR enhances students' understanding through experiential

learning, minimizes risks and costs associated with real-life experiments, and nurtures creative thinking. Studies have shown that students engaged in VR-based learning demonstrate higher retention and attention levels compared to those taught using conventional methods. Collectively, these applications are reshaping education into a more dynamic, accessible, and effective system aligned with the demands of the digital age.

In the rapidly evolving landscape of innovation and technology, educational institutions are compelled to revamp their educational and training programs to align with global advancements and equip students for a dynamic job market. Traditional curricula, often limited in scope, fall short in addressing the demands of the digital era, which prioritizes applied skills, critical thinking, and a commitment to lifelong learning.

Educational and training programs encompass structured activities designed to enhance knowledge, skills, and attitudes for academic or professional objectives within institutional settings such as schools, universities, and training centers. These programs are meticulously crafted with clear curricula that outline educational goals, content, teaching methodologies, and appropriate assessment techniques. Educational programs typically offer a chronological and pedagogical sequence aimed at imparting specific knowledge and skills in a particular field. Conversely, training programs emphasize practical application, focusing on developing professional competencies or enhancing skills within a specialized area, often over a shorter duration compared to formal education. Such programs are instrumental in cultivating human capital capable of thriving in environments that demand technical proficiency, adaptability, and continuous learning.

The objectives of these programs are multifaceted: they aim to instill 21st-century skills such as critical thinking, creativity, collaboration, and technological literacy; align educational outcomes with labor market requirements through flexible and updatable curricula; support personal and professional growth by fostering self-directed and continuous learning; and enhance academic and institutional performance through efficiency-based standards and controls. Organizationally, these programs are structured with explicit cognitive and skill-based objectives, contemporary and relevant content, advanced teaching methods like project-based or problem-based learning, and diverse assessment strategies including standardized tests, self-assessments, and applied projects. Current trends underscore the imperative to integrate technology and innovation into program design, ensuring compatibility with technological advancements and facilitating personalized, flexible learning experiences.

In conducting a study to explore these dynamics, a descriptive analytical approach was employed, deemed suitable for the research objectives. The study focused on the College of Engineering at the University of Dhi Qar, encompassing a community of 70 employees. A sample of 59 employees was selected through a simple random sampling method to provide insights into the implementation and impact of educational and training programs within the context of innovation and technology.

Table (1) shows the characteristics of the study sample:

Table (1): Demographic sample characteristics

variable	number	percentage	Missing values	the total
Sex				
male	32	61.5%	7	59
feminine	20	38.5%		
Specialization				
Administrative Sciences	14	23.7%	1	59
Humanities	11	18.6%		
Engineering Sciences	25	42.3%		
Other	8	13.6%		

Academic qualification				
diploma	10	16.9%	-	59
Bachelor's	40	67.8%		
Master's	6	10.2%		
Other	3	5.1%		
Years of experience				
Under five years	14	23.7%	-	59
5- Less than 10 years	25	42.4%		
From 10-15 years	12	20.3%		
More than 15 years	8	13.6%		
Place of residence				
city	38	64.4%	2	59
village	17	28.8%		
camp	2	3.4%		

Search tool: The researcher did By preparing a questionnaire to measure the knowledge economy and innovation in the higher education sector, studying the impact of technology applications on the development of education and training programs, based on educational literature and previous studies. The questionnaire consisted of two sections: -

Section One: Contains primary data: (gender, specialization, academic qualification, years of experience, place of residence).

Section Two: -It is made of (20) paragraph

Instrument validity: Instrument validity expresses the effectiveness of the instrument used to measure the content of its measurement design.The researcher handed overSurvey of a number of experienced experts The questionnaire was reformulated and the number of paragraphs in its final form became (20) paragraph.

Tool stability: In order to verify the reliability of the measuring tool, the internal consistency and reliability of the accuracy items are verified by calculating Cronbach's alpha coefficient, according to Table (2).

Table (2): Cronbach's alpha coefficient matrix for the reliability of the study tool

Scale	Number of cases	Number of paragraphs	alpha value
Total score	**59**	**20**	**0.953**

The data in Table No. (2) show that the stability value of the learning tool in the total scores is (0.953), which indicates the accuracy of the measurement tool..

Statistical processing: After the researcher collects the research data, examines it, prepares to enter the computer, conduct statistical processing of the data, and assigns a specific number. The level of agreement is given to each level of a specific degree: strongly disagree (1) degree, object (2) degree, neutral (3) degree, agree (4) degree, strongly agree (5) degree. The higher the degree, the knowledge economy and innovation in the higher education sector. Studying the impact of technology applications on the development of education and training programs, as the researcher used the programSPSS for statistical processing, one-way analysis of variance, and Cronbach's coefficient of reliabilityαBy extracting numbers, percentages and averagesArithmetic And deviation theStandard and Pearson correlation.

Study results, discussion and interpretation

Based on the research questions and hypotheses, I present the results of the researcher's responses to the reality of the knowledge economy and innovation in the higher education sector, studying the impact of technology applications on the development of education and training programs (Table 3).

Table (3): The significance of the arithmetic mean.

arithmetic mean	Significance
1.00-1.79	very low
1.80-2.59	low
2.60-3.39	middle
3.40-4.19	high
4.20-5.00	very high

In light of the statistical processing of the study data, the researcher reached the following results:

Answering the main question: What is the knowledge economy and innovation in the higher education sector? Studying the impact of technology applications on the development of education and training programs. To answer this question, arithmetic means and standard deviations were extracted, as shown in Table (4).

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Table (4): Arithmetic means and standard deviations

degree	standard deviation	arithmetic mean	Scale
very high	**0.287**	**4.51**	**Knowledge Economy and Innovation in the Higher Education Sector: A Study of the Impact of Technology Applications on the Development of Education and Training Programs**

It is clear from Table (4) that there is a very high role.toFor the General Company for Electrical and Electronic Industries, the arithmetic mean was (4.51) with a standard deviation of (0.287).

Q1) What is the importance of the knowledge economy and innovation in the higher education sector? Studying the impact of technology applications on the development of education and training programs?

The results of Table (5) indicate that the sample members show a very high level of agreement regarding the importance of the knowledge economy and innovation in developing the higher education sector, especially in terms of the impact of technology applications on developing education and training programmes.The overall arithmetic mean was (4.46) with a standard deviation of (0.473), which reflects consistency in the respondents' opinions and a strong positive tendency towards the content of the statements.

The first paragraph came in the highest rank with an arithmetic mean of (4.57) and a standard deviation of (0.534), and it dealt with the college's use of modern technological applications in developing the content of educational programs.This demonstrates a clear understanding among students that the educational institution is investing significantly in technologically updating content, which contributes to enhancing the quality of education provided.

The second paragraph obtained an average of (4.52) and a deviation of (0.628), and it dealt with the effect of technology in increasing interaction with training programs.This means that technology is not only used theoretically or administratively, but also plays an effective role in improving students' practical interaction with the programs offered, supporting an active learning process.

In the third paragraph, which received an average of (4.50) and a deviation of (0.731), respondents confirmed that e-learning tools contributed to improving their understanding of the curricula, which is an indication that the digital educational environment has become a basic facilitating factor in absorbing scientific content..

The fourth paragraph, which discussed the provision of educational programs for skills compatible with the digital labor market, recorded an average of (4.47) with a deviation of (0.627). This indicates a general feeling among students that current programs are characterized by a degree of modernity and suitability to market needs, an aspect of utmost importance in light of the transition to a digital economy..

With an average of (4.40) and a deviation of (0.647), the fifth paragraph addressed the college's reliance on smart platforms to manage educational content.This figure reflects the actual application of these platforms in the daily educational process, demonstrating the effectiveness of the institution's digital infrastructure.

Finally, the sixth paragraph emphasized the importance of innovation as a necessity for developing educational programs, with an average of (4.37) and a deviation of (0.672). Although it is the lowest paragraph among the other paragraphs, it still falls within the "very high" rating, indicating a strong conviction among students regarding the importance of innovation as a key component of the quality of higher education.

Table (5): Arithmetic means and standard deviations of the importance of the knowledge economy and innovation in the higher education sector. Studying the impact of technology applications on the development of education and training programs, according to importance.

Paragraph number	Paragraph rank	Paragraph	arithmetic mean	standard deviation	degree
1	1	The college uses modern technological applications in developing the content of educational programs.	4.57	0.534	too high
2	2	Technology has increased my interaction with the training programs offered within the college.	4.52	0.628	too high
3	3	The e-learning tools helped improve my understanding of the courses.	4.50	0.731	too high
4	4	The college's educational programs provide skills that are compatible with the digital labor market.	4.47	0.627	too high
6	5	The college relies on smart platforms to manage educational content.	4.40	0.647	too high
5	6	I believe that innovation is essential to the development of university educational programs.	4.37	0.672	too high
The overall degree of importance of the knowledge economy and innovation in the higher education sector. A study of the impact of technology applications on the development of education and training programs.			4.46	0.473	too high

Q2) What are the requirements for the success of the knowledge economy and innovation in the higher education sector? Study the impact of technology applications on the development of education and training programs.

The results of Table (6) indicate that the sample members showed a very high level of evaluation of the requirements for the success of the knowledge economy and innovation within the higher education environment, especially through technology applications in educational and training programs.The overall arithmetic mean was (4.29) with a standard deviation of (0.504), indicating the stability and homogeneity of opinions among respondents regarding the basic elements that support this success.

The seventh paragraph topped the paragraphs with an average of (4.41) and a deviation of (0.565), which dealt with the role of technology in making the educational process more flexible and appropriate.This reflects a general awareness among

respondents that modern technologies contribute to adapting content, providing alternatives, and making education available in a variety of ways to suit different learning styles.

It was followed by the eighth paragraph with an average of (4.40) and a deviation of (0.620), which indicates that the use of virtual reality enhances the educational experience.This reflects the extent of student engagement in the experimental learning environment and the role of simulation in transferring learning from the theoretical to the practical and applied level.

In the ninth paragraph, which obtained an average of (4.31) and a deviation of (0.676), students believed that educational applications contribute to the development of practical skills, which confirms the importance of technology in linking the theoretical aspect with the practical aspect, especially in programs of a professional or technical nature..

As for the tenth paragraph, its average was (4.27) with a deviation of (0.582), and it focused on the compatibility between the outcomes of the academic programs and the requirements of the labor market.This result indicates an awareness of the need for a balance between academic training and professional development, which is an essential element in the success of a knowledge-based economy.

In fifth place, the eleventh paragraph recorded an average of (4.25) with a deviation of (0.779), and it dealt with training workshops based on modern technological methods.This result reflects the effectiveness of the college's training policies and their integration with available digital technologies.

The twelfth paragraph focused on faculty members' possession of technology-use skills, and obtained an average of (4.24) and a deviation of (0.757), which reflects a general awareness of the necessity of qualifying the teaching staff to be an effective partner in the digital transformation..

The thirteenth paragraph came in relatively last place with an average of (4.17) and a deviation of (0.647), which is nevertheless within the high degree, and it deals with the motivation of e-learning for active participation in virtual classes, which indicates that the digital environment provides good opportunities for interaction, albeit to a lesser degree than the other paragraphs.

Table (6): Arithmetic means and standard deviations of the requirements for the success of the knowledge economy and innovation in the higher education sector. A study of the impact of technology applications on the development of education and training programs according to importance.

Paragraph number	Paragraph rank	Paragraph	arithmetic mean	standard deviation	degree
7	1	Technology makes the educational process more flexible and convenient.	4.41	0.565	too high
8	2	I feel that using virtual reality enhances my learning experience.	4.40	0.620	too high
9	3	Educational applications help develop students' practical skills.	4.31	0.676	too high
10	4	There is a match between the outcomes of the academic programmes and the skills required in the labour market.	4.27	0.582	too high
11	5	The college offers training workshops based on modern technological methods.	4.25	0.779	too high
12	6	I notice that the faculty members have the skills to use technology in education.	4.24	0.757	too high

13	7	The e-learning environment motivates me to actively participate within the virtual classes.	4.17	0.647	High
The overall score for the requirements for success of the knowledge economy and innovation in the higher education sector. A study of the impact of technology applications on the development of education and training programs.			4.29	0.504	too high

Q3) What are the obstacles to the knowledge economy and innovation in the higher education sector? Study the impact of technology applications on the development of education and training programs?

The results of Table (7) indicate that the sample members showed a very high level of evaluation regarding the factors that enhance the success of the knowledge economy and innovation in the higher education sector, through the role of technology in improving and developing educational and training programs.The overall arithmetic mean was (4.35)It is at the top of the five-point scale, reflecting high satisfaction and clear appreciation for the impact of innovation and technology.

Table (7): Arithmetic means and standard deviations of the obstacles to using the knowledge economy and innovation in the higher education sector. Studying the impact of technology applications on the development of education and training programs, according to importance.

degree	standard deviation	arithmetic mean	Paragraph	Paragraph rank	Paragraph number
too high	0.598	4.49	Innovation in education increases my motivation for continuous learning.	1	14
too high	0.649	4.42	I feel that technology has helped improve the quality of educational programs.	2	15
too high	0.731	4.42	The college's programs keep pace with the requirements of the modern knowledge economy.	3	16
too high	0.781	4.33	The college uses analytical data to monitor student performance and develop programs.	4	17
too high	0.686	4.32	Smart learning applications have contributed to enhancing my research and analytical capabilities.	5	18
too high	0.811	4.29	College tests rely on accurate digital tools to evaluate students.	6	19
too high	0.897	4.24	There is a clear interest in updating training programs to keep pace with technological developments.	7	20
too high	0.490	4.35	The overall score of obstacles to the success of the knowledge economy and innovation in the higher education sector. A study of the impact of technology applications on the development of education and training programs.		

4. Discussion

Paragraph (14) ranked first with an average of (4.49) and a deviation of (0.598), which dealt with the fact that innovation in education increases students' motivation towards continuous learning.This result reflects the psychological and motivational impact of innovation, and demonstrates the ability of the modern educational environment to encourage students to continually develop themselves.

Paragraph (15) came in second place with an average of (4.42) and a deviation of (0.649), and indicates that technology helped improve the quality of educational programs.This reflects confidence in the effectiveness of technological tools in terms of content, interaction, and evaluation.

Paragraph (16) also came with the same average (4.42) and a higher deviation (0.731), which dealt with the college's programs keeping pace with the requirements of the modern knowledge economy, which indicates a positive feeling towards renewal and modernization in academic content..

As for paragraph (17), it obtained an average of (4.33) with a deviation of (0.781), and indicates that the college uses analytical data to monitor academic performance, which reflects the existence of a trend towards data-driven education.(Data-Driven Education), which is one of the characteristics of modern cognitive systems.

Paragraph (18) obtained an average of (4.32), and it confirmed that smart education applications enhance research and analytical capabilities, which is an indicator of the effectiveness of these applications in supporting critical and systematic thinking among students..

Paragraph (19), which refers to reliance on accurate digital assessment tools, also showed a high score (4.29), reflecting a level of confidence in the new digital systems for assessment and testing..

Finally, paragraph (20) came in seventh place with an average of (4.24) and a deviation of (0.897), expressing a clear interest in updating training programs, which indicates the existence of continuous development initiatives within educational institutions..

5. Conclusion

The integration of innovation into educational programs has significantly enhanced students' motivation for lifelong learning, highlighting innovation as a central driving force in modern education. Technology has emerged as a powerful tool in improving the quality of educational programs, influencing not only content but also the methods of delivery and evaluation processes. This technological advancement has led university programs to become more closely aligned with the evolving demands of the knowledge economy, reflecting an increased strategic awareness of labor market shifts. Furthermore, educational institutions now rely heavily on data-driven approaches, such as graphic analysis of student performance, to support effective academic decision-making grounded in accuracy. The adoption of smart education technologies has also contributed to the development of students' research and analytical skills, both of which are crucial in navigating the digital economy. Colleges are increasingly implementing modern digital tools to assess academic performance, indicating a growing move toward technological governance in the educational sector. Moreover, training programs are being regularly updated to keep pace with ongoing global technological advancements and future workforce requirements. In light of these developments, several recommendations can be made to further strengthen the role of technology and innovation in higher education. It is essential to encourage educational innovation by involving students in the design and development of content through interactive modern tools. Increasing investment in artificial intelligence and augmented reality technologies will further enhance self-directed and smart learning experiences. Establishing specialized units within universities for the analysis of educational data can significantly support strategic decisions related to curriculum advancement. Additionally, digital skills should be fully integrated into the core learning outcomes of academic programs, with a strong emphasis on analytical thinking and innovation. Regular evaluations of the technological tools employed in education are necessary to ensure alignment with international best practices. Expanding workshops and training sessions for faculty in educational design and electronic assessment will also help bridge existing gaps. Finally, institutional policies must adopt the knowledge economy as a guiding framework for higher education development, ensuring a close connection with national development strategies.

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