RESEARCH ARTICLE

Higher Education in the Era of Digitization: Towards Comprehensive and Sustainable Quality

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Abstract

Higher education in the modern era has undergone a fundamental transformation due to rapid technological advancements and the widespread adoption of information and communication technologies. Digitization has become a crucial element in the development of the higher education system. It now serves as a strategic tool to ensure the continuity of the educational process and to achieve comprehensive and sustainable quality by enhancing access to knowledge, providing flexible and diverse learning environments, and improving the academic and administrative performance of universities, Digital higher education aims to meet the demands of the modern age by improving the quality of educational programs, developing digital skills among students and faculty, and promoting equity in access to education. It also contributes to building an integrated knowledge-based society. To achieve these goals, it is essential to adopt modern educational policies, provide digital infrastructure, and activate evaluation and quality assurance mechanisms, In light of this transformation, universities are moving toward adopting integrated digital strategies focused on e-learning, self-directed learning, and distance training, while emphasizing a culture of innovation, interaction, and active participation. This ensures the development of a high-performing, competitive, and sustainable digital higher education system in the long term.

Introduction:

In recent decades, the world has witnessed profound transformations driven by the digital revolution and the rapid advancement of information and communication technology, which have impacted various sectors, foremost among them higher education. Digitization has become one of the fundamental pillars upon which modern educational policies are built and a strategic tool to achieve qualitative transformation in the university education system, by improving academic performance, facilitating access to knowledge, and providing flexible, more inclusive, and innovative learning environments.

The digital transformation in higher education is not limited to the mere use of technology; it also involves restructuring educational systems to keep pace with contemporary demands and to enhance the concepts of comprehensive quality and sustainability. Digitization enables universities to offer equitable learning opportunities, develop digital skills among students and faculty, reinforce the principle of educational equity, and achieve efficiency and effectiveness in both academic and administrative processes.

Therefore, this study aims to shed light on the current state of higher education under digitization and to examine the extent to which this digital transformation contributes to achieving comprehensive and sustainable quality, focusing on the challenges, standards, and mechanisms adopted to ensure quality education in an evolving digital environment.

The topic of digitization has gained significant importance, as it has become a focal point of interest among educational technology experts. It represents one of the fundamental pillars of contemporary educational policies through which educational institutions aim to advance higher education and achieve quality.

This study aims to assess the level of digitization applied in the educational process and its role in ensuring quality, by focusing on the standards, requirements, and mechanisms implemented.

Among the key issues raised by the topic of digitization as a strategy for achieving quality in the educational process is the following central question:

To what extent is digitization effective in achieving quality in higher education?

To explore this issue, we adopted the **descriptive method** by defining the concepts of both digitization and educational quality. Additionally, we relied on the **analytical method** to examine the role of digitization in achieving educational quality and the mechanisms used to accomplish this goal.

In pursuit of this, we divided the subject of the study into two main sections:

Section One: Digitization in the higher education process.

Section Two: Quality in digital higher education.

Chapter One: Digitalization in Higher Education

Digital education is one of the most important applications of communication technology in the field of education. In this chapter, we will address the concept of digitalization in the educational process (Section One). As for (Section Two), we will discuss the types of digital education strategies.

Section One: The Concept of Digitalization in the Educational Process

In this section, we will address the definition of digitalization, its patterns, and its objectives in the educational process.

First: Definition of Digitalization in the Educational Process:

Digitalization is defined as "the process of converting or transforming data into a digital format for processing by a computer. In information systems, digitalization is often referred to as the transformation of printed text or images (photographs, illustrations, and maps) into binary signals using a scanning device to display the result on a computer. In telecommunications, digitalization refers to the conversion of continuous analog signals into digital pulse signals. In library and information science, digitalization refers to the process of creating digital texts from analog documents."[1]

As for digitalization in education, there are several definitions, including the following:

Digital education is defined as: "the learning that relies on the use of electronic media for communication between teachers, learners, and the entire educational institution."

Others define it as: "learning that aims to create an interactive environment rich in applications based on computer and internet technologies, enabling students to access learning resources at any time and from anywhere."[2]

Digitalization in the educational process is defined as:

"Everything used in the process of teaching and learning from information and communication technologies, which are used for the purpose of storing, processing, retrieving, and transmitting information from one place to another. It works to develop and improve education using all modern means such as computers and their software, the internet, e-books, databases, encyclopedias, journals, educational websites, email, voicemail, voice communication, video conferences, virtual classrooms, e-learning, digital libraries, interactive television, distance education, interactive video, multimedia, CDs, and satellite TV broadcasting."[3]

Second: Types of Digital Education.

Digital education is carried out in two ways, as follows:

Direct Digital Education: This involves educational methods and techniques based on the global information network aimed at delivering educational content to the learner in real-time, as well as practical exercises or training.

Indirect Digital Education: This involves the learning process through a series of training courses and organized sessions. This type of digital learning is used in situations where multiple conditions prevent the learner from attending in person.

[1] Chlaghoum Samir, Digitalization as a Mechanism to Ensure the Quality of the Educational Process, Algerian Journal of Legal, Political, and Economic Sciences, Volume 57, Special Issue, 2020, Pages 147-160.

[2] Lounis Ali and Yasmina Achlal, The Role of Education in Improving Performance for Teachers and Learners (The Professional Environment as a Model), Journal of Humanities and Social Sciences, Special Issue on Computers and Information Technology in Higher Education, p. 414.

[3] Chlaghoum Samir, the previous reference, p. 150.

Third: Objectives of Digitalizing Education in the University Educational Environment.

The assessment of a university's progress and development has become closely linked to its focus on information and communication technology systems, which reflects on the university's work structure and the goals it aims to achieve. These objectives are as follows:[1]

1. Improving the Quality of Courses and Educational Programs:

The design of programs, courses, and educational materials is based on global standards and criteria, which clarify how educational tasks are performed. Traditional programs have become unable to keep up with developments in knowledge and scientific disciplines. They need to be developed in line with global advancements to absorb new information and knowledge.

2. Improving the Quality of Education and Learning Outcomes:

Digital education is based on cognitive theories and applies the principles of active learning, whereas traditional education follows behavioral theories, which are limited to presenting information from the teacher. This shift has contributed to the quality of education in the digital age, where learning does not stop at merely memorizing information but expands to include multiple learning outcomes.

3. Achieving Equality and Equal Educational Opportunities:

Digital education provides opportunities for all learners to participate in the learning process and have a full chance to learn, express opinions, engage in discussions, and debate educational topics freely, without restrictions. It also promotes the enjoyment of learning and increases motivation to learn.

4. Spreading Quality Education and Globalizing Education:

Digital education provides learning environments anywhere and anytime. It can accommodate large numbers of learners without specific conditions or requirements. It contributes to the spread of learning and provides various and numerous opportunities for education.

5. Saving Time and Accelerating the Learning Process:

Digital learning in a digital environment alleviates many of the burdens that traditional teaching places on instructors. Course materials and curricula are available electronically on the internet, exams are automatically corrected, and results are sent electronically. It also facilitates academic communication between instructors and learners.

Section Two: Types of Digital Education Strategies.

Digital education relies on a set of strategies that distinguish it from traditional education, as follows:

Interactivity:

This technology allows for direct communication and regular, ongoing exchange of information. It provides information in various forms and makes it available for immediate exchange through the simultaneous transmission of images and sound, thus facilitating communication and ensuring continuous interaction during distance education. Information technology, with its devices, tools, and software, serves as the primary space for interactions in the educational process, where learners can interact with knowledge and engage in self-directed research. Furthermore, innovations allow learners significant freedom, enabling them to control the pace of material delivery according to their ability in self-paced learning. Interactivity creates a communication environment between the learner and the educational material.[2]

Diversity:

Technological innovations provide numerous options for delivering educational content and offer learners various stimuli that engage their different senses, allowing them to interact with multiple elements of information (image, sound, written) in a single learning situation.

Some studies have shown that the extent to which a student retains the information they learn is significantly greater if they participate actively in the educational process, especially if all of the student's senses are involved in comprehension. Statistics have demonstrated that a person retains about 25% of what they hear, 45% of what they see, and 70% of what they both hear and see and actively engage with. Based on this, deep understanding of the knowledge acquired by the student comes from integrating knowledge with experiences and practical applications they engage in.[3]

Collaborative Learning: This strategy is used to exchange electronic information between students through digital media and websites.

Self-Directed Learning and Individual Learning: These approaches aim to enhance and master the concepts and skills of e-learning. It is a form of learning where the learner progresses according to their abilities and readiness, at their own pace, to achieve their goals without direct intervention from the teacher.[4]

Self-directed learning theories and models emerged in the early 1980s, with efforts aimed at clarifying what learners need to do to succeed in education. Self-directed learning

[1] Walaa Mahmoud Abdullah Mahmoud, Components of Developing Academic Human Resources at Benha University in the Digital Age – Reality and Future Scenarios – Journal of the Faculty of Education, Issue 90, Volume 2, 2018, p. 17.

[2] Badi Suham, Policies and Strategies for Integrating Information Technology in Education (Towards a National Strategy for Integrating Information Technology in Higher Education: A Field Study in Eastern Algerian Universities), Master's Thesis in Library Science, University of Constantine, 2005, p. 139.

[3] Badi Suham, the previous reference, p. 139.

[4] Reham Mustafa Mohammed Ahmed, Employing E-Learning to Achieve Quality Standards in the Educational Process, Arab Journal for Quality Assurance in Education, Issue 09, 2012, p. 07.

is defined as a method that encourages individuals to become learners who rely on themselves, primarily depending on self-reading programs.[1]

Universality: The emerging technology enables constant access to knowledge through the global information network, which in turn facilitates quick access to new information, research, and news. This allows both teachers and learners to access all sources of information. The educational environment through information technology is not limited to the geographical boundaries of the university but extends to be comprehensive by providing elements of the educational process with information from various cultures around the world.

Chapter Two: The Quality of Digital Higher Education.

In this chapter, we will address the concept of quality in the educational process and discuss the importance of educational quality management in (Section One), and then explore the mechanisms for achieving digital education quality in (Section Two).

Section One: The Concept of Quality in the Educational Process.

Through this concept, we will define the quality of education and highlight the importance of quality in the educational process, along with the standards adopted to achieve it.

First: Definition of Quality in the Educational Process.

Quality is defined as: "A set of attributes or characteristics of a product or service that demonstrates its ability to meet various needs."

The quality of education is defined as: "The value or quantitative measure granted to an educational institution or program in comparison to the generally accepted standards for that type of institution or educational program."[2]

It is also defined as a set of characteristics or attributes that reflect the status of interventions, processes, and school outputs, and the extent to which all participants contribute to achieving the objectives in the best possible way.[3]

It is also defined as "the ability to continuously change students and add new values to their knowledge and personal growth."[4]

it is also defined as: "The ability of educational administrations at various levels and locations to perform in a way that enables them to graduate students who possess the qualities necessary to meet the developmental needs of their society, according to the objectives and specifications set for these graduates."

According to the 2002 UNDP report titled "Quality of Education," attention to the quality of education reflects the progress of any country. This importance lies in the methods of implementing total quality in the education sector. Total quality management is considered a management approach aimed at enhancing the effectiveness, flexibility, and competitiveness of an institution. It involves organizing the entire institution, including every department, activity, and individual at all administrative and academic levels.[5]

Second: The Importance of Total Quality Educational Management.[6]

Global Nature of Total Quality Management System and Its Role as a Characteristic of the Modern Era:

- The relationship between total quality management and productivity, its sustainability, and the improvement of educational outcomes.

- The comprehensive nature of total quality management covering all areas.

- The support of total quality management for continuous improvement in higher education.

- The development of leadership for the future.

- Increasing work and optimal use of resources while reducing waste.

- Conducting further improvements and continuous development in the process, based on the aspirations of beneficiaries of these institutions.

- The connection between total quality management and the comprehensive evaluation of the educational system.

- Enhancing the performance of teaching staff.

- Developing the administrative environment in these institutions.

- Improving the educational system outputs.

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[1] Abdullah bin Yahya Hassan Al-Mihya, The Impact of Using the Second Generation of E-Learning (200 E-Learning) on Collaborative Learning Skills Among Students of the College of Education in Abha, PhD Dissertation in Curriculum and Instruction, Specialization in Educational Technology, Unm Al-Qura University, Kingdom of Saudi Arabia, 2007, p. 18.

[2] Sharif Mourad and Azouz Munir, The Impact of Using E-Learning as a Tool to Improve the Quality Assurance System in Higher Education in Algeria – A Case Study of M'sila University, Al-Ma'arif Journal, Issue 24, 2018, p. 180.

[3] Ben Ferhat Said and Alouti Ashour, Total Quality in Education, Journal of Psychological and Educational Research, Volume 09, Issue 04, University of M'sila, 2018, p. 125.

[4] Saeed Sharifi, Quality in Education and Its Impact on Comprehensive Development (Higher Education as a Model), Research Journal, Issue 10, Part Two, p. 244.

[5] Ben Ferhat Said and Alouti Ashour, op. cit., p. 125.

[6] said Hayat and Haddad Bakkhta, Towards Implementing Total Quality Management in Higher Education with an Overview of Total Quality Management Implementation Experiences in Various Universities, Journal of Law and Humanities – Economic Studies – Issue 26, Part 01, University of Algiers, p. 07.

- Mastery of professional competencies.

- Developing measurement and evaluation methods.

- Enhancing the use of educational technologies.

Third: Total Quality Standards in Education

As part of the reforms adopted by the Ministry of Education and Scientific Research in Algeria, Ministerial Decision No. 167, dated May 31, 2010, was issued to establish a national committee for the implementation of the quality system in higher education, composed of experts and university professors. This committee aims to support the development of quality assurance practices within higher education institutions and follow up on the implementation of quality assurance through self-assessment procedures to improve quality within educational institutions. The committee was tasked with creating a national reference guide containing the standards and criteria related to quality assurance, which was completed with the help of quality assurance officers in university institutions and presented for the first time in 2014. According to the contents of the national reference for internal quality assurance in higher education institutions, the concerned ministry placed significant emphasis on the field of training. On one hand, it forms the foundation of university institutional activity, and on the other hand, the national committee for internal quality assurance prioritized it in the new national reference. The committee gave priority to self-assessment as the main pillar for quality assurance across five fields in the training domain, reflecting the requirements of the university institutions they aim to achieve.

There are several criteria used to determine the quality of education, as follows:[1]

Student-Related Standards:

These include various aspects such as the average cost per student, the student-to-teacher ratio, and the quality of services provided to students.

2. Teacher-Related Standards:

These involve the level of professional knowledge among teachers, their respect for students, and their contributions to the communities they live in.

3. Curriculum-Related Standards:

These cover the quality of the curriculum, the overall level of its content, and how relevant that content is to real-life applications.

4. School Management Standards:

These focus on the quality of relationships between students and faculty members, the commitment of the administrative staff to quality standards, and the importance of developing and training administrative personnel.

5. Educational Administration Standards:

These are concerned with placing the right person in the right position, delegating authority appropriately, and avoiding any forms of discrimination.

6. School-Community Relationship Standards:

A key standard here is the school's role in meeting the needs of its surrounding environment, solving problems, and the degree of interaction between the school and all sectors of the community, including both production and service sectors.

Section Two: Mechanisms for Achieving the Quality of Digital Higher Education

Digitalization is one of the systems emerging from modern trends in educational technology. It has contributed to achieving educational quality by relying on specific mechanisms, particularly instructional design science and a set of digital platforms.

First: The Science of Digital Instructional Design

Instructional design is a relatively new field that emerged due to technological advancements and their impact on education. In this section, we will address the definition of instructional design and highlight its key characteristics.

1. Definition of Instructional Design Science:

Design is conventionally defined as the engineering of something in a particular way, following specific steps. It is an engineering process for a given situation, and design is essentially a systematic planning process that precedes the implementation of a plan.

instructional design is considered one of the educational sciences that aims to bridge the gap between theory and practice. It consists of a set of steps and approaches used to select the most effective methods, strategies, and tools to achieve educational objectives in the least amount of time and with minimal effort.[2]

2- Characteristics of the Instructional Design Process:

The instructional design process is characterized by a set of features, as follows:[3]

Characteristics of the Instructional Design Process:

The instructional design process is defined by a number of characteristics, including:

- It is a goal-oriented process.

- It is both logical and creative at the same time.

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[1] Rafika Yakhlef, The Quality of Digital Education, Journal of Anthropology and Social Sciences, Issue 05, University of Chlef, 2019, p. 174.

[2] Halima Ezzahi, E-Learning at Algerian Universities: Implementation Components and Application Barriers, Master's Thesis in Library Science, Specialization in Virtual Electronic Information and Information Search Strategies, University of Constantine, 2012, p. 72.
Halima Ezzahi, ibid., p. 72.
[3] Halima Ezzahi, ibid., p. 72.

- It is a problem-solving process, following the same methodology used to identify and resolve problems.

- It is influenced by various factors, such as the cognitive, skill-based, and emotional background of the designers, their previous experience, the nature of the subject matter, and the required and available resources.

- It is a human and social process, as there is a strong connection between the personality of the designer and the program they design.

2. Models of Digital Instructional Design:

3. There are several models of instructional design, the most important of which include:

A. Kemp's Instructional Design Model:

B. This model is used in designing educational and training programs and consists of eight steps.

These processes consist of :[1]

1- Identifying the educational goals of the instructional programs, then preparing a list of the main topics covered in the program, followed by defining the general objectives for teaching these topics.

2- Determining the characteristics of the learners targeted by the instructional program design in terms of their abilities and other academic and social traits that distinguish them as a group.
3- Specifying the learning objectives that the learners are expected to achieve.
4- Defining the content of the subject matter related to each of the educational objectives.
5- Preparing appropriate tools to assess learners' prior experiences and their current knowledge level regarding the subjects that will be covered in the instructional program.
6- Selecting teaching and learning activities, educational resources, and tools through which the subject matter will be delivered to help learners achieve the educational goals.
7- Determining the supporting resources and services such as budget and other educational facilities, and coordinating them to facilitate the implementation of the instructional program.
8- Evaluating students' learning and assessing the extent to which they have achieved the educational objectives.

B- Dick and Carey Instructional Design Model: It is carried out through the following stages:[2]

Here is the translation into English:

1- Identifying the educational goal(s) of the unit that the designer aims to achieve for the learners.
2- Conducting an instructional analysis to determine the sub-skills included under the goal(s). The analysis results in:

- Identifying the concepts, rules, and information required to learn these skills.

- Determining the learning steps in a sequential procedural form that learners follow to perform a specific task.
3- Identifying the entry behavior and characteristics of the learners.
4- Writing performance objectives, which are specific statements describing what learners will be able to do or perform after completing the program.
5- Constructing test items aligned with the previously stated performance objectives.
6- Developing the instructional strategy, which includes:

- Pre-instructional activities.

- Presentation of information.

- Practice and feedback.

- Tests.

- Follow-up   activities.
The strategy should also be based on:

- Current results of educational research.

- Up-to-date information about the teaching process.

- Characteristics of the learners using these materials.
7- Developing and selecting instructional materials.
8- Designing and conducting formative evaluation, in which the designer creates the methods and tools to be used.
9- Reviewing and revising instruction, which is the final step in instructional design.
10- Conducting the final evaluation to ensure the program's effectiveness.

C- Gagné and Briggs Model:

The Gagné and Briggs instructional design model consists of the following steps:[3]

1- Analysis of the general objectives

2- Analysis of the educational material and methods of presentation, as well as the types of difficulties involved

3- Determining the educational topic and its method of presentation for learning

4- Identifying and sequencing the partial educational tasks

5- Analysis of specific behavioral objectives

6- Defining these specific behavioral objectives

7- Preparing a daily lesson plan

8- Selecting appropriate educational tools

D- Gerlach and Ely Model

This model is used for designing daily lessons and includes nine processes as follows:[4]

[1] Saadia Al-Ahmari, ibid., p. 212.
[2] Saadia Al-Ahmari, the same reference, p. 213.
[3] Yakhlef Rafika, previous reference, p. 178.
[4] Saadia Al-Ahmari, previous reference, p. 214.

1-Defining Objectives: The instructional designer identifies the educational system's objectives in an operational form and then determines the related content units.

2- Measuring Teachers' Incoming Behavior: The designer assesses each student's prior knowledge and skills before starting the study topic, either by analyzing the student's academic records or conducting a pre-assessment.

3- Determining the Teaching Strategy: This includes strategies for presentation and discovery.

4- Organizing Students into Groups: The designer chooses the mode of instruction—self-learning, small group, or large group—based on the desired objectives.

5- Allocating Time: Estimating the time required to achieve objectives, which varies according to the subject matter, objectives, location, management style, learners' abilities, and interests.

6- Allocating the Learning Environment: Determining the place where teaching will occur, such as a classroom, laboratory, etc.

7- Selecting Appropriate Teaching Materials.

8- Evaluating Performance: Ensuring that students achieve the objectives through oral questions, tests, and other methods.

9- Analyzing Feedback: The designer uses available data about the effectiveness of the educational system to make necessary adjustments.

Secondly: E-learning Platforms.

There are several platforms, some open-source and others commercial; examples include the following:[1]

1- Moodle:

An open-source learning management system (LMS) designed on educational principles to help instructors provide an e-learning environment. It can be used personally by individuals or serve a university with 40,000 trainees. The system's website hosts 75,000 registered users who speak 70 languages from 138 countries.

2- Claroline-Dokeos:

An open-source LMS used by more than 1,200 organizations in 65 countries to manage education and facilitate collaboration among groups with different objectives. It allows instructors to create high-quality educational content and interactive exercises, as well as communicate with and monitor trainees' performance.

3- ATutor:

An open-source LMS designed to be easy and quick to install by system administrators and user-friendly for both instructors and learners. This system features fast updating and interface customization by instructors. It is suitable for small educational institutions as well as large universities offering online e-learning.

4- WebCT:

A commercial LMS used by many educational institutions interested in e-learning. It provides a rich electronic learning environment from course preparation and installation through the learning period, reflecting its ease of use for both instructors and learners. It was developed at the University of British Columbia and evolved from an online content delivery system into a full course management and delivery system.

5- Tadars:

Tadars is an e-learning management system that includes all the functions and applications offered by advanced LMS platforms. Tadars boasts many features and characteristics that have led numerous institutes, colleges, universities, and schools to consider adopting it or transitioning to it because of its comprehensive educational systems.

Conclusion:

In conclusion, it is evident from the above that the digitization of the educational process has become a necessity in light of the rapid technological advancements of the modern era. The digital transformation of education now stands as an essential and strategic alternative to traditional education, ensuring both continuity and improved quality in the learning experience.

Based on the research and analysis of various aspects of the topic, the following recommendations can be proposed:

• Provide learners with proper training on how to engage with digital education systems.

• Increase interaction and engagement with e-learning platforms.

• Emphasize the importance of e-learning and distance education to encourage the integration of information and communication technologies in academic curricula.

• Promote the use of modern technologies and multi-channel communication tools in education.

• Develop targeted programs to ensure equal digital capabilities among students, while guaranteeing equitable access to educational resources.

• Prioritize the design of e-learning content to align with clearly defined quality standards.

• Establish a strategic plan grounded in the current reality of the educational institution, along with a clear vision for its digital transformation.

• Enhance and expand the institution's ICT infrastructure to facilitate the integration of communication technologies.

• Organize more workshops and training sessions on digital education to support learners and enrich their digital competencies.

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[1] Halima Al-Zahi, previous reference, p. 100.

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