Digital perspective of higher education
- sector in light of the introduction of the Digitalization Roadmap 2025 -
النظرة الرقمية لقطاع التعليم العالي في ظل استحداث المخطط التوجيهي للرقمنة 2025

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Abstract:

This study aims to highlight the role of the 2025 digitalization roadmap in promoting digitization in the higher education sector.

The digitalization roadmap aims to create a secure and appropriate technological ecosystem that is conducive to integration, where the Ministry of Higher Education and Scientific Research is determined to make digitization a fundamental pillar for every pedagogical or research activity that aligns with the strategic vision of preparing the institution's digital future and raising it to the level of international rankings.

Keywords: Digitization; Higher education; Digitalization roadmap.

ملخص:

تهدف هذه الدراسة الى ابراز دور المخطط التوجيهي للرقمنة SDN 2025 في تعميم الرقمنة في قطاع التعليم العالي.

يرمي المخطط التوجيهي للرقمنة الى انشاء بيئة ايكولوجية تكنولوجية مفتوحة مؤمنة بطريقة صحيحة وملائمة ومحفزة للاندماج، حيث أن وزارة التعليم العالي والبحث العلمي من خلاله عازمة على جعل الرقمنة دعامة أساسية لكل نشاط بيداغوجي أو بحثي يتماهى والرؤية الاستراتيجية لإعداد المستقبل الرقمي للمؤسسة، والارتقاء بها لمصاف التصنيفات العالمية.

الكلمات المفتاحية: الرقمنة؛ التعليم العالي؛ المخطط التوجيهي للرقمنة .

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Introduction:

The development in the field of digitalization has unexpectedly emerged within our societies and has transformed our habits in all areas, where pedagogical innovations have arisen through the use of digitalization. It has become an absolute priority and not just a goal that can be achieved in the distant future. In this context, the higher education institution remains a driving force in expanding digital technology and strives to integrate it as a strategy in its educational, research, and service missions provided to the community.

Digital technology has led to significant changes in the education system in general, and the higher education system in particular. This is what the national digitalization roadmap revolves around, which expresses the strategic vision and challenges, and the effects of the digital transformation on the higher education sector in Algeria, in addition to a roadmap for its success. It also lays the foundation for national work to digitize the sector in all areas, making it possible to identify and unify all digitalization procedures for various higher education institutions.

This research study aims to investigate the extent to which the higher education sector in Algeria possesses strategic readiness, manifested in technical and organizational requirements, for the transition towards digitalization. Through this, the following problem will be addressed:

To what extent has the electronic character been imparted to the higher education sector in Algeria with the introduction of the digitalization roadmap?

The logical and methodological context for answering the above problem is by following the steps of the descriptive approach and the elements of the following plan:

- **First:** Manifestations of digitalization in the higher education sector.
- **Second:** Challenges of promoting digitalization in the higher education sector in Algeria.
- **Third:** The digitalization roadmap as a strategic tool for overcoming challenges.

I - Manifestations of digitalization in the higher education sector

The different universities in Algeria, along with centers, have worked towards digitizing the higher education sector, aiming to achieve a number of goals such as qualitative development and complete modernization of management methods that support the development of various scientific research activities and integration into the information society. The following are examples of the digitization of the higher education sector.

A) Digitization of university registration:

The Algerian university provides general electronic services for the benefit of new high school graduates, giving them the opportunity to benefit from online pre-registration services by filling out a preference form in the form of an electronic application, which is made available as soon as the baccalaureate results are announced through electronic sites. The initial registration process is carried out according to the following stages[1]:

1- Stage of filling and sending the electronic card:

Through these websites, the student can participate in the ranking process by filling out and submitting the electronic registration card online. The student can access the website using the

personal code provided in the exam results document. The registration process relies on national computer processing of the preference cards of high school graduates. The system identifies the fields of study, joint programs, and branches that the new student can benefit from and register in, which the students can view on the electronic sites, download, and print.

The program's information system also provides immediate feedback to the student during the registration process if any potential error occurs. For example, if the program rejects a choice that does not match the high school grade, it allows the student to avoid a particular field on the electronic preference form and avoid losing the right to choose that option, which was present during traditional registration. Thanks to the electronic form, the student can correct and modify their card a second time after submission, meaning they can modify their preferences again. However, the system only accepts the final electronic form deposited in the second modification, which contains the names of the branches and their codes arranged according to the student's preferences and results.

2- Guidance results review stage:

After submitting the electronic application, the choices are subject to the national information processing system. Within this processing, the choices are arranged and directed according to the branches, taking into consideration the results of the national processing. The importance of the latter lies in providing the element of neutrality and transparency during guidance, as the process is carried out automatically without the intervention of other factors. The guidance results for each student can be accessed by visiting the websites dedicated to first university registration via the internet directly.

3- Registration confirmation stage:

After reviewing the guidance results on the aforementioned websites, the registration confirmation stage follows, which is done through an electronic form obtained via the registration websites mentioned above.

4- Appeals Stage:

This stage coincides with the confirmation of registration stage, where a student who has been directed to a branch or specialization that they do not want to register for or study in can file a specific appeal regarding their placement. Appeals can also be made only through the online initial registration form. It can be said that this translates into an actual orientation towards the university system to apply electronic services, which allows it to achieve some privileges and achievements, including:

- Keeping up with the development in the higher education and scientific research system, as is the case in developed countries, and eliminating the phenomenon of queues at initial registration centers inside universities.
- Reducing the cost of travel and transportation for students.
- Rationalizing the use of resources within universities and retaining them for urgent needs.
- Speed and accuracy in providing services online.

In addition to that, online initial registration websites offer electronic services that enable students to access the conditions for benefiting from university services, such as scholarships, feeding, and transportation. Algerian universities also rely on the Internet to provide some electronic

services, which is evident on university portals and centers, from providing announcements about opening competitions and announcing results through the university's website. All of this aims to move towards the virtual university project, which is being prepared as part of Algeria's e-strategy.

B) Introduction of the remote e-learning platform Moodel:

Educational platforms are a new digital learning environment that relies on modern technology using the internet. They allow the teacher to publish lessons in the form of interactive digital content, share activities, and exchange files of all types - written, audio, video - and conduct online exams. Educational platforms also allow for the exchange of ideas and content sharing with a large number of students simultaneously using multiple technologies[2].

The Moodle e-learning platform is known as a free web-based application that provides a comprehensive educational environment, including tools for course authoring, student tracking and guidance, adding learning resources such as web pages, multimedia files, creating and grading electronic tests, and announcing their results.

The services of this system, through its various tools, facilitate the educational process by providing forums for discussion, uploading videos, and supporting lectures for this course, in addition to exchanging questions between the teacher and the student, presenting educational assignments, exchanging opinions and ideas between teachers and students, and sharing scientific content. It allows the student to access and interact with educational material at any time they want and can enhance electronic communication between the teacher and the learners themselves, which motivates both the learner and the teacher to keep up with the information technology renaissance, as it is an open-source program[3].

However, distance education faces obstacles such as[4]:

- Students and faculty members' reluctance to use digital platforms.
- Lack of cultural awareness for learning through electronic platforms and not believing in the validity of the certificates awarded.
- Preference for printed books and paper-based research over distance learning.
- Weak infrastructure requiring smart and advanced devices that not every student may possess.
- Society's non-acceptance of community learning through electronic platforms.
- Difficulty in evaluating students through electronic platforms and not feeling secure while using them.
- Lack of incentives that encourage investing in electronic platforms for learning.

c) A digital platform for doctoral thesis discussions and deposit:

as part of enhancing digital measures for educational transactions in the university environment, a digital platform has been created within the Progres information program, for depositing and following up on doctoral thesis discussion files. This platform came into service on October 20, 2022[5].

This platform is intended to support the exclusive depositing process of doctoral theses in digital form. In this regard, those who are going to discuss their doctoral theses are invited to contact their universities to receive their accounts for the platform, which allows them to access and deposit a digital file, which is studied and followed up on through the digital platform by various stakeholders in the process.

The Ministry aims through it[6]:

- Facilitating administrative procedures related to the doctoral dissertation defense process.
- Speeding up and establishing transparency in the stages and procedures of the dissertation defense file.
- Creating an electronic archive for doctoral dissertation defense files, to facilitate access to the files in the future.
- Obtaining accurate statistics on doctoral student files at the local and national level for universities.
- The possibility of using statistics in the upcoming editions of the national ranking of Algerian universities.
- Providing facilities for doctoral students, especially those enrolled in universities far from their place of residence.

D) Introduction of the "Innovation" digital platform:

The "Innovation" digital platform has been introduced to serve students enrolled in the mechanism of a startup certificate or a patent certificate. This is in line with the policy of the higher education and scientific research sector aimed at valuing the works and projects carried out by students during their training path, following ministerial decision 1275 dated September 27, 2022 regarding the mechanism of a startup certificate and a patent certificate. In this context, a letter was sent to the heads of regional seminars for universities to contact officials from higher education institutions, the General Directorate of Scientific Research and Technological Development, and research center officials[7]. This letter includes informing students about the joint research services, especially university business incubators, technological platforms, and technical floors. In this regard, students who are about to complete their master's or engineering theses or doctoral dissertations, within the framework of a startup certificate or a patent certificate mechanism, can benefit from the services of these departments by accessing the "Innovation" digital platform, where they can find all the necessary information and details to model their innovations.

E) Electronic publishing and advertising:

Other services can be obtained through the university's website and advertisements on it, which facilitates communication between the university administration and employees on one hand, and students on the other hand, by providing them with all the information about the schedule of lectures and announcing the results. In addition, job vacancies at the university are advertised on the website, as well as all the dates of scientific councils, pedagogical meetings, and scientific activities, whether international or national. Moreover, administrative information is displayed for

communication between website visitors and the university administration, including the address, phone numbers, and email[8].

II: Challenges of digitalization in the higher education sector in Algeria

The issue of generalizing e-administration and digitalization in the higher education sector in Algeria poses many challenges, including:

A) Administrative challenges:

Digitalization programs involve a transformation to an electronic management system that changes the composition of work within the administrative structure of the university. The role of computer and internet-proficient professionals becomes more prominent, while the role of traditional employees diminishes. New job functions may arise that were previously unknown before the introduction of certain devices. Therefore, human development and the efficiency of human resources play a crucial role in the success of the program. This emphasizes that the implementation of digitalization requires radical changes in the quality of human resources suitable for it, which means that the education and training systems must be reviewed to keep up with the requirements of the new transformation, including plans, programs, methods, educational and training resources at all administrative levels within the university environment[9].

B) Technical challenges:

This axis is the cornerstone of the digitization of higher education, where the necessary devices and technologies represent the success of the transformation, and through them, information is represented and transmitted electronically while ensuring its confidentiality and accuracy. Transactions and services are carried out remotely using electronic networks that ensure their validity and credibility. Providing information and communication technology infrastructure, devices, equipment, software, appropriate methods, and knowledge resources and making them available for use on the widest possible scale are all requirements for the success of digitizing the higher education sector[10].

C) Legal challenges:

Before implementing digital transformation in the higher education sector, the legal framework that recognizes the digitization of the sector must be identified. During the implementation process, any necessary legal gaps and shortcomings that may arise at any stage of the transformation must be addressed. After the implementation, electronic security measures must be put in place to ensure the security of electronic information, and punitive measures must be established for those involved in electronic crimes.

D) Security Challenges:

Despite all the privileges and services that the information age provides, there are significant challenges that mainly focus on information confidentiality, whether it concerns storing and storing electronic information, preserving its confidentiality between institutions, ensuring the existence of the required information and making it available to everyone in an equal manner. It includes confidentiality of information on various axes, such as confidentiality, integration, information

provision, knowing the history of anyone entering the information, and information security. We mention some of the measures that digitization requires to achieve information security and reduce the negative effects of using the internet, including[11]:

- Establishing security policies for information technology, including internet services.
- Establishing regulatory laws and penalties that limit electronic theft and information privacy violations in university institutions.
- Developing encryption tools in software to maintain privacy, especially in internet-related software, to enable users to maintain the confidentiality of their identity and transactions over the network.
- Encrypting information that is stored, stored, and transferred on various media.
- Ensuring the continuity of information systems and their readiness, especially in crisis situations and facing risks related to information systems.

E) Awareness Challenges:

Working on creating a supportive social mobilization, and an understanding of the necessity of digital transformation in the academic environment, with sufficient awareness of the advantages of digitization, using media, awareness-raising seminars and conferences, special study days to promote the benefits of its application, and programming training sessions on the use of digital platforms at various levels.

III: The Digital Transformation Roadmap as a Strategic Tool towards Overcoming Challenges

The Ministry of Higher Education and Scientific Research has set 12 goals to be achieved within the Digital Transformation Roadmap for the sector, which includes 7 strategic axes. A work plan has been developed that extends until 2025.

The Digital Transformation Roadmap, which aligns with the strategic vision, aims to prepare the digital future of higher education institutions. Therefore, it is a project that identifies and clarifies the allocation of digital support and resources necessary for managing the institution's activities and determining its position in time and place.

According to the Digital Transformation Roadmap, the ministry has identified 12 goals and 7 strategic axes to work within the framework of promoting digitization and using available technological means to achieve the desired reforms in the sector, which is a priority for the Algerian state. Therefore, efforts will be focused on digitization in order to accompany user training, modernize resources, and reach visible training offerings and innovative pedagogy to serve students and research activities.

The following outlines the goals of the Digital Transformation Roadmap and its strategic axes.

A) Challenges of the Digital Transformation Plan:

The digital transformation plan includes twelve challenges, which are outlined as follows:

Table.1: Digitalization Roadmap Challenges.

N	Title	Content
1	Acquiring digital resources and competencies	Digital skills have become essential today for ensuring quality education, where a good teacher is evaluated by their experience in using digital tools in all pedagogical and research activities. However, it is noticed that some teachers acquire skills in this field that are not the required skills due to poor guidance or improper use of them. Therefore, higher education institutions should pay special attention to this matter.
2	A successful and secure infrastructure	The credibility of the institution in this field largely depends on the good condition of the networks and enabling Wi-Fi connectivity in the face of major challenges such as supporting educational and research applications, storage, secure digital resources, and developing cloud services.
3	Digitalization as a support for training and visualization	Specialized websites in the field of training have gaps in both form and content. Therefore, a gateway should be established to display both in-person and remote training to simplify access and make the institution competitive at the national and international level in order to use mobile equipment.
4	The professional success and integration of the student	The professional integration of university graduates remains an important issue for the integration of higher education, and this is part of its tasks, which involve ensuring pre- and post-graduation support for graduates.
5	Scientific research with visibility and value creation	Digitization is a set of highly effective tools and structural frameworks aimed at organizing and enhancing research activities. It also encourages thinking about the issue of mutual exchange of resources. The visibility of research activities is also linked to better cooperation among researchers, and significant attention is paid to the data and results of research.
6	Using artificial intelligence	For example, in the medical sciences, this field helps improve the knowledge of health professionals when facing complex situations. It also allows for the acquisition and updating of technical skills and knowledge, encourages teamwork and communication, etc. This is an important challenge as it constantly brings together high-tech technologies and highly skilled remote practitioners.

7	Renewal of Pedagogy and New Forms of Knowledge Acquisition	Digitization makes the student an active and capable person to complete his studies properly. It seems that digital pedagogy is not just about using digitization for teaching, but it is more than that, as it is considered an attempt to transform the method of education through a more rational use of digital technology. It can start with a simple presentation - a slide show - to the opposite section, the active section, a video capsule, teaching aids, curriculum events, the use of social media, and more. These pedagogical activities require conditions such as curricula and professional support to accompany teachers in implementing their pedagogical approaches.
8	Societal modernization - lifelong learning	From now on, universities should include this reality, particularly by focusing on developing continuous training aimed at raising the level of institutional users in future subjects or professions, whether by valuing experience or professional development, aimed at accrediting experience gains to obtain a professional qualification or certificate.
9	Training patterns and multiple media supports	In order to harness all opportunities for student success, the focus should not be on a single training pattern, but rather on rotating between training patterns: face-to-face training, synchronous and asynchronous remote training, blended training. What matters is effectively meeting the needs of students and recording reflections in order to increase academic success opportunities. To achieve this, it is necessary to assess and study the feasibility of the increasingly available technological capabilities to ensure quality training, whether in-person or remotely.
10	Information system	Universities have some traditions in using application software for their various activities such as financial, human resources, employee salaries, point management, and scheduling. All of these software applications have been designed independently of the methods used by institutions, as we find the same applications from one college to another within the same institution. The Higher Education and Education Management developed a significant application called "progress," which is described as an integrated system that responds to some pedagogical concerns with a national dimension such as registering new baccalaureate degree holders.

11	Materialism and Digitalization	Infusing materialism into training, governance, and research processes can replace paper-based supports with digital documents. However, this process can only be completed if the entire environment is conducive to it. In this context, materialism in a higher education institution can be linked to internal and external activities, such as approving degrees. Additionally, it is necessary to digitize and archive documents electronically to secure them and ensure the traceability of all institutional activities. Therefore, several materialism processes or digitization of different document types can be envisaged, such as digitizing administrative procedures, archiving documents, electronic signatures, and online form submission.
12	Visibility and attractiveness of the institution and its national and international relations	The openness at the national or international level depends on the role that higher education institutions should play to strengthen the country's position in the scientific or training field, as well as with social and economic partners internally. This openness can help rediscover the important role of the teacher-researcher in the economic and social development of the country.

Source: Compiled by researchers based on The Digitalization Roadmap, 2022.

B) The Strategic Axes of the Digitalization Roadmap:

The Digitalization Plan includes seven strategic axes that ultimately form the strategic vision of the Ministry responsible for Higher Education.

- The first axis relates to digitalization in order to accompany teacher training, and two programs have been allocated to it through accompanying teachers, technical users, administrators, and institution officials, as well as embodying exploratory workshops for the same purpose.
- The second axis concerns digitalization in the service of a harmonized training offer and focuses on improving the visibility, attractiveness, and coherence of the training offer, which was launched through workshops to unify training offerings. It will also focus on reforming the school system.
- The third axis concerns digitalization as a support for student success and includes two programs to improve pedagogy and student success.
- The fourth axis is based on digitalization in support of research activities, as the ministry has developed two programs to enhance the visibility of research and innovation work, aimed at enhancing the capacity and power of computing, storage, access mechanisms for publishing, open publishing, open data, and the use of artificial intelligence.
- The fifth axis concerns strategic, structural, and programmatic digitalization to ensure successful network-based infrastructure and data security for these structures, relying on daily

user activities and movements through the distribution of Wi-Fi to the infrastructure, with the aim of modernizing and constantly responding to standards.

- The sixth axis is about digitalization as a support for modern management, through the development and implementation of procedures and methods to modernize the management, supervision, and governance of the university institution in order to provide the best services to users and ensure continuity and adaptation of university practices.
- The seventh axis concerns digitalization of national and international relations, through three programs aimed at national and international visibility and openness, international cooperation, and modernization of society.

C) Perspectives of the Digitalization Roadmap:

The objectives of the digital roadmap in the short term are:

- Enriching content, improving graphics, and updating institutional websites: using at least two languages, with a tab in Tamazight and a tab in English, while allocating a tab for digital space - digital platforms.
- Coordinating and updating webmail: by opening accounts for teachers and students on the institution's website or the scientific and technical information research center - webmail - with the possibility of electronic signature.
- Providing a platform for student internships in institutions - secured: by providing internal training at the level of the number of company internships completed, this platform is dedicated to students who have access to partner companies to add internal internship opportunities for students.
- Establishing a platform for monitoring and managing the evaluation of acquired experience: the experience gained regarding the skills reference system, oral exams.
- Establishing a platform for monitoring international agreements - secured: institutions will be able to consolidate partnerships and benefit from experiences.
- Creating a mobile chat agency for user information and guidance: using artificial intelligence to help website users guide themselves better or find specific information.
- Studying and gradually designing an integrated information system in relation to the national PROGRES system.

Conclusion:

As the topic of this study is titled "The Digital View of Higher Education Sector under the 2025 Digitalization Plan," it required an exploration of the digital aspects of the higher education sector, followed by an analysis of the challenges of digitalization in Algeria's higher education sector, and then an examination of the role of the digitalization plan as a strategic tool to overcome these challenges.

Therefore, a number of results and recommendations have been reached:

Results:

- Digital technology in the field of higher education has become a factor for encouraging innovation, by exposing the higher education institution to an open and global field, to prove itself and respond to its core tasks.
- Higher education institutions have been able to build a software portfolio in various fields, such as registration, electronic publishing, and distance learning.
- The Ministry of Higher Education and Scientific Research, through the digital transformation plan, is determined to make digitization a fundamental pillar for every educational, research, or government-related activity within universities and central administration. However, in order to determine the chances of success of this project, questions need to be answered explicitly and gradually regarding the vision that falls within the long term goal of effective integration of digitization in higher education, scientific research, and modern university services, in order to address the student's concerns.
- The SDN digital guidance plan, which is aligned with the strategic vision, aims to prepare the digital future of the higher education institution, and thus, it is a project that determines and clarifies the allocation of digital tools and resources necessary for managing the institution's activities and determining its position in time and place.
- Through the digital transformation plan, the Ministry aims to enhance the position of higher education institutions and to upgrade them to the global ranking, and digitization provides them with this opportunity. It allows them the chance to make their tasks more attractive by allowing students to learn and experiment, as well as enabling professors to implement motivating and diverse curricula and assessments.
- The aim of the digitization guidance plan is to create a comprehensive and integrated environment that enhances motivation and learning by focusing on developing/improving the skills of professors in this field and enhancing the independence of the student at the academic level by providing them with the latest tools.
- The aim of the digitization guidance plan is to create an open and secure technological ecological environment that is appropriate and motivating for integration, as well as to take care of the necessary compatibility issues for the exchange of resources because digitization will produce new needs, behaviors, and requirements, and their consequences will lead to significant changes in the higher education system.
- In order to confirm one of the main tasks of the Ministry of Higher Education and Scientific Research, which is to increase the success rate of students, digitalization is considered an absolute priority and not a goal that can be achieved in the distant future. In this regard, the necessity for the ministry to ensure a strong strategy for the development of digitalization in an environment facing many challenges is clear.

Recommendations:

- The necessity to benefit from the successful experiences of countries that apply electronic administration with the same conditions of the work environment in Algeria.

- The necessity for continuous training and qualification of employees in institutions in the field of modern technologies.
- Working on developing the communication infrastructure by improving internet service.
- Promoting and disseminating a culture of digitalization among members of the academic community.
- The necessity to accompany professors to assist them in developing their pedagogical performance and mastering modern means of digitalization.

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