

The Transition to Administrative Digitalization: Ensuring Service Quality in the Higher Education and Scientific Research Sector in Algeria

التحول نحو الرقمنة الإدارية: ضمان جودة الخدمات
في قطاع التعليم العالي والبحث العلمي في الجزائر



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Abstract:

The implementation of digital transformation is imperative and requires immediate attention to leverage this technology across all fields, including administrative sectors. This study The objective is to emphasize the significance of administrative digitalization in enhancing public administration through the widespread adoption of information and communication technology in administrative management, specifically in the domains of higher education and scientific research sectors.

Nevertheless, Algeria faces challenges that hinder the full benefits of the technological revolution. To mitigate the risks associated with digitalization, legislative and security measures must be implemented through cyber security to ensure trust in electronic administrative transactions.

key words: Digital Protection, Digital Transformation, Electronic Management, Higher Education Sector, Efficiency.

ملخص:

أصبح التحول الرقمي ضرورة ملحة من أجل الاستفادة من هذه التقنية في كافة المجالات، بما فيها الإدارية، وقد جاءت تهدف هذه الدراسة لإبراز دور الرقمنة الإدارية في تحسين الإدارة العمومية، انطلاقاً من تعميم استخدام تكنولوجيا المعلومات والاتصالات في التسيير الإداري، خاصة في قطاع التعليم العالي والبحث العلمي.

ورغم ذلك تواجه الجزائر تحديات تعيق الاستفادة الكاملة من الثورة التكنولوجية، ولتفادي مخاطر الرقمنة الإلكترونية، يجب اتخاذ إجراءات تشريعية وأمنية من خلال الأمن السيبراني لضمان الثقة في التعاملات الإدارية الإلكترونية.

الكلمات المفتاحية: الحماية الرقمية، التحول الرقمي، التسيير الإلكتروني، ميدان التعليم الجامعي، الكفاءة.

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Introduction:

Due to rapid technological advancements, administrative digitization has become imperative for achieving and keeping pace with technological and informational developments across all sectors, particularly in higher education and scientific research. Algeria strives to achieve progress and sustainability, improve quality and efficiency, and enhance academic excellence in this vital sector.

The importance of this transformation has grown significantly, especially following the outbreak of the COVID-19 pandemic. This pandemic compelled Algerian decision-makers to find alternative mechanisms for delivering public services and ensuring their continuity by seeking innovative solutions to manage exceptional emergency conditions.

Higher education and scientific research are considered crucial, as they form the foundational pillar for academic research. It aims to train a generation of distinguished researchers responsible for developing universities and enhancing the competencies that have proven their worth practically. Additionally, it ensures the provision of high-quality University services, contributing to the preparation of a promising youth elite regarded as the true asset for building and advancing the state.

To ensure improved performance and efficiency, the higher education sector has embarked on a transition towards digital transactions and the activation of the digital space under the slogan "Zero Paper." This has been achieved through the adoption of various measures and procedures that have resulted in the implementation of digitization in this sector.

Algeria has paid particular attention to the legal and regulatory framework for digitization in higher education by establishing the Directorate of Networks and Digital Development under Decree No. 21-134, signed on April 7, 2021. The Ministry of Higher Education and Scientific Research's central administration is set up under this directive. This endeavor has been further realized by adopting the Digital Strategic Plan (SDN) for higher education and scientific research, extending from 2022 to 2024.

The plan aims to advance the use of digitization through seven main areas: digitization for supporting faculty training, digitization in training offerings, digitization to support student success, digitization in research activities, digitization to support permanent infrastructure, digitization to support modern management, and digitization in national and international university exchanges.

Our study aims to accentuate the continual changes taking place in the fields of scientific research and higher education, as well as the difficulties these changes present and opportunities, through the shift towards administrative digitization in this sector.

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Considering the aforementioned, the following research question can be posed: **To what extent has administrative digitization been implemented in higher education and scientific research?**

To address this question, a descriptive methodology was used to explain the condition of digitization at the time and the actions made by the state to achieve it, alongside a critical approach to clarify the different barriers impeding the adoption of digitalization in the field of higher education.

The research is separated into four primary sections:

Section 1: The Study's Conceptual Framework

Section 2: The Impact of Digitization on Modernizing the Fields of Scientific Research and Higher Education

Section 3: Challenges to Digitizing Administrative Records in the Higher Education Field

Section 4: Cyber security Must Be Achieved to Meet the Challenges of Administrative Digitization in Higher Education

The Study's Conceptual Framework

With quick developments in technology and digitization, universities and research institutions are facing new challenges related to the management of information and data. Algeria's Leading the way in adjusting to these changes is the field of higher education and scientific research.

In this regard, administrative digitization emerges as a crucial tool for enhancing the performance and management of these institutions. This digital transformation presents a new challenge that requires a deep understanding of digital concepts and technologies and their integration into the university and research environment. Therefore, in this section, we will Describe the idea of administrative digitalization in the context of scientific research and higher education and then explore how digitization contributes to its contemporary.

The first requirement: The Administrative Digitization Concept in the Fields of Scientific Research and Higher Education

In this section, we will explore the concept of administrative digitization by first defining the term digitization and then defining administrative higher education sector's digitization as follows:

The first section: Definition of Digitization

Digitization refers to converting information sources from their traditional form into digital form. This process aims to provide beneficiaries with the maximum number of suitable information sources, contribute to preserving information sources for a more

extended period, and make them accessible to the largest number of beneficiaries worldwide.¹

TERRY KANNY defines it as: “the process of converting information sources of various types (books, periodicals, images, audio recordings, etc.) into a machine-readable form using a computer via the binary digital system (Bits), which is the basic unit of information for an automated information system based on the use of computers. This involves transforming information into a series of binary numbers, a process known as digitization, using specialized techniques and devices”.²

The digitization process is the foundational step required to build an electronic administration system. Implementing electronic administration requires digitizing all physical and legal activities of administrative entities at all levels, both lower and upper, of public administration.³

Additionally, digitization can be defined as converting intellectual content available on traditional physical storage media into digital form.

Digitization is defined as: “All the information and communication technologies used in higher education aimed at storing, processing, retrieving, and transmitting information from one place to another. This process enhances and improves the educational process using all modern means such as computers and their software, internet technologies like e-books, databases, encyclopedias, periodicals, educational websites, email, voicemail, written communication, voice communication, video conferencing, virtual classrooms, e-learning, digital libraries, interactive television, remote learning, interactive video, multimedia, CDs, and satellite television broadcasting”.⁴

The second section Administrative Digitization: A Definition for the Higher Education Sector

In scientific research and higher education, administrative digitization is defined as "the use of information and communication technologies in teaching and learning."

¹ Masfira bint Dakhil Allah Al-Khath'ami, “**Digital Transformation Projects and Experiences in Information Institutions: A Study of Adopted Strategies**”, *RIST Journal*, Vol. 19, No. 01, 2010, pp. 18, 23.

² Aknouch Nabil, “**The Digital Library at the Algerian University: Its Design and Establishment - The Library of Prince Abdelkader University as a Model**”, PhD thesis in Library Science, Department of Library Science, Faculty of Humanities and Social Sciences, Mentouri University Constantine, 2010, p. 148.

³ Rabie Nassira, “**The Imperative of Digitization as a Mechanism for Implementing Digital Administration in Algeria**” *Journal of Teacher Researcher of Legal and Political Studies*, Vol. 06, No. 02, December 2021, Faculty of Law and Political Science, University of M'sila, p. 1035.

⁴ Abdel-Baqi Abdel-Moneim Abu Zeid, “**Obstacles to Employing Information and Communication Technology in Commercial Subjects Curricula in Secondary Education**”, First International Conference on the Use of Information and Communication Technology for the Development of Pre-University Education, Egypt, 2007, p. 6.

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These technologies are employed to store, process, retrieve, and transmit information from one place to another, enhancing and improving the sector using modern tools such as computers and their software, the Internet, databases, encyclopedias, periodicals, educational websites, email, voice mail, text and voice messaging, video conferencing, virtual classrooms, e-learning, digital libraries, and distance education".¹

It also refers to: "technologies that allow for the collection, storage, processing, and transmission of information, relying on the principle of electronic encoding or encryption of information, whether in the form of digital data, text, image, or sound".²

From these definitions, the concept of digitization in the educational process involves integrating information and communication technologies into all its elements.

The third section: Definition of quality

As a term, quality is derived from the Latin word "Qualité." Terminologically, it means the nature of something and its degree of suitability. It is a relative concept that varies depending on the beneficiary's perspective, whether it is an institution, supplier, customer, etc. It is defined by "Rhodes" as: "An administrative process based on a set of values, and it derives its force from the information within which it can employ the talents of workers and invest their intellectual potentials at various organizational levels creatively to achieve continuous improvement in the school of instruction".³

The second requirement: Features of Administrative Digitization in the Field of Higher Education

The following succinctly describes the features of administrative digitization in the higher education sector:⁴

1. There is a vast abundance of information sources, such as e-books, periodicals, databases, encyclopedias, and educational websites.

¹ Mourad Boutaba, "**Training the University Professor as a Necessity to Achieve Digitization and Quality Higher Education**", presented at the International Virtual Symposium titled: (Digitization: A Guarantee for Quality Higher Education and Scientific Research and Achieving Sustainable Development), Faculty of Law, M'Hamed Bougara University Bumerdes, March 20-21, 2021, p. 41.

² Briza Bouz'aib, "**Digitization and Its Role in Modernizing Higher Education in Algeria**", Public Service Quality Journal of Sociological and Administrative Development Studies, Vol. 05, No. 02, 2022, Mohamed Boudiaf University of M'sila, pp. 69, 70.

³ Samira Menad, "**The Effect of Digitization on the Quality of Teaching in Algerian Universities: A Socio-Cultural Approach**", International Journal of Early Childhood Special Education, Vol 16, Issue 02 2024, Turkey, p 278.

⁴ Kaddam Sabrina, Rahali Saifeddine, "The Impact of Digitalization on Enhancing University Students' Academic Achievement," Proceedings of the National Conference titled: "The Role of Digitalization in Quality in Higher Education," Faculty of Law - University of Algiers 1, March 1, 2020, organized by the Quality Assurance Unit of the Faculty of Law - University of Algiers 1, published in the Algerian Journal of Legal, Political, and Economic Sciences, Volume 57, Special Issue, 2020, p. 28.

2. Direct communication occurs in real-time through various methods, including written communication, where a person types what they want to say using a keyboard, voice communication, and audiovisual communication.
3. Indirect communication is when students can communicate with each other indirectly and without the need to be present simultaneously, using various messages such as voicemail and email.

The Impact of Digitization on Modernizing the Fields of Scientific Research and Higher Education

In an effort to digitize scientific research and higher education, the Ministry of Scientific Research and Higher Education has launched multiple programs. As a result in significant developments that have contributed to the sector's advancement. Among these initiatives, we highlight the following:

The first requirement: Digital Platforms' Contribution to Improving University Services

The Scientific Research and Higher Education Ministry strives to incorporate digitization across all its sectors, including university services. It has dedicated substantial material and human resources to ensure the success of these efforts, which align with the ministry's and the state's policies. The process encompasses student ID cards, catering, accommodation, and other services. Algerian universities aim to achieve a "paperless" status by digitizing governance, training, scientific research, and university services, among other areas. Digitization has become imperative for improving and upgrading services to reach a digital economy, representing a challenge akin to a revolution or a battle for the sector and the government. Current efforts are focused on digital transformation.

New digital platforms have been launched to facilitate student success, pedagogical innovation, and sector modernization, bringing the number of platforms the ministry introduced to 29. Digital student cards have been provided, featuring pre-paid electronic payment services for transportation, accommodation, and catering, incorporating a digital ticketing system. Additionally, electronic modifications have been introduced for registering in cultural and sports activities, along with enhanced monitoring and health follow-up through a dedicated platform for students and staff. Recently, a digital platform for university scholarships (**E-minha**) was launched, enabling online scholarship applications without needing paper submissions.

Digitization significantly simplifies procedures and facilitates access to university services. One of the primary benefits of the digital space is eliminating paper files by converting them into easily usable encrypted files. This reduces the burden on service seekers, eliminating the need to search for required documents and visit various offices.

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Digitization entails creating platforms and networks that store and exchange information between different ministries and sectors without requiring individuals to justify specific authorities. Furthermore, digitization helps eliminate bureaucratic practices by reducing the inconveniences that service seekers face under the traditional paper-based administration, which proved ineffective in serving and satisfying citizens. The digital space also allows for correcting errors by reviewing platform content and making necessary adjustments, thereby reducing administrative errors committed by public employees.¹

The second requirement: Digital Platforms' Place in Scientific Research and Higher Education

The ministry has set up several electronic platforms scientific research and higher education, such as the National Online Documentation System (SNDL), the Library Management System, and the (**Progress**) System, the Algerian Scientific Journal Platform (**ASJP**), the (**E-learning**) platform, and the digital platform for teaching English to train university professors (**Dual-Edx**). This platform is used in collaboration with MIT University in the USA to train university professors in English, especially since Algerian universities have adopted English in most scientific disciplines and plan to expand this to other fields in the coming years. A digital platform has also been established to receive petitions and complaints from the university, research, and service community.

The first section: E-learning platform

Distance learning education in Algeria represents a significant advancement in the country's educational landscape. It aims to employ digital technologies to increase learning results and expand access to education. This mode of education has become prominent due to its ability to overcome geographical and temporal barriers, making education that is more widely available.

The Scientific Research and Higher Education Ministry has played a crucial role in facilitating the adoption of distance education through various programs and projects.²

In Algeria, distance education employs various formats to deliver educational content, including video lectures, interactive modules, digital textbooks, and multimedia resources. This approach caters to diverse learning.

¹ Fahima Beloul, “**Digitizing the Higher Education Sector in Algeria: Will the 'Zero Paper' Goal be Achieved in Algerian Universities?**” *Al-Mufakir Journal*, Vol. 18, No. 01, 2023, Faculty of Law and Political Science, Mohamed Khider University Biskra, p. 496.

² Order No. 1242 dated September 22, 2022, regarding the establishment of the sectoral committee for the implementation and monitoring of distance education in higher education institutions. Official Bulletin of the Ministry of Higher Education and Scientific Research, Third Quarter 2022.

The second section: Progress Platform

The Ministry of Higher Education and Scientific Research has implemented cutting-edge electronic information systems to enhance the efficacy and efficiency of university administration and guarantee the best distribution and administration of resources, especially within the framework of the Master's and Doctoral (MD) system, which is distinguished by an ever-expanding range of academic degrees and disciplines each year. These programs enable streamlined access to public resources, automate and digitize administrative procedures, monitor student progress within the MD framework, and manage comprehensive university data efficiently. This strategic initiative aims to support informed decision-making and enhance overall administrative functionality.

Furthermore, the system is notable for its fairness and transparency, providing clear and transparent access to academic results while allowing university students to choose and enroll in master's and doctorate programs of their choice. This portal acts as an all-inclusive data source for managing all university-related activities.¹

The third section: National Online Documentation System²

In Algeria, the National Online Documentation System (SNDL) is a huge initiative designed to enhance the management and accessibility of academic and administrative documentation across the country's higher education institutions. Here is an overview of the SNDL in Algeria. It aims:

- **Centralization of Documentation:** The SNDL aims to centralize academic records, administrative documents, and other relevant information from universities and higher education institutions across Algeria. This centralization helps streamline the management and retrieval of educational documents.
- **Improvement of Administrative Efficiency:** The SNDL seeks to improve the efficiency of university operations, including student registration, program management, and degree issuance, by digitizing and automating various administrative processes.
- **Enhancement of Transparency:** The system provides transparent access to academic records and administrative information, ensuring that students and educational institutions can easily track and verify important data.
- **Support for Policy and Decision-Making:** The SNDL offers valuable data and insights to policymakers and educational administrators, aiding in

¹ Brada abderrazzaq, Fatima dahmani, “**The Significance of Digitization Projects in the Algerian Higher Education Sector for Enhancing Educational Quality**”, Afak for sciences journal, volume 09, No 03, 2024, Djelfa University, Algeria, P 96.

²In French language: **Système National de Documentation en Ligne (SNDL)**

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strategic planning and decision-making processes within the higher learning field.

The Ministry of Higher Education and Scientific Research, primarily representing the Algerian government, has been instrumental in the development of and implementing the SNDL. This initiative aligns with broader efforts to modernize and digitalize the higher education sector in Algeria.

While the SNDL represents a significant advancement, ongoing efforts are required to address challenges such as ensuring widespread access to the system, improving digital literacy, and continually updating the platform to meet evolving needs.

Overall, the SNDL in Algeria is a crucial step towards modernizing the management of higher education documentation, promoting efficiency, and enhancing transparency in the educational sector.

The main advantages of digitization for scientific research can be summarized as follows:

Firstly, Facilitating Scientific Research:

Scientific material is crucial for university students throughout their academic journey to ensure the desired quality in scientific research. This is achieved by providing various scientific research resources, especially references needed by students. Digitization facilitates students' scientific research by making different references and sources easily accessible, saving significant time and effort compared to the traditional search method, which is often difficult in some university libraries. The importance of digital platforms is particularly evident for students preparing graduation theses and doctoral dissertations, ensuring the preparation of high-quality theses instead of merely compiling recycled information.

Secondly, Achieving Quality in Higher Education and Scientific Research:

Using information and communication technologies in the classroom is one way that digitization improves the quality of higher education, thereby improving it. Professors can prepare their lectures meticulously and comfortably when done remotely, unlike the traditional in-person method that could hinder information delivery. Digitization offers numerous advantages for developing scientific research and facilitating exchanges in this field, as evidenced by conferences and scientific meetings held via teleconferencing. This has significantly enlightened Algerian researchers and eased the scientific research process, especially in obtaining references from abroad.¹

Challenges to Digitizing Administrative Records in the Higher Education Field

¹ Fahima Beloul, Op-Cit, p. 498.

The presence of an all-encompassing plan for digital transformation does not necessarily guarantee the smooth and correct implementation of this strategy. Numerous obstacles and challenges may arise during the execution of the plan, as noted by various researchers across different fields.

Therefore, we will attempt to summarize the main obstacles in the following points:

The first requirement: Inadequate Intellectual Property Regulations in the Digital Domain

University research and library digitization are strongly related to the digitization of higher education and scientific research. Due to their unique nature, the production of intellectual works is considered a modern endeavor in the field of intellectual property rights. Thus, adapting them within the scope of rights necessitates establishing a comprehensive system to ensure complete intellectual property protection.

Different countries have enacted laws to protect intellectual property for two main reasons: coordinating and enabling community consumption, as well as defending the moral and financial rights of creators of these creations, thereby ensuring fair commercial practices that contribute to societies' economic and social development.

However, the move towards digitization may lead to violations of these rights and principles that underpin this field, particularly since the Algerian experience in legislating intellectual property has yet to reach the level of responding to the aspirations required by the projects for digitizing university libraries. Despite international agreements' reluctance to regulate digital copying and digital transmission to the public, this does not reflect neglect of the issue. Instead, it leaves room for national legislation in each country to enact laws that align with their political and economic orientations.¹

The second requirement: Difficulties Associated with the Different Information and Communication Technology Use Deficiencies

Notwithstanding Algeria's use of the Internet in 1993, its utilization across various sectors, including higher education, still needs to be significantly below the necessary and desired level. Like many developing countries, Algeria faces numerous challenges in leveraging information and communication technologies (ICT) in higher education for the following reasons:

¹ Sakina Farouj, “Establishing the Electronic Library as a Mechanism for Digitizing Higher Education in Universities”, presented at the International Virtual Symposium titled: (Digitization: A Guarantee for Quality Higher Education and Scientific Research and Achieving Sustainable Development), Faculty of Law, M'Hamed Bougara University Boumerdes, March 20-21, 2021, p. 181.

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- **High Cost of Computers:** Computers are high relative to student grants. Given that The higher education sector's digitization project is primarily focused on students, most students still need to own personal computers, which facilitate remote learning. This presents a significant obstacle to the success of distance education and training.
- **Monopoly of Communication Technologies:** ICT, with the exception of mobile phones, is monopolized by the state-owned telecommunications sector.
- **Insufficient Number of Computer Labs:** Universities need sufficient computer laboratories.
- **Absence of Specialized Educational Software:** More software must be tailored to specific academic courses.
- **Lack of Internet Access in Classrooms:** The absence of Internet access hinders technology integration in the field of education.
- **Weak Infrastructure:** The system that facilitates the use of ICT in education process is inadequate.
- **Low Internet Speed:** Algeria ranks near the bottom regarding internet speed, reflecting the difficulties in digital transformation.
- **Lack of Technological Proficiency among Faculty:** Many faculty members must use computers and modern technological applications proficiently.
- **Challenges in Electronic Student Management:** The increasing number of students complicates electronic management and organization, sometimes preventing the achievement of digitization goals.¹

The third requirement is weak financial capabilities for fund digitalization in some Algerian universities.

Digital transformation generally requires a modern and flexible organizational structure, electronic administrative leadership that supports development and change, and efficient interaction with information technology. It also requires the necessary funds to ensure its continuity and success and the achievement of its desired goals.²

Some universities need more, or in some cases have, weak, qualified human resources to support digital transformation and insufficient financial funding for purchasing devices and applications. This has impacted the universities' role in

¹ Anissa Rekab, Fatima Zahra Jalal, “**The Emergence and Development of Distance Education and the Main Challenges and Difficulties It Faces**”, Studies in Development and Society Journal, Vol. 06, No. 04, Hassiba Ben Bouali University, Chlef, p. 84.

² Heba Ibrahim Al-Shahat Bnwan, “**Educational Requirements for Digital Transformation in Egyptian Society: Basic Education as a Model**”, Journal of Scientific Research in Education, Vol. 23, No. 03, p. 33.

digitizing studies, research, and manuscripts, necessitating increased state efforts, greater attention to human resources, and enhanced financial support.

Cyber security Must Be Achieved to Meet the Challenges of Administrative Digitization in Higher Education

Cyber security is taken into the optimal solution for keeping an eye on the widespread use of the Internet, its different systems, applications, and the risks arising from misuse and unauthorized access to data. Consequently, this leads to the development of a society that is aware of cyber security methods and the preparation of qualified national capabilities and personnel to face cyber threats.

In this section, we will explore the concept of Cyber security and then discuss its goals and significance in dealing with the administrative digitalization problems in the field of higher education.

The first requirement: The Concept of Cyber security

Cyber security is " a set of technical and administrative procedures that include the processes and mechanisms applied by institutions to secure their digital infrastructure and maintain the confidentiality of information and data." ¹

Another definition of it is "the process of defending programs, networks, and systems against cyber attacks that often aim to access sensitive information, alter or destroy it, extort money from users, or disrupt business operations."

Furthermore, it is described as " the protection of individuals and their data and accounts from electronic attacks, measured by the degree obtained by an individual through their responses to cyber security scale items."

It has also been elucidated as: "A security concept specifically concerned with protecting information and everything related to it, including operations, services, devices, and technologies, against any unauthorized access to preserve the integrity and authenticity of data stored on digital devices".

From the aforementioned definitions, we can conclude that Cybersecurity is a relatively modern concept developed within the framework of the digital revolution and contemporary technology. This revolution has caused the proliferation and transfer of information and data across various communication means via different digital devices. Hence, Cyber security focuses on the security aspect of protecting the transfer of information and data among various digital media.²

¹ Mona Al-Ashqar Jabbour, "Cyber security: Challenges and Requirements for Confrontation", First Annual Meeting of Cyber security Specialists, League of Arab States, Arab Center for Judicial and Legal Research, Beirut, August 2012, pp 27, 28.

² Abir Ahmed Ali Kaaouh, "Cyber security Policies to Enhance Digital Transformation in Egyptian Universities: A Proposed Vision in Light of Global Experiences", Educational and Social Studies Journal, Vol. 26, June 2020, Part 3, Helwan University, Egypt, p. 146.

The second requirement: Goals of Cyber security and Its Significance in Handling Administrative Digitization Challenges in Higher Education

We will discuss Cyber security's objectives and then highlight its significance in resolving problems with administrative digitization in the field of higher education.

The first section: Cyber security Goals

In the last few years, all governments and institutions have focused on planning cyber security policies due to the achievement of several significant objectives, which can be outlined as follows:

- Providing a secure environment that users can trust.
- Protecting the digital devices in use.
- Reducing cyber threats and crimes.
- I am resisting malicious software and preventing it from causing damage to information systems.
- It enables the institution to monitor its digital development and improvement plans.

The second section: Cyber security's Critical Role in Handling Higher Education's Administrative Digitization Issues

In the field of higher education, cyber security is a given necessity to confront the increasing challenges associated with administrative digitization. The likelihood of falling victim to cybercrimes rises given the lack of knowledge and the increasing and pervasive use of the Internet through various digital devices. Governments and institutions are keen on digital transformation, underscoring the importance of Cyber security, which has several advantages and adds significant value. This can be clarified as follows:

- Protecting sensitive data: Higher education institutions store and use a vast amount of sensitive data, such as personal information of students and staff and research data. This data must be protected from leaks or breaches.
- Preventing cyber-attacks: Higher education institutions are continuously exposed to malware and hacking attempts. Cyber security helps prevent these attacks and maintains system integrity.
- Ensuring continuity of services: Cyber security is essential to ensure the continuity of digital services in educational institutions, including online classes and academic management systems.
- Enhancing trust and transparency: Cyber security helps build trust among students, staff, and educational institutions. Knowing that their data and privacy are protected can increase confidence and enhance transparency.

- Ensuring secure communication: Cyber security guarantees secure communication over networks, whether between students and teachers or between the educational institution and other entities.
- Preventing academic fraud: Cyber security helps prevent academic fraud, including cheating and digital academic misconduct, thereby preserving the integrity of the educational system.

In summary, achieving Cyber security can help provide a safe and reliable digital educational environment, enhance the experience of students and staff, and support academic and administrative success in educational institutions.

Conclusion:

In conclusion, this study has revealed that adopting administrative digitization in the higher education sector in Algeria has necessitated reevaluating many policies and practices that were prevalent under traditional paper-based administration. The state's commitment to modernizing public services is evident through the adoption of digitization, which has become an indispensable choice. The transition towards administrative digitization enhances the capability of universities and research institutions to keep pace with global developments and to provide world-class education and research. By fully leveraging technology, Algeria can achieve innovation and excellence in higher education and scientific research, notably boosting the country's economy and raising the standard of living for its people. Algeria's pursuit of administrative digitization in this sector is not merely an administrative procedure but an investment in the future, paving a bright path toward sustainable development and leadership in education and scientific research.

It is undeniable that the COVID-19 pandemic has accelerated digitization in Algerian universities due to the urgent need for this space to ensure the provision of remote academic services. The state has provided numerous digital platforms, especially for the higher education sector, to achieve the goal of a paperless university. This was relatively easy given the Minister of Higher Education's policy, which demonstrated his interest and commitment to the necessity of a complete digital transformation in Algerian universities. This included several measures, such as activating digital platforms for distance learning, generalizing digital platforms for professors' administrative files, and creating a digital space for student registration to eliminate paper-based files.

This indicates that digitization is a modern mechanism to facilitate pedagogical work and provide digital spaces that ensure the quality of scientific research in Algerian universities. Administrative digitization has also helped alleviate the pressure on administrative staff at universities, who previously faced significant pressure due to the substantial number of students awaiting university services.

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We conclude this study by presenting several proposals that we consider essential for further activating digitization within the university environment:

1. Focus on the legislative framework governing digitization and electronic transactions by issuing a specific digitization law that encompasses various digitization processes and procedures, as many other countries have done.
2. Avoid various problems and malfunctions encountered by different digital networks.
3. Train administrators and professors in digitization and the technical information they need.
4. Raise awareness among university students about the importance and necessity of the digital space for developing various fields to achieve what is known as the digital student.

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