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Using Artificial Intelligence tools to create a smart university to employ digital transformation in the sustainability of higher education development Applied study, White Nile University - Sudan, 2023

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Abstract

The study aimed to introduce artificial intelligence and design a smart technology educational environment that works to develop digital capabilities and smart digitization in universities by using artificial intelligence methods to achieve the maximum level of education according to different capabilities and skills, raise the value of higher education and improve the quality of education. The problem of the study lies in the presence of real challenges in The field of education, due to the lack of interest in developing innovative tools to meet the needs of society. The study relied on the descriptive analytical approach to define and analyze the conceptual framework for building a smart university that has all the elements of development and electronic renaissance. The study reached the most important results, including the impact of digital transformations on smart universities, and digital transformation achieves many goals. For students and faculty members, digital transformation helps faculty members cope with the increasing number of students, provides thousands of educational sites, and the most important recommendations of the study are preparing an integrated vision between the components of digital transformation and applying it to the smart university, providing the necessary insurance and security of information in the smart digital environment.

Keywords: Artificial intelligence tools; Smart university; Digital transformation; Higher education development

1. Introduction

The development of information and communication technologies has led to the emergence of a new knowledge revolution that has the ability to influence the economic, social, cultural, security and other fields.

Therefore, smart digital transformation has become the beginning of change, development and launch of a system that is compatible with global developments and competitiveness and provides a smart university structure that adapts to changes, in order to achieve interactivity, quality and participation through analytical visions of the requirements of the current structure and future development.

Digital transformation is considered the appropriate solution to several crises, including the Corona virus and the Sudan War in April 2023.

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Universities are institutions of scientific creativity and a basic means for the advancement and progress of societies. They have a profound impact on our societies as they lead the process of continuous development and improvement to increase the effectiveness of their contribution to society.

1.1. Study problem

There are real challenges in the field of education due to the lack of interest in developing innovative tools to meet the needs of society and raise the level of education, the weak development of capabilities and skills in education, the difficulty of keeping pace with and adapting to technological changes and their development, and the lack of a methodology and strategy for developing and developing universities.

1.2. Study importance

- Discovering an effective model for the educational process in universities and improving their performance
- And a new addition to the field of knowledge embodied in the trend towards the smart university,
- Developing the skills and capabilities of members of the educational process and developing their experiences
- And creating rich interactive environments that are constantly evolving in order to advance them to a modern smart university.

Study objectives

Designing a smart technology educational environment that develops digital capabilities and smart digitization in universities using artificial intelligence methods that achieve the following:

- Achieving the maximum amount of education according to different capabilities and skills
- To access information sources of all kinds by browsing the Internet
- Raising the value of higher education and improving the quality of education.

2. Study methodology

The study relied on the descriptive analytical approach to define and analyze the conceptual framework for building a smart university that enjoys all the elements of modern electronic development and renaissance.

2.1. Study limits

Time limits: 2023

Spatial limits: Sudan

Objective limits: It was limited to the components of the smart university represented by the university campus, human cadres, the use of smart technologies, preservation and smart strategies.

2.2. Study Terms

2.2.1. Artificial Intelligence

It is a technology that simulates human intelligence to perform tasks and can repeatedly improve itself based on the information it collects.

Factors that work to develop artificial intelligence:

- Availability of the electronic cloud
- The presence of large quantities available for education
- Applied artificial intelligence technology provides a competitive advantage

Benefits of artificial intelligence in the educational process

- Improving and developing the educational experience
- Providing an individual educational experience customized for each student more effectively and achieving the best results
- Providing immediate feedback and providing immediate feedback.

First axis: The concept of artificial intelligence

2.2.2. Artificial intelligence

It is a set of technologies and systems that aim to give computer systems and the ability to perform intelligent tasks (Audrey Azoulay 5/15/2023, Let's make the best of artificial intelligence).

Advantages of Artificial Intelligence

- Overcoming complex problems
- Increasing business efficiency
- Making smarter decisions
- Automating business processes

Artificial Intelligence applications

- Intelligent document processing
- Monitoring application performance
- Predictive maintenance
- Medical research
- Business analytics

Main AI technologies (Hoda Ali, 10/21/2022, AI applications for developing emotional intelligence)

- Natural language processing
- Computer vision
- Generative AI
- Speech recognition

Main components of the AI application architecture (Amazon Web Services 8/5/2023)

- First layer (data layer)
- Second layer (machine learning frameworks and algorithm layer)
- Third layer (model layer)
- Fourth layer (application layer)

Challenges Facing the Implementation of Artificial Intelligence

- *Data Governance
- ***Technical Difficulties**
- ***Data Limitations**

Artificial Intelligence for Children affects them by providing them with an early look at the challenge of risks and the ability to understand and control amazing technologies and align their development with the interaction of the children's intelligence industry at a very high speed (Dr. Samah Ramadan 4/10/2023 AD. Using Artificial Intelligence to Improve the Learning Process and Enhance Educational Outcomes).

2.2.3. -Smart University

It is a higher education institution that includes a group of subsystems and works to provide a changing interactive environment that has the ability to keep pace with the challenges of the smart age.

2.2.4. The Fourth Industrial Revolution:

It is a revolution based on the digital revolution and is represented in the following:

- -Artificial Intelligence
- -Internet of Things
- -Cloud Computing
- -3D Printing
- -Smart Robots

- -Self-Driving Cars

It requires the formation of smart human forces that meet the emerging requirements to contribute to the current of the knowledge society.

2.3. Theoretical Framework

2.3.1. First

Digital transformation:

- It is the change associated with the application of digital technology to bring about a radical change in the way.
- Work, and to serve beneficiaries more broadly and better. [1]

Another definition:

It is an integrated organizational transformation, in order to facilitate administrative procedures and processes and raise their quality, to reach the stage of digital maturity

Advantages of digital transformation:

- *Improving products and increasing production
- *Flexibility in implementing services
- *Reducing errors
- *Speed of work mechanism
- *Continued beneficiary satisfaction
- *Raising the level of transparency and governance
- *Benefiting from modern technologies to develop performance, forecasting and planning for the future.

Digital transformation requirements:

- Technical requirements (hardware and software)
- An integrated trained work team
- Senior management support
- Digital Transformation Steps
- Define the Digital Transformation Vision
- Draw Goals
- Write a Digital Transformation Strategy
- Divide the Strategy into Small, Manageable Projects.

The Primary Objectives of Digital Transformation:

- Enhance Student Experiences
- Improve Competitiveness
- Create a Data-Driven Decision-Making Culture

Digital Transformation Tools

- Google's G Suite for Education.
 - Employees or students can share information in real time and access a full suite of tools to improve communication and collaboration at work.[2]
- Office 365.
 - Works to establish institutional communication and exchange, store information, and manage business activity. Tools such as Word, Excel, Teams, Outlook, and OneDrive are.
 - essential productivity tools for all employees.

Cloud Storage.

Cloud storage solutions are essential for organizations looking for scalability, rapid deployment, and superior information management. With cloud storage

- Payroll Management Tools.

The benefit lies in reducing the amount of paper financial transactions that the organization must manage and use.

- Workplace Management Tools.

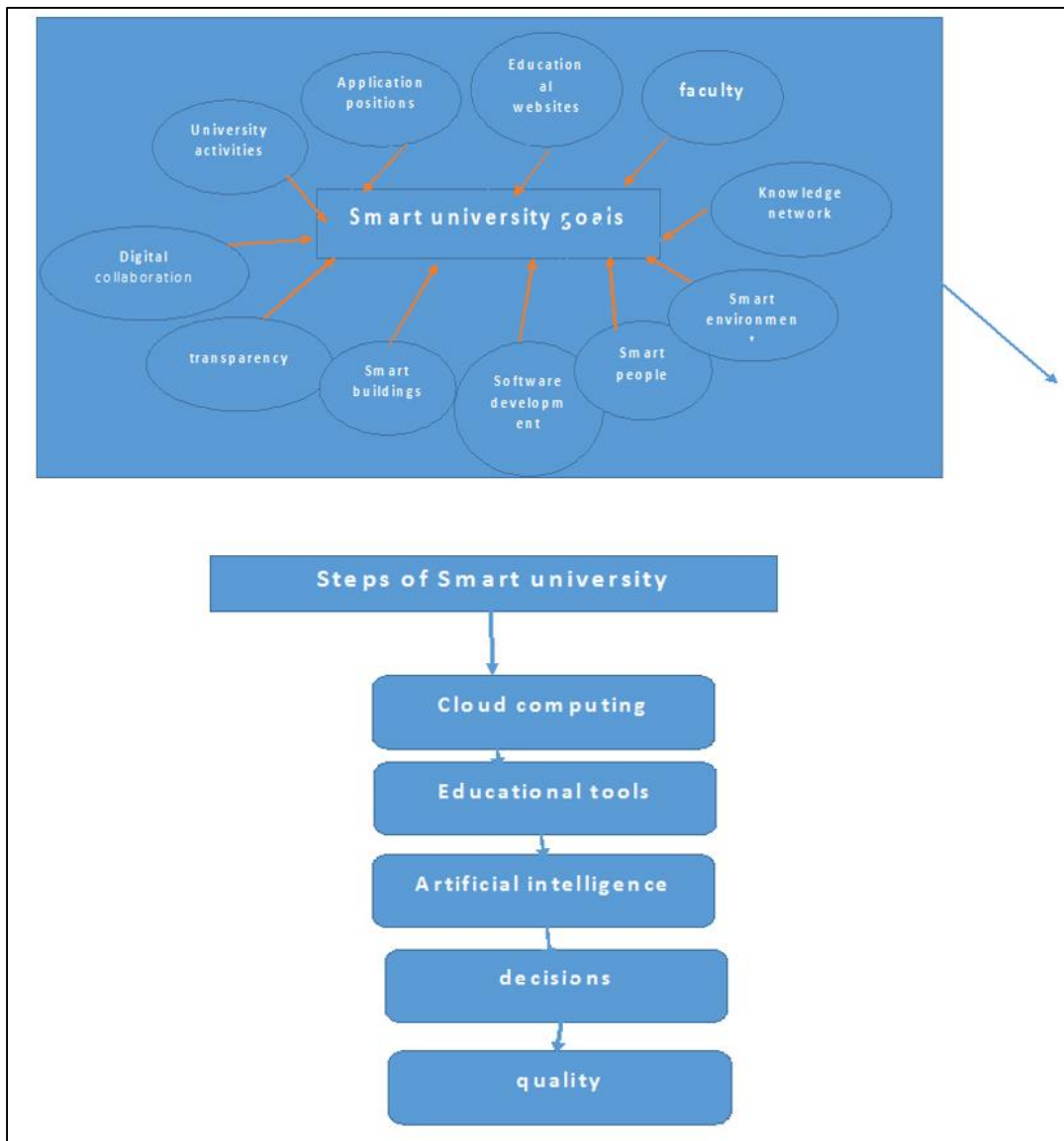
Access to frontline workplace data is an essential part of understanding the impact of implementing new technology.

- Key goals of digital transformation:[3]
 - Enhancing student experiences (improving student metrics of success)
 - Improving competitiveness (differentiating the institution using digital means)
 - Creating a culture of data-driven decision-making

2.3.2. Second

Smart University

There are concepts to know the modern trends for developing and improving universities using modern technology tools.



Source: Prepared by the authors 2024

Figure 1 Smart University

The figure shows the steps that lead you to create a smart virtual university, providing educational material in electronic form to the student and faculty member.

- Improving the quality of education by improving the quality of educational courses and programs and designing them on global foundations and standards, and applying the principles of active learning, which contributes to increasing the quality of education
- Achieving equality and equal educational opportunities for all students participating in the process

The impact of digital transformations on smart universities

Following the steps in the figure with extreme precision provides you with the best types of education and learning in a self-paced, comfortable, inexpensive way in time, money and body, and speed of mastery and high quality, and therefore the figure must be followed carefully. The virtual university provides an integrated electronic educational environment to grant various scientific degrees, through the Internet, and the virtual university provided an alternative to traditional education and the increase in the cost of traditional higher education, which is

: It is the university that frees its students from the barriers of time and place, and learning and communication in it is through various modern technical tools, the most prominent of which is the Internet.

The electronic university

It is not virtual, but it has a physical presence and relies in its programs on the Internet

The concept of the smart university was launched from the design of smart cities, so what is related to smart cities can be applied to the smart university in order to lead, analyze and improve the educational environment through sensors and use data linking and making it open with formalizing education.

The campus:

- It is the campus that uses data that becomes available through technologies to improve the life of the university environment, community partners and the workforce.
- As well as being a major axis for the development of cities through the educational infrastructure of universities and for success in the knowledge economy. Therefore, the smart campus can be an incentive for a smarter city[5]
- Advanced technical network architecture: smart-architecture uses smart systems and the smart grid in the university infrastructure.
- Smart interactive learning environment: smart environment uses technology connected to the smart grid in the educational process.
- Smart management system: smart management uses integrated management programs for education systems, the institution and resources.

Smart strategy: smart strategy includes a set of principles

- They are flexible factors and policies capable of dealing with the conditions and complexities of the infrastructure
- The smart campus is considered a new model of thinking related to its environmental comprehensiveness.
- Which includes many topics such as comprehensive e-learning.
- Social networks and communications for collaboration in work and sustainability.
- Information and communications technology with smart sensor management systems.
- And preventive health care, and smart building management with automatic control.
- And monitoring.

Campus components"

- For a university to be smart, it must be managed in a smart way, which means that
- When developing universities, it must include five basic components, which are
- The overall concept of the smart university, and these components must be viewed as a whole
- That is, they are one unit, which are

Smart university components:

- Smart buildings.
- Smart people - smart people .
- Smart management- smart management.
- Knowledge grid - knowledge network.
- Smart environment- smart environment.

Goals of digital transformation of universities into smart universities:

Most studies that have addressed digital transformation indicate For universities to smart universities

Among its objectives:

- Helping faculty members to cope with the increasing number of students*
- Providing thousands of educational sites with the possibility of exchanging dialogue and discussion*
- Providing huge individual options in its applications, which enables faculty members to*
- Consider individual differences among students
- Reduce time constraints in university activities, and ensure continuity of communication between*
- Faculty members and students[6].
- Enhancing digital cooperation between various universities and research centers by exchanging databases* and establishing cooperative links between researchers.
- Providing requirements for transparency and accountability in university work*
- Working on developing software to combat academic theft*

The Internet of Things technology at the university contributes effectively to developing the educational and environmental process, such as: sending notifications related to smart systems, saving energy, and making decisions,[7]

Facilitating the updating of information and topics on websites.:

- Expanding the geographical area of educational institutions, and reaching remote areas.
- Developing the philosophy of traditional education and its systems, to get rid of the methods of the past and move towards the technology of the future.
- [8]Providing educational material in electronic form to the student and faculty member.

The impact of digital transformations on smart universities

Digital transformation achieves many goals for students, faculty and education, including: it helps faculty members to face the increasing numbers of students, provides thousands of educational sites with the possibility of exchanging dialogue and discussion, getting rid of past methods and moving towards future technology, and developing students' thinking in a self-directed way that is largely free of dependency in selection, interactivity and type of activity, which leads to the effectiveness of the educational process, in addition to enhancing digital cooperation between various universities and research centers; by exchanging databases, and establishing cooperative links between researchers and students, as well as creating new educational programs. such as digitizing programs.

Therefore, it is noted that students' learning patterns have changed in light of the digital transformation of universities into smart universities as follows:

- Accessing the source of information instead of learning by indoctrination.
- Obtaining information on demand accurately and quickly instead of intensive learning in the curricula.

Experiential and collaborative learning and even student-centered learning instead of acquired/passive learning. It is clear from the above that the digital transformation of universities into smart universities enables students of different nationalities and countries to access the latest information, and achieve immediate communication between students, professors and the university to which they belong using websites; to improve information and exchange knowledge. They also, as beneficiaries of educational services, bring their own expectations of the digital world to the university, and they are more intelligent, connected and vocal than ever before.

2.4. Faculty member

Faculty members at universities in many countries such as the United States, Australia, Europe, India and a number of developing countries, in light of the digital transformation of universities into smart universities, are introducing technology to classrooms, taking notes, improving student motivation, and facilitating their participation; because they are more flexible and able to embrace mobile and comprehensive learning opportunities for students inside and outside the classroom, and they depend heavily on their accumulated experience in using digital technologies. (.,Huang, F ,)Teo, T., & He, J.,2019, p.2Therefore, there are personal characteristics in the faculty member who carries out digitization, which are: motivation, self-control, time management skills, future planning, dealing with electronic resources, as well as the ability to communicate. Academic programs: Universities, in light of their digital transformation into smart universities, offer many academic programs, especially in the fields of science, mathematics, languages, literature, and social sciences, which are constantly developed using the media used in this context. Employability, creativity, and digital knowledge are increasingly seen as among the most important characteristics of graduates in smart universities. Developing and recognizing these competencies does not only require improving understanding and providing advanced educational environments, but also requires the existence of modern methods in developing academic programs and curricula in terms of: objectives, content, methods, activities, and evaluation. The Internet facilitates the application of various assessment activities with the aim of demonstrating various skills including creativity and collaboration.)

2.4.1. Digital Library:

The digital library consists of sources of information in digital form, and this information is available for retrieval, saving, printing and sharing via the Internet; to facilitate its optimal use at any time for the user.

Accordingly, the necessity of continuous development of digital libraries with the latest versions to keep pace with the amazing development in knowledge and information and communication technology becomes clear. -8 Student Evaluation:

Evaluating students' educational achievements is an integral part of the teaching process

3. Results

- The impact of digital transformations on smart universities Digital transformation achieves many goals for students, faculty and education members.
- Digital transformation helps faculty members face the increasing numbers of students, provides thousands of educational sites with the possibility of exchanging dialogue and discussion, and getting rid of past methods and moving towards future technology.
- Developing students' thinking in a self-directed way that is largely free of dependence in selection, interactivity and type of activity, which leads to the effectiveness of the educational process.
- Enhancing digital cooperation between various universities and research centers by exchanging databases.
- Establishing cooperation links between researchers and students, as well as creating new educational programs such as digitizing programs.
- It is noted that students' learning patterns have changed in light of the digital transformation of universities into smart universities.
- Access to a direct source of information without an intermediary instead of learning by rote.
- Obtaining information on demand accurately and quickly instead of intensive learning in curricula.
- With experiential and collaborative learning and even student-centered learning instead of passive acquisition.
- The digital library helps provide sources of information in digital form, and this information is available for retrieval, saving, printing and sharing via the Internet to facilitate its optimal use at any time for the user.

Recommendations

- Establishing an integrated vision between the components of digital transformation and applying it to the smart university.
- Providing the necessary insurance and security for information in the smart digital environment.
- Conducting development courses.
- Developing and recognizing these competencies does not only require improving understanding and providing advanced educational environments, but also requires the presence of modern methods in developing study programs and curricula in terms of: objectives, content, methods and activities.

- The necessity of continuous development of digital libraries with the latest versions to keep pace with the amazing development in knowledge and information and communication technology.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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