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**DIGITAL TRANSFORMATION IN THE UNIVERSITY'S  
INFORMATION EDUCATIONAL ENVIRONMENT**

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***Abstract***

Modern digital technologies are radically changing the economy, the labor market and the lifestyle of individuals. Digital data is a key factor of production in all areas of socio-economic activity, including modern universities. Universities, in the context of the digital economy, to maintain their position in the global education market, it is important to offer digital services to students on the basis of new models of business processes. The digital transformation of the information and educational environment of the university will allow the use of information technology as a competitive advantage in all areas of the university. The article proposes the basic principles of digital transformation of the educational information environment of the university. The authors propose technologies for digital transformation of the university's information and educational environment that will help the university build new models of business processes for providing digital educational services. The article notes that the effectiveness of the digital transformation of the university's information and educational environment is associated with the optimization of the development of digital competencies of the university's human capital and the digitalization of educational content? The authors propose the technology of crowdsensing (mobile crowdsensing) to work with the mobile information and educational environment of the university. This publication promotes the digital university studies theory.

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**Keywords:** Digital transformation, information educational environment, digitalization of educational content.



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## 1. Introduction

In the context of the digital economy, the labor market requires qualitatively different content for the training of graduates of higher educational institutions, changing not only the content of education, but also the optimization of all its business processes (Lakhno et al., 2020), which allows us to consider the digital transformation of the information educational environment of the university as one of the main tasks of the digital university.

The electronic information and educational environment includes electronic information resources, electronic educational resources, a set of information technologies, telecommunication technologies, relevant technological tools (Makarchuk et al., 2018) and provides students with the mastery of educational programs in full volume regardless of the location of students (Vanchukhina et al., 2019).

In the first decade of the 21st century, the development of the university's electronic educational information environment was built on the basis of cloud and mobile technologies, social networks and big data analytics, according to the concept of IDC's third platform, a leading global provider of information and consulting services. Currently, most universities in the world offer, within the framework of the existing electronic information and educational environment, the organization of e-learning using learning management systems, massive on-line open course platforms, etc. (Plotnikova, 2019).

Since 2011, the need has arisen for the digital transformation of electronic information and educational environments of the universities related with the new stage of industrial development of the information society set forth in the concept of "Industry 4.0" and, as a result, the functional and structural changes in all processes of the educational institutions (Minakov et al., 2017).

## 2. Problem Statement

In the process of digital transformation of electronic information and educational environment of the university, a number of problems of a scientific and practical nature arise. In particular:

- understanding of the main differences between the electronic educational information environment of traditional and digital universities;
- a description of the new principles of functionality of the digital educational space of a modern university;
- creating new models of business processes at a digital university.

Among the main constraints to the development of the digital environment of the university, there is a shortage of personnel and an insufficient level of training of specialists who are ready to improve and use new IT resources and IT services. Currently, there is a serious shortage of personnel in the educational process at all levels of education (Bogoviz et al., 2019).

In the context of the digital economy, there is no single understanding of the model of the basic electronic educational information environment of a digital university, taking into account the development of digital technology according to the Industry 4.0 concept due to the lack of experience in the functioning of digital universities in the digital economy.

### 3. Research Questions

During the study, the following questions were raised:

How does the purpose and result of using information technologies change with the digital transformation of the university's information and educational environment?

What new principles of building a digital educational space of the university will help to improve the quality of digital educational services?

What key business processes of a digital enterprise can be represented as new models of business processes?

### 4. Purpose of the Study

The aim of the study is to study the issue of digital transformation of the electronic information and educational environment of the university, this will enable us to move from the provision of traditional educational services to digital educational services for a digital user.

### 5. Research Methods

#### 5.1. Comparative analysis of the educational information environment of traditional and digital universities

The place and role of information technologies in the information and educational environment of a modern university is changing, which leads to the emergence of a new type of educational services, such as "digital" educational services for a "digital" consumer.

Table 1 presents the differences in the electronic information and educational environment of traditional and digital universities.

**Table 01.** Comparative analysis of the electronic educational information environment of traditional and digital universities

Index	Traditional university	Digital University
The purpose of information technology	Information technology is used to automate existing university business processes	IT is used as a competitive advantage in all areas of the university
The result of the use of information technology	Improving the effectiveness of some university performance indicators	high convergence of technology, business processes and communications
Products	Providing traditional educational services	Educational services are becoming digital and consumer-oriented.

In the context of the digital transformation of electronic information and educational environment of the university, there is a transfer of managerial, information, and communication solutions to the field of convergent technologies (Lyapina et al., 2019), while adaptation to the needs of the digital consumer becomes a key activity (Osipovskaya & Miakotnikova, 2020).

The main principles of the electronic information and educational environment of a digital university are:

- the principle of "Open API" allows you to develop digital ecosystems with a long life cycle;
- the principle of "Digital by default" expands the possibilities of self-service in the process of obtaining digital educational services;
- the principle of "Design for digital" provides for the fastest possible response to customer requests and the introduction of a product on the market;
- the "Bring your own device" principle to support mobile users;
- the principle of "Paper-light" with the possibility of transition to the principle of "paper free" to support electronic document management;
- "One window" principle for providing students, faculty and university students with the opportunity to receive several services on-line through a personal account.

The main directions of development of the information and educational environment of a digital university is the use the technology Internet of Things (Abdel-Basset et al., 2019), artificial intelligence and large data analytics (Zakharova et al., 2019) cloud and fog computing (Moreira & Rocha, 2019), virtual and augmented reality (Devincenzi et al., 2019), electronic identification and authentication (e.g. based on blockchains), information security (Belej, 2020), etc. Digital transformation of electronic information environments among universities involves the construction of new university business process models.

## **5.2. Composition of the basic electronic educational information environment of a digital university**

The basic electronic educational information environment of a digital university includes IT solutions such as an electronic document management system, an on-line course educational platform, a university website, information systems of individual services as part of an enterprise resource planning system, electronic monitoring of all university business processes, a virtual model of the university and individual buildings, IT services for working with a personal account, as well as support for mobile versions of the proposed IT solutions.

The electronic information and educational environment of a digital university should allow to realize the full life cycle of new models of university business processes, such as:

- strategic planning;
- financial management;
- educational market analysis;
- formation of a portfolio of educational programs;
- planning and controlling;
- educational services marketing;
- admission campaign and recruitment;
- digital learning;
- communal infrastructure;
- security, including information security;
- university human resources management;
- others.

For example, a digital university's "University Human Capital Development" business process may include the following subprocesses: an analysis of the digital competencies of a university teacher; development of digital competency building programs; assisting teachers with courses that have less advanced digital skills; certification of teachers on the use of information technologies of famous vendors; support for teachers in promoting the development of their own digital skills and the development of innovative teaching methods.

The Digital Learning business process may include sub-processes: analysis of the IT content of the As is and To be educational programs taking into account the challenges of the digital economy; definition of a list of popular software for an educational program; development of mandatory modules as part of a training program to enhance the digital competencies of students; analysis of the effectiveness of using software in the implementation of the educational program.

New models of business processes can be implemented on the basis of digital platforms using the services of artificial intelligence and virtual assistants.

The ERP-system is considered as a mandatory attribute of a digital university, for example, accounting for primary data, resource planning, and receiving reports and information in real time. Successful ERP-systems for a modern university are SAP s / 4 HANA, Microsoft Dynamics 365, among Russian developments 1C: ERP, etc.

The academic business processes of the electronic information and educational environment of a modern university are most often represented as electronic educational resources in digital form and include the structure, subject content and metadata about them (Makarchuk, 2017). Access to the electronic educational resource of a modern university is carried out through a digital platform learning management system, massive open online courses and others. To work with the university's mobile educational information environment, it is proposed to use mobile crowdsensing technology (Faulkner et al., 2014).

## **6. Findings**

The digital transformation of the electronic educational information environment is necessary to provide digital educational services aimed at digital consumers. A distinctive feature of the digital educational information environment is the use of convergent technologies as a competitive advantage in all areas of the university.

The new principles of the electronic information and educational environment of a digital university are "Open API", "Digital by default", "Design for digital", "Bring your own device", "Paper-light", "One window".

The digital transformation of the university's electronic educational information environment involves the construction of new models of university business processes and the support of the full life cycle of these business processes.

## **7. Conclusion**

The set of IT solutions proposed in the article as part of the electronic information and educational environment of a digital university is a minimal set and can be supplemented taking into account the

educational needs of the digital consumer. The digital transformation of the electronic information and educational environment of the UNECON University (Russia, Saint Petersburg) has been going on since 2018, it implements the principles of organizing the university's digital space, proposed in the article. It includes the structure of IT solutions with support for artificial intelligence services and virtual assistants. The interim results of the development of the electronic information and educational environment of the UNECON University show that educational services are becoming better and more accessible.

The study promotes the development of theory and practice in the field of building a digital university.

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