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AUTHOR(S)	Tamar Bitchikashvili, Lily Petriashvili, Luka Kavtelishvili Jang
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DIGITALIZATION OF MANAGEMENT OF A HIGHER EDUCATIONAL INSTITUTION, NATIONAL AND INTERNATIONAL CHALLENGES AND WAYS OF SOLUTION

Tamar Bitchikashvili
Professor of Georgian National University. Georgia, Tbilisi

Lily Petriashvili
Professor of Georgian Technical University. Georgia, Tbilisi
ORCID ID: 0000-0003-3593-4877

Luka Kavtelishvili Jang
research of Georgian National University

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ABSTRACT

In the condition of globalization, one of the cornerstones of the economic growth, sustainable development and raising of the level of education of a country lies in its innovative and technological development. The current irreversible global process of digitalization offers us wide spectre of services in every field, among them, it enables higher educational institutions to promote access to education for individuals of different social level through digital transformation, to integrate modern technologies in the teaching and evaluation process and to make the decision-making process flexible and effective in terms of administration. It is also noteworthy that the digitalization process ensures the formation of those necessary instruments and skills, which, based on the transdisciplinary perspective, will facilitate overcoming of global problems (poverty, health problems, inclusive education, social inequality, environmental conditions etc).

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Introduction.

The process of digitalization of higher education has been significantly accelerated by the pandemic since the beginning of 2020. Swift transition to the distant (online) learning was ensured with the integrated use of digital technologies, which made higher educational institutions face new challenges in terms of finding, processing, analysing of information, digital communication, socialization and effective management. Technological environment provides universities with the opportunities to effectively use digital resources, implement them and adapt them to their strategies and to the management process, which will assist them in better formation of their views and strategies.

Like in all developed countries of the world, important steps have been taken in the direction of digitalization of management and managerial processes in Georgia as well. One of the important challenges for Georgia is the digital transformation of current processes and the

implementation/development of sustainable e-governance system, which will assist higher educational institutions and enable them to carry out efficient management in the field of education existing in the country.

Main body. The development of digital technologies made the management systems of educational organizations face new challenges. Technological progress has resulted in changes to the principles of management of universities. The issue of development of e-governance has become one of the priorities for each university. E-commerce is based on the use of information and communication technologies, both – among the subordinate units of university and with external servers and resources. It is also worth mentioning the factor that studying of the validity and reliability of digital exams in higher educational organizations, while measuring the student studies is a critical field of study. The events taking place in the recent period make the use of digital technologies in the learning process more and more actual each day, it is important to determine the correctness and the reliability of the method used for the assessment of students' knowledge. It is important to determine the validity, which indicates to what extent do the criteria determining the level of students' knowledge measure the reliability of which must be depicted in the consistency and stability of assessment of results within certain period of time. The recent studies also confirm that digital exams might be one of the correct and reliable methods for the objective assessment and measuring of the learning outcomes of a student. One of the advantages of digital exams is that it can be easily adapted to different levels of students' skills. For example, digital exams may be developed for the assessment of basic knowledge or for the assessment of higher level of cognitive skills, herewith, digital exams may be assessed automatically, which saves time and upon the assessment, reduces the potential of human mistake, though, digital exams might be more sensitive towards the forms of fraud or academic misconduct. Overall, the study of the validity and reliability of digital platforms and systems is one of the important issues for determining and assessing the level of students' knowledge at university, for establishing the strengths and weaknesses of the university and for making reasoned decisions [1].

Research methods.

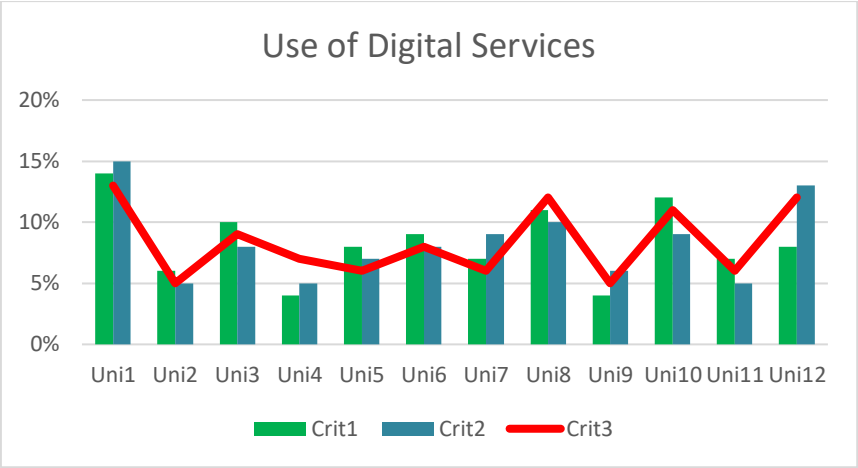
Georgian National University is among those leading universities, which have evaluated in a timely manner the essence of the irreversible processes of digital transformation and those advantages, that will promote the integration of the university with the international educational space, enable it to be flexible environment in terms of the change of processes and respond to those requirements and challenges, which will be faced by the alumni in the global employment market, in order to carry out the full realization of their intellectual resources in their professional activities [2].

In order to improve digital services existing at the university, we have conducted large-scale research, 12 public and private higher educational institutions were studied, both across Georgia and on an international scale.

In the process of research we applied qualitative method, we conducted the interviewing of the students, the academic personnel and the administrative personnel of the university, familiarized ourselves with the research outcomes published in high-ranked journals, also applied the PICO process frame, where we performed the data unification in the following manner:

PICO	Components
Research subject	University
Research method	Qualitative
Comparison of methods	Instruments of data analysis and software
Outcome	Criteria and recommendations

The pre-pandemic, pandemic and post-pandemic data have been used in the research. In the research the main focus was on the following issues: to what extent are the modules existing at the university digitalized, which software is prioritized for the data management, what has affected the outcomes and how, how relevant is it to hold digital exams and to evaluate the priority of functioning of the information system supporting the decision-making at the university [3-4].



Three criteria are depicted on the visually represented outcome: the extent of digitalization of modules, how the relevance of digital exams is evaluated and the extent of granting priority to the decision-making information system, the personnel of the university working at different managerial positions were enquired. IT department and its personnel did not participate in the enquiry.

The conducted studies have demonstrated that most of universities use the Moodle platform, or its integrated modified system in the learning process almost during all processes of provision of didactic materials, visual aids, questioning, provision of learning materials and e-learning. Through the educational platform Moodle they create study courses for supporting face-to-face classes, for providing working materials to students, for fulfilling the tasks and reviewing various topics, also for holding and assessing digital exams [3-5].

Moodle is a web application, which has been developed as an LMS (Learning Management System) platform in which students and lecturers can create environment for mutual communication. It is noteworthy that Moodle is an open system, it has been developed under free software. It has friendly, effective and compatible interface. It enables the user to store and monitor the activities performed by him/her [5-8].

One of the insertions of the e-governance of universities, which can be found on the websites of all universities, is the information on the goals, mission and strategy of the university, on the learning programs, compound infrastructure, academic personnel, registration and assessment of students, learning process, student services and international relations etc. Different form is hardly distinguishable. Though it is noteworthy that attention must be necessarily paid to several issues:

- online and offline communication channels must be applied in an integrated manner upon the provision of university services;
- upon the implementation and application of digital services both the management of university and the students must be actively involved;
- infrastructural and technological renewal of digital governance must be conducted on a permanent basis at universities;
- the concept of ‘’smart university’’ must be actively developed.

Students and foreign colleagues were involved in the research process together with the researchers of Georgian National University, we studied the digital governance strategy and resources of Georgian, as well as several European universities. We have familiarized ourselves with various publications and research outcomes, based on which we have revealed several prioritized fields, which are under significant attention:

Student management system: administration, registration of students, development of cooperation, management of students’ documents, management of courses, management of the learning process, enrolment, suspension/resumption of status, grade sheet, access to syllabi, evaluation of academic personnel;

Academic personnel management system: registration of lectures, reporting, lecture materials, personal profile, education, work experience, research activity, extracurricular activities, contract, table for calculation of salary, assessment, report on arrival and leaving

Study process management platform: e-platform, testing, study materials, monitoring of tasks.

Business process management system: institutional base, financial flows, SCM – Supply Chain Management, CRM – Customer Relationship Management and electronic document flow.

We have developed the following criteria for the assessment of digital transformation at universities, based on which the digital management activities will be determined:

Digital infrastructure: includes the availability of reliable and effective technological infrastructure, such as internet connection, hardware and software, safety systems and determination of volume of servers for storing data;

Teaching process management systems: includes the receipt and effective use of learning management systems for the management and provision of online courses, for supporting online personnel and communication and for the assessment of the outcomes of students' studies;

Digital learning resources: includes availability of digital learning resources such as e-books, videos, podcast, simulations and other interactive learning materials. Integration of digital applications and resources in the teaching and learning process is also considered in order to enhance the participation of students, promote active teaching and support personalized teaching;

Digital skills: includes the development of digital literacy skills of students, professors and administrative personnel in order to effectively use digital instruments and resources for teaching, learning and research;

Digital assessment: includes application of digital assessment instruments and strategies for assessing the learning outcomes of students and for the provision of timely and constructive feedback;

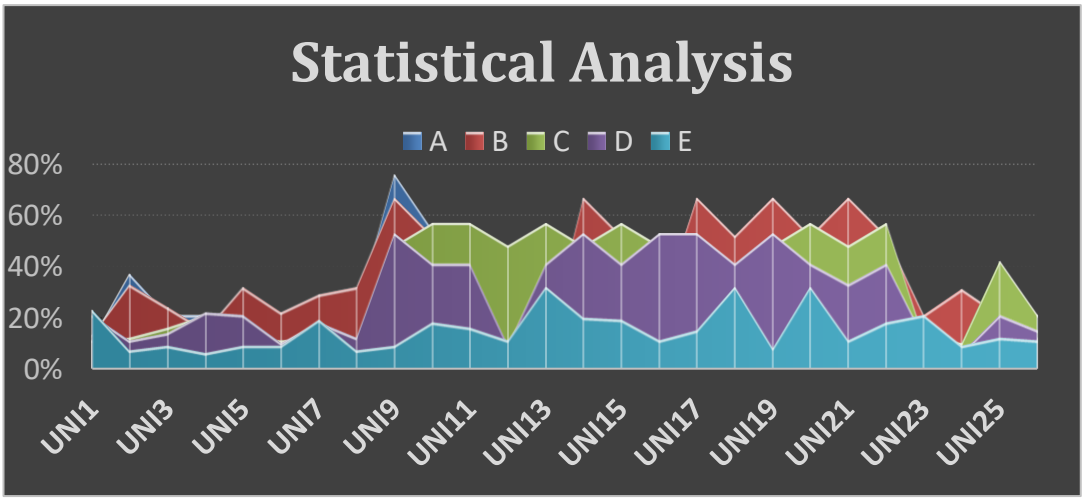
Digital study: includes application of digital instruments and resources for supporting research activities, such as data analysis, cooperation and spreading of research outcomes;

Innovation and entrepreneurship: concerns the level of innovations and entrepreneurship at university. Includes the quality of application of digital technologies for supporting innovations and entrepreneurship and the quality through which university promotes broader digital economy.

Digital accessibility: this includes consideration of the demands of accessibility and inclusiveness in the design and provision of digital learning resources and instruments in order to ensure equal access for all students, irrespective of their abilities and disabilities [8-11].

We have marked out five factors, which influence the digital management of a university:

A. Technological infrastructure:
B. Digital literacy and skills:
C. Institutional policy and culture;
D. Funding and resources;
E. Data confidentiality and safety;



The study has revealed several factors and their periodic analysis gives universities the opportunity to improve the infrastructure, as well as the learning process.

Based on the information studied by us the data, which are most frequently analysed at universities are the following:

- Academic performance of students
- Number of conducted lectures and seminars
- Number of students based on certain academic program (field)
- Number of students enrolled on the basis of the national exams
- Number of students enrolled (left) by mobility
- Financial flows

We have also studied the most widely applied data analysis software used by **higher educational institutions.**

1. **Microsoft Excel –** table-oriented software, which is widely used for data analysis and visualization;
2. **Power BI –** cloud-oriented data analysis service of Microsoft, which creates the interactive visualisation of data and the business monitoring reports;
3. **Tableau –** data visualisation program, which enables analysts to create interactive dashboards and accounts;
4. **Python –** language of programming, whose algorithms are widely used for data analysis;
5. **SPSS –** statistical data analysis system, where various mathematical and statistical modelling instruments for data analysis are applied;
6. **R –** compiled programming language of statistical analysis, which is used for the analysis and visualisation of wide profile data;
7. **SAS –** program of statistical analysis of data, which is widely used for the analysis of business processes and for the analysis of academic learning processes;
8. **MATLAB –** software interface, which is used for the calculation, analysis and visualisation of numerical data.

Factors, which make the digital transformation of higher institutions necessary:

- Accessibility of public services
- Adaptation of researchers in the scientific bases
- Enhancement of the accessibility of students and faculty members to library resources
- Access to internal and external information in real time
- Determination of strategic plan for the development of university;
- Raising of awareness
- Internationalisation

We have developed recommendations, which will provide important assistance to higher institutions in terms of the digitalisation of management processes;

Infrastructural demands:

- At the first stage of digitalisation the internet network corresponding with the demand must be provided;
- Application of cloud-based services must be determined in order to reduce the need for wide technical infrastructure for the territory.
- Grants or alternative sources of funding must be sought, which set the improvement of digital infrastructure of education as a special goal.

Financial limitations:

- Substantial revenue and cost analysis must be conducted in order to reveal the most effective decisions.
- Open or free software alternatives must be selected in order to reduce the licensing costs.
- Cooperation with other educational institutions when necessary and if possible, for the unification of resources, implementation of system and sharing of technical service costs.

Digital incompatibility:

- Computer laboratory resources or high-performance servers must be determined in order to ensure equal access for students;
- Use of offline resources such as pre-downloaded content or use of learning platforms for the students with limited access to internet.

Trainings and support:

- Offering of trainings for the professional advancement opportunities in order to train the personnel in terms of the most recent achievements and the best practice;
- Formation of the information system for supporting the decision-making such as the forums for special support, also, online forums, where the users will be able to share their knowledge.

Data safety and confidentiality:

- Strong data safety policy and protocols must be developed and implemented in order to protect sensitive information.
- Software systems must be regularly updated and corrected in order to solve the security errors;
- Data safety practice audit and evaluations must be conducted on a regular basis in order to reveal potential weaknesses for their operative correction.

Integration and mutual cooperation:

- Priority must be given to the selection of digital management systems, which will ensure continuous integration and compatibility with existing platforms;
- Promote cooperation and communication between the providers of different systems in order to ensure compatibility and transfer of data.

Resistance to change:

- It is important to determine the essence of advantages and function of digital management systems between all interested parties, how to improve the effectiveness, communication and learning outcomes of students.
- Continuous support and trainings, which are oriented at the solution of problems and strengthening of reliability in the use of new systems.

Technical problems:

- The risk of technical malfunction of technics and software systems must be analysed on a regular basis;
- Emergency plans and contingency procedures must be developed in the case of technical problems or malfunction of system to avoid failure;
- Special technical group must ensure the formation of team for the timely solution of any technical problem.

Digital literacy and skills:

- Inclusion of the training on digital literacy in the curriculum for students in order to develop necessary skills of effective application of digital management systems;
- The sessions and trainings for the personnel for the purposes of professional development must be held periodically in order to improve their digital literacy and technical skills;
- Development of continuous learning and support culture, encouragement of the personnel must take place on a permanent basis.

Ethical views:

- Clear ethical instructions must be developed for the collection, storage and use of data on students and personnel;
- Transparency must be ensured in the process of making of algorithmic decision and the potential bias must be evaluated on a regular basis;
- Parties interested in cooperation, experts and specialists of the field must be involved in the sessions in order to solve the ethical issues emerged in the digital management systems.

The given study will increase the interest of scientific society towards the use of modern technologies implemented at the university in the decisions related to learning, research and management; received recommendations will promote effective management of the university, targeted, result-oriented use of resources will take place [8-12].

Conclusion.

The use of the information system supporting the decision-making in the management of a higher educational institution, which connects the modules related to the management of the learning process, business processes and IT infrastructure, supports business processes occurring at the

organisation. Several modules are integrated in the information systems of the studied higher educational institutions, namely: human resources (administrative and service personnel, students, academic personnel), material resources, financial flows, accounting, monitoring systems, marketing, alumni employment, social activities, international relations etc.

Optimal software implementation of information system results in a clear structurization of business processes at higher educational institutions, compliance of internal and external basic data and standardisation of the architecture of information systems.

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