Impact of Digital Technology on Processes at Universities from Teachers' Perspective

Mabić, Mirela; Gašpar, Dražena; Garbin Praničević, Daniela

Source / Izvornik: **Croatian Regional Development Journal, 2024, 5, 1 - 11**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

https://doi.org/10.2478/crdj-2024-0001

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:124:216266

Croatian Regional Development Journal | Vol. 5 No. 1 | 2024

Impact of Digital Technology on Processes at Universities from Teachers' Perspective

Mirela Mabić, Dražana Gašpar
Faculty of Economics Faculty of Economics, University of Mostar

Daniela Garbin Praničević
Faculty of Economics, Business and Tourism, University of Split

Abstract

Digital technology has become inseparable from all core and supportive processes because of the intensive use of different digital tools. The paper aimed to determine teachers' views on the impact of digital technology on business processes in higher education institutions - whether they recognize the impact and how they evaluate it. The survey was conducted among the teachers of the public University in Bosnia and Herzegovina. The results show that digital technology has a positive and mostly strong or medium impact on business processes in higher education institutions. The work on international research and educational projects and the teaching process are the most influenced by digital technology. It has a stronger impact on the core processes than on supportive activities. Teachers recognize the influence of digital transformation on all processes at universities, both core and supporting. The influence is stronger with core processes.

Keywords: digital technology, process, activities, university

Paper type: Research article

Received: 16 Jan 2023
Accepted: 10 Apr 2024

DOI: 10.2478/crdj-2024-0001

Introduction

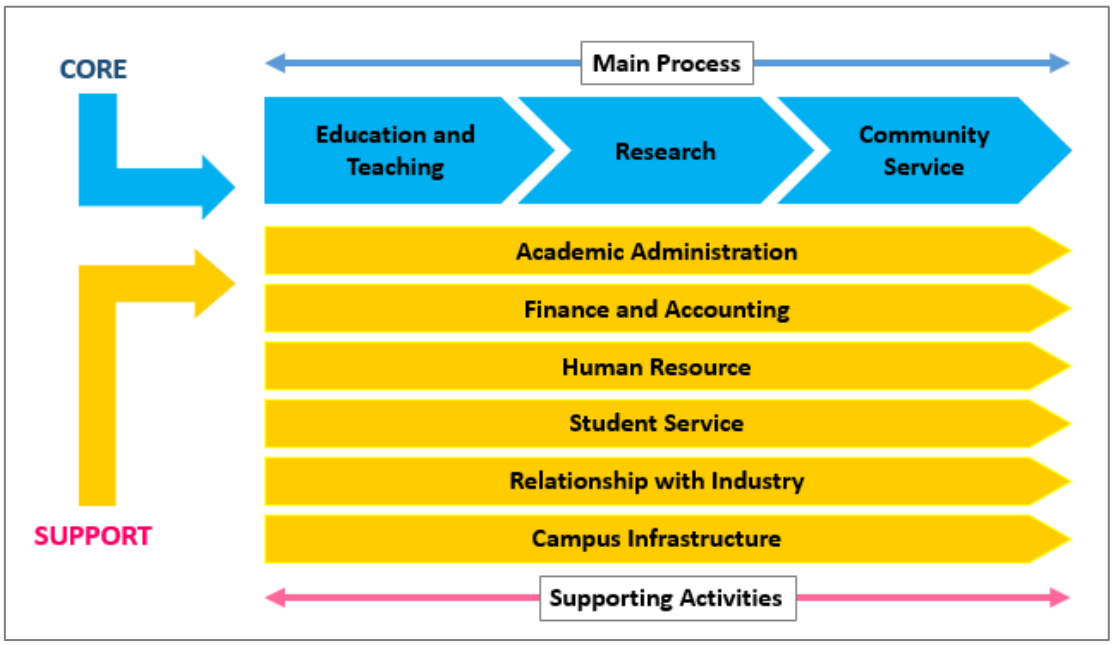
Today, digital technology has become an integral part of all university processes. The use of digital technology (learning management systems, plagiarism detection tools, word-processing tools, email, Google, social media, and others, in the teaching and learning process, has shown rapid growth (Okoye et al., 2021; Mercader and Gairin, 2020) and it improves and transforms both the universities' and students' learning experiences and engagement (Barton and Dexter, 2020; Chiu, 2020; Sanchez-Mena et al., 2019). However, starting from word-processing, email, and plagiarism-detecting tools, to social networks for scientists and researchers (ResearchGate, Academia), where researchers can share papers and ideas, find collaborators, and digital databases (Scopus, ScienceDirect) of papers, chapters, and books. Also, the use of digital technology is indispensable in all other processes of the university, such as administrative activities related to students and teachers (enrolments, exams, student statuses, certificates, teaching staff statuses, appointments), finances, human resources, relations with external stakeholders (industry, ministries), up to the management of the institution.

Although the term digital technology is generally accepted, there is no generally accepted definition. Some of the definitions (Fan and Quppara, 2022; Karaki, 2021; Çoklar et al., 2019) are focused on digital devices (computers, communications devices, smartphones), while others definitions recognize digital technology as an umbrella term for all computer-based products and solutions developed to improve efficiency and create new opportunities in different areas of human activity (PcMag, 2022; Dictionary, 2022; Yu et al., 2022; Merrick and Wilson, 2023). In this paper, digital technology is an umbrella term encompassing all digital-based devices, products, and solutions used to boost productivity and open up new possibilities across all university activities.

Generally, the university has three core processes: teaching and learning, research, and community services/wider business relationships (Simamora et al., 2020; Darmalaksana et al., 2018; Fleacă, 2017). The university requires many supporting activities to efficiently perform the three core processes: academic administration, finance and accounting, human resources, and campus infrastructure (Figure 1).

Figure 1

Core and supporting processes at the university



Source: adjusted according to Darmalaksana et al., 2018

Digital technology could make numerous contributions to the growth of the university. It supplies the supporting infrastructure, gathers and stores data, facilitates data translation into meaningful knowledge, and adds to collective wisdom by facilitating cooperation through collaborative tools (Zahid and Khan, 2016). However, despite the widespread use of digital technology in universities, creating flexible and dynamic university processes supported by digital technology remains a significant problem.

All public universities in Bosnia and Herzegovina face challenges related to using digital technology to boost productivity and open up new possibilities across all university activities. Hence, this paper examines digital technology's impact on the business process at public universities in BiH. The aim was to determine teachers' views on the impact of digital technology on business processes in higher education institutions - whether they recognize the impact and how they evaluate it. Therefore, three research questions were asked:

- RQ1: Does (how and how strong) digital technology affect business processes in higher education institutions?
- RQ2: Which business processes can be identified as the most influenced by digital technology?
- RQ3: Is there any difference in the strength of the impact of digital technology on core and supporting processes in higher education institutions?

After this introductory part, in which a brief overview of the use of digital technology as support to university processes is given and research questions are asked, four

more chapters follow. The methodology focused on empirical research - the research instrument and the data collection and analysis method. The results chapter presents and briefly comments on the obtained results. After that, they were discussed, and a concluding review of the research was conducted, and the research issues were given.

Methodology

Empirical research was conducted at a public university in Bosnia and Herzegovina (BiH) in the spring of 2020. The research focused on the teaching staff. The link to the survey questionnaire was emailed (teachers' emails were taken from the official websites of public universities in BiH). Participation in the research was voluntary and anonymous. A total of 234 teachers responded. After reviewing the collected data, five questionnaires were excluded from further analysis, leaving a total of 229 for statistical analysis.

Table 1

List of activities/processes in higher education institutions

	Code	
Process/Activity	P1	The work of the Scientific-Teaching Council / Senate
	P2	Work of the Dean's / Rector's College
Work on projects	P3	International research projects
	P4	Domestic research projects
	P5	International educational projects
	P6	Cooperation with the economy and the social community
	P7	Financial planning and budgeting
	P8	Strategic planning
Teaching process	P9	Preparation of teaching and teaching materials
	P10	Teaching
	P11	Evaluation of acquired knowledge (examination)
	P12	Scientific research work
	P13	Quality management
	P14	Library business
Resource management	P15	People
	P16	Other resources
	P17	Legal affairs
Administrative affairs	P18	Work with students
	P19	Work with teaching staff

Source: author's work

Respondents were offered different processes in the following areas: management, projects, cooperation with the economy and society, finance, strategic planning, teaching process, scientific research, quality, library, and resources. Table 1 shows the

specifically offered processes. The impact of digital technology on a particular business process or activity could be evaluated through 7 ratings, which included the presence of influence, direction, and strength. Ratings were offered as follows: (-3) negative, strong impact; (-2) negative, moderate impact; (-1) negative, weak impact; (0) no impact; (+1) positive, weak impact; (+2) positive, medium strong influence, (-3) positive, strong influence. Descriptive statistics procedures (frequencies and percentages) were used for all three research questions.

Results

The first research question (RQ1) sought to determine whether teachers recognize digital technology's impact on processes in higher education institutions. Additionally, if the teachers recognize the influence, whether it is a weak/strong, positive/negative influence (Table 2).

Table 2

Impact of digital technology on a process at the university

	Number (%) of respondents (n=229)						
	Impact		**Direction**			**Strength**	
	No	**Yes**	**Positive**	**Negative**	**Strong**	**Medium**	**Weak**
P1	30 (13.1)	199 (86.9)	192 (96.5)	7 (3.5)	58 (29.1)	85 (42.7)	56 (28.1)
P2	41 (17.9)	188 (82.1)	179 (95.2)	9 (4.8)	58 (30.9)	68 (36.2)	62 (33.0)
P3	6 (2.6)	223 (97.4)	220 (98.7)	3 (1.3)	139 (62.3)	61 (27.4)	23 (10.3)
P4	22 (9.6)	207 (90.4)	200 (96.6)	7 (3.4)	77 (37.2)	87 (42.0)	43 (20.8)
P5	5 (2.2)	224 (97.8)	221 (98.7)	3 (1.3)	125 (55.8)	74 (33.0)	25 (11.2)
P6	24 (10.5)	205 (89.5)	199 (97.1)	6 (2.9)	67 (32.7)	86 (42.0)	52 (25.4)
P7	25 (10.9)	204 (89.1)	197 (96.6)	7 (3.4)	65 (31.9)	67 (32.8)	72 (35.3)
P8	23 (10.0)	206 (90.0)	200 (97.1)	6 (2.9)	60 (29.1)	74 (35.9)	72 (35.0)
P9	3 (1.3)	226 (98.7)	223 (98.7)	3 (1.3)	128 (56.6)	71 (31.4)	27 (11.9)
P10	6 (2.6)	223 (97.4)	219 (98.2)	4 (1.8)	96 (43.0)	91 (40.8)	36 (16.1)
P11	40 (17.5)	189 (82.5)	180 (95.2)	9 (4.8)	54 (28.6)	68 (36.0)	67 (35.4)
P12	5 (2.2)	224 (97.8)	220 (98.2)	4 (1.8)	139 (62.1)	67 (29.9)	18 (8.0)
P13	13 (5.7)	216 (94.3)	208 (96.3)	8 (3.7)	86 (39.8)	67 (31.0)	63 (29.2)
P14	14 (6.1)	215 (93.9)	209 (97.2)	6 (2.8)	101 (47.0)	67 (31.2)	47 (21.9)
P15	36 (15.7)	193 (84.3)	182 (94.3)	11 (5.7)	52 (26.9)	66 (34.2)	75 (38.9)
P16	31 (13.5)	198 (86.5)	191 (96.5)	7 (3.5)	46 (23.2)	71 (35.9)	81 (40.9)
P17	38 (16.6)	191 (83.4)	182 (95.3)	9 (4.7)	36 (18.8)	59 (30.9)	96 (50.3)
P18	5 (2.2)	224 (97.8)	214 (95.5)	10 (4.5)	110 (49.1)	84 (37.5)	30 (13.4)
P19	14 (6.1)	215 (93.9)	206 (95.8)	9 (4.2)	87 (40.5)	84 (39.1)	44 (20.5)

Source: author's work

The results from the Impact/yes column directly imply that respondents recognize the effect of digital technology on business processes in higher education institutions. In more than half of the processes (11/19), the percentage of respondents with the answer 'yes' is greater than 90 %. The highest percentages were recorded for the following processes: activities related to the teaching process (preparation of teaching and teaching materials, teaching), work on projects (international research and educational projects), scientific research work, and administrative affairs (work with students).

The lowest percentages were recorded for the following processes: Work of the Dean's / Rector's College, evaluation of acquired knowledge (examination), and legal affairs.

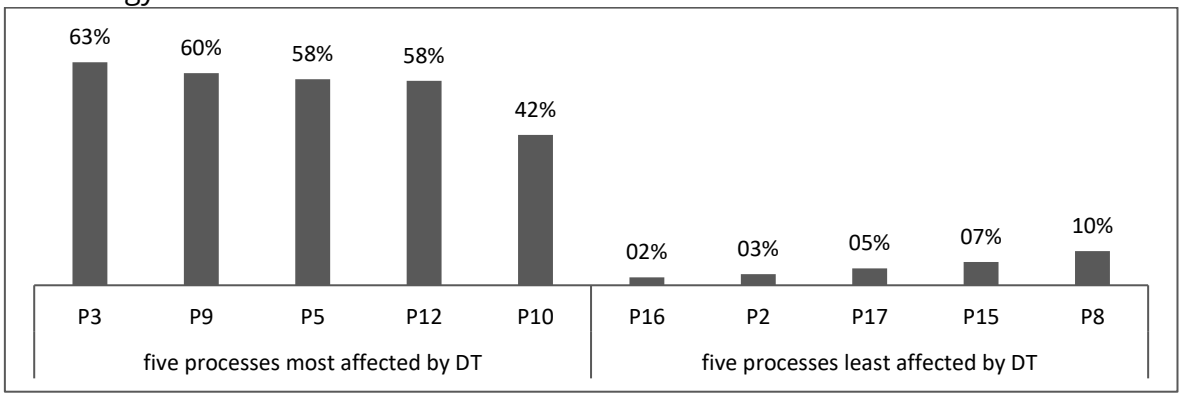
The results obtained for the direction of influence show that most respondents recognize the positive effect of digital technology on processes in higher education institutions (the percentage for all processes is greater than 90 %). About 5 % or less than 5 % of respondents highlighted a negative effect of each process.

Noticeably, more significant results were obtained regarding the strength of the influence of digital technology. The results show that the respondents recognize the strongest effect in work on international research and educational projects, as well as in Scientific research work. The medium effect is most dominant in the following processes/activities: the work of the Scientific-Teaching Council / Senate, work on domestic research projects, and cooperation with the economy and the social community, while the weak impact is evident in resource management with an emphasis on non-human resources and legal affairs.

The second research question (RQ2) sought to determine which business processes, according to the teacher's opinion, are the most influenced by digital technology. The results that offer an answer to RQ2 are presented in Figure 2.

Figure 2

Processes in higher education institutions the most and the least affected by digital technology



Source: author's work

The third research question (RQ3) sought to find out whether there is any difference in the impact of digital technology on core and supporting business processes in universities. The results that offer an answer to RQ3 are presented in Table 3.

Table 3

Impact of digital technology on core and supporting processes at higher education institutions

		M	SD	Rang
Core processes				
cp1	Education and teaching	2.27	0.727	2
cp2	Research	2.53	0.659	1
cp3	Community service	2.16	0.745	3
Supporting activities				
sa1	Academic administration	2.06	0.772	2
sa2	Finance and accounting	1.97	0.821	4
sa3	Human resource	1.88	0.804	6
sa4	Student service	2.03	0.750	3
sa5	Relationship with industry	2.07	0.760	1
sa6	Campus infrastructure	1.82	0.783	7
sa7	Other	1.91	0.799	5

Source: author's work

The results show that the main processes have higher scores in the analysis of the strength of the influence of digital technology on the processes in higher education institutions than supporting activities. Research stands out among the main processes, although all means indicate that it is a relatively strong influence.

Relationships with industry and administrative and student services stand out among supporting activities. The mentioned activities have scores greater than 2, which indicates a moderate impact, while the means of the other activities are below 2.

The common mean for all core processes is 2.33 (SD=0.710), and for supporting processes is 2.02 (SD=0.782).

Discussion

The results obtained through empirical research adequately answered the research questions. The findings related to the initial research question (RQ1) can be summarized as follows: The inquiry sought to determine whether there is an impact and, if so, to characterize its nature. The evidence indicates that the effect is present and predominantly positive, with variations in intensity ranging from medium to strong.

The results for the second research question (RQ2) show that digital technology mainly affects work on projects with an emphasis on international research and educational projects, as well as the teaching process with a focus on preparing teaching materials.

The results for the third research question (RQ3) show that digital technology has a stronger impact on the core than supportive processes.

The above shows that digital transformation is significantly present at all public universities in Bosnia and Herzegovina. That, in turn, implies that public universities in BIH follow world trends in the organization of work at HEIs, and the results obtained are not surprising. They are in line with the findings that show that technology is widely represented in higher education institutions, both in teaching content and as a component of supporting activities of university processes (Okoye et al., 2021; Mercader and Gairin, 2020; Barton and Dexter, 2020; Chiu, 2020). The impact of digital transformation on university processes is mostly positive, which was also confirmed by this research. None of the offered processes/activities has an evident negative effect (they all have only a few answers indicating a negative effect of digital transformation).

The results obtained for RQ2 and RQ3 were also expected. They show that digital transformation, according to the teaching staff, has the greatest influence on business processes from the group of core/main business processes of the university.

The group of processes mentioned above primarily includes all learning, teaching, and knowledge transfer activities. That is following existing knowledge. The literature abounds with examples of the application and implementation of technology in the teaching process to improve the experience of students and teachers (Okoye et al., 2021; Mercader and Gairin, 2020; Barton and Dexter, 2020; Chiu, 2020; Sanchez-Mena et al., 2019). This research showed that digital transformation also affects support activities in higher education institutions. The impact on them is not negligible, and it is positive.

Concerning several different processes offered to the respondents, they also noticed variations in the ratings. They may be the result of the different degrees of digitization of higher education institutions and the additional work and tasks (in addition to learning and teaching) of each respondent. However, despite this, it is evident that the surveyed teachers recognize digital technology as a factor that significantly impacts all processes and activities of higher education institutions.

Conclusion

In this paper, it was determined that the teachers of higher education institutions in BiH are aware of the impact of digital technology on all activities of higher education institutions. Digital technology is used in the daily activities of the university, and teachers have recognized its positive and strong effect. That has achieved the confirmed aim, and the obtained results do not deviate from the findings from the literature.

The results show that higher education institutions in BiH are on the right track regarding the application of digital technologies in their operations. The technologies have already been implemented, and stakeholders recognize their positive effects. In the future, they should continue in the same direction but with a more intensive focus on supporting processes and activities because the research showed lower results for these processes.

The conducted research also shows the directions for continuing to research this topic. In future research, the impact of digital technology on processes in higher education institutions should be seen in the context of the digital literacy of teachers, length of digitization, different stakeholders, and characteristics of higher education institutions (field of science, size, age).

References

Barton, E. A., & Dexter, S. (2020). Sources of teachers' self-efficacy for technology integration from formal, informal, and independent professional learning. *Educational Technology Research and Development, 68*(1), 89-108. https://doi.org/10.1007/s11423-019-09671-6

Chiu, M.-S. (2020). Exploring models for increasing the effects of school information and communication technology use on learning outcomes through outside-school use and socioeconomic status mediation: the Ecological Techno-Process. *Educational Technology Research and Development, 68*(1), 413-436. https://doi.org/10.1007/s11423-019-09707-x

Çoklar, A. N., Efilti, E., & Şahin, Y. L. (2019). Technostress as a Factor Affecting the Use of Technology by Beginning Teachers. *Handbook of Research on Faculty Development for Digital Teaching and Learning*, 460-480. https://doi.org/10.4018/978-1-5225-8476-6.ch023

Darmalaksana, W., Ali Ramdhani, M., Cahyana, R., & Syakur Amin, A. (2018). Strategic Design of Information System Implementation at University. *International Journal of Engineering & Technology, 7*(2.29), 787. https://doi.org/10.14419/ijet.v7i2.29.14257

Dictionary. (2022). *Digital Technology*. https://www.dictionary.com/browse/ digital-technology (accessed 18 December 2022)

Fan, Q., & Ouppara, N. (2022). Surviving Disruption and Uncertainty Through Digital Transformation: A Case Study on Small to Medium-Sized Enterprises (SME). *Moving Businesses Online and Embracing E-Commerce*, 1-22. https://doi.org/10.4018/978-1-7998-8294-7.ch001

Fleacă, E. (2017). Core Processes Roadmap to Deploy the Higher Education Institution's Internationalization Strategy, *TEM Journal*, *6(1)*, 85-92.

Karaki, F. (2021). Enablers of Servitization Roles and Action Mechanism. *Encyclopedia of Organizational Knowledge, Administration, and Technology*, 2321-2337. https://doi.org/10.4018/978-1-7998-3473-1.ch160

Mercader, C., & Gairín, J. (2020). University teachers' perception of barriers to the use of digital technologies: the importance of the academic discipline. *International Journal of*

Educational Technology in Higher Education, 17(1). https://doi.org/10.1186/s41239-020-0182-x

Merrick, B., & Wilson, E. (2023). The Brave New World of Tertiary Teaching: The Intricacies of an Online Blended Learning Environment. *Handbook of Research on Facilitating Collaborative Learning Through Digital Content and Learning Technologies*, 199-216. https://doi.org/10.4018/978-1-6684-5709-2.ch010

Okoye, K., Rodriguez-Tort, J. A., Escamilla, J., & Hosseini, S. (2021). Technology-mediated teaching and learning process: A conceptual study of educators' response amidst the Covid-19 pandemic. *Education and Information Technologies, 26*(6), 7225-7257. https://doi.org/10.1007/s10639-021-10527-x

PcMag. (2022). Digital Technology. https://www.pcmag.com/encyclopedia/term/digital-technology (accessed 18 December 2022).

Sanchez-Mena, A., Marti-Parreno, J., Miquel-Romero, M. J., Jose, M., & Romero, M. (2019). Higher education instructors' intention to use educational video games: an fsQCA approach. *Educational Technology Research and Development*, *67*, 1455–1478.

Simamora, B. H., Kosasih, W., Natalia, N., Rudi, R., & Leonita, L. (2020). Modelling and Mapping University Business Process Level 1, In *Proceedings of the 2nd African International Conference on Industrial Engineering and Operations Management Harare* (pp. 2217-2226), Zimbabwe.

Yu, P., Chen, D., & Ahuja, A. (2022). Smart and Sustainable Economy: How COVID-19 Has Acted as a Catalyst for China's Digital Transformation. *AI-Enabled Agile Internet of Things for Sustainable FinTech Ecosystems*, 106-146. https://doi.org/10.4018/978-1-6684-4176-3.ch006

Zahid, A. T., & Khan, F. A. (2016), Impact of ICT Innovations on the Quality of Business Research Process in Higher Education Institutions. *International Journal of Engineering and Management Research*, *6(1)*, 473-477.

About the authors

Mirela Mabić is an Assistant Professor at the Faculty of Economics Faculty of Economics, University of Mostar, at the Department for Business Informatics. Her research interests include business information systems, the practical application of software and digital technologies in business and education, higher education quality, and applied statistics. The author can be contacted at mirela.mabic@ef.sum.ba

Dražena Gašpar is a Full-time Professor of Database Systems and Business Information Systems at the Faculty of Economics, University of Mostar. Her research interests include databases, data warehouses, business information systems, and software applications in business and education. She is a co-founder of a "Hera" software company in Mostar and has more than two decades of experience developing and implementing business information systems. The author can be contacted at drazena.gaspar@ef.sum.ba

Daniela Garbin Praničević, PhD, is an Associate Professor of Business Informatics at the Faculty of Economics, Business and Tourism, University of Split. Her M.A. degree is in Information Management at the Faculty of Economics, University of Zagreb, and her Ph.D. degree is in Business Informatics at the Faculty of Economics, Business and Tourism, University of Split. Her research interests are knowledge management, ICT project management, and ICT appliances in education and business, particularly in tourism and hospitality. She participated in a few research projects and published papers based on the project results. The author can be contacted at daniela@efst.hr