Publication Date: 30 October 2024
Archs Sci. (2024) Volume 74, Issue 6 Pages 51-58, Paper ID 2024607.
https://doi.org/10.62227/as/74607

Contemporary Management Innovations in Shaping the Educational Process: Insights from Europe

Liudmyla Mialkovska[1,*], Oksana Maiboroda[2], Nataliia Koretska[3], Yaroslava Martyniuk[4], Olena Haponchuk[5] and Liudmyla Korobchuk[6]

[1]Doctor of Philological Sciences, Professor, Professor of Foreign and Ukrainian Philology Department, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[2]PhD in History, Associate Professor of the Department of Social and Humanitarian Technologies, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[3]PhD in Economics, Associate Professor of the Department of Management, Faculty of Business and Law, Lutsk National Technical University, Lutsk, Ukraine.
[4]PhD in History, Associate Professor of the Department of Social and Humanitarian Technologies, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[5]Candidate of Pedagogical Sciences, Senior Lecturer of the Department of Social and Humanitarian Technologies, Faculty of Digital Education and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[6]PhD in Pedagogical Sciences, Associate Professor of the Department of Ecology, Faculty of Agricultural Technologies and Ecology, Lutsk National Technical University, Lutsk, Ukraine.

Corresponding authors: (e-mail: l.myalkovska@lutsk-ntu.com.ua).

Abstract Today, globalisation processes, technological progress, and changes in socio-economic conditions require educational institutions to implement new approaches to managing the educational process. This paper analyses innovative approaches in modern management to model the educational process based on European experience. The contribution of the research to the scientific discussion is to substantiate the impact of the introduction of digital technologies and adaptive and personalised programs, as well as the development of collaboration skills, on the educational process's effectiveness in the educational process's modelling. For this purpose, a correlation matrix was formed based on the assessments by university professors and university students. The research design included verification of the objectivity of expert assessments on the achievement of goals and management functions in the performance of educational tasks, which effectively ensured the quality of the digital skills of students and professors. The main conclusions of the study indicate that to model the educational process effectively, it is necessary to focus on planning the introduction of digital technologies and creating individual learning environments. Implications for further research include the development of new methods for managing the educational process in the context of rapid technological progress.

Index Terms education, training, digital communications, change management, management of educational institutions, environmental culture

I. Introduction

This paper analyses innovative approaches in modern management to model the educational process based on European experience. The study substantiates the impact of the introduction of digital technologies, adaptive and personalised programmes, and the development of collaboration skills on the effectiveness of the educational process. General scientific methods such as literature analysis, generalisation and systematisation were used. The research plan included verifying the objectivity of expert assessments on achieving goals and management functions during educational tasks, which ensured the quality of the digital skills acquired by students and teachers. The main conclusions indicate that effectively modelling the educational process requires planning the introduction of digital technologies and creating individual learning environments.

Additionally, there is a need to improve approaches to organising and stimulating the adaptation of the educational process to digitalisation challenges, mainly when introducing online learning. Implications for further research include developing new methods for managing and organising the educational process in the context of rapid technological progress and globalisation changes. The establishment and development of modern education in a digitised society are determined by the expanding influence of information, computer technologies, and software on all aspects of the educational process [1]. New development trends and challenges, such as the COVID-19 pandemic, have necessitated expanding online education capabilities and using innovations to plan and model the educational process. In 2023, the European online university education market is valued at $12.83 billion and is expected to grow to $21.4 billion over the next five years. Additionally, the number of online education users is increasing, with online students rising from 2.8 million in 2018 to 5.4 million in 2023 [2]. Given the spread of the online approach to education, the main challenge is digi-

tal literacy, particularly in using digital tools and programs (Moodle, Google Classroom, Zoom, Google Meet, Word Pad, MathCAD), which enhance the effectiveness of various types of classes and forms of education [3], as well as massive open online courses (MOOCs) to ensure interactivity in the learning process and develop students' collaborative skills [4], [5].

In the context of digitisation changes in the educational environment, the transformation of modern education management remains a relevant issue. This involves modelling the educational process based on the quality of students' acquired knowledge, the effectiveness of educational content, and the education system's adaptability according to sustainable development principles. An innovative approach to managing individual educational institutions involves engaging all participants and stakeholders in decision-making, promoting openness, and ensuring high-quality education [6]. Therefore, it is essential to systematically update educational management strategies to improve pedagogical practices and support innovative teaching methods.

This scientific article aims to explore innovative approaches in modern management for modelling the educational process based on the European experience. The tasks include analysing and evaluating the impact of implementing digital technologies and adaptive and personalised learning programs and developing collaborative skills to improve the educational process's effectiveness. The research aims to identify best practices from European countries used to manage the digitalisation of the educational process.

This research is motivated by the pressing need to understand and improve the effectiveness of educational management practices in the context of rapidly evolving digital technologies and innovative learning approaches. The focus is on analysing the implementation of modern educational management functions, explicitly planning, organisation, motivation, and control, and their impact on the quality of digital skills acquisition by students and educators. Additionally, the review explores how management practices can be optimised to enhance the overall learning experience and outcomes in digital learning environments.

II. Literature Review

The European Union (EU) is promoting a high-performance digital education ecosystem to enhance its citizens' digital competence and skills. According to the Digital Education Action Plan [7], strategic priorities include fostering a high-performing digital education ecosystem and enhancing digital skills for education's digital transformation. European countries focus on effective planning, developing digital potential, and enhancing digital literacy, competence [8] and environmental awareness [9] of participants in the educational process, and the quality and relevance of educational content. Digital tools, platforms, and AI technologies are emphasized [10]. Digital platforms increase opportunities for collaboration and networking, making online platforms and social networks popular for academic interactions [11]. This highlights the relevance of applying innovative approaches to modern educational management and addressing administration and education management issues.

In Europe, education management should ensure professional development for teachers in modern educational technologies, enabling them to integrate technologies into teaching practices, engage students, and develop relevant curricula and projects [12]–[14]. Project-based learning promotes student engagement and develops social skills such as teamwork, communication, and leadership, which are essential for personal and professional development [15], [16]. It also fosters critical thinking and problem-solving skills [17] and supports a positive classroom atmosphere [18].

MOOC (Massive Open Online Courses) platforms are growing, providing broad access to online education and enhancing professional skills for educators and students [19]. Gamage et al. [20] research indicates that countries like India, Mexico, Thailand, and Italy have created MOOC platforms. Common European MOOC platforms include Coursera, EdX, Future Learn, OpenSAP, and Iversity [21]. Additionally, Ramadhani and Khusniati [22] state that modern education involves using interactive learning materials, multimedia tools, interactive textbooks, and virtual laboratories. Integrating digital tools and resources in educational institutions is necessary to improve quality, sustainability, and development. This involves analysing technical and information infrastructure and determining the needs of institutions, teachers, and students regarding digital resources and programs [23]. The educational environment requires new approaches to managing the learning process and institutions. Digital technologies can transform education, ensuring its modernisation, continuity, and individualisation.

III. Applied Methods

In the course of the study, methods of literature analysis, generalisation, and systematisation were used, which allowed for the identification of the main goals of the educational process (digital technologies, collaboration, personalisation, adaptation) and the functions of education management (planning, organisation, motivation, control) for researching the effectiveness of applying modern management innovations in modelling the educational process. To gain an objective assessment, a two-level evaluation was conducted using an expert survey method involving teachers (Group 1 = 15 persons) and students (Group 1 = 15 persons) to assess the alignment of educational process tasks with the identified goals and functions on a scale of 1 to 10 points, where 0 is the lowest score, and 10 is the highest score, to obtain an integrated score for the identified indicators. As part of the study, a correlation analysis of the effectiveness of modern management in applying innovative approaches to modelling the educational process was conducted using the JASP program (Classical Correlation tool) and a related correlation matrix was compiled.

To verify the reliability of the obtained assessments, an additional analysis was conducted using a Bayesian paired t-test, including summarising the indicators of this t-test, conducting an inferential analysis, and checking the stability of the Bayes

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

factor in the JASP program (Bayesian Paired Samples T-Test tool). Thus, the level of objectivity of the assessments and their degrees of discrepancy were determined.

A limitation of the study from a Bayesian statistical perspective is the relatively small sample size involved. In [24] it is noted that this creates a high probability of obtaining a false positive result from the analysis. For example, in a sample with N = M = 2, the probability of obtaining a true positive result is only 4.7%, while the probability of a false positive result is 2.5%. This means that the probability that a statistically significant result reflects a true effect is only 65%. However, obtaining a true positive result for a sample of N = M = 100 increases to 50%, which makes the result more reliable. In the context of the conducted research, to ensure the reliability of the obtained results, it is necessary to increase the sample size to at least 50 people in each group. An increase in the sample will reduce the probability of false conclusions and increase the reliability of statistical results.

IV. Results and Discussion

Educational systems face constant challenges requiring continuous improvement and adaptation. Studying strategies and methods to enhance these systems is crucial in our rapidly developing society and technological landscape. Implementing the latest technologies and updating educational programmes are essential to ensure high-quality, productive education [25]. Educational digital technologies open new opportunities for implementing mobile, differentiated, and individualised learning. It should be noted that such innovative tools aim to supplement the teacher rather than actively complement their role.

Digital technologies in education offer new opportunities for mobile, differentiated, and individualised learning. These tools are designed to supplement rather than replace teachers. They create adaptable, manageable, interactive lessons that blend individual and group learning, allowing unlimited time for material processing [26].

Educational technologies automate many teacher tasks, freeing time for deeper communication, individual student work, and practical research. They provide instant feedback, improving the management of educational and research processes and increasing overall efficiency. These technologies open new horizons for teachers and students to interact and learn together [27].

A. Evaluating the effectiveness of modern management tasks

The main educational goals and management functions were summarised to assess the effectiveness of achieving modern management tasks when applying innovative approaches to modelling the educational process based on a literature review. The evaluation was carried out using the expert assessment method with two groups: higher education institution teachers (Group 1 = 15 persons) and full-time university students (Group 2 = 15 persons) regarding the performance of management functions in modelling the educational process. The first analysis stage involves performing Pearson correlation analysis between the assessments of achieving modern educational management tasks by higher education institution teachers (Fi) and university students (Ci). The results of the correlation analysis of the effectiveness of achieving modern educational management tasks are presented in Table 1.

The obtained correlation indicators were grouped into a correlation matrix to ensure clarity and ease of data interpretation. This approach makes it possible to identify the correlations between diverse aspects of educational management and their impact on the efficacy of the educational process. The correlation matrix is presented in Table 2.

According to the results of the correlation analysis between expert evaluations of modern educational management tasks, a high level of correlation is observed between the expert evaluations on the indicators: Organisation of access to resources for individual learning for students and teachers ($r = 0.53$ at $p = 0.041$), Control of academic results of students in the online format ($r = -0.42$ at $p = 0.124$), and Motivation for implementing collective learning methods ($r = 0.41$ at $p = 0.128$). It indicates a high level of management efficiency in these indicators and shows general agreement on the effectiveness of these management functions and educational tasks. Although the indicators Planning the implementation of digital technologies in educational programmes ($r = 0.76$ at $p = 0.001$), Control of the effectiveness of group projects and team interactions ($r = -0.7$ at $p = 0.004$), and Control of students' success considering their plans ($r = 0.65$ at $p = 0.008$) also show a high degree of correlation, the p-values > 0.05 confirm that the found correlations are not sufficient to establish a stable connection between the expert evaluations for these indicators.

A moderate degree of correlation is marked between management functions and educational goals according to the following tasks: Planning activities for developing collaborative skills ($r = 0.26$ at $p = 0.353$), Developing a strategic plan for integrating online courses ($r = 0.29$ at $p = 0.278$), Motivating active use of digital technologies ($r = 0.29$ at $p = 0.295$), and Controlling the effectiveness of using digital technologies in the educational process ($r = 0.31$ at $p = 0.261$). It indicates an unclear connection between expert evaluations for these indicators and moderate effectiveness in performing these educational management tasks. A low level of correlation is observed when evaluating the organisation of space for group work and interaction ($r = 0.06$ at $p = 0.827$), planning activities for developing collaborative skills ($r = 0.02$ at $p = 0.954$), organising access to digital platforms for students and teachers ($r = 0.05$ at $p = 0.853$), and organising distance learning ($r = 0.06$ at $p = 0.833$). It indicates that the tasks of modern educational management are not entirely performed, given the significant difference in the initial expert evaluation values.

B. Analysing the goals and functions of modern education management

This study explored the effectiveness of modern management tasks by applying innovative approaches to modelling the

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

Variable		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16
C1	Pearson's r	0.764	0.039	-0.018	-0.368	-0.272	-0.047	0.089	-0.197	0.172	-0.368	-0.198	-0.143	0.034	-0.093	0.477	-0.183
	p-value	<.001	0.891	0.949	0.177	0.326	0.869	0.752	0.483	0.539	0.177	0.479	0.610	0.904	0.741	0.072	0.513
C2	Pearson's r	0.291	0.057	0.322	0.037	-0.052	-0.226	0.050	-0.370	-0.284	0.090	-0.329	-0.247	-0.015	-0.231	-0.184	0.307
	p-value	0.293	0.840	0.242	0.896	0.853	0.419	0.860	0.175	0.304	0.749	0.231	0.376	0.957	0.408	0.510	0.265
C3	Pearson's r	0.170	0.025	0.083	-0.105	-0.403	-0.157	0.291	-0.383	0.290	0.260	-0.095	-0.008	0.090	0.051	-0.108	0.177
	p-value	0.544	0.930	0.769	0.711	0.136	0.575	0.292	0.159	0.295	0.349	0.735	0.976	0.750	0.857	0.701	0.529
C4	Pearson's r	-0.068	-0.333	-0.291	-0.300	-0.297	0.000	0.411	0.334	0.314	0.193	0.216	0.601	-0.310	-0.058	-0.202	-0.028
	p-value	0.809	0.225	0.293	0.277	0.283	1.000	0.128	0.224	0.255	0.490	0.440	0.018	0.261	0.839	0.471	0.922
C5	Pearson's r	0.166	-0.258	0.271	-0.096	0.080	-0.264	0.346	-0.435	-0.010	-0.153	0.028	-0.536	-0.149	0.441	-0.155	0.245
	p-value	0.554	0.353	0.328	0.734	0.776	0.341	0.206	0.105	0.973	0.586	0.921	0.039	0.596	0.099	0.582	0.379
C6	Pearson's r	0.577	-0.262	-0.223	-0.399	-0.125	0.062	-0.227	0.254	0.117	0.353	-0.109	0.509	-0.292	-0.365	0.229	-0.096
	p-value	0.024	0.346	0.424	0.140	0.657	0.827	0.415	0.362	0.679	0.197	0.699	0.053	0.291	0.181	0.412	0.733
C7	Pearson's r	0.450	-0.127	0.228	-0.167	-0.531	-0.020	0.192	0.192	0.239	0.411	-0.271	-0.110	-0.125	-0.085	-0.085	0.419
	p-value	0.093	0.653	0.413	0.552	0.042	0.945	0.493	0.493	0.391	0.128	0.329	0.697	0.657	0.762	0.762	0.120
C8	Pearson's r	-0.392	-0.069	0.231	-0.059	-0.116	0.065	0.237	-0.349	0.348	0.299	0.069	-0.347	0.086	0.700	-0.067	0.202
	p-value	0.149	0.806	0.407	0.833	0.680	0.817	0.395	0.202	0.204	0.279	0.806	0.205	0.760	0.004	0.812	0.471
C9	Pearson's r	0.213	-0.062	-0.016	-0.176	-0.192	0.378	-0.204	0.008	0.174	-0.346	0.089	0.438	-0.275	-0.066	0.654	-0.791
	p-value	0.446	0.826	0.954	0.530	0.494	0.165	0.467	0.977	0.535	0.207	0.752	0.103	0.321	0.816	0.008	<.001
C10	Pearson's r	0.129	-0.202	-0.219	-0.283	0.098	-0.103	0.532	0.127	-0.080	-0.124	0.145	0.312	-0.149	-0.006	-0.038	-0.074
	p-value	0.646	0.471	0.434	0.306	0.727	0.716	0.041	0.651	0.777	0.660	0.606	0.258	0.596	0.983	0.894	0.793
C11	Pearson's r	0.570	-0.108	0.050	-0.431	-0.148	-0.259	0.145	-0.025	0.193	-0.346	0.172	0.579	-0.212	-0.276	0.468	-0.533
	p-value	0.026	0.703	0.859	0.109	0.599	0.350	0.606	0.928	0.491	0.207	0.540	0.024	0.448	0.319	0.079	0.041
C12	Pearson's r	-0.384	-0.243	-0.223	-0.224	0.083	0.123	-0.040	0.314	0.145	0.224	0.349	0.605	-0.217	-0.043	-0.093	-0.117
	p-value	0.157	0.383	0.424	0.422	0.767	0.661	0.887	0.254	0.607	0.423	0.202	0.017	0.437	0.879	0.742	0.678
C13	Pearson's r	0.161	0.122	0.345	0.299	-0.087	-0.258	-0.195	-0.034	-0.183	0.166	-0.091	-0.246	0.083	-0.354	-0.331	0.433
	p-value	0.566	0.666	0.209	0.278	0.757	0.353	0.486	0.905	0.513	0.554	0.746	0.378	0.768	0.195	0.229	0.107
C14	Pearson's r	0.053	-0.511	0.217	-0.248	-0.370	0.051	0.116	-0.060	0.156	-0.131	0.621	0.487	-0.638	-0.208	-0.034	-0.084
	p-value	0.852	0.052	0.438	0.373	0.175	0.857	0.680	0.833	0.579	0.641	0.014	0.065	0.011	0.457	0.905	0.765
C15	Pearson's r	0.287	-0.079	0.186	-0.012	0.185	-0.160	-0.122	-0.199	-0.344	-0.141	-0.198	-0.189	-0.155	-0.200	-0.057	0.089
	p-value	0.300	0.780	0.506	0.966	0.509	0.568	0.665	0.478	0.209	0.615	0.479	0.500	0.580	0.475	0.839	0.754
C16	Pearson's r	-0.129	-0.219	-0.430	-0.052	0.609	-0.022	-0.089	-0.095	-0.113	-0.289	0.256	0.053	-0.132	0.393	0.225	-0.415
	p-value	0.648	0.434	0.110	0.853	0.016	0.938	0.752	0.738	0.689	0.296	0.357	0.851	0.640	0.147	0.420	0.124

Table 1: The results of correlation analysis of management tasks in the application of innovative approaches to modelling the educational process source: compiled by the author

Objectives	Management functions											
	Planning	**Pearson's r**	**p-value**	**Organisation**	**Pearson's r**	**p-value**	**Motivation**	**Pearson's r**	**p-value**	**Control**	**Pearson's r**	p-value
Digital technologies	Planning the implementation of digital technologies in the curriculum (F1/C1)	0.764	< 0.001	Organising access to digital platforms for students and teachers (F5/C2)	-0.052	0.853	Motivation to actively use digital technologies (F9/C3)	0.290	0.295	Monitoring the effectiveness of the use of digital technologies in the educational process (F13/C4)	-0.310	0.261
Collaboration	Planning activities to develop collaborative skills (F2/C5)	-0.258	0.353	Organising space for group work and interaction (F6/C6)	0.062	0.827	Motivation to implement collaborative learning methods (F10/C7)	0.411	0.128	Monitoring the effectiveness of group projects and teamwork (F14/C8)	0.700	0.004
Personalisation	Planning individual curricula, programmes and courses (F3/C9)	-0.016	0.954	Organising access to resources for individual learning for students and teachers (F7/C10)	0.532	0.041	Motivation to apply an individual approach (F11/C11)	0.172	0.540	Monitoring students' progress based on their plans (F15/C12)	0.654	0.008
Adaptation	Developing a strategic plan for the integration of online courses (F4/C13)	0.299	0.278	The organisation of distance learning (F8/C14)	-0.060	0.833	Encouraging learners to use online tools (F12/C15)	-0.189	0.500	Monitoring the level of students' academic performance in the online format (F16/C16)	-0.415	0.124

Table 2: Correlation Matrix of Modern Management Tasks in Modelling the Educational Process Source: compiled by the author

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

Bayesian Paired Samples T-Test			
Measure 1	**Measure 2**	BF_O	**error %**
C1	F1	0.211	~ 0.013
C5	F2	0.494	$\sim 7.814\times10^{-6}$
C9	F3	0.067	~ 0.002
C13	F4	0.343	$\sim 5.517\times10^{-6}$
C2	F5	0.108	$\sim 7.504\times10^{-4}$
C6	F6	0.187	~ 0.003
C10	F7	0.052	~ 0.007
C14	F8	0.196	~ 0.006
C3	F9	4.190	$\sim 5.642\times10^{-5}$
C7	F10	2.385	$\sim 9.261\times10^{-5}$
C11	F11	0.079	~ 0.081
C15	F12	2.154	$\sim 6.894\times10^{-5}$
C4	F13	0.320	$\sim 7.004\times10^{-6}$
C8	F14	8.834	$\sim 2.695\times10^{-4}$
C12	F15	0.056	~ 0.137
C16	F16	0.388	$\sim 2.138\times10^{-6}$

Table 3: The Effectiveness of Evaluating the Educational Process Management System Using the Bayesian Paired T-Test Source: compiled by the author

educational process. Based on a literature review, it summarised the main goals of education and management functions. However, further in-depth studies may be needed to confirm its validity, especially concerning the correlation between different groups of experts and the effectiveness of specific management functions.

Considering the variability of the evaluations obtained from the expert survey, an additional analysis of the goals and functions of modern educational management was conducted using the Bayesian paired t-test [28]–[31] in the JASP program. This analysis allows for assessing the differences between the evaluations of the two groups of experts for the defined indicators. The results of the Bayesian paired t-test are presented in Table 3.

Based on the analysis of educational management tasks, it was found that the evaluations of the two groups of experts are pretty consistent regarding the indicators: Motivation for active use of digital technologies (BF_O = 4.19, with error $\sim 5.642\times10^{-5}$); (BF_O = 2.385, with error $\sim 9.261\times10^{-5}$); (BF_O = 2.154, with error $\sim 6.894\times10^{-5}$); and (BF_O = 8.834, with error $\sim 2.695\times10^{-4}$), indicating a high level of efficiency in implementing tasks within the educational management process. A high consistency is observed in Planning activities for developing collaborative skills (BF_O = 0.494, with error $\sim 7.814\times10^{-6}$), Developing a strategic plan for integrating online courses (BF_O = 0.343, with error $\sim 5.517\times10^{-6}$), and Control of students' academic results in the online format (BF_O = 0.388, with error $\sim 2.138\times10^{-6}$). These indicators are objective, indicating a high efficiency in achieving the educational management tasks from both groups of experts' perspectives. The indicators Planning individual educational plans, programmes, and courses (BF_O = 0.067, with error $\sim$ 0.002), Organisation of access to resources for individual learning for students and teachers (BF_O = 0.052, with error $\sim$ 0.007), and Control of students' success considering their plans (BF_O = 0.056, with error $\sim$ 0.137) showed a significant percentage of discrepancies between the expert groups. Moreover, slight discrepancies between the groups' evaluations are observed for the indicators (BF_O = 0.079, with error $\sim$ 0.081), (BF_O = 0.187, with error $\sim$ 0.003), and (BF_O = 0.196, with error $\sim$ 0.006), highlighting the importance of this aspect for both expert groups.

1) Analysing assessment objectivity

It is necessary to conduct a detailed analysis of the indicators with the most significant discrepancies between the evaluations of the two expert groups. The following challenges were highlighted: Planning individual educational plans, programmes, and courses (Figure 1a), Organising access to resources for individual learning for students and teachers (Figure 1b), and Controlling students' success considering their plans (Figure 1c). For the analysis, Inferential Plots were determined using the statistical program JASP [30].

Notes: (a) – Inferential Plots for the Indicator "Planning of Individual Curricula, Programmes and Courses"; (b) – Inferential Plots for the Indicator "Organisation of Access to Resources for Individual Learning for Students and Teachers"; (c) – Inferential Plots for the Indicator "Monitoring of Students' Progress Based on Their Individual Plans"

The t-test results showed a high degree of discrepancy between experts in evaluating the planning of individual educational plans, programmes, and courses (BF_O = 0.067, with error 0.002). However, the inferential plot graph strongly supports the null hypothesis. The overall results of the analysis did not reveal any significant differences between the assessments of educational management tasks. This indicates the overall stability and reliability of the methods used to plan individual curricula in modern educational management.

According to the inferential plot graph results, the organisation of access to resources for individual learning for students and teachers (BF_O = 0.052, with error 0.007) also strongly supports the null hypothesis, indicating that there is no significant difference between the pairs of measurements (assessments of the two groups). This finding is crucial for educational institutions as it confirms that existing approaches to organising access to resources for individual learning are practical and equally valued by both students and teachers. It also emphasises the importance of balancing resource provision for different user groups in the learning environment.

Inferential Plots for the assessments of student performance control considering their plans (BF_O = 0.056, with error 0.137) also show strong support for the null hypothesis, indicating that the differences between the assessments of modern management tasks when applying innovative approaches to modelling the educational process are not statistically significant. Therefore, the expert evaluations should be considered objective. This demonstrates that innovative approaches to managing the educational process, aimed at personalising learning and individualising plans, are reliable and can be widely applied in educational institutions.

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

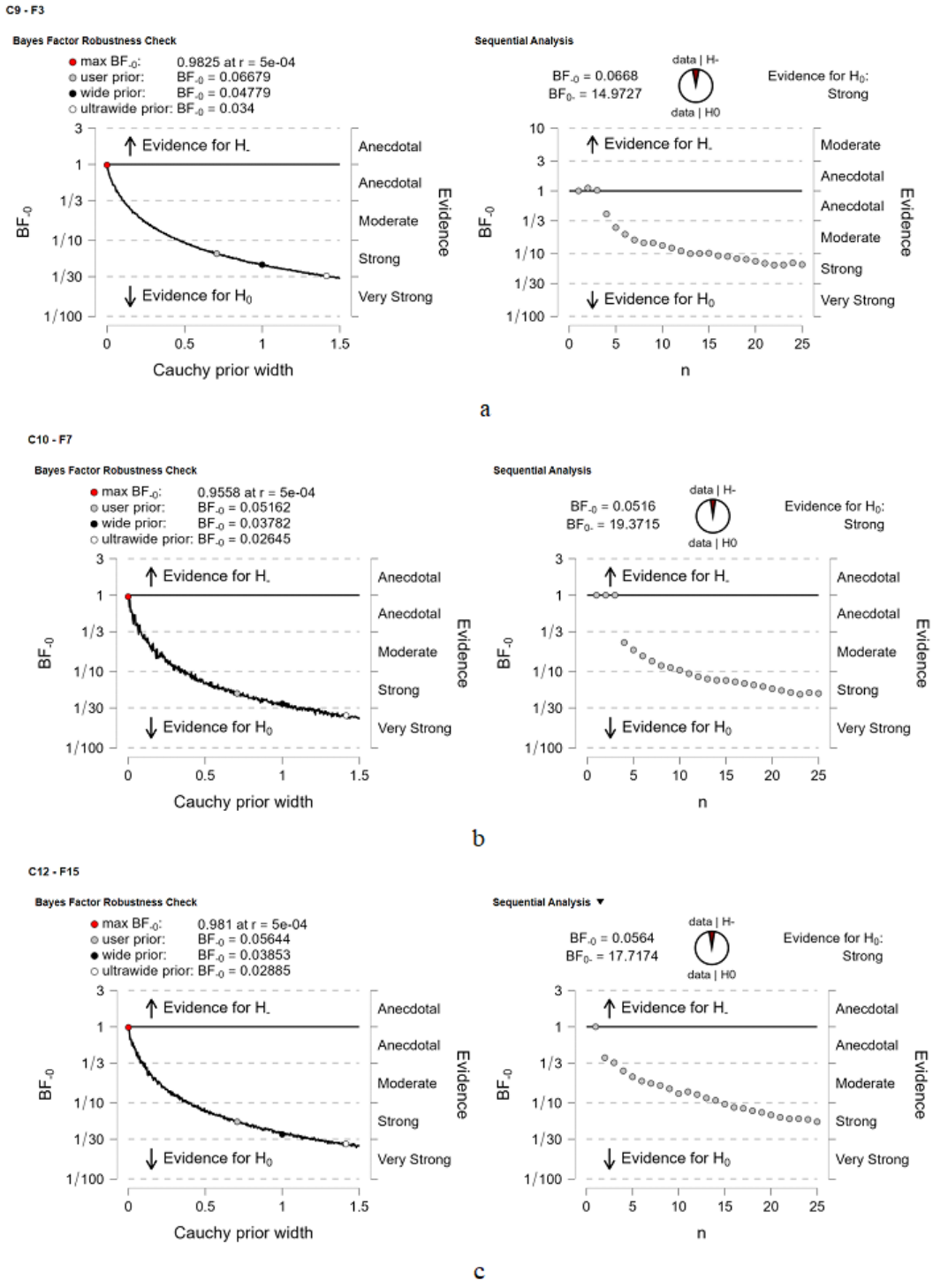

Figure 1: Inferential Plots of the indicators that had the most significant discrepancies between the evaluations of the two expert groups Source: compiled by the author

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

2) Analysing results stability

To evaluate the reliability of the preliminary analysis of contemporary educational management objectives and responsibilities, the statistical program JASP was employed to verify the stability of the Bayes factor (Table 4). The study comprehensively analyses mean values, standard deviations, and coefficients of variation for various indicators of planning, organisation, motivation, and control. The 95% confidence intervals facilitate the assessment of the accuracy and stability of the data, thereby ensuring the objectivity and reliability of the conclusions.

Descriptives							
No.	N	Mean	SD	SE	Coefficient of variation	95% Credible Interval	
						Lower	Upper
C1	15	5.920	2.100	0.420	0.355	5.053	6.787
F1	15	5.920	2.308	0.462	0.390	4.967	6.873
C5	15	5.080	1.824	0.365	0.359	4.327	5.833
F2	15	5.640	2.515	0.503	0.446	4.602	6.678
C9	15	7.120	2.774	0.555	0.390	5.975	8.265
F3	15	5.880	2.789	0.558	0.474	4.729	7.031
C13	15	5.640	1.977	0.395	0.350	4.824	6.456
F4	15	5.920	2.644	0.529	0.447	4.828	7.012
C2	15	6.000	1.803	0.361	0.300	5.256	6.744
F5	15	5.480	2.275	0.455	0.415	4.541	6.419
C6	15	5.160	1.886	0.377	0.365	4.382	5.938
F6	15	5.080	1.891	0.378	0.372	4.299	5.861
C10	15	6.880	2.635	0.527	0.383	5.792	7.968
F7	15	4.960	2.746	0.549	0.554	3.827	6.093
C14	15	5.800	2.021	0.404	0.348	4.966	6.634
F8	15	5.760	1.690	0.338	0.293	5.062	6.458
C3	15	5.800	2.179	0.436	0.376	4.900	6.700
F9	15	6.760	2.488	0.498	0.368	5.733	7.787
C7	15	5.160	2.192	0.438	0.425	4.255	6.065
F10	15	6.120	2.759	0.552	0.451	4.981	7.259
C11	15	6.880	2.315	0.463	0.337	5.924	7.836
F11	15	5.960	2.894	0.579	0.486	4.766	7.154
C15	15	5.960	2.031	0.406	0.341	5.122	6.798
F12	15	6.880	2.587	0.517	0.376	5.812	7.948
C4	15	5.680	1.952	0.390	0.344	4.874	6.486
F13	15	5.920	2.482	0.496	0.419	4.896	6.944
C8	15	4.840	2.511	0.502	0.519	3.803	5.877
F14	15	6.120	2.386	0.477	0.390	5.135	7.105
C12	15	7.160	2.544	0.509	0.355	6.110	8.210
F15	15	5.560	2.859	0.572	0.514	4.380	6.740
C16	15	5.640	2.059	0.412	0.365	4.790	6.490
F16	15	6.040	2.622	0.524	0.434	4.958	7.122

Table 4: Checking the Stability of the Bayes Factor Source: compiled by the author

An investigation into the reliability of the Bayes factor in contemporary management tasks and innovative educational modelling established that indicators for Planning collaborative skills development (C5 = 1.82), Organising space for group work (C6 = 1.87; F6 = 1.89), Organising access to digital platforms (C2 = 1.8), and Organising distance learning (F8 = 1.69) showed low deviation between assessments. This indicates a high degree of stability and measurement accuracy. Other deviations are considerable, suggesting potential reduced objectivity in individual expert assessments. However, these findings do not indicate pervasive instability. The robustness verification of the Bayesian paired t-test results confirms that the mean values for modern management tasks in educational modelling are sufficiently stable. Consequently, achieving management goals and functions in these tasks ensures the quality of digital skills acquired by students and teachers.

This study investigated the effects of innovative approaches on modern educational programmes and learning approaches. While previous studies [8]–[13] examined the impact of digital technologies and individualised curricula, they did not consider the organisation of access to resources for individualised learning and monitoring student performance based on individual plans. We have analysed the effectiveness of fulfilling modern educational goals and management functions. Our findings indicate that academic performance and student perceptions of curricula correlate with the quality of educational management. The proposed methods of improving learning can benefit from integrating modern technologies and personalised approaches without negatively affecting educational quality. However, confirming their effectiveness in improving education and student performance requires further research based on assessing student learning outcomes and mastery of specialised skills.

Our study demonstrates that traditional educational management approaches are currently ineffective, necessitating new methods. We proposed a new approach detailing current educational goals and management functions. These proposed methods can benefit from digital technologies without negatively affecting student performance, allowing effective planning and organisation of the educational process. This ensures high-quality education and meets the needs of students and teachers in the modern digital environment. Future research may investigate student performance and skill acquisition changes and explore ways to implement personalised curricula and digital technologies.

V. Conclusion

Analysis of the effectiveness of modern management tasks using innovative educational process modelling revealed that successful implementation of digital technologies depends on thorough planning ($r = 0.76$ at $p = 0.001$). Organisation ($r = -0.7$ at $p = 0.004$) and control ($r = 0.65$ at $p = 0.008$) also have significant impacts. Collaboration in learning benefits from motivation and control but requires improved planning. Personalised learning depends on resource access and performance monitoring, whereas planning needs enhancement. Adapting to online learning requires better strategic planning and organisation, as current approaches do not yield significant results. The originality of this article lies in its integrated approach to analysing the effectiveness of modern educational management tasks in implementing innovative educational modelling. Correlational analysis between management functions and learning outcomes provides insights into optimising the educational process within digitalisation and personalisation contexts. This study significantly contributes to educational management theory and practice. The proposed learning management method, including personalisation and individualisation of plans, achieved higher performance ratings than traditional approaches. This underscores the importance of innovative educational management approaches that ensure high-quality learning experiences, meet the needs of students and teachers, and promote digital skill development.

References

[1] Nikitenko, O. V., Oleksenko, R. I., & Kivlyuk, O. P. (2022). Formation of values of digital education and digital man in a digitalised society. *Humanities Studies, 10*(87), 53–63.

[2] Statista (2023). "Online Education – Europe". *Statista Market Insights*. https://www.statista.com/outlook/emo/online-education/europe

[3] Sinyaeva, O., Krekot, M., Zavhorodniy, O., Sychova, T., & Sychov, A. (2023). Features of the use of information technologies in education. *Education. Innovation. Practice, 11*(7), 98–104.

[4] Ossiannilsson, E., Altinay, F., & Altinay, Z. (2015). Analysis of MOOCs practices from the perspective of learner experiences and quality culture. *Educational Media International, 52*(4), 272–283.

[5] Onah, D. F. O., & Sinclair, J. E. (2017). Assessing Self-Regulation of Learning Dimensions in a Stand-alone MOOC Platform. *International Journal of Engineering Pedagogy (iJEP), 7*(2), 4–21.

[6] Voichenko, D. V. (2023). Innovations in education management: transformation of the modern system. *Innovations and scientific potential of the world: materials of the III International Scientific Conference*, pp. 211–213.

[7] European Commission (2021). European Commission Digital Education Action Plan. 2021–2027. https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

[8] Dokuchaieva, V. V., Poznanskyy, R. V., & Shvets, I. B. (2022). Digital Competence as a Component of the Process of Formation of Pedagogical Skills. *Science and Technology Today, 4*(4), 242–254.

[9] Mialkovska, L., Redchuk, R., Sushyk, I., Martyniuk, Y., Maiboroda, O., & Savchuk, N. (2023). Social Management and Digital Communications as Important Components of Modern Higher Education. *Cadernos de Educacao Tecnologia e Sociedade, 16*(1), 143–152.

[10] Shparyk, O. (2022). Digital transformation of secondary education: common strategic vectors of the USA and EU countries. *Ukrainian Pedagogical Journal, 3*, 33–43.

[11] Mialkovska, L., Zhvaniia, L., & Voitenko, I. (2023). Environmental culture of modern media in Ukraine. *Frontiers of Printing: a Scientific Journal, 2*(14), 140–153.

[12] Canaran, Ö., & Mirici, İ. H. (2019). An Overview of the Recent Views and Practices in Teacher Professional Development. *Eğitimde Kuram ve Uygulama, 15*(4), 350–362.

[13] Radkevych, V., Kravets, S., Herliand, T., Radkevych, O., & Kozak, A. (2021). Modern technologies in the development of professional competence in teachers from professional (vocational) education schools. *Journal of Physics: Conference Series, 1840*(1).

[14] Savage, R., Chen, K., & Vanasupa, L. (2008). Integrating project-based learning throughout the undergraduate engineering curriculum. *Journal of STEM Education, 8*(3).

[15] Naji, K. K., Ebead, U., Al-Ali, A. K., & Du, X. (2020). Comparing models of problem and project-based learning (PBL) courses and student engagement in civil engineering in Qatar. *Eurasia Journal of Mathematics, Science and Technology Education, 16*(8), 1–16.

[16] Adiyono, A., Hayat, E. W., Oktavia, E. D., & Prasetiyo, N. T. (2024). Learning interaction in the digital era: Technological innovations and education management strategies to enhance student engagement. *Journal of Research in Instructional, 4*(1), 205–221.

[17] Falcione, S., Campbell, E., McCollum, B., Chamberlain, J., Macias, M., Morsch, L., & Pinder, C. (2019). Emergence of Different Perspectives of Success in Collaborative Learning. *The Canadian Journal for the Scholarship of Teaching and Learning, 10*(2), 1–23.

[18] Adiyono, A., Fadhilatunnisa, A., Rahmat, N. A., & Munawarroh, N. (2022). Skills of Islamic religious education teachers in class management. *Al-Hayat: Journal of Islamic Education, 6*(1), 104–115.

[19] Beskorsa, O. S. (2021). MOOC: Platforms for professional self-development of future elementary school English teachers. *Scientific Bulletin of Uzhhorod University. Series: "Pedagogy. social work", 1*(48), 33–38.

[20] Gamage, D., Perera, I., & Fernando, S. (2020). MOOCs lack interactivity and collaborativeness: evaluating MOOC platforms. *International Journal of Engineering Pedagogy (iJEP), 10*(2), 94–111.

[21] Terzi, S., Zourou, K., & Stamelos, I. (2022). Information and communication technologies supporting the standardisation of credentials among MOOC providers. In *ICERI2022 Proceedings*, pp. 6910–6919. IATED.

[22] Ramadhani, V. Y., & Khusniati, M. (2022). Development of Interactive E-Books containing Virtual Laboratory to Improve Students' Motivation Learning. *Journal of Environmental and Science Education (JESE), 2*(1), 49–57.

[23] Mialkovska, L., Herasymchuk, H., Sushyk, I., Martyniuk, Y., Haponchuk, O., & Melnychuk, Y. (2023). Management models and methods in modern education: information technologies, sustainability and development. *Journal of Innovative Management and Sustainable Development, 1*(2), 105–114.

[24] de Winter, J. C. (2019). Using the Student's t-test with extremely small sample sizes. *Practical Assessment, Research, and Evaluation, 18*(10), 1–12.

[25] Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers, 3*, 275–285.

[26] Khvostetskyi, O. V., & Soya, O. M. (2023). The use of digital technologies of communication and cooperation by participants in the educational process in the conditions of distance learning in institutions of general secondary education. In Theory and practice of using information technologies in the conditions of digital transformation of education: materials of the All-Ukrainian scientific and practical conference, pp. 191–194. Publishing House of M. Drahomanov State University. http://surl.li/leacjo

[27] Spivachuk, V., & Ikonnikova, M. (2022). Modern information and communication technologies in the educational process of higher education institutions. *Scientific Innovations and Advanced Technologies, 9*(11), 220–232.

[28] Cleophas, T. J., Zwinderman, A. H., Cleophas, T. J., & Zwinderman, A. H. (2018). Bayesian paired T-Test. Bayesian Paired T-Test. In *Modern Bayesian Statistics in Clinical Research,* pp. 49–58. Springer.

[29] Gronau, Q. F., Ly, A., & Wagenmakers, E.-J. (2020). Informed Bayesian t-Tests. *American Statistician, 74*(2), 137–143.

[30] van den Bergh, D., van Doorn, J., Marsman, M., Draws, T., van Kesteren, E., Derks, K., & Wagenmakers, E. A. (2020). Tutorial on Conducting and Interpreting a Bayesian ANOVA in JASP. *L'Année psychologique, 120,* 73–96.

[31] van Doorn, J., Ly, A., Marsman, M., & Wagenmakerss, E. J. (2020). Bayesian rank-based hypothesis testing for the rank sum test, the signed rank test, and Spearman's p. *Journal of Applied Statistics, 47*(16), 2984–3006.