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Research paper

Fostering Managerial Culture in Prospective Specialists via Digital Technology Integration

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Abstract

The article analyzes legislative, regulatory, and legal documents that prove the relevance and significance of our research. The innovative principles of educational management that underpin the concept of digitalizing educational institutions' management are revealed. The role of mass open online courses of various directions and durations, MEO platforms, discussion methods, training courses, and hackathons in the practice of forming the educational development in universities for the formation of a management culture among future specialists is clari-fied. During the ascertaining experiment, respondents did not demonstrate the use of digital skills, and insufficient progress of skills and abilities to participate in digital interaction, implement technologies for digital management of an educational institution, and find alternative ways to resolve conflict situations was revealed. Therefore, the problem of creating innovative educational circumstances for the foundation of the managerial culture of specialists through the use of digital technologies arose, which, during the experiment, showed effectiveness and contributed to the optimistic changing aspects of the indicators of the formation of the phenomenon under study between respondents in the experimental groups.

Keywords: *Digital Technologies; Digitalization of Management of Educational Institutions; Educational Process; Formation of Managerial Culture; Future Specialists; Hackathon; Universities.*

1. Introduction

The ongoing digital transformation of higher education has significantly reshaped the requirements for professional training of future specialists, particularly in relation to their readiness to perform managerial functions in complex, dynamic, and technology-mediated environments. Contemporary societies increasingly demand specialists who not only possess advanced digital skills but are also capable of value-based decision-making, democratic leadership, effective communication, and reflective professional behavior. In this context, managerial culture emerges as a key integrative construct that determines the quality of professional activity, organizational development, and the sustainability of educational institutions. Consequently, higher education faces the challenge of designing pedagogical models that systematically foster managerial culture through the meaningful integration of digital technologies [1].

At the European and international levels, this challenge is reinforced by strategic policy documents emphasizing democratic governance, digital competence, institutional autonomy, and ethical leadership in education. Frameworks developed by the Council of Europe and the European Commission underline the role of educational institutions in cultivating democratic values, responsibility, openness, and participation, particularly under conditions of digitalization. These priorities redefine the professional profile of future specialists, positioning managerial culture as a multidimensional phenomenon that combines axiological orientations, epistemological knowledge, practical activity, and reflective self-regulation within digital educational environments. However, despite the growing availability of digital tools and platforms, their pedagogical potential for the systematic formation of managerial culture remains insufficiently conceptualized and empirically verified.

Analysis of contemporary scientific literature reveals that existing studies predominantly focus on isolated digital practices – such as MOOCs, online discussions, training courses, or hackathons – without integrating them into a coherent pedagogical framework aimed at developing managerial culture as a stable professional quality. Moreover, empirical research often lacks methodological consistency,

longitudinal perspective, and clear operationalization of managerial culture in digital contexts. These gaps indicate the need for theoretically grounded and experimentally validated pedagogical conditions that ensure the holistic formation of managerial culture among future specialists. Addressing this need determines the relevance of the present study, which seeks to substantiate and empirically test the effectiveness of digital technologies as a systemic factor in fostering managerial culture within higher education.

2. Literature Review

Contemporary scientific research demonstrates a growing global focus on the formation of managerial culture among future specialists through digital technologies, alongside the development of scientific, methodological, regulatory, and informational support for the professional training of education managers. Despite this expanding body of work, the existing literature remains fragmented in terms of conceptual coherence, methodological rigor, and integrative frameworks.

McAuley et al. [2], based on large-scale data from the Boston College Center for International Higher Education (CIHE) and the International Association of Universities (IAU), convincingly show that the professional preparation of education managers predominantly occurs within non-formal educational contexts. Their emphasis on MOOCs as a leading digital tool reflects a well-documented global trend. However, while the effectiveness of platforms such as Coursera, edX, Udemy, and MIT OpenCourseWare in supporting managerial values is highlighted, the study largely focuses on descriptive platform analysis. It does not sufficiently examine how specific instructional designs, learning analytics, or pedagogical mechanisms within MOOCs contribute to the deeper formation of management culture, nor does it address long-term learning outcomes or contextual differences across educational systems.

Sant et al. [3] shift attention toward dialogical and diversity-oriented training methods, positioning digitalization as a catalyst for inclusive professional discourse. Their work contributes a valuable socio-pedagogical perspective by linking digital learning to sustainable development goals and democratic participation. Nevertheless, the study remains primarily normative and practice-oriented, offering limited empirical evidence on the effectiveness of dialogical digital methods in shaping managerial competencies or values over time. Moreover, the interaction between digital tools and participants' managerial identity formation is not sufficiently problematized.

The contribution of Abdulbaki et al. [4] lies in their emphasis on action-based learning grounded in the social nature of educational activity. This approach aligns with humanistic and democratic principles and underscores active participation as a foundation of management culture. However, the authors do not clearly operationalize the concept of "management culture" within digital environments, nor do they differentiate between general professional activity and digitally mediated managerial practices. As a result, the transferability of their findings to structured digital learning ecosystems remains limited.

Similarly, Gordon and Andrea [5] advance a broad theoretical argument that digital technologies can facilitate the democratization of education and society. While conceptually compelling, their work lacks empirical validation in the specific context of education managers' professional training, leaving unanswered questions regarding the conditions under which digital technologies genuinely promote democratic managerial values rather than reproducing existing institutional hierarchies.

Research by Suominen et al. [6] and Adamczyk et al. [7] introduces hackathons as an innovative pedagogical practice capable of integrating theory and practice, fostering collaboration, and enhancing leadership and communication skills. These studies convincingly demonstrate the motivational and skills-oriented benefits of hackathons in digital environments. However, they primarily focus on short-term outcomes and innovation potential, paying insufficient attention to the systematic development of managerial culture as a stable professional construct. The lack of longitudinal studies and comparative analyses across disciplines further limits the generalizability of their conclusions.

Despite increased scholarly attention to the formation of management culture through digital technologies, several key gaps remain.

First, there is a conceptual gap caused by the absence of a unified and operational definition of management culture in digital professional training. Second, a methodological gap is evident, as existing studies are predominantly descriptive and short-term, lacking longitudinal and mixed-method designs.

Third, an integrative gap persists: digital practices such as MOOCs, dialogical learning, action-based training, and hackathons are studied separately rather than within a coherent pedagogical model. Fourth, a contextual gap arises from limited consideration of institutional, cultural, and disciplinary factors influencing digital management training.

Finally, an outcome gap remains, as the long-term impact of digital learning on managerial values, identity, and professional behavior is insufficiently explored.

Research Objective: To theoretically substantiate and empirically verify pedagogical conditions for the formation of the managerial culture of future specialists through digital technologies in higher education.

3. Methodology

To realize the set goal, the following research methods were used:

- Theoretical: theoretical analysis of legislative, regulatory, scientific, and pedagogical, literary sources to determine the relevance and significance of the study; generalization and study of experience in the democratization of management of educational institutions, the development of the managerial culture of specialists using digital skills, and the training of future education managers.
- Empirical: surveys, interviews, questionnaires, testing, observation of the procedure of creating the managerial culture of future specialists using digital technologies; pedagogical experiment, which included stages – ascertaining, formative and control stages.
- Statistical methods: qualitative, quantitative, and analysis and verification of the effectiveness of experimental work, the use of Student's t-test, and MS Excel software to verify the statistical significance of the research grades.

The logical continuation of the theoretical search was the diagnosis of the points of development of the managerial culture of future specialists through the use of digital technologies. The criteria for assessing the development of the managerial values of specialists through the use of digital technologies, along with their indicators, were identified: value, knowledge, procedural, and evaluative.

The value criterion determines the formation of the axiological component; the knowledge criterion determines the formation of the epistemological module, the procedural criterion determines the creation of the motion module; and the value criterion determines the development of the reflective module. Determining the requirements and indicators of future specialists enabled us to define the levels of the phenomenon under study. The experiment involved 68 master's level higher education applicants. The control group included 35 people, and the experimental groups included 33 people each. Among candidates for the second master's level of higher education, a survey was conducted at the beginning of the experiment using the Google Forms service in remote mode. The questionnaire asked for yes/no responses and focused on determining future specialists' orientation toward implementing digital technologies. We conducted a diagnostic assessment of the stages of development of all four components of the managerial culture of specialists using digital technologies (axiological,

epistemological, activity, and reflective), the results of which provide grounds for asserting that the problem raised in our study warrants improvement.

During the ascertaining experiment, respondents did not demonstrate the depth and stability of knowledge regarding the formation of the managerial culture of specialists. Knowledge of non-verbal and verbal means of communication and communicative styles in the conditions of managing an educational institution proved to be unsystematic. Insufficient development of skills and abilities to participate in digital interactions, implement digital technologies for the management of an educational institution, and find alternative ways to resolve conflict situations was revealed. Therefore, the problem of creating innovative pedagogical conditions for the formation of their digital culture during professional training, to implement the experience of digitalization, and enable them to extrapolate it into future professional activities, arose. The correctness and clarity of compliance with the specified pedagogically relevant conditions should ensure multi-vector effectiveness, dynamism, and flexibility in the development of the managerial culture of future specialists through the use of digital technologies and further digitalization of the educational process in educational institutions of different levels. The outlined pedagogical conditions for the formation of the managerial culture of future specialists through the use of digital technologies were theoretically substantiated, drawing on synergistic, culturological, systemic, and axiological approaches.

Comparison of quantitative indicators of the formation of the managerial culture of future specialists through the use of digital technologies for all components at the control and ascertaining stages of the experiment allowed us to speak about a significant increase in high-level indicators among EG respondents by 14% and a decrease in basic level indicators by 12%. Specific changes also occurred in the indicators of the formation of the managerial culture of future specialists in the CG; in particular, the basic-level indicators decreased by 3%, while the average- and high-level indicators increased by 1% and 2%, respectively.

Using the Student's t-test, the statistical meaning of the study was checked, which allows us to refute or confirm the effectiveness of the enactment of the established pedagogical conditions for the development of the managerial culture of specialists through the use of digital technologies with a significance level of 5% and made it possible to assess the differences between two samples of mean values, the distribution of which occurs according to a normal law.

Each component of managerial culture was assessed using a corresponding set of diagnostic tools: questionnaires for the axiological and reflective components, knowledge tests for the epistemological component, and observation and task-based assessment for the activity component.

The submitted manuscript is an applied scientific research with elements of a pedagogical experiment aimed at solving the urgent problem of forming the managerial culture of future specialists in the context of digitalization of education. The study combines a theoretical analysis of modern approaches and normative principles of digital management with an empirical verification of the effectiveness of the developed pedagogical conditions.

The contribution of the work to applied science consists in the development and experimental testing of a set of pedagogical conditions and digital tools (MOOCs, online discussions, trainings, hackathons), which can be directly implemented in the practice of professional training of future managers and specialists in socio-economic and managerial specialties. The results obtained have practical value for higher education institutions, advanced training centers and organizations that provide managerial training in distance and blended formats, and can serve as the basis for the modernization of educational programs in the context of digital transformation.

4. Results and Discussion

4.1. Analysis of legislative, regulatory, and legal documents that prove the relevance. Innovative principles of educational management on which the concept of digitalization of management of educational institutions is based

Analysis of legislative, regulatory and legal world documents that prove the relevance and significance of the study suggests that they contain provisions that directly relate to the issues of forming the management culture, strengthening innovation processes in various spheres of society, among which education occupies a leading place in the cultural, social and economic development of countries. Most legislative documents in European countries determine the right of applicants to receive modern education and to form the management culture, to become competitive citizens of their country. The EU Action Plan on Human Rights and Democracy, adopted by the Council of Europe in November 2020, defines priorities for building a sustainable, digital, democratic society. The document states that implementing human rights is a multifaceted process today, which involves political sectors in which the formation of a human management culture through the use of digital technologies is mandatory, particularly in the following sectors: economic, educational, digital, environmental, security, and others. The digital transformation of society is given primary importance in this document because it brings new challenges and new opportunities. Digital technologies, when shaping the management culture of future professionals, can support democratic processes and human rights by providing everyone with access to reports from government organizations, simplifying participation in public processes, promoting social and economic integration, ensuring access to quality public services, supporting online citizen activity, and promoting open education [8].

The quality of education is directly affected by the development of a culture of democracy, and the higher education system should contribute to the formation of a management culture among future specialists by leveraging digital technologies and addressing the challenges of modern society. Thus, according to the Graz Declaration – Forward from Berlin: the role of universities to 2010 and beyond, signed by the European University Association in 2003 to promote high-quality education, universities should create a system of institutional management. The document also identifies key values necessary for the formation of a management culture among future specialists through the use of digital technologies [9]. The Education and Training (ET 2020) program of the European Commission, developed to improve the value of qualified training for heads of educational institutions, offers ways to shape a person's managerial culture and identifies the central role of heads of institutions in creating a quality learning environment [10].

Within each country, taking into account the leading positions of normative pan-European documents, a national regulatory framework is created, tailored to each country's political and economic conditions, to regulate educational policy by fostering a human-centered management culture. At the national level, the main document of all countries is the laws on higher education and education [11].

The concept of digitalization of the management of educational institutions is based on the introduction of innovative principles of educational management, namely:

- Granting autonomy to higher education institutions.
- A clear division of functions of regional, central, and local education management bodies − digitalization of education management;
- Openness of education.
- A combination of state and public control.

- Creation of a management values of heads of instructive establishments through the use of digital technologies and their appointment to positions based on democracy, transparency, and openness.
- Introduction of management ethics founded on the values of tolerance, common respect, positive motivation, and digitalization.

4.2. The role of mass open online courses in various directions and with different durations, discussion methods, training courses, and hackathons in the practice of organizing the educational process in universities for the formation of a management culture among future specialists through the use of digital technologies

Analysis of MOOC platforms and scientific sources shows that Oxford and Cambridge universities, the best universities in the world, recognize the introduction of open online courses across various disciplines and durations. The University of London, Harvard, and Stanford universities offer open, massive online courses in multiple disciplines and durations. To shape the management culture of future specialists, it is essential to analyze existing MOOCs that can be used in their professional training. Working with the search engines of MOOC platforms Coursera, FutureLearn, EdX, and Canvas.net made it possible to develop innovative courses that can be used to shape the management culture of specialists, for professional training, or to improve the qualifications of heads of educational institutions. The content of the proposed courses is aimed at developing students' professional competence, enabling them to successfully carry out professional activities in the field of management of educational institutions. Such competencies include: digital, leadership, communication, intercultural, conflict management, entrepreneurship, management, coaching, etc.
of great importance is the discussion method in the practice of organizing the educational process at universities, which allows improving various aspects of the educational process, namely:

- A constructive influence on learning and the development of inspiration to form the management culture, since during discussions, students find non-standard solutions and new ideas, experience certain situations of success, and assert themselves.
- Development of the cognitive sphere of students during the educational process by expanding knowledge and improving the ability to compare ideas, discuss certain phenomena or objects, and generalize etc.
- Improvement of students' communicative and language skills by involving them in active speech during discussions [12].

The comprehensive application of discussion methods makes it possible to solve the following tasks: to substantiate one's own position, to develop the ability to carry out non-verbal and verbal communication, to form the ability to treat other people's opinions with respect, to expand the complex of professional knowledge during active discussion, to deepen understanding of various ways of digitalizing interaction [13].
Therefore, the specifics of founding the management culture of specialists through the use of digital technologies and training future education managers lie in their involvement in group activities to gain experience in interaction and develop skills based on digitalization, namely: providing the opportunity to make joint decisions, taking into account human rights [14].
We agree with the opinion of E. Bäckman and B. Trafford, who argue that training courses are an effective tool for training specialists and shaping the management culture, since their use is based on the ability to freely express opinions, group interaction, and finding common customs to explain complications [15]. For effective interaction between higher education students and experts to foster a management culture, careful preparation for the training is essential. Creative methods of work (open space, world cafe, etc.) using role-playing techniques are similar, as they include creative exercises.
Hackathon, an innovative method of organizing events in education, is in demand today. A hackathon can be held as a multi-day event, where participants engage in active, collaborative work to find original solutions across various educational areas, which is the specificity of this method. Participants form teams during the hackathon and are given time to develop a joint solution, which is evaluated at the end of the event and officially presented [16].
As one of the types of training, conducting a hackathon requires compliance with innovative organizational conditions:

- The hackathon topic should allow for solving specific problems and be relevant.
- Higher education applicants should have theoretical training on the problem to be solved.
- During the hackathon, consulting and ongoing support from the trainer should be provided to the education applicants.
- The results of the hackathon must be presented; it is desirable to have a digital final product.

In the structure of the hackathon, scientists distinguish the following main elements: topic, customer (organizer), format (online, mixed, offline), final product (concept, plan, idea, ready-made solution, etc.), participants (level of education of participants, number, mandatory or voluntary participation, etc.), reward, duration of the competition, evaluation (group of experts, criteria for evaluating the final product), frequency of holding (once every six months, annually, etc.) [4].
Thus, when forming the management culture of specialists, when training future education managers at the level of higher education, Hackathons were recognized as an effective method, because the training of specialists in the field of management should move in the direction of innovation, digitalization, increasing flexibility, dynamism, and distance from templates. The future specialist should be able to find non-standard solutions in new situations, think independently and actively, be open to interaction, and use digital technologies professionally.

4.3. Organization of a pedagogical experiment

The logical continuation of the theoretical search was the diagnosis of the phases of progress of the management culture of experts through the use of digital technologies.
The criteria for assessing, along with their indicators, were identified: value, knowledge, procedural, and evaluative.
The value criterion determines the formation of the axiological component. It includes a group of professional values that are decisive for the successful creation of the management culture of specialists through the use of digital technologies and is revealed by the following indicators: identification of the significance of management activities, awareness of the importance of the management culture of specialists through the use of digital skills for the positive enactment of professional activities, the desire to follow the values of the digital society and understanding the value of the diversity of management activities.
The knowledge criterion determines the formation of the epistemological component. It contributes to the successful development of the management culture of experts by leveraging digital technologies. It is revealed by the following indicators that ensure the level of student knowledge regarding: basic principles and approaches to the digitalization of education and management of an educational institution; the main national and international regulatory and legal framework of digital relationships in civilization; basic concepts of the making digital of teaching and management of the informative space; non-verbal and verbal means should use.

The procedural criterion determines the formation of the activity component, contributes the following indicators: practical mastery of the management culture of specialists, the ability to discovery another customs to prevent or resolve war conditions, the ability to use non-verbal and vocal income of communication, the skill to transfer out calculated development of the growth of an educational organization enchanting into version digital imports; the capacity to be flexible and empathetic in executive.

The evaluation principle determines the reflective component's formation. It contributes to the successful development of the management culture of specialists by leveraging digital technologies. It is revealed by such indicators as the ability to assess one's individual actions from the point of view of management values, the formation of the reflective position of the future skull of an educational organization to overcome and identify difficulties, and responsiveness of the equal of progress of one's own management culture through the use of digital technologies.

Determining the criteria and pointers of the creation of the managerial culture of specialists enabled us to define the levels of the phenomenon under study. When characterizing the levels of formation, we were guided by a framework document that divided the available descriptors into three levels: basic, average, and high [1].

The criteria, indicators, and levels of formation of the managerial culture of future specialists through the use of digital technologies were verified through a pedagogical experiment.

A total of 68 applicants for master's-level higher education joined in the experiment. The control groups comprised 35 participants, while the experimental groups included 33 participants.

The ascertaining stage of the experiment.

The determination of the learning step of the experiment was to control the initial conditions for the formation of the managerial culture of future specialists. To achieve the goal, the following tasks were performed:

- Development of diagnostic tools for studying the formation of the managerial culture of specialists.
- Clarification of the criteria, pointers, and levels of development of the managerial culture of specialists.
- Implementation of diagnostic tools to establish the original equal of creation of the managerial culture, and statistical processing of the results obtained.

Let us proceed to a more detailed description of the results and the course of the ascertaining experiment. Among applicants for the second master's level of higher education, a survey was conducted at the beginning of the experiment using the Google Forms service in remote mode. The questionnaire asked for negative or affirmative answers and focused on determining the orientation of specialists toward the implementation of digital skills. We conducted a diagnosis of the levels of formation of all four components of the managerial culture (axiological, epistemological, activity, reflective), the results of which provide grounds for asserting that the problem raised in our study requires improvement.

During the ascertaining experiment, the respondents did not demonstrate the depth and stability of knowledge regarding the development of the managerial culture through the use of digital technologies, nor did they demonstrate understanding of non-verbal and verbal means of communication and communicative styles in the conditions of managing an educational institution. Insufficient development of skills and abilities to participate in digital interactions, implement digital technologies, and find alternative ways to resolve conflict situations was revealed.

The generalized quantitative indicators for the formation of all components of the managerial culture through the use of digital technologies at the ascertaining step of the experiment are presented in Table 1 and Fig. 1.

Table 1: Quantitative Indicators of the Initial Levels of the Formation of the Managerial Culture of Future Specialists

Levels	EG (in %)	CG (in %)
Basic	47	48
Average	38	37
High	15	15

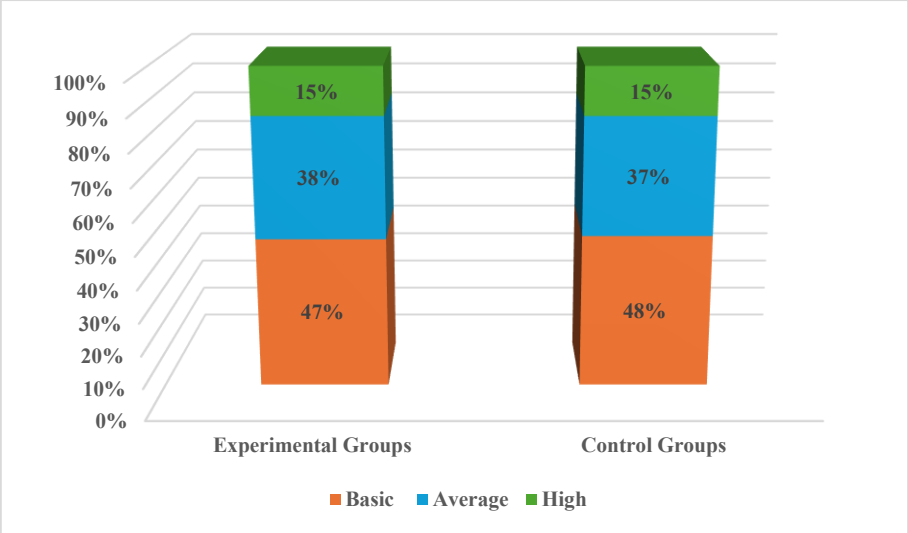

Fig. 1: Quantitative Indicators of the Initial Levels of the Formation of the Managerial Culture of Future Specialists.

To obtain generalized results of the ascertaining experiment, which indicate the level of development of the managerial culture of future specialists in the control and experimental groups, we performed calculations for each component with the derivation of the weight coefficient of the studied phenomenon:

- Axiological component − weight coefficient is − 0.3.
- Epistemological component − weight coefficient is − 0.15.
- Activity component − weight coefficient is − 0.4.
- Reflective component − weight coefficient is − 0.15.

Thus, among higher education applicants, the basic (48% in the CG, 47% in the EG) and average levels (37% in the CG, 38% in the EG) prevailed. In comparison, the quantitative indicators of a high level of managerial culture formation among future specialists were relatively low (15% in both the CG and the EG).

Future specialists should take an active role in advancing the digitalization of the educational process in an educational institution. When choosing a management model for the activities of an educational institution, they should give preference to digital technologies and to the principles of dialogical and partnership interaction. Therefore, the problem of creating innovative pedagogical conditions for the formation of their digital culture during professional training has arisen, to implement the experience of digitalization and extrapolate it into future professional activities. The correctness and clarity of compliance with certain pedagogically relevant conditions should ensure multi-vectorality, effectiveness, dynamism, and flexibility in the formation of the managerial culture of future specialists through the use of digital technologies and the further digitalization of the educational process in educational institutions of different levels.

We have identified the following pedagogical conditions for implementation in the EG:

- Ensuring variable combination of innovative digital technologies and into the general educational process of training students.
- Development of motivation for the formation of the managerial culture, and awareness of the role of democratic values in the management of educational institutions.
- Introduction of training methods for the formation of the managerial culture of future specialists through the use of digital technologies in the preparation of applicants for the second (master's) equal, to develop the skills and abilities of future specialists for the implementation of democratic innovative management of educational institutions.

The outlined pedagogical conditions for the formation of the managerial culture of future specialists through the use of digital technologies were theoretically justified, drawing on synergistic, culturological, systemic, and axiological approaches.

In the CG, education was conducted within the usual education system, whereas in the EG, separate pedagogical conditions were introduced. In actual, a usual of digital material posters (properties) was created in the EG, which included specific information about the features of the process of digitalization of management of educational institutions: digital information resources aimed at familiarizing with the primary regulatory and legislative documents in the educational space, which directly highlight the development of the organization culture through the use of digital technologies at the current stage of development of society; digital information resources that reveal the structural components that allow digitalizing the study of educational disciplines of training of experts; digital information resources that highlight possible ways of introducing modern forms of training and innovative methods, digital technologies for the development of the management culture; digital information resources that are necessary for the integration of education throughout the training of applicants.

The creation of the managing culture of specialists in the EG was carried out, in particular, the graphic design tool Canva (https://www.canva.com/), which is necessary for creating presentations, posters, social network posts, videos, etc.

Using the digital visualization method, information support was provided to teachers who trained master's-level higher education applicants, enabling them to assimilate a significant amount of theoretical information presented in visual form through the introduction of digital technologies. Visualized material is more convincing, deeper, and more effective at accelerating the understanding of a significant amount of information.

The involvement of EG students in taking open mass online courses allowed them to get acquainted with the features of management culture through the use of digital technologies based on general democratic principles that an education manager should be guided by, which had a positive effect on increasing the level of motivation to procedure the management culture of specialists through the use of digital technologies.

The formative stage of the experimental study. At the formative stage of the study, the developed educational circumstances were implemented as a set of measures and circumstances deliberately created during the creation of the managerial culture of specialists through the use of digital technologies in the expert training process. Master's-level higher education applicants participated in the experimental work.

The control stage of the experimental study. At the control stage of the study, an analysis of the success of the developed pedagogical circumstances for the development of the managerial culture in the process of professional training of future specialists was carried out, which was carried out by re-diagnosis of the stages of creation of the managerial culture of experts according to specific criteria. At the control and ascertaining stages of the experiment, the same tools were used for diagnostics, including surveys and testing.

The axiological component enabled us to answer the questionnaire questions regarding the determination of the orientations for the formation of the managerial culture of specialists through the practice of digital skills in the professional training process. It allowed us to document the changes in this component among students who entered the experimental group, while no significant changes were observed in the control group.

In the experimental group, the quantitative results of the indicators of the axiological component underwent significant changes:

- The high level increased by 12%.
- The basic level decreased by 8%.
- The average level decreased by 4%.

In the control group, the quantitative results of the indicators of the axiological component underwent minor changes:

- The high level increased by 1%.
- The average level increased by 4%.
- The basic level decreased by 5%.

The epistemological component enabled us to answer the questionnaire questions regarding the determination of the orientations for the formation of the management culture in the process of their training. It allowed us to document the changes in this component among students who entered the experimental group, while no significant changes were observed in the control group.

In the experimental group, the quantitative results of the indicators of the epistemological component underwent significant changes:

- The high level increased by 6%.
- The average level increased by 7%.
- The basic level decreased by 13%.

In the control group, the quantitative marks of the indicators of the epistemological component underwent minor changes:

- The high level increased by 1%.
- The average level increased by 3%.
- The basic level decreased by 4%.

The motion component compared to the ascertaining stage of the experimental study allowed us to record an increase in the indicators of the specified component in the EG, to obtain answers to the questionnaire questions regarding the determination of the orientations of the development of the management culture of specialists through the use of digital technologies in the process of professional training of

future specialists, and allowed us to ascertain the changes that occurred in this component among students who entered the experimental group. Among the CG respondents, there were no changes in pointers of the creation of the activity module.
In the experimental group, the quantitative results of the pointers of the movement module underwent significant changes:

- The high level increased by 9%.
- The average level increased by 7%.
- The basic level decreased by 16%.

In the control group, we do not detect variations in the levels of development of the activity component regarding the management culture of future specialists.
The reflective component of the management culture of specialists compared to the ascertaining step of the experimental study allowed us to record an rise in the indicators of the indicated component in the EG, to obtain answers to the questionnaire questions regarding the determination of the orientations of the development of the management culture of specialists through the use of digital technologies, and allowed us to ascertain the changes that occurred in this component among students who entered the experimental group. Among the CG respondents, there were almost no changes in the pointers of the reflective component.
In the experimental group, the quantitative results of the indicators of the reflective component underwent significant changes:

- The high level increased by 47%.
- The average level decreased by 21%.
- The basic level decreased by 26%.

The results obtained from the CG respondents during the experimental study were insignificant compared to those from the ascertaining stage.
Experimental data obtained in the EG during the determining and control stages of the research show that indicators of the foundation of a high level of managerial culture among specialists have increased by 15%. The differences in the quantitative indicators between the basic and average levels are 12% and 3%, respectively.
Insignificant variations in the indicators of the equal of development of the managerial culture of experts through the usage of digital technologies were found among the respondents of the CG, namely, the increase (percentage) of the high-level indicators is 3%. The indicators for the basic and average levels decreased by 1% and 3%, respectively.
At the determining and control stages of the experiment, generalized indicators of the formation of the managerial culture of future specialists were obtained, taking into account the weight coefficients of each of the studied components of the phenomenon. Thus, 0.3 is the weight coefficient for the axiological component, 0.15 for the epistemological component, 0.4 for the activity component, and 0.15 for the reflective component.

Table 2: Quantitative Indicators of Managerial Culture Formation Levels Among Future Specialists at the Control Stage

Levels	EG (in %)	CG (in %)
Basic	32	47
Average	40	36
High	28	17

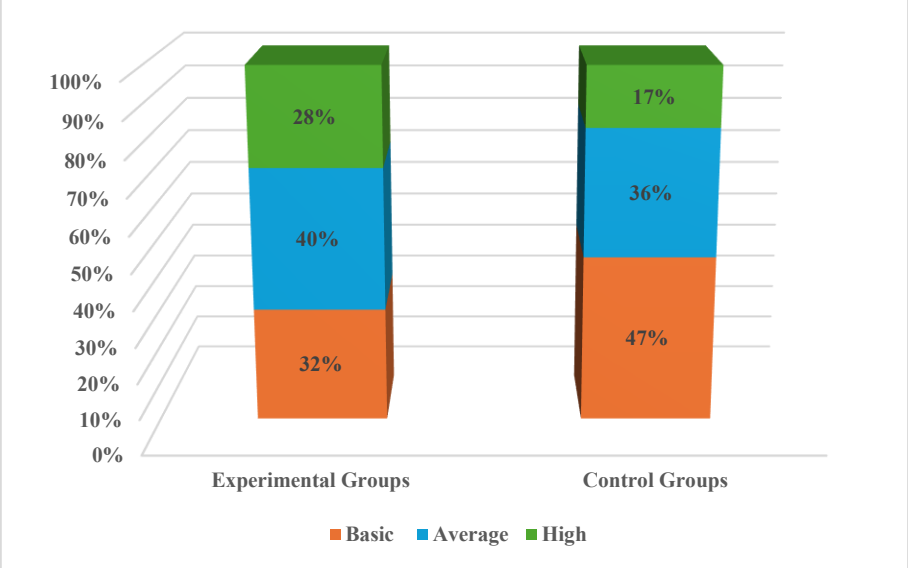

Fig. 2: Quantitative Indicators of Managerial Culture Formation Levels Among Future Specialists at the Control Stage.

Comparison of quantitative pointers of the development of the managerial culture of specialists through the use of digital technologies for all components (axiological, epistemological, activity, reflective) at the control and ascertaining stages of the experiment allowed us to speak about a significant increase in high-level indicators among EG respondents by 14% and a decrease in basic level indicators by 12%. Specific changes also occurred in the indicators of the creation of the managerial culture of specialists in the CG; in particular, the basic-level indicators decreased by 3%, while the average- and high-level indicators increased by 1% and 2%, respectively.
Using the Student's t-test, the statistical significance of the study was checked, which allows us to refute or confirm the effectiveness of the operation of the advanced pedagogical conditions with a significance level of 5% and made it possible to assess the differences between two samples of mean values, the distribution of which is normal.
Let's formulate the null and alternative hypotheses.
H_0 shows that there are no important modifications in the arithmetic mean scores among the control and experimental groups. That is, the success rates of respondents in the control and experimental groups do not differ significantly.

H_1 is an alternative hypothesis indicating significant differences in arithmetic mean scores resulting from the development and implementation of pedagogical conditions for the formation of the management culture of specialists.
For applicants in both groups (CG and EG), according to the Student's t-test table value, for respondents who participated in the experiment, $t_{tab.} = 2.98$; $t_{emp} = 4.27$, which is greater than the tabular value, indicating that the null hypothesis is not confirmed.
For the number of respondents who participated in the experiment, the tabular value of the Student's t-test with a significance level of 5% is $t_{table} = 1.98$. Since $t_{emp} = 2.04$ is greater than the tabular value, the null hypothesis is not confirmed.
According to the conducted statistical calculations, the difference in indicators between the experimental and control groups is not accidental, objectively confirming the higher level of success in implementing the developed and implemented pedagogical conditions in the experimental group.

5. Conclusion

An analysis of legislative, regulatory, and legal documents was conducted, proving the relevance and significance of our research. The innovative principles of educational management on which the concept of the digitalization of educational institutions' management is based are revealed. The role of mass opens online courses in various directions and of multiple durations, MEP platforms, discussion methods, training courses, and hackathons in the practice of forming the didactic development in universities for the formation of the management culture of specialists was clarified.
The logical continuation of the theoretical search was the diagnosis of the stages of development of the management culture of specialists through the use of digital technologies. The criteria for assessing the creation of the organization culture of specialists through the use of digital technologies, along with their indicators, were identified: value, knowledge, procedural, and evaluative.
The value criterion determines the formation of the axiological component; the knowledge criterion determines the formation of the epistemological component, the procedural criterion determines the creation of the activity component; and the value criterion determines the formation of the reflective component. Determining the criteria and indicators of the development of the managerial culture of future specialists enabled us to define the levels of the phenomenon under study.
During the ascertaining experiment, the respondents did not demonstrate the depth and stability of knowledge regarding the development of the managerial culture of specialists through the use of digital technologies, nor did they demonstrate understanding of non-verbal and verbal means of communication and communicative styles in the conditions of managing an educational institution. Insufficient development of skills and abilities to participate in digital interactions, implement digital technologies for the management of an educational institution, and find alternative ways to resolve conflict situations was revealed.
Therefore, the problem of creating innovative pedagogical conditions for the formation of their digital culture during professional training arose, so that they can implement the experience of digitalization and extrapolate it into their future professional activity. The outlined pedagogical conditions for the development of the managerial culture of specialists through the use of digital technologies were theoretically substantiated, drawing on synergistic, culturological, systemic, and axiological approaches.
Through the use of the Student's t-criterion, the statistical significance of the study was checked, which allows us to refute or confirm the effectiveness of the operation of the established pedagogical conditions for the development of the managerial culture of specialists through the use of digital technologies with a significance level of 5% and made it possible to assess the differences between two samples of mean values, the distribution of which occurs according to a normal law.
Promising directions for further scientific research are: studying the longitudinal impact of digital management culture, which involves tracking its development and sustainability in future specialists at different stages of professional development. Special attention is required to analyze the long-term impact of digital management practices on management values, professional identity and the effectiveness of management decisions in real conditions of activity. It is relevant to conduct cross-cultural and international comparative studies aimed at identifying common and different approaches to the formation of digital management culture in different educational and socio-cultural contexts. Such studies will allow us to more deeply understand the impact of national educational policies, digital infrastructure and cultural factors on the content and results of management training. It is promising to expand the scope of application of digital management culture beyond educational institutions, in particular in public organizations, local governments, business structures and informal educational environments. This will contribute to the cross-sectoral transfer of effective digital management practices and increase their social significance.
It should be emphasized separately that the study of digital collaboration in distance learning is a relevant and promising direction, since it is online interaction that forms new models of managerial communication, collective decision-making and leadership in the digital environment. Analysis of the mechanisms of such collaboration will allow improving the pedagogical conditions for the formation of managerial culture in the context of global digitalization of education.

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