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Digital Competence of a Teacher as a Means of Education Process Managing in a High School

Zhestkova Ye.A.* Maklaeva E.V. Filippova L.V. Fomina N.I. Fedorova S.V.

Lobachevsky State University of Nizhny Novgorod (Arzamas Branch), Arzamas, Russia.
*Corresponding author. *Email: ezhestkova@mail.ru*

ABSTRACT
In the era of digitalization, the need to expand management tools is considered to be the main problem of modern education. The implementation of a model for improving the effectiveness of digital competence of a teacher will contribute to the optimal level of Higher education process management. The model is based on two components: knowledge-based and motivation-activity-based. The knowledge component includes self-education (advanced training courses, participation in various webinars and forums, etc.). The second component is determined by the desire to improve the quality of the educational process and maintain the image of a modern teacher. The activity component includes the development of electronic courses in readable disciplines, web-quests, knowledge controllingntools and learning results evaluationetc. The article presents the results of the study of the Preschool and Primary Education Faculty teachers' digital competence level(Lobachevsky State University of Nizhny Novgorod, Arzamas branch) which makes it possible to reveal the relationship between the level of digital competence of a teacher and the level a teacher's organizational and controlling functions forming concerning theeducational process management. The results of applying the developed model to improve the effectiveness of teachers' digital competence, as well as experimental research data, indicate its effectiveness.
***Keywords**: educational process management, digital competence of a University teacher, high school, planning, digitalization, information technology*

1. INTRODUCTION

Currently, the management of the educational process is a priority task ensuring the quality of specialists training at the University. The complexity of the University management process is shown in the balance of managers' efforts both vertically (the level of theeducational organization management) and horizontally (University teacher level). The works are devoted to the issues of educational process management in Higher education. T. A. Artemenkova [2], L. V. Baiborodova [3], I. P. Grishan [6], L. N. Kofman[9], E. I. Pavlyuchenko [16], O. V. Pokosovskaya [17] and others. However, despite the fundamental results obtained by these authors, there is still a number of insufficiently studied problems in the studied field.

In particular, the issues of increasing the managerial component in teachers' activity at the level of the horizontal power are not sufficiently studied. In this regard, the need to expand management tools is considered to be the main problem of education concerning the era of digitalization. We assume that the implementation of the model for improving the effectiveness of teachers' digital competencewill contribute to the optimal level of Higher education management.

2. RESEARCH METHODOLOGY

One of the strategic directions for the development of higher education in the Russian Federation is to solve educational problems at the management level. The organization of the educational process at the University at the level of authority should be considered as the optimal managed activity of students and teachers. Educational process management at the University is a pedagogical management, which L. V. Bayborodova understands as one of the types of management, characterized by the organization of interaction among participants in the educational process aimed at implementing educational goals and objectives [3, p. 5].

Educational process management should be indirect, meaning thatit should consist in creating optimal conditions for students' self-education and self-development. The student should not accept the values, goals and means of achieving them offered by the teacherpassively;the development of the latter should be carried out in the joint activity of the student and the teacherthrough their cooperation. Therefore, it is not the student's activity that should be managed through the teacher's activity, but the process of building their joint activities. According to this approach, the student and the

teacher are the subjects of educational process management.

"The signs of such management are the following:

- creating conditions that contribute to the improvement of the pedagogical process;
- active (interactive) influence on the control object;
- whether there are changes concerning the educational process participants;
- regulation and self-regulation of the educational process subjects;
- achieving the planned results" [3, p. 5].

Managerial positions of a teacher and changes concerningstudentsresult in relevant co-management (the process of transferring responsibilities to students) and government (the process whereby the members of the student team in the management of their learning activities). Educational process management covers all its structural components (invariant-the goal and result of education, the student's and the teacher's activity, and variable-education content; methods, means and forms of the educational process) [6, p. 6].

This study is based on a procedural or functional approach to management. This approach develops the ideas of classical management theory, enriching them with aspects of behavioral, systemic and situational approaches. Based on the functional approach, we will consider pedagogical management as an integral process of implementing managerial functions in all structural components of the educational process. Various authors distinguish the following management functions: planning, organization, motivation, leadership, coordination, communication, control, decision-making, analysis, evaluation, and others. L. V. Baiborodova notes that the most often distinguished main functions are the following: planning, organization and control [3, p. 6]. It is assumed that in the implementation of each management function, a variety of decisions is made, the development of which is carried out in accordance with different schemes. The ideas of the situational approach are reflected in the procedural approach, which consists in the fact that there is no one best composition of management functions for different management systems and no better way to implement them [6, p.7].

For the teacher being a supervisor the following system of functions is most acceptable:

1. Planning, being one of the ways in which management ensures that the efforts of all members of the educational process are directed towards achieving common goals. It includes the analysis of previous development andproblem statement, forecasting, definingthe goals and objectives as well as ways and means of achieving them, programming, preparation, evaluation and decision-making.
2. Organization being a management function means creating rational conditions forimplementing the educational process in order to achieve the goals of their activities in the optimal time as well as at the optimal cost of labor, material and financial resources.
3. Controllingmeans a system of scientifically-based verification, identification and evaluation of educational results, as well as the factors that caused it.

The way the educational process management functions are performed is largely related to the teacher's ability to work in the digital educational space. A necessary condition for such work is forming digital competence.

The education system is designed to become the leading factor of digitalizing the traditional society.

Digitalization of the education system serves as the foundation for the transition to a new level and is aimed at training employees necessary for the modern labor market. V. S. Moskalyuk notes that they "must master the latest technologies, as well as continue permanent training through online distant learning" [15, p. 12].

In this regard, it is possible to speak about the "digital competence of a University teacher" concept. V. S. Moskalyuk refers to it as "a fairly high level of teacher's knowledge concerning information and communication tools (being able to build professional interaction in the Internet space, perform information search, select and critically evaluate professionally important information and build an individual trajectory of continuous professional development in the open information space" [16, p. 17].

Researcher denotes six areas of teachers'digital competence:

Area 1 focuses on using digital technologies in the professional teaching environment.

Area 2 deals with developing professional skills for searching, creating, and sharing digital educational resources.

Area 3 is aimed at developing skills necessary to use digital tools in teaching and learning.

Area 4 relates to the ownership of digital tools for evaluating learning outcomes.

Area 5 focuses on using digital tools to enhance students' educational opportunities.

Area 6 defines the content of a University teacher's activities to support the development of students' digital competence [13].

The content aspect of these areas includes the ability of a University teacher to search for professionally important information and resources in digital environments; its processing, analysis and interpretation, comparing and critical evaluation, determining the reliability of information and its sources; providing digital communication for cooperation as well as the ability to create content using digital means in different formats;

ensuring the responsible use of digital learning technologies for the physical, psychological and social well-being of students, increasing the ability to manage risks while using digital technologies; solve problems associated with the use of digital technologies (technical and technological) [13].

The current stage of education digitalization is aimed atimmersing all its subjects into the digital educationa environment.

The analysis of the digital educationenvironment allows us to conclude that the emergence and use of new digital technologies (cloud technologies, distance learning technologies, mobile learning) greatly contributes to

improving the digital competence of a University teacher [20, p.252].

We believe that it is necessary to create a *model* of the teachers' digital competence.

This model can be based on two components: knowledge-based and motivation-activity-based.

The knowledge-based component includes the following aspects: self-education, training in advanced training courses, participation in various webinars and forums, conferences, seminars on the basis of an educational institution.

As for themotivation-based component component, in our opinion, it is supported by the following factors: the desire to maintain the image of a modern teacher, its authority in the student's environment, the access to digital educational environment of the University, as well asteacher's time and energy preservation, the desire to improve the quality of the educational process, an example of effective activities of other educational institutions and educators [23, p. 81].

Its activity component includes the following: the development of electronic courses of various disciplines concerningreading, web quests, knowledge control and evaluating learning results, preparing electronic methodological and didactic materials; mastering the capabilities of the electronic educational environment of the University, supporting the educational process with virtual models of objects and phenomena; participating in master-classes devoted to the digital education of the teachers, automation of information search concerning the educational process, controlling the educational process implementation, compliance with its curricula and regulatory documents, organizingthe interaction with students and colleagues [22, p. 267].

3. RESEARCH RESULTS

Forstudying the initial level of teachers' digital competence, a questionnaire was conducted for the teachers of the Preschool and Primary Education Faculty teachers' digital competence level (Lobachevsky State University of Nizhny Novgorod, Arzamas branch). The survey was attended by 25 teachers who were offered questionnaires for determining the level of knowledge and activity components.

The "Questionnaire for identifying the level of a University teacher's digital competence" (knowledge component of digital competence) consisted of 16 questions.

In order to evaluate the results of the survey, we adopted the following scale: 2 points– correct answer, 1 point – partially correct answer, 0 points – incorrect answer.

The points were distributed in the following way: high level of knowledge - 67-88 points, average level - 45 -66 points, low level-less than 44 points.

The questionnaire aimed at identifying the level of digital competence of a University teacher (motivational and activity component) consisted of 15 questions aimed at identifying the teacher's ability to work in a digital educational environment.

To evaluate the results of the survey, we adopted the following scale: 2 points– correct answer, 1 point – partially correct answer, 0 points – incorrect answer. The distribution of points when answering all the questions in the questionnaire is as follows: the high level of representation of the activity component of the digital competence of the teacher - 24 - 30 points, the average level - 16 - 23 points, the low level - less than 15 points.

Data from the experimental study are shown in Figure 1.

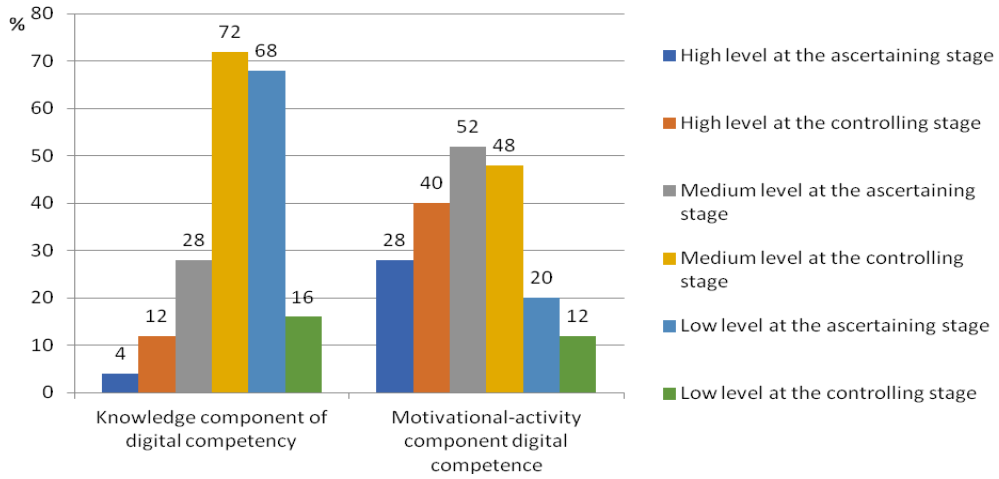

Figure 1 Results of the comparative diagnostics of knowledge and motivational-activity components of digital competence of a teacher

A comparative analysis of the results of the ascertaining and control stages of diagnostics of the level of digital competence of the teacher allows us to conclude that there is a positive dynamics in the knowledge and motivational-activity components. It manifests itself in the fact that teachers have significantly expanded the boundaries of the terminological dictionary and the conceptual apparatus of digital didactics. When answering the questionnaire questions, an understanding of the specifics of conventional and digital didactics, awareness of the essence of the principles of digital didactics was revealed. Answers to questions have become more accurate and detailed. Comparison of the percentage indicators of the ascertaining and control stages of the knowledge component shows an increase in the high level by 8% (2 people), the average - by 44% (11 people) and a significant decrease in the number of teachers at the low level by 52% (13 people).

In the activity aspect, teachers are more likely to use digital technologies, cloud storage of information, independently develop e-educational courses and educational Web-quests, use the resources of the digital educational environment to control students ' knowledge, take personal initiative in using interactive technical devices (interactive whiteboard, tablets, etc. gadgets), optimally use digital communication tools (email, social networks, forums, chats, messengers (ICQ, Telegram, Whatsapp, Viber), etc.), improve their skills in remote online courses, create educational content for remote courses, online courses, electronic educational courses [21, p. 255]. Comparison of the percentage indicators of the ascertaining and control stages of diagnostics of the motivational activity component shows an increase in the high level by 12% (3 people), a decrease in the number of teachers at the low level by 8% (2 people), the average level has changed slightly.

According to the results of the diagnostic study, the increase in indicators of the motivational and activity component lags behind the increase in knowledge. In our opinion, this is due to the fact that the development of practical skills in the digital educational environment requires considerable time.

The study of management functions was carried out on three components: the quality of planning the teacher's work; the effectiveness of organizational and pedagogical activities; control and regulation of the educational process.

Each of the criteria was considered by us on three levels: high, medium and low.

High level:

quality of teacher's work planning: having free electronic document management skills, providing full coverage of educational tasks, being able to define the goals and objectives of the pedagogical process clearly;ability to take the conditions of the educational environment of the city and district into account, as well as individual characteristics of students and the recommendations of the faculty Council;ability tocoordinate the working plan with the General educational plan; regular using the resources of the University's electronic library systems ("Lan'", "yurait", "Znanium", " student Consultant»);

effectiveness of the teachers' organizational and pedagogical activity: ability to create favorable conditions for studying, observing the continuity of Higher education stages, implementnt intersubject relationships, completecomplete fulfilling the academic assignments, avoiding duplication whiledistributing students' responsibilities; preventing overloading in the distribution of students' responsibilities; being able to set educational tasks clearly and specifically; combining discipline with a creative approach to organizing educational activities; using the the achievements of pedagogical science and best practices actively; showing efficiency and specificity in making managerial decisions; constant self-education; improving the quality of teaching systematically by undergoingadvanced training courses; using various forms of student self-government; ability to demonstrate morality and charity during the educational process; continuouscooperating with students; reaching the optimal level of mutual understanding and interaction with students, administration and other teachers;

controlling and regulating the educational process: demonstrates the objectivity of controlling the educational process, timeliness and efficiency of control activity concerning students; careful monitoring the completeness of performing the educational tasks; analyzing the positive dynamics of learning outcomes; systematic analyzing the state of students' knowledge using computer classes and labs, showing theequality of requirementstowards students on a regular basis; creating a favorable psychological climate; combiningstrictness and tact; showing respecttowardsan individual student; supporting the authority of the University among teachers; creating the conditions for professional educational results among students; facilitating the dissemination of pedagogical experience among teachers; motivating cognitive activity among students; complying with the training regime; observing studying discipline; implementing a humane approach towards controlling the students' educational results; effective use of digital educational environment of the University.

Medium level:

quality of a teacher's work planning:havingskills generally sufficient for implementing electronic document management; providing partial coverage of educational tasks; being partially able to define the goals and objectives of the pedagogical process clearly, taking the conditions of the educational environment of the city and district into account, as well as individual characteristics of astudent and recommendations of the faculty Council; partial ability to coordinate the working plan with the General educational plan; regular use of the resources of the University's electronic library systems ("Lan'", "yurait", "Znanium", "student Consultant»);

the effectiveness of organizational-and-pedagogic activity of a teacher:general ability to create favourable conditions for students, observing the continuity of Higher education levels; partial implementing interdisciplinary connections; incomplete compliance with the training instructions;

sometimes allowing the duplication in students' responsibilities; inconstantruling out over-allocation of students' responsibilities; partialcapablility to statement educational objectives clearly and precisely;combining discipline with a creative approach to organizing educational activities;using mainly the achievements of pedagogical science and practices;partialshowing efficiency and specificity in making managerial decisions; inconstant self-education and improving the quality of teaching systematically by undergoing advanced training courses as well as inconstant use of some forms of student self-government; in general, being capable of demonstrating morality and compassion during the educational process; inconstant cooperating with students; reaching an optimal level of understanding and interaction with students, administration and other teachers in general terms;

controlling and regulating the educational process: in demonstrates the objectivity of controlling the educational process, timeliness and efficiency of control activity concerning students in general terms; inconstant monitoring the completeness of performing the educational tasks; analyzing only certain components of the positive dynamics of learning results; inconstantanalyzing students' knowledge; constant use of computer classes and laboratories; inconstant showing theequality of requirements towards students; in general, forms a favorable psychological climate in the student environment; inconstant harmonious combining strictness and tactfulness; inconstant showing respect towardsa student's personality; generally supporting the authority of the University among teachers; generally creating conditions forimproving professional educational results among students; partial facilitating the dissemination of pedagogical experience among teachers; inconstantmotivating cognitive activity among students; partialobserving studying discipline and the educational regime; partial implementing a humane approach towards controlling the students' educational results; the digital educational environment of the Universityis used insufficiently.

The low-level content is treated similarly to the high-level and the medium-levelones.

To study the functions teacher management, a "University teacher management activity diagnosis" questionnaire was created. The content of the questionnaire is aimed at identifying the level of management activity according to three criteria: the quality of teacher work planning (8 questions), the effectiveness of organizational and pedagogical activity (17 questions), controlling and regulating the educational process (18 questions).

For evaluating the results of the survey, we adopted the following scale: 5 points – highly expressed, 4 points – expressed enough, 3 points – weakly expressed, 2 points – can not be evaluated. The following distribution of points is accepted for each of the criteria based on one teacher:

Criterion 1. Quality of teacher's work planning (40 - 33 points – high level; 32 - 25 points - medium level; less than 24 points – low level).

Criterion 2. Organizational and pedagogicactivity efficiency (85 - 70 points – high level; 69 - 52 points-medium level; less than 51 points – low level).

Criterion 3. Controlling and regulating the educational process (90 - 73 points – high level; 72 - 55 points - medium level; less than 54 points – low level).

The comparative results of the ascertaining and control stages of experiments on the criterion "Quality of a teacher's work planning" are presented in Figure 2.

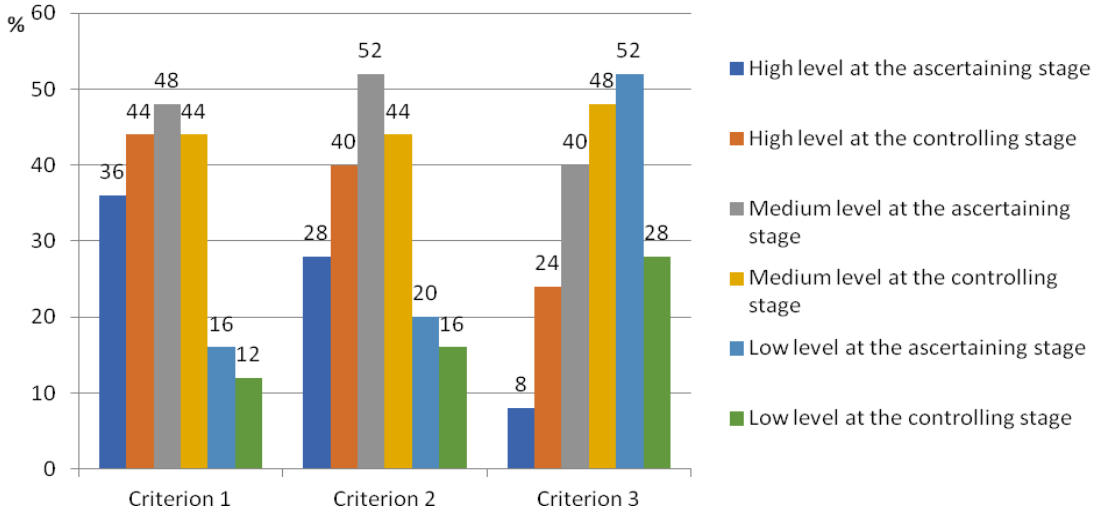

Figure 2 Results of teacher's managerial activity diagnostics according to the"Quality of a teacher's work planning" criterion

4. DISCUSSION

A comparative analysis of the results of the ascertaining and control stages of the experiment makes it possible to conclude that positive dynamics is observed for all three criteria. However, the greatest changes in the managerial component of the teacher's activity take place in organizational and pedagogiccriteria and criteria for monitoring and regulating the educational process. While the first of them, at the summative stage, shows a high level of 36% (9 people), at the control stage this figure increased only to 44% (11 people); the average level decreased by 4% (1 person); slight changes are observed at the low level from 16% (4 people) to 12% (3 people), then according to the second criterion, reflecting the organizational component of management activities, a greater divergence of performance can be seen: at a high level the difference was 12% (3 people), on average decreased by 8% (2 people), and the number of teachers with low level of performance decreased by 4% (1 person). Significant changes were recorded according to the third criterion: the discrepancy between the low level at the ascertaining and control stages of the experiment was 24% (6 people). According to the third criterion, the indicators of high and medium levels increase significantly.

Therefore, we can state the relationship between the level of digital competence of the teacher and the level of formation of the teacher's organizational and controlling functions of educational process management.

5. CONCLUSION

The performance of educational process management functions is largely related to the ability to work in the digital educational space. We can see the construction of a digital educational process based on digital didactics, serving as the basis for designing the activities and interaction between a student and a teacher.

A necessary condition for implementing the teacher's management functions is the formation of digital competence, which includes the ability to search for professionally important information and resources in digital environments; its processing, analyzing and interpretation, comparison and critical evaluation, determining the reliability of information and its sources; ensuring digital communication for cooperation; the ability to create content using digital means in different formats; ensuring the responsible use of digital learning technologies for the physical, psychological and social well-being of students, increasing the ability to manage risks when using digital technologies as well as solving problems related to the use of digital technologies.

The components of the digital competence of a teacher make it possible to reduce the time of studying educational programs, ensure full assimilation of knowledge and skills, free the teacher from routine operations and enable continuous diagnosing the educational results. Thus, a sufficient level of forming digital competence of a teacher is a pedagogical meanscontributing to the successful implementation of management functions in the digital educational environment.

To improve the management of the educational process, we consider it appropriate to use a model for increasing the level of digital competence amongteachers, which is based on two components: knowledge and motivational activity. The results of applying the developed model the experimental data make it possible to consider the model to be effective.

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