Digital Quality Management in Higher Education

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Abstract. The study first examines the concept of digital quality management in higher education, and is aimed at featuring the theoretical justification and practical implementation of digital quality management of education at the university level. A fundamental difference between digital quality management and traditional quality management is shown. The authors present and describe the features and advantages of the developed technology of interactive intellectual environment, which is the basis of digital management. The functionality of quality management in higher education is revealed on the basis of a participative synergistic approach. The practical significance of the study lies in the introduction of an interactive intellectual environment into the higher education system, which enables the effective digital management of the quality of education. The main results comprise building an individual learning trajectory, depending on the diagnosed abilities and intelligence of each student, as well as conditioning students' research competencies as a means of improving the quality of higher education. Further development of this topic is seen in the study of the cultural aspects of interaction in the educational process, implemented in digital management.

Keywords: quality of education, digital quality management, development, interaction, educational technologies, interactive intellectual environment, autonomy, individual learning trajectory, research competencies, synergistic-participatory approach

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Introduction

Why is it digital? This is not a tribute to fashion or "trends" in the development of modern education. We regard this as a necessary process of transforming or transferring a personal quality into the inner self, the sustainable functioning of this personality trait in the global information society, and the adaptation to rapidly changing living conditions. Based on these prevailing conditions, we define digital quality management in education as a matrix process of interaction based on the collaboration of all participants in the education system, which allows the defining and continuously adjusting of the tailor-made route for each, as well as providing an opportunity to develop each person's professional and personal qualities. It is important to mention that in the outlined targeted concept there are no traditional management components such as of manageable and controllable properties. This is our principled stand to be thoroughly revealed in the article.

Literature review

While functioning in the integrated educational environment (we have defined it as interactive intellectual environment), the teacher does not adjust and coordinate the student's learning activities as such. This is due to the following factors highlighted by researchers worldwide [1–3; 5–7]:

– the powers of IT technologies in in the organization of the open-space learning cycles and training courses "without walls and borders";

– individual features of the personality of both the student and the teacher;

– livelihood systems of the modern person in terms of the need for constant interaction as a matter of setting into a habit of functioning in the chosen environment;

– the need for constant re-skilling, retraining, requalification, replenishment and deepening of existing knowledge;

– assessment of their own activities by external "experts" important to individuals, finding "like-minded people" and associates in the network.

Methods of research

It should be noted that the development of conceptual and methodological foundations of digital quality management in higher education creates certain contradictions and problems associated with integration processes in the constantly changing conditions of the information society and the knowledge society. The solution of these problems is connected with the expansion of the context of the conceptual analysis of the existing paradigm of quality management and the methodological refinement of the foundations of such an analysis. This process will be facilitated by identifying common features of the ongoing integration changes. The philosophical synthesis of the problems of quality management in education, its particularities, functions and content at various levels of higher education makes it possible to explore digital quality management as the process of design, achievement and maintenance of the quality implementation, conditioning the results of the educational process. Especially important for digital quality management in higher education is to identify each player in the educational system as an active stakeholder of a learning process, and to recognize their intrinsic value, taking into account their individual subjective experience, personality traits, intellectual and communicational characteristics, as well as the possibility of exercising independent management of their personal activities.

Experimental work within the framework of this study has been organized as a set of practical and technological developments aimed at solving research issues: individualization of the educational process conditioning research competencies. The performed work is confirmed by the results of mathematical calculations and statistical estimates with regard to the requirements for conducting a pedagogical experiment.

Results

The comparison of the essence of the concepts "management" and "digital management" is schematically presented in *Figure 1*. Thus, the concept of "digital" management is based on the functioning of the subsystems of the educational process inside the circle and their interaction with external subsystems outside the circle. The digital quality management allocates the person as a subsystem consisting of components, such as: internal guidelines, requirements, knowledge, abilities, experience, etc. At the same time, interactions and information exchanges are carried out in various formats and divergent interaction patterns, including communication in one-on-one and many-to-many contests.

By implementing the "many-to-many" pattern, the subsystems contact each other as if "switching on" the components necessary for the inverse subsystem, both inside and outside the circle. Traditional management performs one-sided interaction within a circle, without exchanging the components of the subsystems, limiting it to the normative, methodological framework, ready-made solutions, their imprinting as patterns of future professional activity. The core of the concept of "management" is the impact, the one for "digital management" is interaction.

A prerequisite for being in an environment for an effective digital quality management is the presence of properties of a self-developing system, when a learner involved in the process of learning activity is not an object, but a subject with the possibility of making complete changes to himself/herself independently, developing not only his/her cognitive but also personal abilities. The developmental nature of the environment "burdens" the management of the educational process both inside and outside. Constant changes, movements and collaboration of educational routes

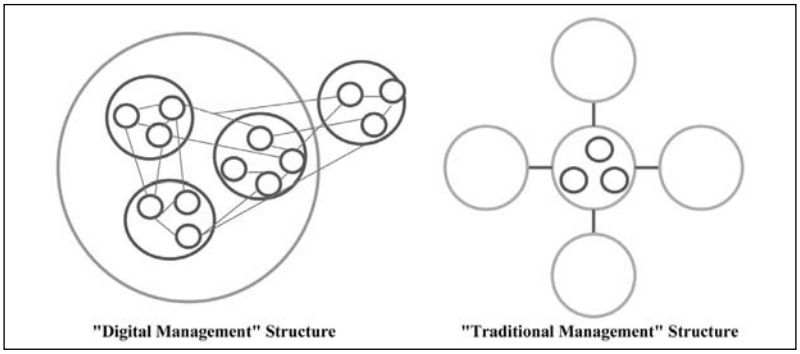

Fig. 1. The structure of the concepts of "digital management" and "traditional management"

"force" the system to adapt, restructure, and find the most effective ways for further development.

The results of the digital quality management which are possible to obtain with the interactive intellectual environment, can be presented only by analyzing, the progress along the educational route of each individual student based on the monitoring and assessing his/her cognitive abilities and personality traits. Thus, the concept of digital quality management in higher education implies conditioning of certain heuristic abilities of students, teachers and all the participants in general. These abilities are associated with finding certain tailor-made optimal solutions in quality management. Interactive intellectual environment can help in this case, which allows, firstly, to involve a large number of participants, and secondly, to prolong the decisions and accumulate them, leaving some of them in stock for solving other real-life cases in different content.

Digital quality management ensures and provides different "experiential learning cycles", which are described by David A. Kolb as a four staged process of concrete learning, reflective observation, abstract conceptualization and active experimentation [4].

Only for digital quality management some experience is inherent; only digital management makes it possible to familiarize, study and take into account the opinions, arguments, and reflections of all participants in the educational process. At the same time, a properly constructed technology for the implementation of digital quality management becomes a part of the daily educational, scientific and research activities of students and teachers. Then there is a paradigm shift from the formal, a sort of "bureaucratic" management process to a completely different "joint" acquisition of an educational program, its part or a particular module of a programme based on a synergistic-participatory approach.

It is the property of intelligence that ensures the process of digital quality management in education, the solution of proposed tasks, eliminating or "washing away" the framework of bureaucracy and the constant control of the external influential management side. The intelligence of the developed interactive intellectual environment implies the ability of the system to interact, communicate, think, and to apply experience to make decisions. In interactive intellectual environment, functions are implemented through the interface of the system with the user in a language close to natural, the interpretation of the data obtained by comparing with available information about a particular subject area, the logical derivation of solutions, the use of a certain type of constructive information, including the knowledge concerning the ways, methods and strategies for solving problems in a certain area of expertise. Interactive intellectual environment, as well as a human being has the ability to develop, summarize the information received and accumulate experience, at the same time explaining the solutions obtained.

The property of intellectuality is of particular interest for an effective digital quality management in education, since the control is not static, and not even a quasi-static system. Some tasks in

digital quality management are solved only once, and then they lose their relevance and necessity. Also today it might be difficult to find an ideal specialist in digital quality management, who would not basically make mistakes under any circumstances, and could every minute develop and describe clear criteria for finding an effective solution for achieving managerial targets. At the same time, it is still unknown whether the effectiveness of the decision itself or the efficiency of the decision-making process should be strengthened.

A certain accumulated knowledge bank of interactive intellectual environment makes it possible to formulate recommendations to all actors of the educational process for making decisions on specific professional tasks arising before them, for example, to help doctors in diagnosing their patients, or engineers in identifying certain faults or technical problems, or geologists in discovering mineral deposits.

Discussions and Conclusions

How is the process of digital quality management of education implemented? Due to what factors is it possible? What specificities should not be disregarded?

1. All educational, methodological, assessment and measuring materials located in the interactive intellectual environment databases are of problematic, research and statistical nature. There are no "ready-made" solutions or templates. Only recommendations and links to evidence-based research results, databases, literature databases are possible to take into consideration.

2. All tasks, exercises, tests, projects, simulators are designed in such a way that they check the course of shaping and conditioning competencies and at the same time of developing them.

3. Continuous feedback, distinguished by an individual approach and a high differentiation of training due to the presence of an individual personal tutor, whose role is performed by a computer.

4. Creation of working conditions in interactive intellectual environment when a user (student, teacher, parent, administration) implements management, design and search for new solutions in an active, expanding dialogue with computers and gadgets, using professional experience and making decisions simultaneously on a multiple criteria scenario.

5. The process of monitoring is based on the results of diagnostics of not only the potential of the cognitive sphere, but also personal qualities, professional abilities and interests.

6. Due to being in a situation of uncertainty, the development of personal qualities of students takes place, such as learning abilities, identity-building, self-development, self-education, creative abilities, skills to apply the knowledge gained in practice, cognitive interest, attitude to professional activity practices.

7. The effect of scaffolding is created not only for teaching and developing a student, but also for supporting a teacher, determining the vector of development of his/her professional skills and abilities, upgrading disciplines and assessment tools, by monitoring and rating the results of educational activities.

8. Interactive intellectual environment and its content have the properties of multimedia, interactivity, include simulators, virtual laboratories, virtual reality systems.

9. Ample opportunity of joint distributed network activities arises. Interactive intellectual environment allows you to "attract" partners from outside the educational organization. It enables the scalability of provided interactions, which contributes to the development of new competencies, self-realization in educational activities.

10. Open integrated interdisciplinary platforms for student's, teacher's and employer's joint research activities are operated on the interactive intellectual environment platform.

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Цифровое управление качеством высшего образования

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Аннотация. *В статье впервые вводится понятие «цифровое управление качеством образования». Цель статьи заключается в раскрытии особенностей цифрового управления учебным процессом в вузе в отличие от традиционного управления.*

Представлены и описаны достоинства и преимущества разработанной технологии интерактивной интеллектуальной среды, являющейся основой цифрового управления. Функциональные возможности цифрового управления качеством образования описаны исходя из партисипативно-синергетического подхода. Практическая значимость исследования заключается во внедрении в систему высшего образования интерактивной интеллектуальной среды, позволяющей обеспечить эффективное цифровое управление качеством образования. В качестве основных результатов авторы выделяют: построение индивидуальной траектории обучения в зависимости от диагностируемых способностей и интеллекта каждого обучающегося, а также формирование исследовательских компетенций обучающихся как средство повышения качества образования в университете. Дальнейшее развитие данной тематики видится в исследовании культурных аспектов взаимодействия в образовательном процессе, реализуемом при цифровом управлении.

Ключевые слова: *качество образования, цифровое управление качеством, интерактивная интеллектуальная среда, партисипативно-синергетический подход, индивидуальная траектория обучения, исследовательские компетенции*

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