Forming and Developing Future Masters' of Industrial Training of Motor Transport Profile Readiness for Applying Digital Technologies in the Conditions of Education Digitalization

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Summary
Applying modern digital technologies is a necessary condition for the development of more effective approaches to teaching and improving teaching methods, which allows to save time and to achieve the goal faster. The authors analyze the concept of readiness for applying digital technologies, determine the criteria for the development of readiness for applying digital technologies of future masters of industrial training in the conditions of digitalization and substantiate the pedagogical conditions for forming and developing of the researched readiness. The article highlights the results of experimental research, which confirmed the effectiveness of substantiated pedagogical conditions for forming and developing the readiness for applying digital technologies of future masters of industrial training of motor transport profile

Keywords:
motor transport profile, readiness for applying digital technologies, master of industrial training, digital technologies, education digitalization.

1. Introduction

One of the priorities of Ukraine's state policy in the field of education is using digital technologies.
Working out new technical and technological solutions based on digital technologies and implementing them in various fields of science, industry, education and economics increases the demand for specialists in the relevant field and the level of their training. Creating "digital state" requires the educational system orientation on training specialists who will be able to adapt to the rapidly changing world of technologies.
Today, the quality of training future specialists for a particular field depends on the level of masters of industrial training professional competence. Therefore, the problem of forming the readiness of future masters of industrial training for professional activities, which is a purposeful process of achieving by person appropriate competence, gaining professional experience, developing skills, socially and professionally important qualities, motivation and beliefs, arises.

In the development of the digital society, quality education is becoming one of the main factors of success, and the master of industrial training is both an object and a driver of positive changes. Only an information-literate person can effectively carry out the educational process, ensure the responsible use of digital technologies for information management, communication, and content creation. Digital competence and readiness for applying digital technologies are components of the fundamental core, which provides the most effective way of lifelong professional development of professionals who possess a universal tool for successful professional activity in any field [3].

The current stage the world motor transport market development is characterized by increasing and changing conditions of competition. This industry is undergoing major changes due to appearing of new digital technologies (including artificial intelligence), which is causing major structural changes. Changing the pattern of consumption in the market, its high mobility, introducing new production concepts, as well as the constant increase in the number of both private and municipal motor transport, growing its role in freight transportation are the main answers to the transformational challenges of the world motor transport industry.

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The introduction of digital technologies and their integration into the field of motor transport have determined the active developing and applying of automated vehicle control systems. Therefore, while training of future masters of industrial training of motor transport profile it is important to form and develop readiness for applying digital technologies. Their digital competence and ability to use digital technologies in professional activities will become a guarantee that students after graduating will be able to meet the labour market requirements and contribute to the society development.

2. Theoretical Consideration

The theoretical analysis of the researched problem was carried out based on scientific works of domestic and foreign researchers, who direct their studies on certain aspects of the outlined issue. In the dimension of the researched topic of scientific interest are the works related to: readiness for professional activity in the aspect of pedagogics, theory and methodology of higher education (O. Abdulina, I. Bekh, S. Honcharenko, V. Kraievskyi, I. Moskalova, O. Ponomarov, Ya. Tsekhmister, etc.); readiness for professional activity from the standpoint of psychological, physiological and other sciences (M. Diachenko, L. Kandybovych, A. Linenko, P. Pidkasistyi, V. Slastonin, D. Uznadze, etc.); forming of future masters of industrial training readiness for professional activity (H. Zhukov, I. Smyrnov, Ye. Tkachenko); the essence of education digitalization (V. Bykov, A. Hurzhii, M. Zhaldak, N. Morze, O. Spirin, etc.); introducing digital technologies in the educational process (V. Bykov, M. Byrka, M. Zhaldak, V. Kovalchuk, M. Leshchenko, N. Morze, I. Novik, A. Poplavskyi, V. Rozumovskyi, O. Spirin, etc.) ; the importance of forming students readiness to use computer technologies (M. Ally, S. Brookfield, F. Desjardins, J. Horrigan, M. Lynch, P. Normak, M. Simonson, C. Scott, O. Abramova, I. Zakharova, E. Polat).

The results of mentioned researches show that only a specialist, who is competent in the field of digital technologies and ready to apply them, can organize a productive educational environment. And such an effective professional activity is possible based on combining modern digital and pedagogical technologies.

Education, which is a major factor in differentiating our time, is becoming increasingly creative, critical, problem-solving and decision-making oriented, and promotes communication and collaboration, new potential tools formation alongside existing technologies and, most importantly, development of social and emotional skills that help people live and work together. All this creates a demand for new and innovative approaches in education that will allow technology to be at the heart of any solution.

Nowadays, using modern digital technologies in education has become the norm of our lives, a large number of different resources have been created to help students not only know about all new trends, but also effectively apply digital services and technologies in teaching. But without students' understanding of when and what digital services and technologies to use, a quality and effective educational process is not possible. Considering it, the readiness for applying digital technologies becomes the minimum basis for successful professional activity in the context of digitalization [2].

The concept of "readiness" in the scientific literature is used in different variations: as a condition and regulator of the ability to productive activity; a favourable psychological state; attitudes; subject's needs, which are the personality traits [8].

Readiness can be considered in different aspects, it depends primarily on the structure of the professional activity of the subject. Most domestic and foreign authors (R. Hasparian, E. Kozlov, L. Nerserian, A. Puni, etc.) characterize readiness through a combination of basic personality traits, such as motivational, cognitive, emotional, volitional; general psychological state, which provides the actualization of opportunities; individual's orientation to perform certain actions. Ya. Kolomynskyi studied readiness as a certain level of personality development.

V. Hladkykh and M. Yemets claim that readiness is formed by purposeful influence of the directive, which causes a kind of "adaptation" of the subject for future activities [5].

Georgian scientist D. Uznadze wrote that readiness is an essential feature of the attitude, which is manifested in all cases of behavioral activity of the subject [10]. S. Rubinstein gives broader definition. In his opinion, readiness is a set of abilities, in the structure of which there are different properties and qualities of personality, and ability is a general category in relation to these properties and qualities.

Of particular interest for understanding the essence of readiness is the work of K. Durai-Novakova [6], where readiness appears as a system of integrative qualities, properties, knowledge, skills (experience) of the individual.

Given that the activity of the individual at the stage of preparation for the activity may have different temporal characteristics, M. Diachenko and L. Kandybovich [7] propose to distinguish between long-term and short-term (situational) readiness.

Short-term (situational) readiness is the adaptation of the individual's capabilities for successful actions at a particular moment, the internal adjustment of the individual to a certain behavior when performing tasks,

setting for active and purposeful actions. Long-term readiness is a system of professionally important qualities of a person such as experience, knowledge, skills necessary for successful work [7].

It should be noted that foreign researchers also highlight the digital readiness – a concept that means the level of workers' readiness for transition to production processes provided by software and technologies [4].

According to J. Horrigan, the definition of digital readiness includes several components: digital skills, i. e. skills needed to start online sessions, surf the Internet and share digital content; confidence, i. e. a person's constant conviction in his/her ability to determine the reliability of information received from the network and the ability to protect personal data; practical use, i. e. the more a person will use digital technologies, the more experience and new opportunities he/she will receive [1].

Thus, based on the above mentioned scientists views we define the readiness of future masters of industrial training of motor transport profile for applying digital technologies as integrative personal formation, structured by motivational, cognitive, operational and control-evaluation components, which involves updating professional and subject competencies of specialist based on the achievements of the digital industry and aimed at extending digital educational environment.

It follows that the readiness of future masters of industrial training of motor transport profile for using digital technologies is characterized as a multicomponent structure that contains interrelated components: motivational, cognitive, operational-activity and control-evaluation. *Motivational component* reflects the manifestation of interest for learning digital technologies and their specifics in transport sphere, the need to acquire knowledge as for applying digital technologies in the chosen specialty, the desire to gain experience in applying digital technologies in this field. *Cognitive component* represents the consequence of cognitive (educational and self-educational) activities of the future specialist and gives the student a free and varied choice of new necessary theoretical, pedagogical, technological knowledge, which is the indicator of student's theoretical readiness for applying digital technologies. *Operational-activity component* is designed to ensure the practical readiness of future masters of industrial training of motor transport profile for applying digital technologies and covers a set of specific skills needed by students for using digital technologies in future professional activities. *Control-evaluation component* involves the organization of feedback on the results of forming the studied readiness by monitoring the academic achievements of students in this direction.

Taking into account the outlined structure of readiness of future masters of industrial training of motor transport profile for applying digital technologies in professional activities we distinguish the following criteria of its formation and development: motivational, cognitive, operational-activity, control-evaluation.

The process of forming and developing the readiness for applying digital technologies in professional training requires implementing a number of pedagogical conditions as a set of interrelated, specially organized activities that will enhance forming of the studied phenomenon to ensure positive dynamics of training the future masters of industrial training.

The analysis of the state of training of future masters of industrial training of motor transport profile in the scientific literature and the results of expert assessment allowed to identify and theoretically substantiate *pedagogical conditions of forming readiness of future masters of industrial training of motor transport profile for applying digital technologies in professional activities*, namely: developing motivation of higher education students to master digital technologies; improving the content of education of future masters of industrial training; introducing digital technologies in the educational process; using non-formal education opportunities.

The implementation of the first pedagogical condition is carried out by creating a unique information environment that helps to increase motivation and stimulate educational and cognitive activities, students' awareness of value and need for applying digital technologies in future professional activities by creating the need for professionally relevant knowledge of modern digital technologies; interest in the study of digital devices and resources used in professional and pedagogical activities; gaining experience in applying digital technologies.

The implementation of the second pedagogical condition is aimed at forming the cognitive component of the studied readiness of future masters of industrial training by identifying disciplines that have potential opportunities for forming and developing the studied readiness of future masters of industrial training of motor transport profile; projecting additional issues and topics connected with digital technologies and the possibility of their application by future professionals in the transport industry and working out appropriate methodological support.

The implementation of the third pedagogical condition is aimed at forming and developing operational-activity component of the studied readiness of future masters of industrial training through the introduction of various digital technologies in different forms of education.

The main guideline while implementing the fourth pedagogical condition is to involve future masters of industrial training in mass open online courses, which allows to increase their general pedagogical and

professional knowledge on certain topics, as well as gain new skills in applying digital technologies.

3. Experimental Consideration

During 2019-2021, we conducted an experiment on forming and developing future masters of industrial training of motor transport profile readiness for applying digital technologies in institutions of professional pre-higher education. 229 students of the speciality 015 Professional Education (Transport) were involved in the experiment.

The results of diagnosing the levels of formation the components of the readiness of future masters of industrial training for applying digital technologies at the control stage of the experiment revealed positive dynamics (decreasing number of students with low and medium levels of readiness and increasing one with sufficient and high) in the experimental group [9].

The data obtained at the control stage of the experiment on the formation of the motivational component of the studied readiness of future masters of industrial training in the experimental group (Fig. 1.) show that the number of students who reached high level increased by 3.5%, the number of students with sufficient level increased by 16.4%, the number of students with medium level increased by 2.5%. The indicators of the low level have changed quite significantly, namely the number of students at this level has decreased by 22.4%.

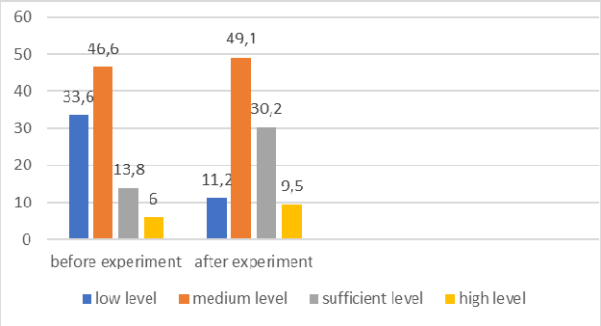

Fig. 1. Dynamics of levels of formation of the motivational component of the studied readiness in the experimental and control groups after the formative experiment

The obtained data on the formation of the cognitive component of the studied readiness of future masters of industrial training of motor transport profile in the experimental group (Fig. 2) give grounds to state that the number of students with high level of readiness increased by 4.3%, with sufficient – by 16.4%, medium – by 1.7%. Low-level indicators have changed significantly, namely the number of students who reached a low level decreased by 22.4%.

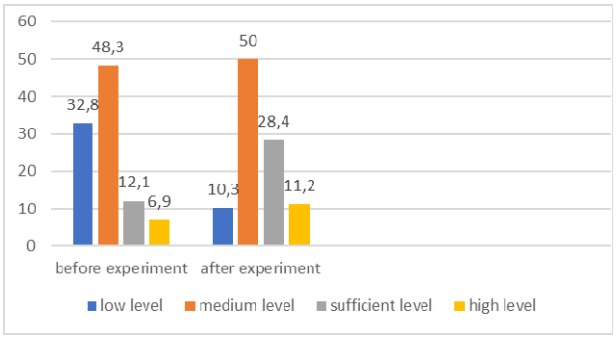

Fig. 2. Dynamics of the level of formation of the cognitive component of the studied readiness in the experimental and control groups after the formative experiment

The obtained results of the formation of the operational component of the readiness of future masters of industrial training of motor transport to the use of digital technologies (Fig. 3.) show a high level in the experimental group by 2.6%, sufficient - by 15.5%, medium – by 3, 4%. Low-level indicators have a significant decrease: by 21.6%.

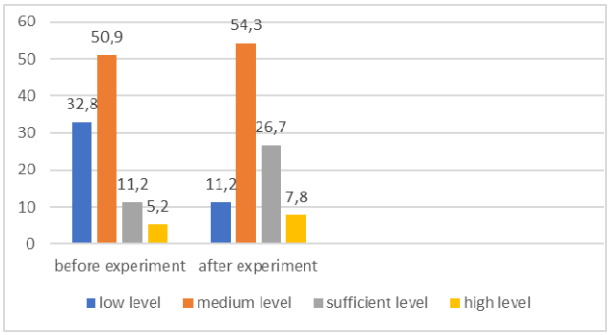

Fig. 3. Dynamics of the levels of formation of the operational-activity component of the studied readiness in the experimental and control groups after the formative experiment

The data, obtained at the control stage of the experiment on the formation of the control-evaluation component of future masters of industrial training of motor transport profile readiness for applying digital technologies in the experimental group (Fig. 4) show, that the number of students who reached high level increased by 2.6%, sufficient level – increased by 14.7%, medium level – decreased by 2.6%. The indicators of the low level have changed quite significantly, namely the number of students with the low level has decreased by 19.8%.

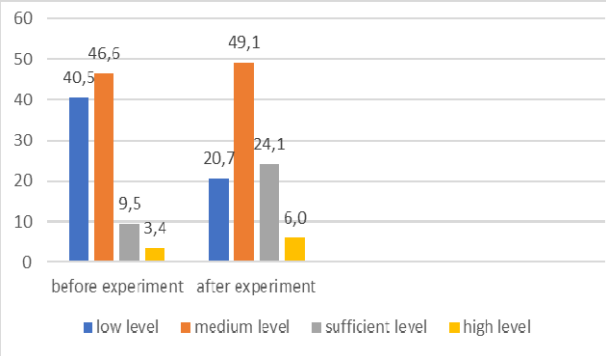

Fig. 4. Dynamics of the level of formation of the control-evaluation component of the studied readiness in the experimental and control groups after the formative experiment

The analysis of the obtained results shows a significant increase in the levels of formation of the components of readiness in the experimental group, namely: a decrease in the number of applicants with a low level of readiness, and due to it increase in number of students who reached medium, sufficient and high levels. At the same time, the indicators of the levels of formation of the readiness components in the control group remained almost at the same level (the dynamics of changes is not very pronounced).

4. Conclusion

The implementation of the set of proposed pedagogical conditions allows making the process of forming and developing the readiness of future masters of industrial training of motor transport profile for applying digital technologies more efficient and effective, taking into account the latest achievements in computer technologies and information systems. As a result, students can acquire the appropriate motivation, knowledge, skills and abilities that allow to purposeful search and evaluate educational information, as well as, using digital technologies to manage the processes of exchanging data, information and digital educational content.

Future masters of industrial training, interacting with other users of digital content, will be ready to use effectively information resources and technologies to joint knowledge generating, as well as develop conceptual solutions for problem situations in digital environments. In addition, they will be able to develop their cognitive skills, in particular the focus on self-development and achieving high results. Increasing the creativity of thinking, initiative in achieving the goals will allow future professionals to successfully solve non-standard problems, see the potential of the digital environment.

The results of theoretical and experimental research confirmed the effectiveness of substantiated pedagogical conditions of forming the readiness of future masters of industrial training of motor transport profile for applying digital technologies. Diagnosis of the levels of formation of the components of the studied readiness at the control stage of the experiment in the experimental group showed positive dynamics. Comparison of the results of control and experimental groups by statistical criteria confirmed, that the obtained data are not random and will repeat in next study.

Thus, creating in the educational institution pedagogical conditions, which include developing higher education students' motivation to master digital technologies; improving the content of education of future masters of industrial training; introducing digital technologies in the educational process; using non-formal education opportunities will contribute to forming and developing their readiness for applying digital technologies. It also will enable learners to adapt to information flows, increase overall digital literacy and competence, and promote mastering the skills needed in the 21st century.

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