

# The Formation of Students’ Professional Thinking in the Digital Age

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## ABSTRACT

The article presents an analysis of the concept and essence of professional thinking at the present stage of digital society's development. The urgency of the problem is justified in the context of a new approach to understanding professional thinking in the framework of the social development's law - the universality of labor (in addition to the laws of division and change of labor formulated by K. Marx). The meaning of the law is to universalize the requirements for a modern employee, regardless of profile education, this is computer literacy, creativity, sociability, teamwork, mobility (willingness to change, self-education, self-development, mastering new skills, competencies). The problem of the professional thinking formation in connection with the new requirements for the student in the system of vocational education is examined - the criticality and consistency of thinking (the requirement of the Federal State Educational Standard). The research methodology is substantiated, the contents of the study and a discussion of its results are presented. Conclusions are drawn on the communication problem, the determination of the individual's professional thinking and the digitalization of education.

**Keywords:** *digitalization, professional thinking, professional education, the law of universality of work*

## 1. INTRODUCTION

The modern period of society's development is characterized by such concepts as “globalization”, “integration”, “informatization”, “digitalization”, etc. Gradually, these features become inherent in all areas of public life: economics, politics, the spiritual, social sphere, and, of course, education, as the most important means of not only transmitting information but as a transformer of information into knowledge. Digitalization as a global phenomenon at the beginning of the 21st century today has a significant impact on the life organization and world outlook of mankind as a whole, and thereby on its thinking and rethinking of the role and place of man in the digital world. Modern forms of education in the form of information and computer, distance technologies, e-learning make fundamental changes in the psychology of students and trainers. The role of a professor, a teacher of vocational education in the recent past, as a carrier of information and knowledge, is also changing significantly, giving way to an independent search for information by students, and the teacher more and more acts as a motivator and navigator in this search.

The most important type of social thinking is professional thinking, which is traditionally interpreted in the scientific literature either as a high level of mastery of one's profession, and then they say that a person thinks, speaks, and speculates professionally; or the author speaks about the specifics of thinking in close connection with the profession - a doctor, teacher, lawyer, military, athlete, etc.

Professional thinking as a general scientific problem, as a generic concept, is not adequately represented in modern scientific research. Mainly, this problem is considered in the second sense, as a species concept without revealing the essential features of the generic concept itself. Nevertheless, the question of the professional thinking formation remains very relevant, since there is no clear answer who and how at what stage of the person's formation should be responsible for this process. It seems that the formation of professional thinking is one of the important tasks of professional education since the mastery of the profession occurs at this stage and its improvement during the process of self-education and self-development. The requirements for an employee - the carrier of professional thinking - are also increasing and modernizing, they acquire features, on the one hand, universality (tolerance, sociability, ability to work in a team, etc.), and, on the other hand, individualization in the form of creativity, the ability to accept non-standard decisions and take personal responsibility for the result of labor, the ability to predict, design, etc. Therefore, this study's aim is to identify the connection and determinants of professional thinking during the digitalization of all spheres of society and directly professional education. The results of the study can make a feasible contribution to the development of the world experience of scientific understanding and practical implementation of digital education technologies in connection with the formation of professional thinking of students and potential employees.

## 2. RESEARCH METHODOLOGY

In the process of studying the transformation of modern society, digitalization of the economy and education, the following methods were used: theoretical (analysis; synthesis; concretization; generalization; analogy method; modeling; historical and logical, design method and socio-prognostic modeling) and empirical (observation, description, the study of documents). The methodological basis of the study was the philosophical and anthropological approach - in solving the problem of personality formation in the digitalization system of modern society, activity and systemic approaches helped to identify the place and role of the teacher and the learning person (future employee) in the modern digital economic and social system as a whole. An interdisciplinary approach has revealed the features of the formation of professional thinking of the individual at the present stage of development of a digital society.

## 3. THE RESULTS OF THE STUDY

We formulate and try to justify several of the most important points of the presented study.

*First:* professional thinking and vocational education have been linked historically for extensive time. In our study, we used the periodization of D. Bell's historical process, which divided history into pre-industrial, industrial, and post-industrial periods [2] (this period is now called information or digital society in various sources). The pre-industrial period was long and rather static (from the moment a person appeared until the middle of the 19th century), it was mainly characterized by reproducing professional thinking, since knowledge of labor, craft, and later the profession, professional skills were transferred from father to son, from master to apprentice, etc.

Dimension, stability, conscientiousness, high-quality reproduction of the mastered labor functions are the main requirements for the employee of that time, they formed professional thinking, mainly the artisan's thinking. Although we should not forget about the representatives of the elite - rulers, philosophers, courtiers. In the broad sense of the word, this is also a professional activity that requires training and mastering the professional skills of a judge, official, soldier, etc. In particular, even in antiquity, knowledge of the law was included in the general education system, they were studied together with philosophy and religion. In ancient India, for example, the right of Brahmanas was associated with religion and studied along with the characteristics of a religious cult. They preferred to study law in Israel according to the Laws of Moses. And in ancient Greece, Stoic philosophers were also taught judicial eloquence. One of the most important features of the professional thinking of the pre-industrial era was either heredity (the transfer of experience from the older generation to the younger), or caste (belonging to the social layer). Ancient Rome can surely be called the cradle of legal education. Back in the

1st century A.D. Sabin opened the first private law school and in the IV-V centuries. AD Law schools in Rome, Constantinople, Athens, etc. became widely known. In the XII-XV centuries, the first universities appear in Western Europe, where one of the areas of preparation was legal education. Thus, we can talk about the formation of professional thinking in the pre-industrial period of development of society, which was based on the relay and practice-oriented nature of the transfer of labor and professional experience.

The industrial period begins around the middle of the 19th century in connection with dynamic changes in the sphere of economy, industry, and social life of a society. There is a complication and mechanization of production, a complication of production functions performed by workers. Thus, there is a need for a worker with different qualities, abilities, skills than in the pre-industrial period, the development of a polytechnical professional education, and the expansion of the network of professional educational institutions. In connection with changes in the sphere of economics and industry, the professional thinking of an employee changes, it gets the features of dynamism, there is a need for personal initiative, interest in the final result of labor. It is being rebuilt towards multifunctionality, employee mobility. This period lasted until about the mid-1990s. Its feature is the integrative, complex nature of the labor's transfer and professional experience.

*The second thesis* is the direct connection between professional thinking and the laws of social development. K. Marx formulated two laws - this is the law of the division of labor and the change of labor. If the first law was predominantly characteristic of pre-industrial society in connection with the division of labor into agriculture and handicraft, later into mental and physical, then with the onset of the industrial period the law of labor change comes to the fore. The accelerating mobility of labor functions is the main requirement of the law of labor change. That is how K. Marx characterized this law: "the all-round mobility of the worker" [5, v. 23, p. 498-499]. This is the absolute suitability of the worker with constantly changing dynamic needs for labor, labor functions of the employee. To meet this need, there is a need for a variety of forms of vocational training and retraining. Changes in the economic sphere determined the change in the professional thinking of the employee, which began to be characterized by greater flexibility, variability, ability and willingness to combine different labor functions (especially in the second half of the 20th century). In the domestic production system, as scientists note, the law of labor change manifested itself in three main forms: within the boundaries of the profession (for example, primary school teacher, music teacher), the possibility of transition from one type of work to another (the combination of professions), or a combination of the main activity with other activities (sometimes not related to the main profession). The professional thinking of the industrial period is multifunctional, integrative in nature.

*The third thesis:* for the modern period from the point of view of the social development's laws, a manifestation of

the law of labor's universality is characteristic. In history, at the present stage, the closest connection between the economy and education, their interdependence, is recorded. "Knowledge is now the main component of economic and social development. The ability of society to generate, select, adapt, apply knowledge and derive profit from them is crucial for sustainable economic growth and improving living standards" [7, p. 28]. Describing post-industrial society, D. Bell focused on the progress of theoretical knowledge as a potential for its development. And Bell's followers confess that the modern economy is really becoming not an information-based economy, but as a knowledge-based. Besides, Bell drew attention to the fact that post-industrial society does not replace the agrarian and industrial society, but only supplements it with new features [3, p. 254]. There is a need for a new type of workers with universal (universalized, unified) qualities, the need for personal and professional comprehensive development, which makes the employee more mobile and in demand in a market economy, in a changing content and nature of work. Automation and computerization processes are inherent in modern production, which leads to the replacement of manual and machine labor and the replacement of tens - hundreds and thousands of workers with one or two machines, automatic machines, robots. Computerization and automation have become integral features of modern production. The law of the universality of labor is objective, like any law, it is caused by changes in social life in the form of changes in the nature of labor and the requirements for the worker of modern material and spiritual production. These changes, undoubtedly, lead to a change in the professional training of the specialist, the future employee, the formation of specific competencies in them, corresponding to the fundamental nature and universality of labor in the modern world. And if K. Marx, as applied to the law of labor change, spoke of a universal worker, capable of various types of activities, now we should talk about universal super professional qualities and competences obtained by students in the process of professional education and developed throughout their working lives. From here the growing role of the vocational education system in the process of becoming a specialist and his professional thinking, corresponding to the challenges and demands of modern society.

#### **4. RESULTS AND DISCUSSION**

The formulated problem has two sides: a qualitatively new state of the modern society of the digitalization era and the preparation of students (future specialists, workers) in the vocational education system, primarily the formation of their professional thinking, as the basis of professionalism, for this society. Analyzing scientific research on the problem of digitalization, we can group them in the following areas: digitalization of the economy, digitalization of workflow, digitalization of education (digital transformation of education), the relationship between digitalization of the economy and education (the

problems of the relationship and interdependence of these areas are studied), etc. Discussion of the problems of digitalization of society as a whole is currently being conducted both at the international and state levels. A milestone in the process of digitalization of education can be considered the Message of the President of the Russian Federation to the Federal Assembly of 2016, which resulted in the adoption of the program "Modern digital educational environment in the Russian Federation". In the Address of the President of Russia in 2018, attention was focused on the possibilities of digital technologies in the field of education (online education), medicine (telemedicine) in the context of combining talents, competencies, ideas. The digital transformation of education, as the basis of the digital economy, is devoted to the work of T. Zh. Bazardzhapova, E.O. Vanzatova, N. S. Yashin and others. The problems of digitalization of society as a whole and education, in particular, are also of interest to foreign researchers. The digitized education sector can transform any country by developing human resources and increasing the country's productivity [14]. An analysis of foreign scientific research in the field of digitalization allows us to make the following generalizations: the evolution of the educational industry and the features of its development in the 21st century based on the transition from the "old school" to the "new school" is due to the digitalization process [10]. The digitalization of education affects the education ecosystem [11]. V.A.Sukhomlin also emphasizes the role of human digital skills in the ecosystem of the digital economy and shows the feasibility of deploying a national system for the development of skills based on an open system of IT education, i.e. a system that implements educational practice based on international educational standards in the field of information technology [9]. Nguyen Thine Le in his studies focuses on the existing computer-based training system aimed at developing critical thinking of students and identifies the shortcomings of this technology in training [12].

At the same time, the digitalization of modern education has some unresolved problems related to the multidimensionality of the theoretical understanding of this concept and its practical implementation in the educational process. The following aspects can be distinguished, the results of the study of which can make a significant contribution to Russian and world science: conceptual (there is no clarity in the definition of concepts: digitalization of the educational process, digital learning, e-learning, distance learning, online learning, etc.), legal (analysis regulatory support and regulation of digital education), organizational (changing policies regarding the content and structure of the teaching and methodological workload of the teacher; development of educational content and their practical implementation in the educational process), methodological and psychological (preparation of teachers for work in a new educational environment using information and computer technologies).

Analyzing the problems of modern education in the era of the digital transformation of society, many scientists pay

attention to the psychological feature of the modern generation in terms of their perception of the information received. The authors are attracted to the publication by J. N. Naumenko, which analyzes the features of the training of the new generation, called the Z generation in terms of digitalization of modern education and the use of information and computer technologies in the educational process, linking this process with the development of students' thinking. Speaking about generation Z, the author of the article notes that he is characterized by a decrease in the duration of memorization, the concentration of attention, and the transition from a linear model of thinking to a network one [6, p.138]. Besides, digital information technologies today allow the teacher to build partnerships with students, create pedagogical situations of student involvement in the educational process, construct new knowledge in a team, and not reproduce already existing knowledge. Modern pedagogical science has a powerful methodological apparatus for the active and interactive interaction of the teacher with the student, digital technology is not the last in this arsenal.

In the system of both general and vocational education, the emphasis is currently being placed on the development of personal competencies of teachers and students. The formation of these competencies helps the individual quickly find his place in a situation of social uncertainty in changing reality, and thereby in the labor market. According to the changed conditions and nature of work, the requirements for the employee, the requirements for his professional thinking also change. "Flexible, capable of adaptation, proactive, independent, ready for lifelong learning, productively collaborating with other people, employees are in demand" [6, p.138].

One of the factors in the development of professional thinking in an educational organization is the principle of interdisciplinarity, integrativity in teaching. Well known in the vocational training methodology is vertical and horizontal integration, the meaning of which is, in the first case, to consider a specific educational issue based on previously covered material (the principle of continuity in training), in the second, it is intersubject integration, statement and disclosure of the problem with positions of different sciences. This forms an important sign of professional thinking - systematicity and criticality, which is the most important requirement of the modern Federal State Educational Standard of Higher Education (FSES VO 3 ++). The modern thinking of the younger generation is practice-oriented, students want to see the benefits of the acquired knowledge and competencies. Zh. N. Naumenko identifies some features of the thinking of generation Z and, accordingly, the requirements for the process of their learning: 1. A modern student should be in the center of attention, and training should preferably be personality-oriented; 2. The applicability of the knowledge gained is important, the benefit; 3. The time spent on training should correspond to the result; 4. The requirement for the structure of the material - the studied texts should be easy to understand, and key points visualized; 5. in the learning process, it is not the process that is important, but the result; 6. In the training using distance, information and

computer technologies, the dialogue between the teacher and the student is important; 7. visibility, visualization - the main condition for the perception of the material; 8. a reflection of the requirements of the Federal State Educational Standards of Higher Education is the condition of oral interaction with students, as a result of which we can hope for the development of memory and critical thinking, which will be developed in the process of not performing tasks mechanically, but critical analysis of information, thinking about actions, discussions with other students, working in group 9. One of the conditions for the effectiveness of training is feedback with students, which becomes quite possible with the use of information and computer technologies; 10. learning motivation in the process of praise, rewards, earning points in a personal portfolio, etc. Thus, N. N. Naumenko notes the wide possibilities of digital tools and resources for high-quality education of the modern generation.

At the same time, digitalization does not imply a complete rejection of the human factor in learning, it is a new place and quality of teachers in the digital society and the education sector as a whole. The teacher becomes not so much a translator of knowledge as a mentor and facilitator, whose task is to help students adapt and put into practice their knowledge. As before, both in our country and abroad, there is a great fear of change, loss of self, a focus on stability and a lack of strategic vision [8].

Among both domestic and foreign studies, there is no unequivocal opinion on assessing the role and determining the place of digitalization processes in the educational process. Scientists, recognizing that technology has changed modern education, draws attention to the fears and doubts of many educators about how or even whether it is worth including it in their education [13]. Nonetheless, an inability to integrate technology into the educational experience can provide students with poor service when they join the labor market. Digital technologies are becoming a large part of their life outside of classrooms, and therefore their inclusion in the educational process is necessary and should not be limited to lecturing using presentations at the powerpoint. Digital technology plays an important role as a powerful learning tool. I.A. Voevodkin, analyzing the problems of education's digitalization speaks about the negative consequences for schoolchildren and students that arise during its implementation, such as loss of mental abilities (loss of large texts' perception without deepening the essence of the text), screen dependence, decrease in social skills and even the appearance of cancer [4]. Dr. Peter Weibrau calls gadget screens "electronic cocaine," and Chinese researchers call them "digital heroin" [1].

## 5. CONCLUSION

The article presents a new approach to determining the essence and content of professional thinking in the framework of the social development's law - the universality of labor (in addition to the laws of division of labor's change formulated by K. Marx for the pre-

industrial and industrial stages of society). Its appearance is associated with objective processes taking place in the modern world, with a cardinal change in the nature and content of labor and, as a consequence, a change in the requirements for an employee for the modern production of material and spiritual goods (do it with your hands and think with your head). The meaning of the universality's law of labor is to universalize the requirements for a modern employee, regardless of profile education, this is computer literacy, creativity, sociability, ability to work in a team, mobility (willingness to change, self-education, self-development, mastering new skills, competencies). This is an invariant (general) part of the professional thinking's formation of any student in any direction of training. The variable part is designed to form special knowledge, skills, possessions and competencies in the field of the chosen profession. In the context of the formation's problem of professional thinking, properties such as criticality, systematic and consistent thinking (a requirement of the Federal State Educational Standard) have acquired particular importance.

The process of forming professional thinking is also determined by a feature of modern society as digitalization of almost all of its spheres. The sphere of vocational education is not an exception, which faces an important task - taking into account the characteristics of the modern generation of students, to develop their motivation for learning, mastering professional knowledge, skills, possessions and competencies; the ability to communicate through digital information technology; to formulate critical and systemic thinking skills in the context of professional and over professional competencies.

## REFERENCES

- [1] Afanas'ev, A. A. «Cifrovizaciya obrazovaniya, vse minusy elektronnoj SHkoly» [Transliteraciya nazvaniya stat'i v kavychkah], available at: <https://vc.ru/flood/43800-cifrovizaciya-obrazovaniya-vseminusyelektronnoj-shkoly-chto-budet-s-detmi>.
- [2] Bell, D. (1999), *Gryadushchee postindustrial'noe obshchestvo* [Transliteraciya nazvaniya knigi], Akademiya, Moskva, 949 s.
- [3] Bell, D., Inozemcev, V. L. (2007), *Epoha razobshchennosti: razmyshleniya o mire XXI veka* [Transliteraciya nazvaniya knigi], Centr issledovaniy postindustrial'nogo obshchestva, Moskva, 278 s.
- [4] Voevodkin, I.A., Caregorodceva E. V. (2019), «Problemy cifrovizacii obrazovaniya» [Transliteraciya nazvaniya stat'i v kavychkah], *Mezhdunarodnyj nauchnyj zhurnal «Sinergiya nauk»*, No 33, pp.1272-1281.
- [5] Marks, K. *Kapital: v 4 tomah* [Transliteraciya nazvaniya knigi], / K. Marks // Marks K., Engel's F. *Sobranie sochinenij: v 50 tomah. 2-e izd.* Politizdat, Moskva, 1960–1964. T. 23–26.
- [6] Naumenko, ZH. N. (2018), «Vzaimodejstvie v sisteme «uchitel' – uchenik» v epohu cifrovoj transformacii obrazovaniya» [Transliteraciya nazvaniya stat'i v kavychkah], *Cifrovaya transformaciya obrazovaniya. Elektronnyj sbornik tezisov dokladov 18-j nauchno-prakticheskoj konferencii (30 maya 2018g.)*, Minsk, S.138 – 142.
- [7] Salmi, D. (2013), «Kak gosudarstva dobivayutsya mezhdunarodnoj konkurentosposobnosti universitetov: uroki dlya Rossii», [Transliteraciya nazvaniya stat'i v kavychkah], *Voprosy obrazovaniya*, No1. pp. 25 – 68.
- [8] Sinyagina, N.YU. , Artamonova, E. G. (2019), «Cifrovizaciya obrazovaniya: predvidet' sobstvennyj uspek» [Transliteraciya nazvaniya stat'i v kavychkah], *Obrazovanie lichnosti*, No 1, p.3.
- [9] Suhomlin, V. A. (2017), «Otkrytaya sistema IT-obrazovaniya kak instrument formirovaniya cifrovyyh navykov cheloveka», [Transliteraciya nazvaniya stat'i v kavychkah], *Strategicheskie priority*, No 1(13), pp.70-81.
- [10] Ainslee, J. (2018), «Digitalization of Education in The 21st Century», available at: <https://elearningindustry.com/digitization-of-education-21st-century>
- [11] «Digital Education Survey» (2019), available at: <https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/digital-education-survey.html>
- [12] Nguyen, Thine Le (2019), «How do Technology - Enhanced Learning Tools Support Critical Thinking», available at: <https://www.frontiersin.org/articles/10.3389/feduc.2019.00126/abstract>
- [13] «How to Use Digital Technologies to Teach Students» (2019), available at: <https://digitalmarketinginstitute.com/blog/how-to-use-digital-technologies-to-teach-students>
- [14] Wadhwa, Rajan. «How Digitization can be a game-changer for India's Education Sector» (2019), available at: <https://www.entrepreneur.com/article/337947>