

# New Technological Wave and Challenges to Professional Education: Signals from the Labour Market

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**Abstract**—The problem of employment of young professionals in the conditions of changing technological way and the transition to innovative development is raised in the paper. It is shown that in the modern labour market new challenges are forming both for alumni and for the university system as a whole. Based on the research, it is stated that the competitiveness of a university alumni in a transforming world is determined not only by his professional specialization, experience, but also by his interdisciplinary training, as well as his social and personal potential. Alumni with universal competencies, demonstrating a higher level of social and cultural capital and having a convergent character of training are more preferable for employers.

**Keywords**—labour market challenges; interdisciplinary training profile; universal competence; social and personal potential of an alumni, new type of professionalism

## I. INTRODUCTION

Analyzing modern technological development, social dynamics in general, many experts come to a single conclusion: the next generations will have to live in a different, more complex world of technologies, actively developing a new technological way, which is determined by the development of biotechnology, nanotechnology, new medicine, robotics, cognitive technologies, ecology, high humanitarian technologies [1]. Essentially, a person will be forced to spend the significant part of the life in a new sociality: virtually — an information technology environment, characterized by high dynamism, complexity and forming new challenges.

In leading experts' opinion, we are facing an era of "new Cambrian explosion of technologies", when in the next hundred years mankind will have to go through the same

technological path that it has passed over the previous 20 thousand years, and by 2040 each of us will have its own robot [2].

Social and technological transformations are changing the labour market, creating a demand for new competencies of specialists, including alumni, putting serious pressure on the training of specialists for the new economy, creating new challenges for the higher education system. Researchers note that today in the labour market we are talking about employment not by specialty, but employment by competence [3]. This is an objective necessity that a modern professional should have a special interdisciplinary core in the system of competences, which will allow to participate in solving problems of an interdisciplinary level, which will determine the success of any specialist in the labour market.

For example, in the European Union, the implementation of interdisciplinary education is considered as an innovative project [4]. Traditional universities in Europe trained narrowly focused specialists, but nowadays, employers expect specialists who can cooperate, look at the problem in a complex of contradictions, set tasks and propose solutions with colleagues from other areas.

One of the important trends, which is just beginning to be understood and articulated by experts in the public space, is the change of the employer's attitude to the institution of higher education itself [5]. During the time of structural dynamics emerging in the economy, the evolution of social production towards digital and robotized space, not only the number of workers in manufacturing industries decreases, but the requirements for a number of professions are also changing. The most typical example is IT specialists [6]. Previously, a person who did not go through the specialized university education was not able to professionally engage in

this type of activity. Today, a good programmer must have trainings every two to three years. At the same time, a large number of alternative ways of learning appeared, allowing even a student who is passionate about mathematics to earn money at the level of a senior developer even by completing courses. Higher education now is no more obligatory just for a record in resume and in order to find a well-paying job. The presence of a diploma does not guarantee a high level of salary for young professionals [7].

In general, this is typical of a wide range of specialties, employers increasingly look not at the general training of a young specialist, but at his specific knowledge, work experience and certain social and communication skills.

## II. NEW TYPE OF PROFESSIONALISM: RESEARCH METHODOLOGY

The most important modern society trends related to the transition to a new way based on high-tech, knowledge-intensive and information-intensive industries have revealed the main changes outlined in the semantic content and main features of the professions of the future, namely in the competence-based recruitment of a professional specialist. In 1996 an American researcher G.Perkin wrote about the beginning of the professional revolution and the transition to a new type of professionalism, when the personnel potential of successful corporations will be transprofessional — people who can effectively and creatively work in various poly-professional environments, quickly adapting to different working contexts and tools [8].

Modern researchers also note that the labour market is already demonstrating changes in the requirements for the role behaviour of a professional in an innovative economy. A specialist is not in demand as a tool — an obedient performer, a staffing position, but as a partner and a creator, as an independent figure, freely disposing of the main capital — his qualifications. Orientation of business to project activity, as an effective technology for implementing strategic plans and increasing the proportion of collective creative work in connection with this, actualizes the presence of developed communicative competences: cooperation skills, teamwork, ability to engage in constructive dialogue, etc. The international work requires not only knowledge of foreign languages (preferably not one), but also an understanding of the "rules of the global game", skills of cross-cultural communication [9].

In this case, students are of great interest as a special socialization stage in the life of the majority of young Russians, the essence of which consists in mastering professional knowledge, work skills, patterns of behavior and communication, norms, values necessary by young people for integration into the socio-professional structure of society. Nowadays, there is a certain contradiction connected with the including of young people by the social institution of education in the structure of social production. Past social mechanisms for integration of young people into a socio-professional structure are not relevant, the modern integration vector is shifted from the principles of state administration of alumni employment to professional self-

determination of a young man, his independent choice of professional path [10].

These trends determined the research interest of the presented work. An attempt to identify the emerging profile of new professionalism by the monitoring materials, held at the exhibitions of employers of BMSTU, having considered the views of employers about university alumni, the requirements they set for the preparation of a modern specialist, as well as the opinions of the undergraduates about their training is made and presented in the paper. The survey item was the companies — participants of employers' exhibitions at BMSTU in 2017 and 2018 and undergraduate students. In total, 91 representatives of companies participating in the exhibitions, and also 268 undergraduate students were interviewed. The selection is not so representative, but allows to identify some trends, as well as to identify the basic grounds for effective interaction between the employer and the young specialist, in order to bring education closer to the needs of social production, the direct employer.

## III. ALUMNI OF HIGHER EDUCATION INSTITUTIONS AND EMPLOYERS IN INNOVATIVE ECONOMY: DISEQUILIBRIUM AND CONGRUENCE LINES

The study revealed both the lines of disequilibrium and congruence between employers and graduates, in determining strategies for the behavior of young professionals entering the labor market in the future working life.

One of the congruence points, which was indicated by both respondents, is the lack of training of alumni both for future professional activities and for the realities of the labor market, which puts young professionals at a disadvantage for him in fierce competition with people with work experience and effective social capital, and the alumnus must be able to prove the presence of the relevant knowledge, skills, competencies, must be able to reveal abilities. Dissatisfaction with the preparation of future specialists is constantly fixed by researchers. Thus, the monitoring of HSE showed that in the course of multi-year measurements, employers' assessments of the level of professional training of alumni, which are just received diplomas, practically do not change. The average score in the evaluation of university alumni was 3.7 points on a five-point scale [11]. During the measurements at employers' exhibitions at BMSTU, the average score for assessing the competence-based characteristics of graduates was 4.1 points.

But what exactly is the lack of training for future specialists, the opinions of the interviewed parties differ: the alumni consider that the professional needs specific functional skills, willingness to work in certain technological chains (narrow specialization), almost 60% of respondents said so, and the employer considers that the alumni should have general professional competencies and developed abilities for operational training (wide specialization), and they will have an opportunity to train special working skills in the place they will work in (58%). The orientation of employers to specialists of a wide profile was also fixed in

the monitoring of HSE, while the share of employers who consider it preferable to train workers of just a wide profile has continuously increased since 2005, and in 2013 reached 70% of respondents [12].

There is another interesting point that manifested in the study. Dynamically developing technological trends form new opportunities when not a person is looking for a job, but a job is looking for a person. Under the conditions of de-massification of production, companies with a unique technological profile survive and consolidate in the market, not only working to fulfil customer needs, but also actively shaping new customer needs. At the same time, alumni which were trained for a specific company profile are becoming increasingly popular. At the same time, the majority of respondents from among the undergraduates surveyed did not catch this trend, traditionally considering the future professional employment as a post-graduate project [13]. Despite the fact that most of the undergraduates in the period of study had working experience, only 18% of the respondents worked in the specialty, most of whom linked their future professional activities with the education they received at the university. The effectiveness of the development of the university professional program, and, consequently, the professional potential of the alumni depends largely on the system of students' work practices. And in this issue, both undergraduates and employers are unanimous. At Bauman Moscow State Technical University, there are a lot of active schemes for attracting young people to work in companies for a wide range of students who would like to combine work and study - the so-called part-time internship programs, joint projects, exhibitions, conferences, and so on. For many, these forms are a real opportunity for professional development, an opportunity for a student to improve the skills directly on the labour market in real professional mode. Organizations and companies collaborating with BMSTU offer various options for internship practices, projective assignments and other modern forms of student participation in the work of the company, the inclusion of these forms in the educational process. This allows employers to see a young specialist "in business", assess his knowledge, skills, and abilities, and helps the future specialist to adequately assess their capabilities in their future profession and expand the variability of professional competencies. Unfortunately, most undergraduates still did not feel the positive role of practitioners in developing their own professional potential.

The study recorded more than one disequilibrium. When hiring a young specialist without first-hand experience in assessing the structure of his competences, for the employer, the behavioral competencies and personal qualities of the applicant are more important, almost 58% of respondents answered this way, and undergraduates consider professional competence and work experience as a guarantee of successful employment — almost 73% of respondents noted these values. At the same time, both sides consider such an important factor of success in finding a job as a future specialist as responsibility, motivation to work, diligence and ability to work in a team.

It should be noted an important point: the vision of the aspects of employment and the structure of the necessary competencies in future specialists is differentiated according to the fields of training. Students of management departments consider the ability to formulate their point of view and communicate it to the team, the ability to predict the situation and navigate in unusual situations, offer alternative solutions, the ability to plan and perform their work independently, and technical students consider important for future employment skills such as analysis, professional computer skills. In general, students place greater emphasis on their professional knowledge, ability to plan and carry out their work independently, work experience in their field, professional computer skills and knowledge of a foreign language, and the employer on employee's personal qualities, namely responsibility, motivation to work and diligence, the desire to learn and relearn. Based on the changes occurring in the labour market, it can be assumed that in an innovative economy employers' requirements for graduates in the professional field will increasingly focus on the universality of primary professional competencies, and the gap in understanding the importance of social and communicative competences will be less noticeable [14].

By asking the same questions to alumni and employers, you can see a slightly different picture of the perception of the current situation on the labour market in the area of expectations of each other. Alumni in employment in the company are focused on team work, considering the level of performance as uninteresting, and prefer office work to the production process, while their salary expectations are clearly overestimated. In addition to high salaries, they place high demands on career opportunities and, moreover, on comfortable working conditions. At the same time, it is precisely the overestimated wage expectations on the part of alumni that employers are most concerned about. The distrust of employers in the quality of social capital of a young specialist is reinforced by the unreliability of the graduate, manifested, in their opinion, in insufficient professional training, as well as in the pursuit of a quick change of job in search of a "better life." This disagreement of interests and the discrepancy between the expectations of employers and graduates today can be defined as the social problem of the interaction of agents of the modern labour market, the reasons for which require further study.

The study revealed various views of labour market participants on the effectiveness of job search channels. So, it is the employers' exhibitions for undergraduates are not the preferred channel for finding a job, but for many employers these exhibitions act as platforms where employers and future employees should meet. In addition, the study revealed that for some enterprises of the exhibition employers are the only connection with universities in the area of hiring young professionals. It can be stated that the exhibitions of employers in Bauman Moscow State Technical University are increasingly acquiring institutional status, acting as platforms for employer and graduate meetings, the popularity of this event is increasing, the number of participants in this event is increasing, events are

held with a certain frequency, the university carries out a strict selection of companies — participants. In order to increase the attractiveness of this employment channel for future specialists, to increase its effectiveness, it may be recommended to include free trainings, business games, master classes, seminars, as well as vocational guidance testing in the exhibition program.

#### IV. CONCLUSION

In general, the study showed that there is a growing need to find mechanisms for coordinating and integrating the interests of educational institutions and the labour market, students and employers in the context of dynamic changes in the requirements for a future professional. One of the key areas of the university work should be the formation of effective relationships between the labour market and educational institutions, the creation of a systematic basis for the employment of future specialists.

Today, more and more often they say that the pace of innovation development of a particular country will be directly related to the degree to which its members master new technologies and the training of new personnel, with a wide profile of interdisciplinary competencies [15]. Alumni of higher education, in particular, a technical university, are today this force which is more than any other can affect the development and success of society as a whole. Today, experts say, that the key of effective and successful development of any country are the interdisciplinary competencies that allow alumni to quickly adapt to new conditions, master vast amounts of information, deeply master specific activities, apply their knowledge to solve new problems, demonstrating social and psychological maturity. It is necessary for the Russian education system, domestic universities, to recognize these challenges in order to be competitive in modern conditions of labour market.

#### REFERENCES

- [1] S.Y. Glazyev, *Theory of long-term technical and economic development*. Moscow: Vldar, 1993.
- [2] A. Konstantinov, "The Cambrian Explosion" of Technologies, *Schrödinger's Cat*, no. 4 (18), pp. 46-48, 2016.
- [3] E.V. Mikhalkin, L.S. Skachkova, "Graduates of universities: current trends in the labor market and the problem of quality," *Human resource and intellectual resources management in Russia*, no. 1, 2012, pp. 38-43, Moscow: LLC INFRA-M.
- [4] M. V. Kovalchuk, "From Synthesis in Science to Convergence in Education," *Proceedings of MIPT*. 2011, Vol. 3, No. 4, C 16-21.
- [5] N.N. Gubanov, N.I. Gubanov and L.O. Rokotyanskaya, "Apollo's Challenge as a Driving Force in Education," *Proceedings of the International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSSES 2018)*. Series "Advances in Social Science, Education and Humanities Research", vol. 283, pp. 13-17, 2018. DOI: 10.2991/cesses-18.2018.4
- [6] V.Yu. Ivlev, M.L. Ivleva and V.P. Sedyakin, "Information Metaphors and Classification of Information Sciences," *Proceedings of the International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSSES 2018)*. Series "Advances in Social Science, Education and Humanities Research", vol. 283, pp. 874-879, 2018. DOI: 10.2991/cesses-18.2018.193
- [7] A.S. Chepovskaya, "I went down with a crust: a line on education was removed from vacancies" <https://iz.ru/837296/anastasiia-chepovskaia/s-korochkoi-spustilsia-iz-vakansii-ubrali-strochku-ob-obrazovanii> (date of circulation 01.06.2019)
- [8] H. Perkin, «The Third Revolution: Professional Elites in the Modern.» World. L., 1996, Perkin G. *The Third Revolution: Professional Society in International Perspective*. L., 1996.
- [9] N.V. Opletina, "Modern algorithms for managing the employability of a university graduate," *Humanitarian Gazette*, no. 3 (17), p. 10, 2014.
- [10] V.Yu. Ivlev, Yu.V. Ivlev V.Yu., M.L. Ivleva, "Logical-argumentative basics of educational culture," *Proceedings of 4th International Conference on Education, Language, Art and Intercultural Communication (ICELAIC 2017)*. Series "Advances in Social Science, Education and Humanities Research", vol. 142, pp. 173-177, 2017. DOI: 10.2991/icelaic-17.2017.38
- [11] Employers' requirements for current and future professional competencies of staff, *Monitoring of economic education. Information bulletin*, № 1 (75), 2014, C.27, Access mode:[https://www.hse.ru/data/2014/06/24/1310217910/%D0%98%D0%91%20%D0%9C%D0%AD%D0%9E%20%E2%84%961%20\(75\)%202014%20\(2\).pdf](https://www.hse.ru/data/2014/06/24/1310217910/%D0%98%D0%91%20%D0%9C%D0%AD%D0%9E%20%E2%84%961%20(75)%202014%20(2).pdf) )
- [12] *Ibid*, p. 24.
- [13] M.B. Oseledchik, V.Yu. Ivlev, M.L. Ivleva, "Knowledge as a non-equilibrium dynamic system," *Proceedings of the 2nd International Conference on Contemporary Education, Social Sciences and Humanities (ICESSH2017)*. Series "Advances in Social Science, Education and Humanities Research", vol. 124, pp. 1-5, 2017. DOI: 10.2991/icecssh-17.2017.1
- [14] N.N. Gubanov, N.I. Gubanov and L.O. Rokotyanskaya, "Prospects for the Development of a Universal Theory of Truth," *Proceedings of the International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSSES 2018)*. Series "Advances in Social Science, Education and Humanities Research", vol. 283, pp. 801-805, 2018. DOI: 10.2991/cesses-18.2018.177
- [15] V.A. Nekhamkin, "Synergetic and Modern Historical Knowledge: Possibilities and Limits," *Istoriya-Electronnyi Nauchno-obrazovatelnyi zhurnal*, vol. 6, no 7, 2015. DOI 10.18254/S00012222-3-1