

The Role of Publishing Activity of Polytechnic University Students in the Development of Polytechnic Education

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Abstract. Increasing publication activity is an important task in ensuring the effectiveness of students' learning and independent work, it contributes to the achievement of a high level in mastering basic, general professional and professional competencies in mastering "smart" technologies of the "Industry 4.0" concept. The aim of the study is to determine the role of publication activity of students of polytechnic universities in the development of polytechnic education in new economic conditions. In this study, the following tasks were solved: the mechanisms for increasing the publication activity of students at Russian polytechnic universities were investigated; recommendations were developed to increase the publication activity of polytechnic university students. The object of the research is a leading polytechnic university and comparable universities. The subject of the research is the influence of external and internal factors on the publication activity of students of polytechnic universities in the conditions of training specialists working with "smart" technologies in the transition to the concept of "Industry 4.0". The results and conclusions have elements of novelty, scientific and practical importance in terms of substantiating the role of publication activity of university students in the development of polytechnic education. The main research methods are the methods of analogies and logical analysis.

1. Introduction

Socio-economic transformations of the country are occurring at a rapid pace, there is a change in the value guidelines of society, an increase in the amount of information and requirements for professional competencies, which determined the change in educational programs of higher education. The concept of "Industry 4.0" requires the training of specialists to quickly and efficiently form and implement competences using "smart" technologies. And in this regard, publication activity is one of the priorities in the organization of independent research and project activities of university students [1, 2].

2. Publication activity in the scientific activities and education of students of polytechnic universities

Information on the Bologna Agreement (Slovenia, 2004, Bergen, 2005, etc.) noted that higher education needs to become more competitive, and if skills are transient, this contradiction may be

overcome with the help of flexible education systems. Modern specialists should have competencies for creatively solving professional tasks, adaptability to changes and innovations, and working with “smart” technologies. This is achieved through the active involvement of students in research and design work and the testing of results in publications [3, 4, 5, 6]. Within the EU, in 2002, the Declaration of the European Commission and European Ministers of Education on the development of cooperation in the field of professional education in Europe was accepted, which provided the basis for the Copenhagen process and determined the necessary conditions for the formation of a single European space in the field of professional training processes, provision of qualification visibility and competencies. Russia actively joined the processes of harmonization of higher education conditions in the framework of the Bologna process [7, 8, 9, 10]. There are many examples of tools to improve the scientific activity of students: a guide for teaching bachelors; master programs aimed at encouraging university graduates to study at the magistracy, postgraduate and doctoral programs. The results of independent research and project activities of students are published in various types of publications: monographs, collections of scientific articles, collections of materials of scientific conferences, periodicals [11]. The data in Table 1 show a high level of publication activity of Volgograd State Technical University, with a slight decrease by 2018.

Table 1. Key indicators of publication activity at Volgograd State Technical University during 5 years (2014-2018)^a.

The name of indicators	2014	2015	2016	2017	2018
1. Number of publications at elibrary.ru, of which:	4619	5038	5561	5493	4027
1.1 Number of articles in journals	2305	2103	1928	1773	1301
1.2 Number of articles in journals Web of Science or Scopus	190	184	188	188	87
1.3 Number of articles in journals of Higher Attestation Commission	1397	1283	1198	1222	869
1.4 Number of monographs	77	90	61	54	56
1.5 Number of patents	230	225	227	246	200
2. Number of citations at elibrary.ru	15676	14225	16896	17093	12597
3 Number of citations at Russian Science Citation Index	13966	11289	12485	12991	10221
4. Number of publication authors at elibrary.ru, of which:	1789	1855	1874	1837	1427
4.1 Number of authors of articles in journals	1358	1292	1276	1285	951
4.2 Number of authors of articles in journals Web of Science или Scopus	279	269	254	292	163
4.3 Number of authors of articles in journals of Higher Attestation Commission	1024	1035	1062	1105	770
4.4 Number of authors of monographs	159	191	165	121	117

^a it is compiled by the authors according to the scientific electronic library eLIBRARY.RU (date of updating the indicators of the organization 04/07/2019)

When comparing the data of comparable universities [12] of table 2 it can be seen: the studied university takes the second place in the number of publications.

Table 2. Publication activity of the Russian state polytechnic universities based at eLIBRARY.RU^b

	Name of the university	city	Number of publications	Number of quoted publications
1.	Altai State Technical University	Barnaul	25056	41678
2.	Volgograd State Technical University	Volgograd	47972	95384
3.	Voronezh State Technical University	Voronezh	43687	107171
4.	Don State Technical University	Rostov-on-Don	48963	98004
5.	Magnitogorsk State Technical University	Magnitogorsk	28269	66365
6.	Bauman Moscow State Technical University	Moscow	70226	256713
7.	Novosibirsk State Technical University	Novosibirsk	47744	141106
8.	Samara State Technical University	Samara	32309	706748
9.	Peter the Great St. Petersburg Polytechnic University	St. Petersburg	48213	167158
10.	Saratov State Technical University	Saratov	30482	63743

^b it is compiled by the authors according to the scientific electronic library eLIBRARY.RU (date of updating the indicators of the organization 04/07/2019)

Students take part in many publications as co-authors, but they are mainly presented in regional and university publications. Publication activity is the most important criterion for evaluating the effectiveness of a research institution as a whole and for each of the authors [13, 14] and is determined by indicators: the total number of publications per period; the structure of publications by type / kind, year, co-authorship; impact factor of journals; citation index, including Hirsch index [15].

In the modern scientific world, the basic indicator of scientometric analysis is a scientific text (publication), usually presented in the form of monographs (individual or collective) or articles in specialized journals. Since the scientific direction is also directly connected with the production of a huge amount of non-format texts, there are needs for the collection and analysis of scientific material, but also for providing accessibility to everyone. The information-analytical method, which aggregates scientific publications, is intended to fulfill the following purpose: to track and analyze the dynamics of the flow of scientific information, relying only on some of the publications. It is also necessary to take into account the fact that in order to obtain a good result, it is necessary to attract the largest spheres of Russian scientific and educational systems, and above all - polytechnic universities as agents of “smart” technologies during the transition to the “Industry 4.0” concept. [16, 17, 26].

3. Research of mechanisms for increasing publication activity of students of polytechnic universities

The mechanisms for activating a publication have two circuits: 1) intensive - there is an increase in the activity of teachers at polytechnic universities and students who have experience in publishing in journals of international databases; 2) extensive – it is correlated with the involvement of teachers of polytechnic universities and students in the process of publishing a scientific result in the Web of Science or Scopus journals [16], which requires inclusion in international scientific projects and academic mobility. Important factors determining the citation are: 1) the relevance and quality of the results presented in the article; 2) impact factor; 3) authority in the scientific community of a group of authors [16]. To increase the publication activity of students, extensive cooperation with priority research institutions abroad and Russia, with successful practices of introducing “smart” technologies, is necessary; formation of competence centers for cooperation with successful universities and rating publishers. [18]. Analysis of the data shows the need to develop approaches that contribute to enhance

the motivation of students of polytechnic universities to independent research and design work as the basis for the growth of publication activity with information support for students [19, 20].

4. Suggestions for increasing the publication activity of polytechnic university students

The university support of independent research and project activities of students is aimed at the growth and quality of mutual results, among which is the university's image in the scientific sphere, largely formed by evaluating the participation of students. Information support of students in terms of relevant "smart" technologies and solutions is important for the formation of research competence and responsibility for the project [20].

A necessary indicator of improving the quality of training is the effectiveness of publication activity and research work as a result of the implementation of mastered general professional and professional competencies and readiness to develop and protect the author's final qualifying work. In assessing the level and quality of these works / their protection, in addition to academic performance, meeting the regulatory requirements, as well as the requirements for the content and mastery of the theoretical methodological apparatus in the development of projects close to the real conditions of their implementation, we consider it important to take into account the experience and results of the student's participation in : 1) research work; 2) design work; 3) the presentation and public defense of research and design work; 4) publication of articles in the central press, collections, abstracts of conference reports; 5) approbation and implementation of research results in the practice of industrial enterprises; 6) obtaining the copyright to the approved developments on the basis of the implementation of scientific research and design works [19, 20]. This algorithm is known and successfully used in many large federal universities. However, at the regional level, the 3rd, 4th stages are implemented fragmentarily and formally at polytechnic universities. A very rare performance is generally observed for the 6th stage, that affects non-mastering a certain block of professional competences in the field of innovation and entrepreneurship, narrows professional mobility and business activity graduates of polytechnic universities. The authors believe that the 3rd and 4th stages are the connecting links in the integrated development of the above competencies, and therefore the authors offer recommendations for increasing the publication activity of students:

- at the 3rd stage ***presentation and public defense of research and design work***: the formation of an institute of mentors and centers of competence for research and design work of students; participation in scientific and methodological seminars and workshops, strategic, project sessions, trainings; conferences; the formation of teams of "student-consultants" of successfully mastered the competence of the preparation of presentations and public protection of the author's research and design work; forming teams of "organizing students" of scientific and methodological seminars and workshops, strategic, project sessions, trainings; conferences;
- at the 4th stage ***publication of articles in the central press, collections, abstracts of conferences***: mastering the competence of work in scientific electronic libraries by students (eLIBRARY.RU, ZNANIUM.COM, BOOK.ru); participation in the preparation of publications in journals indexed in the cited Web of Science or Scopus databases; the formation of teams of "student-experts", evaluating the author's contribution and the potential for the implementation of the results of the author's research and design work; the formation of teams of "student-reviewers", evaluating the possibility of publishing the results of copyright research and design work.

For the development of polytechnic education, this is a fundamentally important task of training specialists using "smart" technologies in the transition to the concept of "Industry 4.0" [21]. Activation of publication activity of political university students is an auxiliary process in the preparation of such specialists based on the stimulation and organization of their independent research and design work, related with their mastery of academic and scientific disciplines, each of which

should encourage students to participate at 3rd and 4th stages. The proposed recommendations are based on the principles of moral incentives within the framework of a proper approach and contribute to the development of polytechnic education.

5. Conclusion

The organization of independent research and design work of students at polytechnic universities is a complex and multifactorial process aimed at shaping the professional and civic position of a future specialist, motivated initiative work in the process of mastering educational and scientific disciplines; mastering high-level competencies. Success in this matter depends on the positive attitudes of the student and supervisor for co-creation and cooperation, the students' acceptance of responsibility for the formalization, demonstration and public protection of the results of original research and design works, their approbation in publications, in practice, and design and obtaining copyright. The results of the research, obtained by the authors, develop and refine the existing methodological approaches to the development of polytechnic education, are universal in nature and can be further used as recommendations for increasing publication activity and research and project activities of students on the basis of higher educational institutions of various sectoral profiles.

References

- [1] Bogoslovsky V I, Pisareva S A and Tryapitsyna A P 2007 Academic Mobility: A Manual for Students on the System for Acquiring Academic Degrees in the Member States of the Bologna Process (St. Petersburg) 120
- [2] Borisov A V and Vypritskaya E U 2015 The role of higher education in the modern world for the student *Materials of the IV International Scientific and Practical Conference (Voronezh)* 99-103
- [3] Turkulets S E, Listopadova E V and Barei N S 2018 Problems and Prospects of the Quality Management of Higher Education *Advances in Economics, Business and Management Research* **47** 124-126
- [4] Rusjan B and Castka P 2010 Understanding ISO's 9001 Benefits and Research through an Operations Strategy Framework. *Managing Global Transitions* **8** 97-118
- [5] Listopadova E V 2012 System of the quality management in higher education institutions *European Social Science Journal* **12(28)** vol 1 104-110
- [6] Listopadova E V and Turkulets S E 2013 The order and quality in the context of social engineering *European Social Science Journal* **11(38)** vol 1 266-270
- [7] J J Tari 2010 Self-assessment processes: the importance of follow-up for success, *Quality Assurance in Education* **18** 19-33
- [8] Tari J J and Madeleine C 2011 Preparing Jordanian university services to implement a quality self-assessment methodology *International Review of Administrative Sciences* **77(1)** 138-158
- [9] Tari J J and Madeleine C 2012 Introducing management models in service organizations in developed and developing countries *The Service Industries Journal* **32** 789-806
- [10] Zhao L, Sun C, Lv H and Sun Z, 2014 Practice plans of and factors influencing graduating dental students in China *International Dental Journal* **64(5)** 233-240
- [11] Popov D, Tyumeneva U and Kuzmina V 2012 Modern educational trajectories of pupils and students *Sociological Studies* **2** 135-142
- [12] The official website of the scientific electronic library eLIBRARY.RU <https://elibrary.ru/defaultx.asp?session=off>
- [13] Odintsova V A 2015 Formation of cognitive independence of students *Innovations in education* **11** 98-103
- [14] Kharitonova O V 2016 Academic mobility in the space of higher education *Person and education* **2** 41-45
- [15] Shogenova F A 2016 Development of the system of research activities of students in new social conditions *Pedagogy* **9** 85

- [16] Taranova A V, Borisova N I and Borisov A V 2016 Activation of publication activity of bachelors and masters of Russian universities in modern conditions *Russian Journal of Management*. **4(22)** 443-450
- [17] Grigoryan V G 2015 The role of the teacher in the organization of students' independent work *Higher education in Russia* **11** 108-114
- [18] Minyaeva N M 2015 Self-education teaching at the university in the light of the key ideas of the humanities *Higher education today* **7** 49-54
- [19] Zenkin A S and Kirnyaev V M 2014 Independent work of students: method. instructions:(Saransk. Publisher of Mordov University) 35
- [20] Chuprova L V 2012 Research work of students in the educational process of the university Theory and practice of education in the modern world: materials of the International correspondence scientific conference (St. Petersburg: Renome) 380-383
- [21] Maksimchuk O V and Pershina T A 2017 A New paradigm of industrial system optimization based on the conception "Industry 4.0" MATEC Web of Conferences vol 129 :International Conference on Modern Trends in Manufacturing Technologies and Equipment (Sevastopol, Russia, September 11-15) eds.: S. Bratan et al. Sevastopol State University, National University of Science and Technology «MISIS» Polzunov Altai State Technical University Inlink Ltd. and International Union of Machine Builders doi: 10.1051/mateconf/201712904006