

18th PCSF 2018
Professional Culture of the Specialist of the Future

**COMMUNICATIVE COMPETENCE OF ENGINEERS AS A
REQUIREMENT TO THE FUTURE PROFESSIONS**

Irina Trostinskaia (a)*, Dmitrii Popov (b), Veronika Fokina (c)

*Corresponding author

(a) Peter the Great St. Petersburg Polytechnic University (SPbPU), Polytechnicheskaya 29, Saint Petersburg, 195251
Russia, trostinskaya_ir@spbstu.ru, 8 (911)285-56-15

(b) Peter the Great St. Petersburg Polytechnic University (SPbPU), Polytechnicheskaya 29, Saint
Petersburg, 195251 Russia, popov_dg@spbstu.ru, 8 (911)940-93-36

(c) Peter the Great St. Petersburg Polytechnic University (SPbPU), Polytechnicheskaya 29, Saint Petersburg, 195251
Russia, fokina_vv@spbstu.ru, 8 (921)380-39-86

Abstract

This paper examines the grounds for the Master's program introduction in the sphere of scientific PR and the promotion of scientific and technical products, proves the relevance of technical, socio-economic and human sciences convergence in a modern and promising market of professions. The review of the program contents, new competences, and learning outcomes is presented. Problems of a communicative nature that arise in hi-tech and innovative enterprises are noted. We justified the role of PR, advertising and marketing in the process of building communication with potential customers and partners and in promoting the scientific and technical product. The potential of socio-economic and humanitarian components in the formation of professional competencies of future professions has been revealed, it is noted that specialists-carriers of interdisciplinary convergent knowledge come to the fore. The perspectives of studying the Master program "Scientific PR and promotion of scientific and technical product" on the basis of the "Advertising and Public Relations" direction are shown for graduates, business, universities. The receipt of additional competences in the field of scientific PR is justified.

© 2018 Published by Future Academy www.FutureAcademy.org.UK

Keywords: And master's program, communicative competences, engineers, scientific PR.



1. Introduction

The idea of the sciences convergence is, in a way, the driving force of the modern educational paradigm. The education system returns to its ancient sources, marking the next stage of the sciences integration, only in a less concentrated form, which seems quite logical in the light of the human relations complication, the commissioning of new discoveries (geographical, quantum, genetic, etc.), the appearance of new objects and new technologies, the enrichment of mankind with new knowledge, and so on. In the history of antiquity, training was based on the "three pillars" - philosophy, law, theology, where philosophy laid the foundation for the synthesis and at the same time the diffusion of sciences, incorporating a moral and natural philosophy, to the first group, in modern terms, culturology, political science, economics and further, to the second - physics, chemistry, materials science and other sciences. In turn, New Times has contributed to the fragmentation of science, making knowledge private.

The modern task of the learning process is to generalize the achievements of various scientific directions to solve a significant theoretical or applied problem, while the convergence of humanitarian, technical and economic knowledge significantly simplifies the implementation of this task. At the same time nowadays the business environment also appeals to universities with a request for new qualities of human resources, new competencies formed in the framework of educational programs (Trostinskaia, Safonova, & Pokrovskaja, 2017).

In addition, training by virtue of its continuity and significance is a factor of competitiveness not only of the individual, professional group, but also of the state. This is evidenced by the wide attention of executive authorities and the public to the projects of the National Technological Initiative. The change in global markets, in the structure of industrial production, automatically raises the question of new approaches to the place and role of education in providing the Russian economy with competitive engineers, workers, and managers (National Technology Initiative, 2018). "Public communication of major scientific and technical projects performs a number of functions - creates an actual agenda for thinking about scientific and technological progress, shapes public opinion, participates in the construction of national identity" (Nikiforova, Bylieva, Lobatyuk, & Petrova, 2017, p.118).

2. Problem Statement

The modern market assigns the most diverse tasks to high-tech and innovative enterprises, it has long been not sufficient to develop a unique product, there are non-engineering problems connected with the need to build communication with potential consumers and partners (including investors). The market of scientific and technical products has its own specifics, since products of this kind are of piece, not mass character, it requires the search for a particular customer, the demand for this kind of products is conditioned by the current situation (market, political, environmental, etc.). In this regard, knowledge of a technical nature should be complemented by competencies in the field of advertising, PR and marketing.

In this connection it is possible to note the Framework Program for Scientific Research and Innovation of the EU "Horizon 2020", which aims to promote the development of an economy based on scientific knowledge and innovations in Europe, in this regard its main components are: "advanced science", "social challenges" "And" industrial leadership "(Horizon 2020).

The importance of knowledge integration is also emphasized at the state and regional levels of different countries. Strategy in the field of Germany innovation policy "Die neue Hightech-Strategie. Innovationen für Deutschland" includes such areas of state activity in the innovation field as: digital economy and society, environmentally responsible economy and energy, innovative labor market, healthy life, smart mobility, security of civil society, to achieve innovations in these areas work should be carried out in such directions as: simplification of the transfer of knowledge, higher innovation dynamics, improving the quality of institutional framework conditions and more intensive a dialogue between all participants of the innovation process (Die neue Hightech-Strategie Innovationen für Deutschland, Berlin, 2014).

According to the joint innovation strategy of the federal states of Germany in Berlin and Brandenburg, promising sectors are: healthcare, energy, transport, mobility, logistics; ICT, media, creative industries; optics (Gemeinsame Innovationsstrategie der Länder Berlin und Brandenburg (innoBB), 2011).

According to the strategy of UK scientific and innovative development, science and innovation remain the most priority and are the key to long-term economic growth of the country, it is based on such principles as: achieving scientific superiority, quick response to new challenges, intensifying cooperation between scientific disciplines, sectors, experts and countries, awareness of the importance of the territorial factor in the deployment of research facilities, openness and inclusion in the world and novation processes (Our Plan for Growth: science and innovation, 2014, Innovation Report 2014).

Already there are approximate ideas about the future of science and technology, and at the same time about the professions that will be in demand in the future. It can be noted that all these professions are integrative and, quite often, combine social and technical knowledge and skills, in particular, IT-medic, energy auditor, personal profile safety consultant, clinical bioinformatics, agroecologist, compositional engineer-economist, designer of emotions, architect of transmedia products, techno-stylist, etc.

It is interesting that the socio-economic and humanitarian components play a very important role in the development of future professions competencies. Managers, marketers and communication specialists come to the fore, going beyond the usual view of their professions, since now they are carriers of interdisciplinary knowledge, for which a variety of combinations become possible.

"It is not only power institutions and large corporations that can benefit from the achievements of scientific and technological progress, we are talking about accessibility for ordinary citizens, despite attempts to restrict access or filter content" (Popov & Fokina, 2018, p. 108).

The competitiveness of the state in the international arena, as well as the competitiveness of the authorities in designing the desired quality of life from citizens point of view, more than ever depend on the successful modernization of the labor market, production and consumption of goods, services and ideas.

Universities as the main player in the market of educational services are also interested in forming new proposals for the labor market. "Higher education is a special world and a special communication space. In modern conditions, universities are becoming multidisciplinary centers for the generation and preservation of knowledge, the training of a new specialists generation and the creation of a national innovation system" (Popov & Fokina, 2015, p. 61). Requests from employers are complicated in accordance with the requirements of the time. The economy of knowledge is looking for new formats for interaction with educational institutions in order to obtain the best possible labor force in the right amount and at the

right time. Claims to the market of educational services are largely related to the discrepancy between the desired image of an employee, his skills and abilities with the requirements of the organization and the industry. According to a number of authors, "the university plays the role of a leading participant and an organizational mediator for the cooperation of the academic environment, business environment and government" (Barykin & Kobicheva, 2018), "universities should play a major role in the formation and implementation of new ideas and technologies" (Etzkowitz, 2010), this also applies to the training of specialists with new competencies.

3. Research Questions

In this connection, a number of questions arise that require a fundamental answer:

- What additional competencies should specialists in engineering and technical specialties receive in order to be competitive in the new conditions?
- Does scientific and technical production require PR promotion?
- Do engineers need additional competencies of socio-economic and humanitarian nature, including the communication sphere?

The president of Motorola, Ch. Galvin, believes that a modern organization for success needs:

- quick adaptation to the needs of the client (with a tendency to shorten the reaction time for individual orders);
- foreseeing changes in the external environment and managing internal changes;
- creative possibilities of the firm (Rubin, 2005, p. 96).

At the same time, there is an opinion that "one of the main factors hampering the development of the innovation process in universities is the lack of a modern, market-oriented integrated management and innovation cycle support system from searching and supporting promising research and development to realizing a high-tech product on the market and reinvesting part profit in the development of scientific research" (Rubin, 2005, p. 154).

PR in the marketing system of a high-tech product is designed to neutralize this problem, if not from an organizational position, then from a communication one. The role of PR is emphasized by the importance of forming the fame of the manufacturer, which is achieved through:

- studying consumer requests and analyzing consumer behaviour (scientific and marketing research);
- building relationships with staff (internal communications);
- research of socio-psychological factors and political conjuncture in determining pricing policy (sociological and marketing research);
- use of active methods and means of PR (presentations, seminars, conferences, exhibitions, etc.) (external PR) (Rubin, 2005, p. 245).

At the same time, taking into account the specifics of the scientific and technical product, a mutual movement is possible: from the interests of the developer to the formation of demand from the customer; from the customer's need to creation a product for the specified criteria.

4. Purpose of the Study

In our opinion, this kind of educational program that facilitates the convergence of technical and social knowledge is the Master program "Scientific PR and the promotion of scientific and technical product" on the basis of the training area 42.04.01 "Advertising and Public Relations." In the process of mastering the knowledge and skills of the program, the student-engineer develops the following additional professional competencies:

- is able to manage the communication project at all stages of its life cycle;
- able to create and coordinate the work of the team, defining a strategy for achieving the goal;
- is able to plan, organize and coordinate the process of creating media content and communication products that are in demand by the audience;
- is able to analyze the needs and interests of the audience in order to forecast and meet the demand for scientific and technical products;
- is able to use modern technical means and information and communication technologies corresponding to a certain audience;
- is able to evaluate and forecast possible effects on the customer, including in the media sphere.

At the same time, it is important to use additional competencies for the implementation of basic professional skills, since it is assumed that the student has his own scientific and technical product at the time of enrolment to the master's program, which requires promotion and search for the customer. The student should be prepared for two important tasks:

- to convince the potential customer that this particular product has all chances to be successful in the market;
- to know which product needs to be created to meet market and customer requirements.

To solve these problems, the student must have the skills of a researcher, an analyst and a communicator, while working in a team - communicator-moderator and communicator-mediator.

5. Research Methods

In our opinion, it is advisable to consider graduate engineers as a kind of system, the formation of which is influenced by a number of elements (education, market, culture, etc.) that fill the structure with certain functions. Under the influence of various factors, these elements change their state and function. Our task is to propose the state of the system close to optimal under modern conditions and to work out ways of achieving it and outrunning the requirements of transformations.

One can note the influence of modern approaches to the perception of the future through the concept of the socio-technical imaginary, which influenced, among other things, both the development of professional competencies in the professions of the future and the image of the future employee in the eyes of the employer (Jasanoff, 2015). Within the framework of the international conference "Contours of the Future: Technologies and Innovations in a Cultural Context (2017)" (RFBR, Project 17-03-14200), the authors of the article, the organizers and participants of the conference, considered various aspects of synthesis in the St. Petersburg Polytechnic University Peter the Great representations about the future in the most important branches of socio-humanitarian knowledge, including the future labor market issues at

the global, regional and local levels of interaction between the state, science, society, business and education (Contour Future: Technology and innovation in the cultural context, 2017).

It is also important to focus on the laws of the theory of rational choice in determining the additional competencies required in the future that will increase the competitiveness of the technical specialist.

6. Findings

The master's program "Scientific PR and the promotion of scientific and technical product" reflects the current challenges facing graduates of polytechnic universities, since scientific and technical products currently require not only qualified engineers, but also specialists capable of substantiating its uniqueness for the customer, form a demand for this product and promote it to a modern highly competitive market. That determines the relevance of the master's program on the basis of the St. Petersburg Polytechnic of the University of Peter the Great.

Theoretical basis in combination with applied disciplines; training at the Department of Advertising and Public Relations, existing on the basis of the well-known research center - St. Petersburg Polytechnic University Peter the Great, well-known practitioners; master classes; practice in leading advertising and PR agencies; participation in scientific and scientific-practical conferences; project activity; participation in profile competitions and exhibitions - all this gives students the opportunity to discover their creative potential and become specialists in the field of PR and advertising and in the sphere of scientific and technical communications.

The goal of the program is to integrate the knowledge and skills of PR specialists and advertisers in relation to the knowledge and skills of technical specialties, which should result in the students receiving additional competencies in the field of innovative products promotion based on the previously mastered bachelor's program in the framework of technical, economic and humanitarian training.

The objectives of the program: to study technologies of technical products promotion; to get skills in the field of scientific communications; to study technologies of printed and TV advertising of scientific and technical products; to get skills in positioning and promoting scientific and technical products; to learn how to use information and communication technologies in scientific and technical PR; to get skills of planning and implementing advertising on the promotion of scientific and technical product; to master skills of project management; to study technologies of human resources management; to master the methodology of PR-design; to get skills of development of PR-strategy and tactics in the scientific and technical sphere; to get ideas about scientific journalism and ways of popularizing scientific activity; to get skills of publishing and printing activities to promote scientific and technical products; master the skills of design and graphic presentation of the advertising product; to gain management skills in crisis communications in various situations, from technical problems to man-made disasters; to study ways of working with investors.

It is important to remember that the program has a practical nature and its main task is to include the undergraduate in the process of obtaining knowledge and skills. As we noted above, this is facilitated by the combination of theoretical knowledge with applied abilities and skills, which is achieved through the approbation of the acquired knowledge in the process of students passing a number of practices, including: educational, organizational, project, pedagogical, industrial research, pre-diploma practice and research work.

Each master student receives a supervisor from the first year of training, who helps him to develop his own individual PR project, corresponding to the previously obtained education and knowledge in the technical field.

The key professional disciplines are: channels for the technical products promotion, market analysis for specialized media, advertising products production technology, strategies for scientific products PR promotion, Internet entrepreneurship in the scientific and technical sphere, communication technologies with target audiences, etc.

Students receive the knowledge and skills necessary for successful work in the field of advertising and PR in various industries and businesses, as a PR manager of high-tech companies and research organizations, the Event Manager of museum and exhibition complexes, a PR specialist in communications with industry Media, specialist in the promotion of innovative products, SMM-manager, Internet marketer, etc.

At the same time, prerequisites are created for students to acquire knowledge and skills that meet the requirements of future professions, including such overprofessional skills and skills as working with people, project management, multiculturalism, client-oriented thinking, system thinking, work in conditions of uncertainty, intersectoral communication, skills of artistic creation (Atlas of new professions, 2018).

7. Conclusion

Such modern integrative professions of the future (Atlas of new professions, 2018), emerging at the junction of advertising, PR and other sciences, correspond to modern trends (increasing complexity of management systems, increasing competition, globalization, increasing demands for environmental compatibility):

Table 01. Characteristics of the future professions

The profession of the future	Characteristic
Brand Manager of Spaces	a specialist who is responsible for filling the virtual space with cultural meanings associated with a particular territory and thereby creating a brand of territory (cities, countries and at other levels)
Infostylist	A person who selects information and style of its presentation for the needs of a specific user
IT preacher	a specialist in communication with end users of IT products and promotion of new solutions to groups that are conservative in relation to advanced technologies
Community Development Coordinator	a specialist who organizes and maintains a dialogue between independent producers' teams, coordinating their long-term goals and the general image of the future, helping them to determine the program of joint investments in production capacities and people
Coordinator of productions in distributed communities	a professional who consolidates the order and organizes the work of independent teams working within the industry community to design, manufacture and assemble the product as required by the client
Marketer in the field of composites and ceramics	a specialist who predicts and designs the opening of new markets or the reassembly of available materials for composite materials

Curator of collective creativity	a specialist who collects art groups for the implementation of a specific creative project
Marketer for energy markets	specialist engaged in solving the problems of energy sales
Medical marketer	specialist in market research in the field of pharmacology, medical services and medical equipment, develops the marketing policy of an enterprise or research center
Manager of crowds and crowding platforms	a specialist who organizes the work of crowded framing platforms, conducts preliminary assessment of projects for obtaining crowdaming financing, analyzes conflicts between depositors and project holders
Online Sales Manager	a specialist who in offline companies develops mechanisms for promoting products via the Internet, organizes marketing campaigns on the Internet, accompanies his own online stores or works with partners to improve the service for customers
Moderator	a specialist in organizing group discussion of a problem or collective creative work with the aim of ensuring that students learn new material in the course of practical work
Moderator platform for communication with government agencies	a specialist who organizes an online and offline dialogue between social activists and officials responsible for specific areas (for example, education, construction, etc.), to develop joint solutions
Moderator of user communities	a specialist who organizes online communities of users, accompanies a dialogue with the company's product developers for the development of the product line, supports their loyalty
Technomediator	key specialist in the field of strategic development of the company. Its basic tasks include research and analysis of changes in market needs, a forecast of the potential customers consumption structure
Trendwatching / Foresighter	a specialist who tracks the emergence of new trends in various sectors of the economy, public life, politics and culture, which reports on the impact of new trends on client needs

The considered master's program will allow to solve the following tasks:

- to give the market specialists of an integrative profile capable of combining engineering knowledge with applied skills of promoting their products;
- to teach graduates to establish and maintain communication at all stages of development and introducing a scientific product.

Thus, it seems important for engineers to receive additional competencies in the field of communication, which will allow combining scientific, industrial and communication technologies in the development and implementation of scientific and technical products.

Acknowledgments

The reported study was funded by RFBR according to the research project № 17-03-00799

References

- Atlas novy`x professij (2018). Retrieved from: <http://atlas100.ru/catalog/> [in Rus.].
- Barykin S., & Kobicheva A. (2018). Logistical approach to universities integration in the Russian innovation economy, *MATEC Web of Conferences*, Vol. 170, 01-20. DOI:10.1051/mateconf/201817001020.
- Die neue Hightech-Strategie Innovationen fur Deutschland [The new high-tech strategy innovations for Germany] (2014). Berlin. Retrieved from: https://www.bmbf.de/pub_hts/HTS_Broschure_Web.pdf [in Germ.].

- Etzkowitz, H. (2010). *Trojnaya spiral` : universitety`-predpriyatiya-gosudarstvo : innovacii v dejstvii [The Triple Helix: University—Industry—Government: Innovation in Action]*. Tomsk: Tomsk State University of Control Systems and Radioelectronics. [in Rus.].
- Gemeinsame Innovationsstrategie der Lander Berlin und Brandenburg-innoBB. [Joint innovation strategy of the States Berlin and Brandenburg innoBB]. (2011). Retrieved from: <http://innobb.de/Gemeinsame-Innovationsstrategie-Berlin-Brandenburg-innoBB> [in Germ.].
- Horizon 2020. (2013). *The EU Framework Programme for Research and Innovation. Spreading Excellence and Widening Participation*. Retrieved from: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/spreadingexcellence-and-widening-participation>.
- Innovation Report (2014, March). *Innovation Research and Growth. Policy Paper. BIS*, 20. Retrieved from: www.gov.uk/government/publications/innovation-report-2014-innovation-research-and-growth.
- Jasanoff, S., & Kim, S-H. (2015). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power*. Chicago, London: University of Chicago Press. DOI:10.7208/chicago/9780226276663.001.0001
- Nikiforova, N., Bylieva, D., Lobatyuk, V., & Petrova, M. (2017). The Problem of "Sign Field" Creation for the Russian National Technology Initiative. *4th International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM2017. Book 6, Vol. 1*, 117-124. DOI:10.5593/SGEMSOCIAL2017/HB61/S7.14
- Our Plan for Growth: science and innovation (2014, December). *Presented to Parliament by the Minister of State for Universities, Science and Cities by Command of Her Majesty*. Retrieved from: www.gov.uk/government/publications/our-plan-for-growth-science-and-innovation.
- Popov, D.G., & Fokina, V.V. (2015). Rossijskaya vy`sshaya shkola: voprosy` kommunikacii proizvoditelej i potrebitelej obrazovatel`ny`x uslug [Russian Higher School: to the Questions of Communication between Producers and Consumers of Educational Services]. In S.V. Klyagin, O.D. Shipunova (Eds.), *Philosophy of the Communication: University education in sociocultural dynamics of information society* (pp. 58-63). Saint-Petersburg: Publishing House of the Polytechnical University. [In Rus.].
- Popov, D.G., & Fokina, V.V. (2018). Vliyanie nauchno-texnicheskogo progressa na transformaciyu resursov vlasti i obshhestva [The Influence of Scientific and Technical Progress on the Transformation of Power and Society Resources]. *Journal of Administrative Consulting*, 3, 103-113. [In Rus.]. doi:10.22394/1726-1139-2018-3-103-113.
- Kuznetsov D.I., Sergeev, V.V., Almazova, N.I., & Nikiforova, N.V. (2017). *Kontury` budushhego: texnologii i in,novacii v kul`turnom kontekste. [The contours of the future: technology and innovation in a cultural context]*. [Collective monograph] Saint-Petersburg: Asterion. [In Rus.].
- Rubin, Y. B. (Ed.) (2005). *Predprinimatel`skie universitety` v innovacionnoj e`konomike [The enterprise Universities in Innovative Economy]* Mocsow: Market DS Corporation. [In Rus.].
- The National Technological Initiative (2018). Retrieved from: <http://www.nti2035.ru/nti/>
- Trostinskaia, I.R., Safonova, A.S., & Pokrovskaia, N.N. (2017). Professionalization of education within the digital economy and communicative competencies. In M. Shestopalov (Ed.). *Proceedings of 2017 IEEE 6th Forum Strategic Partnership of Universities and Enterprises of Hi-Tech Branches (Science. Education. Innovations)* (pp. 29-32). Saint-Petersburg: SPUE. DOI: 10.1109/IVForum.2017.8245961