

## **Modelling as the Basis for Building a Competency Model of a Specialist Demanded by Industrial Enterprises in Priority Social and Economic Development Area (PSEDA)**

<https://doi.org/10.3991/ijet.v15i13.13941>

Vladislav Lizunkov <sup>(✉)</sup>

Tomsk Polytechnic University Yurga Institute of Technology,  
Yurga, Kemerovo Oblast, Russia  
vladeslave@rambler.ru

Ekaterina Politsinskaya

Tomsk Polytechnic University, Tomsk, Russia

Elena Malushko

Volgograd State University, Volgogradskaya Oblast, Russia

Alexander Pavlov

Penza state technological university, Penza, Russia

**Abstract**—The article links with methodological analysis and review of the foundations presented in various scientific sources, features of process modelling and models structuring for training specialists in special economic zones for manufacturing enterprises. Modelling is a key tool for building a competency model of a specialist demanded by industrial enterprises in PSEDA.

**Keywords**—Model, modeling, supplementary vocational education, specialist, Priority Social and Economic Development Area, enterprise.

### **1 Introduction**

The world economy associated with the constant development of competition, the introduction of new rapidly updated technologies and industries creates an ever-growing and changing demand for new types of competencies and forms of specialist training in the system of supplementary vocational education.

On December 29, 2014, Federal Law of the Russian Federation No. 473-FZ “On Priority Social and Economic Development Area (PSEDA) in the Russian Federation” was signed, the main purpose of which is the development of the Far East through the creation of PSEDA with many preferences [1].

On June 22, 2015 On June 22, 2015, the Government of the Russian Federation issued Decree No. 614 “On the peculiarities of creating priority social and economic development areas in the territories of single-industry municipal formations of the Russian Federation, single-industry towns. This Decree is focused on addressing the key socioeconomic problems: an increase in the standard of living of single-industry settlements, on the territory of which more than 17 million people live, as of 2019.

The main goal of PSEDA is to attract investors and, as a result, avoid mono-dependence through creating new enterprises and production facilities.

When analyzing various literary sources reflecting the world experience in the training and retraining of specialists in supplementary vocational education systems, we determined that modelling is one of the key tools for building a model of the specialist demanded by industrial enterprises at PSEDA.

## **2 Subject and Methods of Research**

As we know, modelling quite often is the basis for various scientific and experimental practices in building both theoretical and organizational-methodological factors for improving educational approaches and systems.

This method today is a learning tool in science, modelling is a method that studies individual, selected sides of the objects studied.

Of course, this is a way of studying rather than the object itself, but its model, which further analyses the modelling results (B.S. Gershunsky). By V.V. Kraevsky definition modelling is the reproduction of the characteristics of some object on another object specially created for studying them [1].

A model is a modelling tool and product resulting in an intelligent process. Using it the researcher in the studying process receives the necessary information characterizing the main object.

Our study present interesting author's approaches to constructing specialist models and competencies in the theory of professional activity and work psychology (A.A. Derkach, E. A. Klimov, A. K. Markova, A. A. Verbitsky, N.V. Shestak and A.A. Dulzon) [2, 3, 4]. In our work, we also studied approaches in the field of model development [5].

The approaches are used for the educational practice of demanded by the PDA staff. Investigations are presented in the scholarly writings aimed at studying the staff professionalization problems: A.V. Novokreschenova, I.P. Marchenko, V.I. Gorb, T.D. Pshenichnikova, T.M. Mineeva, etc.

To implement the research plan, we chose a modelling method - reproduction of some characteristics of an object on another object (model) specially created for their study by V.V. Kraevsky. The modelling method helps to reproduce the integrity of the studied object, its structure, communications, functioning, to maintain this integrity at all stages of the study. Modelling the process of development of economic and managerial competencies of engineering bachelors involves the construction of a system that functions similarly to the process under study.

We agree with the opinion of E.L. Rudneva, who believes that the creation of a simplified model of the system is an effective means of verifying the completeness of theoretical concepts.

According to V.S. Bezrukova, the general principles of modelling any pedagogical acts are to place a person's model in the centre paying attention to his personality traits and development prospects, principles of human priorities, humanization and nature-compatibility. Meanwhile, it is necessary to create simulated systems flexible, dynamic, so that during the implementation of a given process they are capable of restructuring, changing, complicating or simplifying by the principle of self-development of simulated systems [6].

For an incomplete empirical picture of the investigated phenomenon or object which is incomprehensible in details, modelling as a cognition method has a particular importance. The main modelling advantages are the synthesis of knowledge about this object and the definition of the important for its study parties.

The essence of the modelling scientific method is the formation of analogies, the correspondence of one object to another from certain positions. On this base, a simple structural object is displayed in a more complex object which allows by analogy to transfer data to the original from the model.

Modelling is a research method that is currently widely used in various scientific fields. Modelling is meant the reproduction of the characteristics of some object on another object specially created for studying them [6].

According to scientists, the formation of simplified models of the system is an effective means of checking the reliability and integrity of theoretical concepts in various fields of knowledge.

Modelling is applied research since it focuses on the practical use of results and simultaneously is a connecting element of pedagogical theory and practice.

The main goal of competency modelling is to provide arguments for adjusting the educational process. The student's competency model enables precise orientation, denotes clear guidelines for the formative processes of preparing graduates for professional activities.

The model sets such characteristics of business activity, the implementation of which in the educational process will provide the necessary level of competence of the graduate [7].

A model is an idealized concept of correspondence to a real object of research [8]. The presence of a partial similarity relationship allows using the model as a substitute or representative of the system under study. Science has already proved that a well-constructed model has a highly attractive property: its study provides some new knowledge about the original object.

Based on these principles, V.S. Bezrukova proposes the following procedure for creating a model that guides us in our work.

### **3 Survey Results Analysis**

The procedure for modelling a pedagogical object, according to V.S. Bezrukova:

**Stage 1** (Preparatory work): Analysis of the modelling object; Choice of model shape; Theoretical basis of modelling; Methodological support; Spatial and temporal support; Logistics support; Legal support of modelling.

**Stage 2** (Model Development): Choice of a system-forming factor; Establishing relationships and dependencies of components; Writing a document.

**Stage 3** (Model Quality Check): Theoretical experimentation of the model; Expert review; Adjustment; Deciding about use.

We took a conditional structural model as the basis for modelling the specialist's competency model, which, according to S.I. Arkhangelsky, expresses one or another assumption about the internal structure and connections of the studied object, manifested in the observed facts. Our model represents the subject of research as a system of relations. The basis for the construction of the model is the structure of the object, which meets the purpose of construction and reflects the essential aspects and signs of preparing Bachelor of Mechanical Engineering for professional activities [9].

Two models are reflected in scientific works: static and dynamic. Characterizing an object only at a specific moment, the static model is its mould, section in the process of cognition. Therefore, every process is interpreted as to its fragments since both the initial state and the result remain unknown [10].

As for the dynamic model, its essence lies in clarifying the interdependencies between the goals of the formation of all components of the model at a certain time point and establishing a specific sequence of neoplasms as well as changes in them. A similar model serves to orient the process, determine its specific goals and ways to achieve them [11, 12].

Nevertheless, the literature notes the impossibility of creating an accurate statistical model in pedagogy because the pedagogical activity is a creative process and interaction of people, individuals requiring specific approaches and methods of influence.

## **4 Conclusion**

A theoretical and empirical summary of the problems range of this study made it possible to develop a model and highlight the main structural components in it [13].

In the process of modelling and development, we used competency-based and systematic approaches. Such trends in Russian education as the need to form a new type of competence in the human resources of Russian society, improve the quality of specialists training, prospects for the free integration of specialists in the socio-cultural and economic space of modern Russia and the near and far abroad countries, into the international system of labour division, the formation of conditions for expanding access to educational services market created a special educational context requiring the use of competency-based approach for modelling [14, 15].

The competency-based approach determines the most important methodological guidelines for the organization of didactic and methodological support for the educational process of developing competencies among students as a system that presents opportunities for solving the problem [16].

## 5 Acknowledgement

"The article was carried out with the financial grant support of the Russian Science Foundation (project No. 19-78-00018)".

## 6 Referenses

- [1] Gershunsky, B.S. (1990) Continuity of educational activities in the context of continuing education. Prospects for the development of the continuing education system, Moscow: Pedagogy, pp 148-163.
- [2] Verbitsky, A.A. (1991) Active Learning in Higher Education: A Contextual Approach. Active higher school education: a contextual approach, Moscow: High school, 204 p.
- [3] Pedagogy and Psychology of Higher Education study guide 2005, Moscow: RAPS, 258 p.
- [4] Shestak, N.V. (2006) Learning technology in the system of continuing professional education. Higher Education in Russia, 12: 98-103.
- [5] Verbitsky, A.A. (2004) Competency-based approach and contextual learning theory, Moscow: Research Center for the Problems of the Quality of Labour Training, 83 p.
- [6] Bezrukova, V.S. (1996) Pedagogy: Projective pedagogy, Yekaterinburg: Publishing house "Business book", 344 p.
- [7] Antonova, I.I. (1999) Didactic conditions for training future teachers of technology and entrepreneurship in the basics of management: dis. ... candidate of Pedagogical Sciences: 13.00.08, Komsomolsk-on-Amur, 176 p.
- [8] Kulikova, L.V. (2006) Communicative style in an intercultural paradigm, Krasnoyarsk State Pedagogical University named after V.P. Astafiev, Krasnoyarsk, 392 p. <https://doi.org/10.25146/1995-0861-2018-46-4-97>
- [9] Sattari, A., Abdekhoda, M., Gavvani, V.Z. (2017) Determinant factors affecting the web-based training acceptance by health students, applying UTAUT model. International Journal of Emerging Technologies in Learning, 12(10) : 112-126. <https://doi.org/10.3991/ijet.v12i10.7258>
- [10] Wichadee, S. (2017) A development of the blended learning model using edmodo for maximizing students' oral proficiency and motivation // International Journal of Emerging Technologies in Learning, 12(10): 137-154. <https://doi.org/10.3991/ijet.v12i02.6324>
- [11] Chen, J., Zhao, J. (2018) An educational data mining model for supervision of network learning process // International Journal of Emerging Technologies in Learning, 13(11) : 67-77. <https://doi.org/10.3991/ijet.v13i11.9599>
- [12] Nesterova, L.V. (2003) Formation of the information culture of future forestry engineers in the process of humanitarian training: dis. ... candidate of Pedagogical Sciences: 13.00.08, Bryansk, 227 p.
- [13] Zhang, W. (2018) A variable precision rough set model for Knowledgeassisted management in distance education // International Journal of Emerging Technologies in Learning, 13(11): 41-53. <https://doi.org/10.3991/ijet.v13i11.9602>

- [14] Waheed, H., Hassan, S., Aljohani, N., Hardman, J., Alelyani, S., Nawaz, R. (2020) Predicting academic performance of students from VLE big data using deep learning models. *Computers in Human Behavior*, 104, March. <https://doi.org/10.1016/j.chb.2019.106189>
- [15] Lizunkov, V., Politsinskaya, E., Malushko, E., Kindaev, A., Minin, M. (2018) Population of the world and regions as the principal energy consumer. *International journal of energy economics and policy*, 8 (3): 250-257.
- [16] Shamne, N. L., Milovanova, M.V., Malushko, E.Yu. (2019) Cross-cultural professional communication in the context of globalization. *IOP Conference Series: Materials Science and Engineering*, 483(1): 012081. <https://doi.org/10.1088/1757-899x/483/1/012081>

## 7 Authors

**Vladislav Lizunkov** is PhD at Tomsk Polytechnic University Yurga Institute of Technology, Yurga, Kemerovo Oblast, Russia, [vladeslave@rambler.ru](mailto:vladeslave@rambler.ru). The area of scientific interests is the theory and methodology of vocational training.

**Ekaterina Politsinskaya** is undergraduate at Tomsk Polytechnic University, Tomsk, Russia,. The area of scientific interests is the theory and methodology of vocational training. [Katy031983@mail.ru](mailto:Katy031983@mail.ru)

**Elena Malushko** is PhD at Volgograd State University in Volgograd, Russia.. The area of scientific interests is the theory and methodology of vocational training. [malushko\\_elena@mail.ru](mailto:malushko_elena@mail.ru)

**Pavlov Alexander** is PhD at Penza state technological university in Penza, Russia. [pavlov\\_85@bk.ru](mailto:pavlov_85@bk.ru). The area of scientific interests is the theory and methodology of vocational training.

Article submitted 2020-02-26. Resubmitted 2020-03-26. Final acceptance 2020-04-01. Final version published as submitted by the authors.