# CRITERIA AND INDICATORS FOR COMPETENCIES DEVELOPED BY SPECIALISTS FOR PRIORITY DEVELOPMENT AREAS

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## Abstract

In the context of creating Priority Development Areas (PDAs) on the territory of the Russian Federation, it is becoming increasingly important to find effective forms and methods of training specialists to work in the enterprises of the real sector of the economy located in the PDAs. The creation of new enterprises is a necessary, and often the only prerequisite for the development of territories that for various reasons are facing a difficult socio-economic situation. Undoubtedly, with new businesses opening in the region and requiring specialists with competencies not previously demanded in the region, or requiring a higher level of training, the interaction between educational institutions and businesses is also reaching a new level of training. The authors of the article, together with representatives of manufacturing enterprises, developed a diagnostic map for assessing the competencies developed in specialists trained to work in PDAs, which contributed to determining the effectiveness of interaction. The authors introduced the developed diagnostic map into the activities of the educational organisation, thus facilitating the implementation of the experimental part of the study, which assessed the effectiveness of training specialists for PDAs. The experiment involved 172 employees from various enterprises in the PDAs. This tool for diagnosing the criteria and indicators for the competencies developed in specialists trained to work in manufacturing PDAs can serve as part of the interaction between any type of educational organisation and any type of enterprise.

## 1. Introduction

Pedagogical science and practice have shown in recent years that the quality of the educational process depends directly on how comprehensive and systematic the approach to its organization is, and how well the internal mechanisms for the functioning of the educational process are regulated. One such mechanism is the interaction of the parties involved in the training of future specialists, namely the cooperation of educational organisations with enterprises of the real economic sector (hereinafter referred to as enterprises) (Zavarzin & Goev, 2011).

## 2. Problem Statement

There is a holistic and comprehensive understanding of the interaction between the subjects of pedagogical systems, in the context of the interaction between educational organisations and enterprises, in the works of L.A. Vitvitskaya, Zh. M. Dyatchina, N. F. Radionova, M. Ranga, H. Etzkowitz and other scientists (Prosvirkin, 2009; Ranga & Etzkowitz, 2013; Savchenkov, 2016; Savchenkov & Gordeeva, 2016). In their view, the educational process itself is a polymorphous and multidimensional interaction of its actors. Based on the specifics of educational activity, the authors see it as a process of mutual enrichment with the meaning of joint activities, experiences, emotions, attitudes and different standpoints. Interaction of subjects of the educational process from the position of systematic approach is understood as a special type of their links, relations, characterizing the processes of mutual influence and change of subjects of pedagogical systems on each other, their active and personal exchange, which results in their mutual enrichment and transformation, joining of efforts in influencing the common subject of activity.

## 3. Research Questions

In the context of the PDA, the need to find forms of interaction between educational institutions and enterprises has become more relevant with the opening of new manufacturing enterprises. The emerging business sectors are often new to the region, and it is difficult to train specialists with the required profile and qualifications due to the lack of specialized educational institutions in the region. Here we are faced with a contradiction: a PDA opens an enterprise on its territory to create jobs, and the specialists who would occupy these jobs are not available, or they need retraining of personnel with competencies that do not meet the requirements of a modern enterprise (Kitova, 2019; Risin, 2009).

## 4. Purpose of the Study

One way of resolving this contradiction is through competency-based training, which begins as early as the planning stages of new enterprises. It is important to determine the effectiveness of specialist training by the level of the required competencies according to the criteria and indicators developed by educational institutions in cooperation with production enterprises. The key criterion for effective training work is the degree of employer satisfaction with the outcome of training, and its indicator is the availability of demand for professionals.

This interaction makes feasible one of the main objectives of the creation of new production enterprises in the PDAs, which is to create new jobs.

However, it is not possible to assess all criteria by simply comparing labour market statistics and surveys of employers. For this reason, the problem of finding effective means and methods of diagnosing the criteria and indicators for the competencies developed in specialists trained to work in PDAs remains topical for modern pedagogical science (Lizunkov et al., 2019).

## 5.  Research Methods

Many researchers deal with the development and application of tools and methods for diagnosing the criteria of effectiveness of specialist training in the interaction of educational organisations with enterprises of the real economic sector. Thus, the authors of the article draw on the writings of B. Blum, M.G. Minin, A.I. Subetto and J.G. Tatura, S. Ankrah, M. Franco, ML. Pinheiro et al. (Ankrah & Omar, 2015; Franco & Haase, 2015; Pinheiro et al., 2015). An analysis of the scientific and methodological literature on pedagogical measurement issues enabled the authors to identify the most significant means and methods in world practice with the greatest evidence of effectiveness, including:

- sociological (in most cases in the form of a questionnaire);
- expert, i.e. an expert evaluation based on a questionnaire by the assessed employee (experts may be managers, responsible officials, supervisory boards, NGOs, auditors, consumers);
- computational (statistical), i.e. mathematical processing of an array of data. Analysis of the received data allows concluding about the quality of personnel training, with the further calculation of training efficiency

## 6.  Findings

The authors have defined the criteria and corresponding indicators reflecting the level of competencies developed in specialists trained to work in PDAs, which are given in Table 01 (Shestak, 2006).

They discussed the proposed criteria and indicators with experts and representatives of enterprises starting up and operating in the PDA (OOO Siberian Investment Group, OOO Yurginsky factory of nonwoven materials, OOO Double Medical.ru2), educational organisations involved in personnel training, with specialists from employment centres and human resources specialists from the PDA administration.

We worked together with representatives of the companies to develop the characteristics of the main elements in the diagnostic tool for assessing the development of competencies. An example of a diagnostic map for assessing the level of developed competencies according to the planned training results for demanded specialists in PDA is given in Table 02 (Chen & Zhao, 2018; Verbitsky, 1991)

**Table 1.** Criteria and indicators for the competencies developed in specialists demanded by PDAs

| Criteria | Indicators |
|---|---|
| 1. Personality-oriented accentuation of competencies | Motivation for personal and career growth in the acquired profession, readiness for self-improvement and self-development. Acquisition of self-analysis and self-assessment skills. Personal qualities and their formation, which consists of purposefulness and goal-setting, responsibility, accuracy and punctuality, creativity, organization and independence. |
| 2. Cognitive-oriented accentuation of competencies | Professional competencies (in the fields of modern technologies, peculiarities of industries and manufactures, trends and dynamics of development of the industry and economy in general, etc.). High level of literacy (in areas of work with information sources, technical works and tasks, project activities, research and development, etc.). Innovative thinking (in the areas of forecasting and analytical activities, the ability to anticipate industry and market trends, etc.). |
| 3. Activity-oriented focus on competencies | Upper-professional and professional competencies, knowledge of norms and standards, practical possessions and skills aimed at the development of the enterprise and industry. Primary skills of research and design and implementation activities Experience of leadership, teamwork, social interaction of organizational activities. |
| 4. Satisfaction of employers with the results of training specialists | There is a demand for specialists. It is determined by comparing and analysing statistical data from employment centres and personnel services of enterprises; interviewing representatives of production enterprises. |

The data in Table 02 reflect an expert toolkit for assessing the developed competencies of a specialist trained/re-trained to work in PDA enterprises (using the example of the chief fishmonger of the trout production plant OOO SIG). Each expert, based on the indicators for assessing the competencies of specialists, correlated them with the level of competencies (1-3), thereby determining the degree of their development.

Person-centred knowledge, skills and abilities:

Level 1 - depth, clarity, completeness, validity, reasonable originality (non-standard) of judgements and inferences; ability to establish causal relationships independently;

Level 2 - minor deficits in depth, clarity, completeness, validity of judgements and inferences; ability to make causal relationships independently manifests with external assistance;

Level 3 - superficiality, lack of clarity, narrowness, empirical and unsubstantiated judgements and inferences, inability to establish causal relationships even with external assistance (Lizunkov et al., 2020).

**Table 2.**  Example of a diagnostic map for assessing the developed competencies of the head fishmonger of the rainbow trout plant, OOO SIG

| Content of the competency | | |
|---|---|---|
| Plan, organise and supervise the work of the workshops and individual production areas of the fish farming process. | | |
| Evaluation indicators | 1. Work on the improvement of fish breeding standards, methods of rearing pond and lake fish and whitebait for fish stock reproduction and organise their implementation (number of developed standards and methods for the reporting period). 2. Manage experimental works on fish breeding and fish farming (number of experimental works carried out in the reporting period). 3. Participate in the development of new processes and the improvement of existing ones. Promote the implementation of science and best practices (number of technological processes developed and implemented in the reporting period). 4. Train workers in safe work practices and methods (number of workers trained in the reporting period). 5. Monitor compliance with the established biotechnical processes for fish farming. 6. Participate in the development and implementation of efficiency measures (number of measures proposed in the reporting period). 7. Develop current and future production plans in the organisation. 8. Monitor the implementation of the production plan for fish breeding and fish farming and take measures for its fulfilment. 9. Monitor: - the performance by subordinate employees of their occupational safety and health duties; - compliance by employees with the requirements of the legislation on labour protection. 10. Organise record keeping and reporting of fish production at all stages of the fish farming process. | | |
| Assessment of indicator performance | Assessment of presence/absence, completeness of these indicators | | |
| Proficiency level | Level 1 (low) Compliance with 1-3 indicators | Level 2 (average) Compliance with 4-6 indicators | Level 3 (high) Compliance with more than 7 indicators |

Cognitive-oriented knowledge, skills and abilities:

Level 1 - completeness and the correct sequence of the operations that make up the action; accuracy and certainty of execution;

Level 2 - completeness and the correct sequence of operations constituting the action; minor inaccuracies in the performance of individual operations;

Level 3 - inability to reproduce the correct sequence of operations that make up the action.

Activity-oriented knowledge, skills and abilities:

Level 1 - systematic observation reveals behavioral signs of personality traits in all learning (professional) situations;

Level 2 - systematic observation reveals behavioral signs of the personality trait (attitudes) in learning, professional and other activities occasionally;

Level 3 - systematic observation does not reveal behavioral signs of personality traits (attitudes) (Lizunkov et al., 2020).

The developed expert toolkit for assessment of developed competencies is one of the methods to diagnose not only the criterion "Satisfaction of employers with training results", but also the level of joint interaction between the educational organization and enterprises in the process of advanced training, as it was the joint work of the educational organization and enterprise that prepared the diagnostic card (Lizunkov et al., 2020).

## 7.  Conclusion

The experiment to test the effectiveness of the training of future specialists involved 172 employees of various PDA enterprises. The key criterion for effective specialist training and, as a consequence, successful interaction between an educational organisation and PDA enterprise was the criterion "Satisfaction of employers with training results".  The authors of the study conducted a survey of employers whose employees have received SVE at the Yurga Technological Institute of Tomsk Polytechnic University (UTI TPU) and have been working at the company for six months. Employers assessed the development of personal, cognitive and practical knowledge, skills and competencies, including knowledge of job duties; knowledge of company information; theoretical and practical foundations of professional activity; and motivation for professional growth (Osipov, 2016). Table 03 shows the results of the training assessment and the list of enterprises whose employees participated in the expert committee's work to assess the level of proficiency of the trained specialists.

The total number of company representatives was 172, who all participated in the work to identify the relevant competencies of the demanded specialists in PDA, performed at the beginning of our survey. Columns 1 and 2 in Table 03 list the enterprises and the number of experts; in addition to the enterprises (lines 1 and 2) whose employees underwent training, the expert commission included representatives of organisations planning to enter the PSEDA of various Russian regions (lines 3-5).

Table 03 shows that 128 experts rather highly estimate the level of training of the employees who were trained at UTI TPU, 27 experts assess the training at an average level, which is probably associated with the complexity of assimilation of the educational program by trainees, 17 experts classify the trainees as having a low level of training, which is affected by their low level of basic training (Lizunkov et al., 2021).

**Table 3.**  Results of experts' assessment of the proficiency level of employees trained at the UTI TPU

| PSEDA enterprises that participated in the expertise | Experts (number of people) | Level of training | | |
|---|---|---|---|---|
| | | 1 level (low), (people) | 2 level (average), (people) | 3 level (high), (people) |
| 1.OOO SIG | 23 | 2 | 2 | 19 |
| 2. OOO Textile Factory "Siberia" | 26 | 2 | 3 | 21 |
| 3. OOO Yurginskiy Factory of Nonwoven Materials | 27 | 3 | 5 | 19 |
| 4. OOO Double Medical.ru2 | 19 | 2 | 4 | 13 |
| 5. OOO Vostok | 22 | 2 | 4 | 16 |
| OOO Angerosudzhensky melkombinat | 28 | 3 | 4 | 21 |
| OOO LesPromMax | 27 | 3 | 5 | 19 |
| Total | 172 | 17 | 27 | 128 |

The result of this assessment also confirms the effectiveness of interaction between the educational organisation and the PDA enterprise, which largely resulted from the application of interaction between university teachers and enterprise representatives (Lizunkov et al., 2021).

The developed diagnostic toolkit enabled a critical approach to the quality of specialist training for manufacturing enterprises in PDAs.

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