On the issue of evaluating educational programs for additional professional education

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Abstract. The article considers the problems of assessing the program of additional vocational education, considering the new realities, the management environment, the widespread introduction of the digital economy, which place new demands on workers and their professional competencies or even changes in their work activities. A methodology is proposed for calculating the integrated index of the educational program effectiveness, including vocational education, considering important economic, social, organizational, and educational components, which involves considering their quantitative and qualitative characteristics. The main conceptual elements of the evaluation system of additional programs are reflected, and the scale and evaluation standards are proposed. The economic effect of the program is determined in cost terms based on the expected revenues and expenses for the program. The article shows an example of calculating private indicators of the effectiveness of educational programs for additional vocational training, and their translation into the relative effect is carried out with the help of the profitability indicator. This allows choosing the educational product necessary for specific consumers to attract additional extra-budgetary funds for the development of science in educational institutions. In addition, the issue of training the necessary personnel in demand for business is being addressed. According to societal needs, personnel with specified professional competencies appear on the labor market. All this creates conditions for realizing the interests of employees, employers, and the state.

Keywords: further vocational education, training efficiency, improving the competence of listeners, program evaluation

1   Introduction

The modern business environment for successful functioning requires compliance with the laws of sustainable development, which are reflected in the bills of government agencies and economic communities. However, the key role in all actions is given to the professional quality of the workforce and, consequently, to issues of vocational training.

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New vocational training programs must be meaningfully filled with unique knowledge and skills, accessible to students, and meet the requirements of state standards. Research on professional skills and competencies is vital to achieving successful professional programs. As a result, much attention should be paid to research into the pedagogical design and implementation of competencies focused on developing creative thinking.

Therefore, the question arises about the effectiveness of educational programs, including vocational education. There are no control-targeted numbers of admission to the ministry in this area, and therefore, there is no budget funding. It is necessary to select and implement programs in demand on the educational services market and of interest to business representatives.

The algorithm for changing vocational education curricula is not universal, as there are also institutional obstacles. Curricula are not easy to change. Therefore, institutions implementing educational programs, including vocational education, must combine efforts and organize the joint work of their structural units scientific institutions to commercialize advanced knowledge, technologies, and their implementation in everyday life.

The study aims to evaluate the choice of the optimal supplementary education program.

In our opinion, the main tasks for educational institutions in today's environment must be:

- Development of exports of key knowledge and priority technologies.
- Ensuring the growth of high-tech startups.
- Attracting budgetary and non-budgetary funds in scientific development.
- Qualitative growth of in-demand professional competencies of students.
- Development and implementation of vocational educational programs.

The central place in these issues is occupied by the tasks associated with developing and implementing educational programs for vocational education [1, 2]. They are at the heart of any quality development, and the educational environment is no exception. We must have trained personnel to implement breakthrough technologies introduce them into production and our lives. All this predetermines the importance of developing a new type of program aimed at training the necessary professional competencies [3, 4].

Not every educational program, including vocational education programs, can meet these requirements, but there is a question of its usefulness – effectiveness even if it does.

Therefore, its evaluation is necessary [5-7].

2   Materials and methods

Considering the issue of evaluating educational programs for further vocational education (FVE), it is necessary, in our opinion, to use the integral method of summing up the usefulness. Since any educational program and professional training has not only economic feasibility and practical usefulness, but also an organizational necessity and social significance.

We reflect the main conceptual elements of the proposed evaluation system of additional vocational educational programs. The total usefulness of the educational program is calculated by the formula (1):

$$U_{ed} = \sqrt[4]{Ee * Es * Eo * Ep}, \tag{1}$$

where: U_{ed} – the general usefulness of the educational program;

Ee – economic effect of the educational program;

Es – social effect of the educational program;

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Eo – organizational effect of the educational program;

Ep- professional effect of the educational program.

The total usefulness of the educational program (U_{ed}) varies from 0 to 1, respectively; the closer to one, the more effective FVE educational program proposed for implementation, and vice versa, if the indicator tends to zero. The educational organization has the right to set its standard for recognizing an effective program, but based on the examples discussed; it is recommended to set the standard in the range of 0.5 and above.

Calculation of the economic effect of the educational program is based on the expected costs and revenues of the organization in value terms, and their translation into the relative effect is carried out using the profitability formula.

The expected effect (E_e) is calculated as the difference between the income from the training program (I_{ed}) and the costs of the program (C_{pr}).

The profitability of the educational program is determined by the ratio of the economic effect of the educational program (E_e) to the cost of implementing the program (C_{pr}).

The calculation of the social effect of the educational program is based on qualitative characteristics. When calculating it, it is necessary to properly understand the social effect of an educational program.

The social effect is an indicator to strengthen the socially significant role of the professional educational program. In other words, the social effect will be a type or some form or content of the implemented social change under the influence of the formed competencies of the professional educational program. This indicator, in our opinion, reflects the characteristic of qualitative change. For example, an increase in the professional level, satisfaction with the financial situation, the growth of importance in society as a whole. Since society is primarily responsible for the social effect, the evaluation method should be based on society's expectations of the educational program. However, it should not be abstract people, but people involved in the problem. Based on the expert method, forming a table of requests for different selected experts, we collect information characterizing the expectations of these training programs. Processing the data using the technology of expert decisions, we calculate the generalizing ratio of the social importance of the educational program.

Calculation of the organizational effect of the educational program reflects the need and demand for the formed knowledge for the business or project groups. Formulas (2) and (3) can be used to calculate:

Request (shift) of business groups for educational programs:

$$\Delta = x_i - x_j, \tag{2}$$

where: Δ – request (shift);

x_i – the actual value of students in the program;

x_j – the planned value of students in the program.

The arithmetic mean of average shifts will show the need and demand for programs for the business community

$$\Delta_{av} = \frac{\Sigma\Delta}{n}, \tag{3}$$

where: Δ_{av} – organizational effect of the educational program;

n – the number of educational programs in a certain area;

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$\sum \Delta$ – the total number of requests (shift) from business groups for educational programs.

The calculation of the professional effect of the FVE educational program can be carried out as follows. For this assessment, it is necessary to use a ballot method based on surveys in selected groups of experts, and the resulting integrated index will be responsible for the educational effect of the educational program. The integral coefficient characterizing the professional effect is formed using the mechanism of rationing scores.

3   Results and discussion

Domestic and foreign researchers, assessing education, educational services, educational programs, as a rule, offer to define their quality, the result. The term "educational effectiveness" is used. However, there is no consensus on its interpretation and application. It should be especially noted that most often, this problem is considered in theory, or only in part of the economic component, that is, "costs – results" [8-11]. In our opinion, evaluation of the effectiveness of educational programs must necessarily include quantitative and qualitative characteristics, as already mentioned earlier. For educational programs of vocational education, the development of professional competencies is a mandatory aspect.

Consider the components designed to ensure the performance of employees necessary for the formation of competitive professional educational programs.

Competence assessment is carried out in the following areas:
1.   Communication – successful exchange, transfer of information, and interaction.
2.   Resource management in terms of education – especially in time management.
3.   Analytical thinking – the ability to operate with data arrays to choose a solution.
4.   Achieving the result – the formation of the results of any tasks for further analysis.
5.   Desire to learn – an opportunity to integrate new knowledge and skills.
6.   Teamwork – meaningful action, participation in teamwork.
7.   Change management – understanding and effective management of change; this competence also works for stress tolerance at work.
8.   Diligence – the ability to accurately perform the assigned tasks.

FVE educational programs are evaluated according to the presence of these competencies and their sustainable relationship. That is, already at the stage of development, these requirements should be included in the programs, and only programs that meet this requirement participate in the evaluation [12-15].

A fair question arises if this requirement is not considered, but the FVE educational program was still evaluated; what will the proposed evaluation mechanism show.

This situation was tested on programs that were not in the sample of programs to be evaluated and received a logical result, a decrease in values for two particular indicators of evaluation: organizational and social effect. The influence of the social and organizational effect on the integrated index of total utility leads to its value at a level below 0.5. According to our methodology, this indicates the ineffectiveness of the vocational education program and, consequently, the refusal to decide on the feasibility of its implementation within the framework of the educational institution. Testing the proposed methodology is shown in Figures 1 and 2.

4   Conclusion

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Summing up, it is worth saying that research into pedagogical approaches to the effective development of skills and competencies for sustainable development will undoubtedly be a priority. Research on the implementation of assessment of the effectiveness of vocational educational programs in university practice and academic systems, in general, will also be highly valued. The evaluation system for any FVE educational program should include quantitative and qualitative indicators that measure its usefulness for science and society, including the business community, based on expert evaluation models.
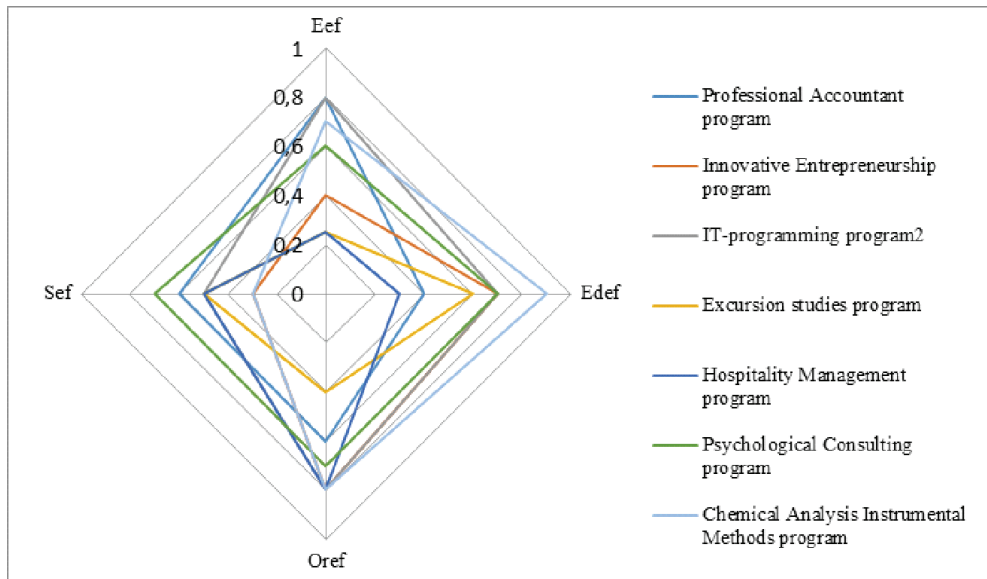
Fig. 1. Testing the evaluation of educational programs for additional vocational education (calculation of private indicators). Source: independent research of the authors based on the FVE NNSU programs).
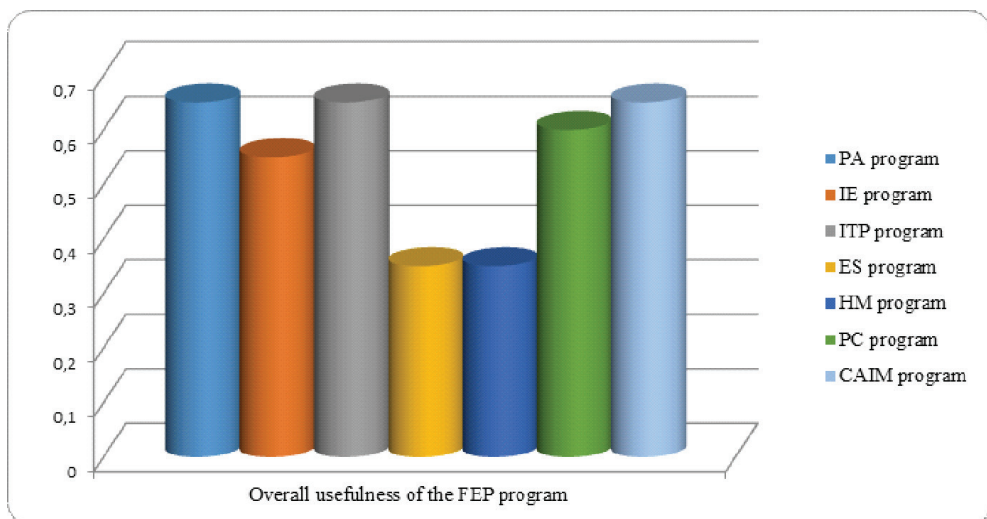
Fig. 2. Testing the evaluation of educational programs for additional vocational education (calculation of the overall usefulness). Source: independent research of the authors based on the FVE NNSU programs).

This assessment can be done both at the stage of developing programs, justifying their necessity, and existing programs to see in time and introduce the necessary changes in the education program, or to abandon it altogether if its usefulness is already negative. The need to develop and transform human resources is currently an urgent and important task. It closely correlates with global changes in the labor market, the digitalization of the economy, and the use of artificial intelligence in various professional fields. And here, it is important, in our opinion, to respect the interests of society, government, business, and education. And this, to a certain extent, is only possible with the demand for additional vocational education programs and, therefore, their proper evaluation.

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