



On the systemic approach in dual training

Sobre el enfoque sistémico en la formación dual

YESSEKESHOVA Maral Duiseneevna [1](#); SAGALIEVA Zhanar Kaukerbekovna [2](#); ISSABEKOVA Azhar Ordabaevna [3](#) & TASTANBEKOVA Nursaula Dzhaksibaevna [4](#)

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ABSTRACT:

This article considers theoretical and methodological aspects of developing the conceptual model of the dual training system and the model of the corresponding system of the learning process. Individual features of their practical implementation are shown, and basic positions of the development of students' systemic thinking skills and abilities are presented. The study analyzes the specificity of the formation of an indicative basis for the forthcoming professional activity of future specialists.

Keywords: systemic approach, dual training, model of the dual training system

RESUMEN:

Este artículo considera los aspectos teóricos y metodológicos del desarrollo del modelo conceptual del sistema de formación dual y el modelo del sistema correspondiente del proceso de aprendizaje. Se muestran las características individuales de su implementación práctica y se presentan las posiciones básicas del desarrollo de las habilidades y habilidades de pensamiento sistémico de los estudiantes. El estudio analiza la especificidad de la formación de una base indicativa para la próxima actividad profesional de futuros especialistas.

Palabras clave: enfoque sistémico, formación dual, modelo del sistema de formación dual

1. Introduction

Dual training in the Republic of Kazakhstan has been introduced relatively recently, therefore, there is a need for a holistic examination of this phenomenon. In addition, an analysis of the existing practice of dual training shows the dominance of traditional approaches in the organization of the learning process. Virtually nothing has changed in the content and methods of teaching.

The factor of increasing the effectiveness and quality of dual training is a systematic approach, which makes it possible to develop an appropriate model of the system. Such a system contributes to a more holistic study of dual training and the definition of the processes of its implementation in practice.

Like any pedagogical system, dual training has its structure, functions, mechanisms, and integrative qualities, the comprehension and purposeful use of which in cognitive and other activities requires systemic apprehension from students. As shown by our studies, REFERENCE the development of systemic thinking skills and abilities in future specialists contributes to the

improvement of the quality and effectiveness of preparation of modern specialists, their professional socialization, as well as the development of professionally significant personal qualities.

The present article is part of the common studies carried out by the research center of advanced specialist training at the S. Seifullin Kazakh Agro-Technical University (Astana, Kazakhstan). It is devoted to the elaboration of conceptual models of the dual training and learning process systems, as well as the consideration of their implementation in practice.

2. Conceptual models of the system of dual training and the system of the learning process and individual results of their implementation

The conceptual model of the system of dual training based on the systemic approach makes it possible to create a holistic representation of the systemic organization of activities and interaction of participants in the learning process which envisages the professional training of students, their professional socialization and the comprehensive development of professionally significant qualities.

From the point of view of the systemic approach, the learning process is seen as a "system-phenomenon" and as a "system-process", as such.

In the first case, the system of the learning process as a phenomenon can be represented as a set of its components, which include:

- 1) the activities of the teacher and students, their interaction for the effective implementation of the goals and objectives of the learning process, the achievement of the required quality of the planned learning outcomes and the training of future specialists;
- 2) the principles of teaching. In addition to the traditional didactic principles, the principles of systematicity and intensity were used;
- 3) the content of education, upbringing and development of future specialists. In our study, the content of education is seen as one of the fundamental components of the system of the learning process, to be assimilated by students. All other components of the learning process, including teachers, serve to ensure this assimilation. This, in our view, reflects the essence of the functioning mechanisms of the considered system. This phenomenon, which needs to be studied, can contribute to the development of our ideas about the theory of the mechanisms of the learning process.

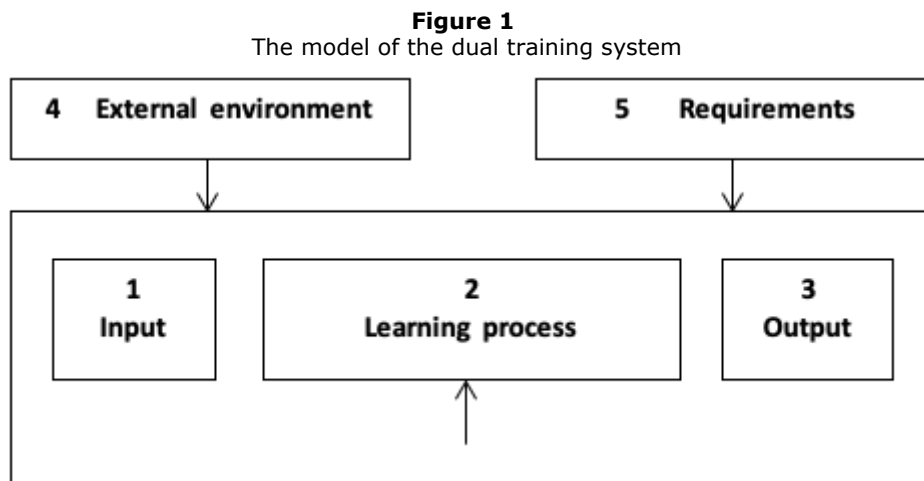
The content of learning envisages its components, which relate not only to professional training, but also to the development of professional socialization, professional self-determination and professionally significant personal qualities;

- 4) methods (of training, education, development, management, control, etc.). In the experiments, the methods of the systemic approach were also used: the method of analysis, synthesis, generalization and construction of a conceptual model of educational information to be learned; the method of systemic structuring, study and collapsed representation of information about the considered object; the method of studying the dynamic state of the studied object and others.
- 5) learning forms. In addition to traditional forms, it is also suggested to take into account the forms of management and self-management in the learning process, as well as the forms of interaction between subjects of learning – direct and indirect interaction;
- 6) means – personal (knowledge, skills, abilities, experience, competences acquired in the previous and current cognitive and other activities that can be used in this learning process, knowledge and skills of systemic thinking and creative activity, etc.), information, technical and other means of training;
- 7) the creative environment of training, development and education of students, contributing to improving the effectiveness and quality of the learning process;
- 8) the results of training received in each unit of study time, which can immediately be used and are used by subjects in their cognitive, theoretical, practical, research and other activities.

In the second case, the "system-process" reflects the functioning of all the components of the learning process in order to achieve its goals and solve the set tasks of education, upbringing and development.

System-forming factors for the projected systems are external goals with respect to dual training and internal goals of participants in the learning process, on the basis of which the learning process is designed and implemented.

The general model of the dual training system, which is designed as a set of input, process, output and feedback, is shown in Figure 1, where:



1 – The system input, where everything that is necessary for the implementation of the qualitative and effective learning process aimed at the professional training of students, their professional socialization and the comprehensive development of professionally significant personal qualities was formed. An important component of the input is a set of qualitative providing subsystems, including financial, material, information, personnel, scientific, methodological, software, psychological and other support.

2 – The learning process of dual training, where an active targeted interaction of its participants takes place to achieve the goals and objectives of dual training.

3 – The output, which is seen as the results of the learning process and dual training in general, changes in the status of participants in the learning process, and the effectiveness of providing subsystems, including management and monitoring of the process and results of training, upbringing and development of future specialists.

4 – The external environment, with respect to the dual training system, which has an active impact on the learning process and the state of its participants. The components of this environment included economic, social, political, demographic, market and other environments. The dynamic components of the environment are influencing factors. External factors include global educational processes (including in the field of dual training), state policy, and legislation. Particular attention as regards internal factors was given to the motivation of students and their readiness to receive the necessary knowledge, skills and competencies.

5 – Requirements determined by society, state, market, international and national standards, as well as students and teachers directly. We consider these requirements to be the dominant factor in improving the quality of education and training of future specialists.

Figure 1 presents the learning process of a holistic dual training system.

The model of the system of the learning process is shown in Figure 2, which contains:

1 - Goals and objectives of dual training.

2 - Activities of teachers, focused on achieving the goals and objectives of training.

3 - Components of dual training: principles, content, methods, forms, means, environment and results of training.

4 - Advanced learning in the classroom, the feature of which is the accelerated (in the advanced sense) formation of an indicative basis for the ongoing and forthcoming cognitive and other activities, as well as a set of relevant benchmarks for specific activities and actions resulting from the underlying knowledge and skills. The use of the methods of the systemic approach made it possible to form certain skills and abilities of systemic thinking, the advantages of which are indisputable for cognitive and other activities (Abdyrov et al., 2016; Reshetova, 2002; J. O'Connor and I. McDermott, 2008; Meadows, 2010; Razumov and Blagodatskikh, 2006; Ksenchuk, 2011).

Students' acquaintance with the well-known literature in the field of the systemic approach and systemic thinking significantly increased their interest not only in these phenomena, but also in

the questions of their practical use in cognitive and other activities.

It is noteworthy that the formation of systemic and other ways of thinking occurs within the framework of a traditional occupation, without violating its logic and content.

5 – Training in the field of production or in the workplace, in the course of which students check, refine and supplement the knowledge and skills acquired, as well as the assimilated guidelines for specific actions.

6 – Activities of students in the process of training, independent work, performance of professional tasks, development of personal qualities, etc.

7 – The end results of dual training, reflecting the quality of the acquired knowledge, skills, abilities and competences that meet the goals and objectives of education and training of future specialists, their professional socialization, the formation of relevant competences and the development of professionally significant qualities. An important result is also the level of formation of students' skills and abilities of systemic and other relevant ways of thinking.

6 – Feedback, implemented by monitoring the process and results of training. Feedback allows us to make timely adjustments (in case of any deviations) to the learning process and activities in order to ensure the required quality.

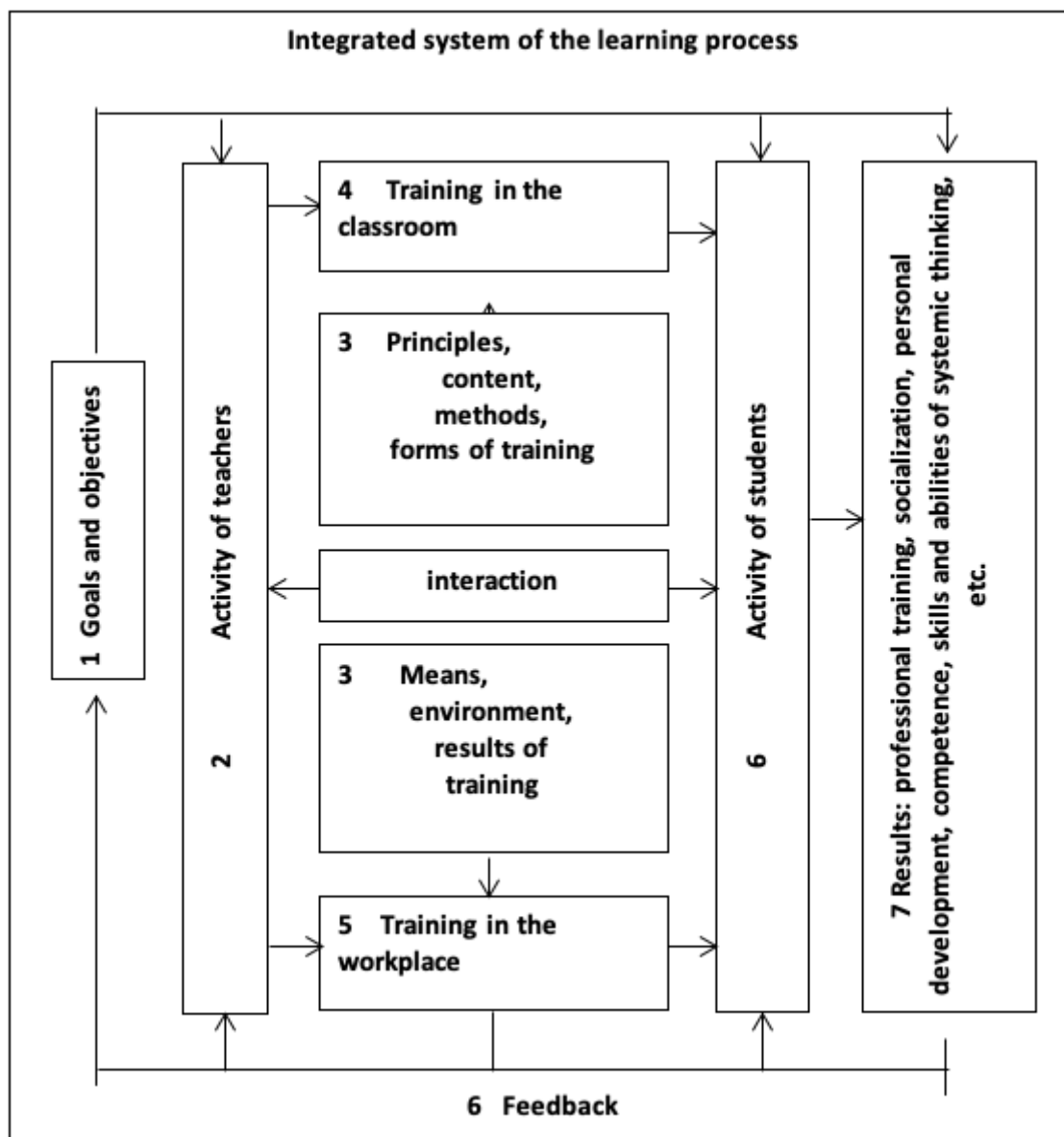
In the process of quality monitoring, relevant changes are introduced into all components of the integrated system of the learning process. Lastly, necessary adjustments are made to the goals and objectives of the learning process.

The developed model of the integrated system of the learning process was implemented on the basis of the systematic approach and in the context of training intensification that meets the rule: the sooner the learner starts to form systemic representations, skills and abilities of systemic and other relevant ways of thinking, the faster they help him to achieve the goals and tasks of dual training.

In addition, longstanding research has revealed a stable influence of the very process of formation of systemic thinking on the active and productive development of students' intellectual and creative abilities.

Figure 2

The model of the integrated system of the learning process



The periodic measurement of the received level of skills and abilities of systemic and other ways of thinking took into account the results of students' educational achievements, and their performance of special tasks.

The systematic approach in dual training (and in education as a whole) made it possible to realize the perspective idea of simultaneous formation of an indicative basis for the ongoing and forthcoming professional activity of students, which constitutes the "core" of basic knowledge, skills, and competencies.

In our experiments, along with the formation of an indicative basis for the forthcoming professional activity, students formed a wide range of indicative basic schemes for specific (and other professionally significant) actions that were the specification of basic knowledge, skills and competences in a certain field of professional activity. Thus, the future specialist was provided with a carefully designed set of specific actions and abilities to flexibly use and transform them depending on changing conditions and different situations.

As shown by our studies, the effectiveness and quality of the learning process was achieved largely through the formation of students' systemic representations, skills and abilities of systemic and other relevant ways of thinking. To a large extent this was facilitated by the method of systemic structuring, study and collapsed representation of information on the considered object, which helped students:

to master the principle and technology of systemic structuring of the studied and any other information;

to acquire the experience of versatile (integral) cognition of the studied objects and the environment;

to master the proposed types of activities and actions necessary for the future specialist to effectively solve the set and other professional tasks, including: analysis of the object; its modeling; studying and accounting of the set and changed conditions of existence and functioning of the object; studying and accounting of influencing factors, as well as the consequences of their impact on the considered object; studying and recording of the results of various scientists and their own research; studying and accounting of the existing practice of handling a given or similar object; monitoring of the state of the object; forecasting of the future state of the object; improvement of the object and the types of activities, methods of research, etc. At the same time, students simultaneously mastered the methods inherent in each of the activities and actions presented;

to master the ways of thinking, conditioned by the above activities and actions;

to realize the advantages of the systemic assimilation of effective activities and corresponding ways of thinking, significantly increasing their competitiveness;

to master the techniques of the voluminous perception of information and the creation of a matrix for its convenient and rapid structuring;

to master the skills and abilities of synthetic thinking as the basis for developing the creative abilities of future specialists;

to acquire the experience of using intersubject communications for the effective study of the object using information from various fields of knowledge and activity.

Dual training based on the systematic approach reduces the unproductive expenditure of labor and time, increases the cognitive capacity and productivity of training sessions, as well as provides for the positive motivation and professional orientation of training.

In the course of the study, the level of students' assimilation of the proposed activities as well as skills and abilities of systemic and other ways of thinking was positively evaluated: with an excellent mark – 15% of students of the learning experimental groups, with a good mark – 80%. This confirms the effectiveness of the used techniques and methods of the systemic approach.

Long-term experience in the implementation of training based on the systemic approach showed the almost complete (about 94%) assimilation of the content of training.

3. Conclusions

1. The generalized model of the dual training system and the model of the corresponding system of the learning process are developed on the basis of the systemic approach, and specific features of their practical implementation are shown.

2. A general description of the main processes of dual training is presented on the basis of the systematic approach that fosters the development of students' skills and abilities of systemic and other ways of thinking.

3. The peculiarity of the implemented dual training is that in the process of training in the production sphere or in the workplace, not only the acquired basic knowledge, skills and competencies, but also the corresponding schemes of the indicative basis for specific actions are verified, refined and improved (under the guidance of training specialists). In this case, we consider the basic knowledge, skills and competencies to be an indicative basis for the forthcoming professional activity.

Attention should be paid to the fact that the indicative basis for the forthcoming professional activity and the corresponding set of guidelines for specific actions (rules, instructions, schemes, algorithms, requirements, etc.) that are assimilated mainly during training in the classroom are systematically checked, refined and fixed in the minds and actions of students in the learning process in the workplace. All this is also carried out during the period of production activity under the guidance and supervision of specialists.

4. As shown by our studies and international experience, the organization of dual training based on the systemic approach is a kind of scientific inquiry, an attempt to change the existing traditional ideas about this type of training.

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1. Department of Vocational Education, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan, PhD in Pedagogical Sciences, Associate Professor, Head of the Department

2. Department of Vocational Education, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan, PhD in Pedagogical Sciences, Chief Researcher

3. Department of Vocational Education, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan, PhD in Pedagogical Sciences, Senior Lecturer

4. Department of Vocational Education, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan, Master of Vocational Education, Doctoral Student

Email contact: sensusveris11@gmail.com

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