Professional Competence Formation of High School Students Based on The System Approach.

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Abstract

This study addresses the issue of implementing a system approach during the higher school specialists preparation, which effectively leads to their professional competence formation. The study results of higher education teachers professional difficulties in the interaction with the educational process participants are presented. The training technology on the system approach basis creates conditions for the learning process participants' activities systemic organization, as well as for the system thinking skills and the system approach developing in cognitive, practical and other ongoing and forthcoming activities. An important factor in the future specialists' professional competence formation is an indicative basis formation for their future professional activity.

The professional competence structure and components characteristic are given. Examples are also presented, that demonstrate the professional competence formation implementation with a focus on current society needs. There is a description of the students' considerable professional competence increase after its formation methods correction.

Keywords: Competence, Professional Competence, System Approach, System, System Thinking, System Structuring Method.

Introduction

The problem of creating modern system methods that serve the formation of the student's professional competencies seems to be very relevant.

Issues of a professional competence systemic representation, its system structure and organization, as well as a systematic approach to its formation remain insufficiently studied. As a phenomenon, professional competence is considered by us as a systemic education, as integrity, as a set of its constituent competencies, which manifest their properties and functions only within this integrity framework.

At the same time, the opportunities for the formation of systemic representations, system skills and other relevant thinking ways in subjects are significantly increased. This is also aimed at various activities' types and activities used in the study, the mastering of which is an indispensable condition for the successful tasks set solving for vocational training, professional socialization and the all-round personality development of the future specialist.

The system approach allows to understand and form the professional competence of future specialists as competences and personal qualities' integral set necessary for the professional activities.

It is quite difficult to understand and form an interrelated competences set without the goal-oriented learning and active use of system knowledge, skills, abilities in the cognitive, theoretical and practical activities, as well as the indicative basis of the forthcoming professional activity. So-called indicative activity (actions) basis schemes are of particular importance, their assimilation arm future specialists in order to achieve certain goals and objectives of the tasks assigned.

In general, competence is defined as a correspondence measure of knowledge, skills and experience of a certain socio-professional individuals' status to the real tasks complexity level they perform and problems to be solved [1, p. 237]

Discussing the professional competence, the work [2, p. 34] authors define it as a specialist's integral business and personal qualities characteristic, reflecting not only the knowledge, skills, experience level, sufficient to achieve the professional activity goals, but also the individual's social and moral position.

According to A.I.Subetto, competence is a competences set, updated in certain activities types. At the same time, competence is considered by the last as a potential properties set or as a sub-quality in the university graduate potential qualities system [3,p.19] System-forming factors for the professional competence formation are the goals and final results of vocational training, professional socialization and the professionally significant personal qualities comprehensive development (realized by students). In this case, the professional individual socialization provides for the individual's entry into the social environment process, his integration into the professional community and, through this, to society as a whole .[2,p.23]

For the professional socialization implementation, the necessary conditions (in the classroom and periodical practice course)were created: for the development of the students certain ideas about the chosen profession and the forthcoming professional activity; for self-management certain skills formation and realization in educational-cognitive and other activity; to assimilate the conduct requirements and rules, established by the professional community and society as a whole, national legislation, regulations and forthcoming professional activity rules, etc.

It was established that the personality's professionally significant qualities development effectiveness largely depends on the availability of system thinking certain skills in the learner. In the vocational education process, the mastery and active use of the skills and systemic and other relevant approaches experience, appropriate methods for effectively achieving the goals and solving problems and tasks took place in the cognitive and other activities.

As Z.A. Reshetova thinks, the general methodological setting of systems thinking is to consider any science objects from the identical point of view in their one existence universal form: in the systems form as wholeness in unity with the internal complexity and parts organization [4, p.85]

So, D.O. Connor and I. McDermott believe that systemic thinking is the basis for clarity in thought and communication, this is the way to see more and more. Seeing a different, broader picture, you can more accurately understand what is happening and act in such a way as to obtain the best results in the long run. In their opinion, systemic thinking is an approach that allows us to see and understand the meaning and pattern in the observed sequences - patterns of events, so that we can prepare for the future and influence it appropriately. This means that we will be able to control the situation in some sense. [5, p. 21, 22].

A person as a system thinker [6, p. 15]:

- sees the whole picture;
- considers complex systems from different points of view in order to see new key points;
- is based on independent opinions;
- reflects on how the stereotypes of thinking affect our future;
- gives preference to long-term prospects;
- has a broad outlook (and a broad view of things), able to identify complex causal relationships;
- knows how to predict undesirable consequences;
- focus on facts, and not on reproaches and accusations;

- is able to come with the existence of paradoxes, contradictions and disagreements, without trying to immediately resolve them at any cost.

Following the system views, the researcher, according to A.I. Pushkar and L.V. Potrashkova, "should mentally see an object in three aspects: as something whole (system); as part of a more general system (supersystem); as a set of smaller parts (elements, subsystems) "[7, p. 107].

The systemic way of organizing and implementing cognitive, theoretical, practical, and other activities in the process of interiorizing activities becomes a way of systems thinking.

System thinking is defined as mediated and generalized reflection of the surrounding reality on the basis of the systematic principle, associated with the implementation of a systems approach in cognitive, theoretical, practical and other human activities [8, p.58]. At the same time, it is necessary to create the conditions for students to master various types of activities and activities that are relevant to their professional activities, contributing to the formation of general and special professional competencies, as well as the comprehensive individual development.

Materials and methods.

 Based on the above, as well as analyzing the main provisions that relate to the formation of professional competencies based on a systems approach, we conducted a study based on the research center of advanced specialists training at S. Seifullin Kazakh Agrotechnical University.

One of such methods is the method of systemic structuring, studying and "minimized" presentation of information about the object under consideration [8], developed at the Research Center for Advanced Training of Specialists at the Kazakh Agrotechnical University. S.Seifullin (KazATU) under the leadership of Professor T.T. Galiyev.

This work is devoted to the features study of the above method and the experimental study of its implementation in the learning process of KazATU. This study was attended by students of this school.

Structuring the learning content is defined by us as a specific way (method, technology) of transforming and presenting this content, carried out to achieve the learning objectives and the planned learning outcomes, education and development of the subject.

Structuring the studied (including advanced) information is a method (technique, technology) of transforming (coding, modeling, etc.) and presenting information for subsequent use in cognitive, theoretical, practical and prognostic activities of students and specialists.

Structuring the information under study has many objectives, including:

1) transformation of the considered information (for example, educational material) with the aim of its more efficient use, study and assimilation;

2) obtaining new information, new knowledge content;

3) changing the form of presenting information without changing its content;

4) the development of the considered information in terms of achieving the goal;

5) the identified information use to construct a system model of the object being studied;

6) information structuring methods and technologies improvement;

7) the students' relevant knowledge, skills and abilities development.

The peculiarity of such study of educational information is that at the first stage the material is studied in the form it is presented in this or that paragraph, chapter, section of the textbook. In addition, each paragraph is studied in the aspect of the chapter, each chapter in the aspect of the relevant sections, each section in the aspect of the textbook. Another strategy may be chosen when paragraphs, chapters and sections are studied in the context of a textbook, a field of scientific knowledge and activity, a relevant science or a field of science. In this case, the invariant and variable components of the educational material are determined and assimilated.

At the second stage, the same educational information is studied from different sides on the basis of the activities carried out for this purpose. In this case, a more in-depth "immersion" in the material under study is carried out, as well as the expedient and reasonable expansion of its borders. In certain situations, the steps mentioned above can be combined.

Taking into consideration the analysis and synthesis continuity, the analytical thinking skills formation is recommended to be combined with the synthetic thinking development.

The activities and actions choice for studying a particular topic in various disciplines is carried out first by the teacher, then by the teacher together with the education subjects and, finally, by the students themselves. For the successful implementation of a systems approach, system methods and technologies, it is recommended to formulate and develop methodological knowledge, skills, abilities and competencies in every possible way. The required knowledge and skills assimilation must be combined with the effective cognition methods , various thinking ways thinking and practical activity assimilation.

The general model of system structuring, studying and "minimized" presentation of information about the object in question includes:

1) the goal defined by the teacher and (or) the students themselves in the process of their learning, independent work, self-education, self-development;

2) the object under study (in the broad sense of the word: subject, information, object, phenomenon, process, etc.), considered as a system;

3) the studied system object components;

4) the super-system to which the studied system object belongs or in which this system object is a part;

5) activities and actions types that promote a holistic and versatile object study, as well as the systemic and other relevant thinking ways formation;

6) the information synthesis identified in the object analyzing process, its specification (with the aim to "link" to the object name which is in question (for example, the paragraph t content to the paragraph title, the paragraph content to the chapter title, etc.). Generalization of the studied information in the context of the subject area;

7) a conceptual (theoretical, abstract) system model construction of the object being studied. of the main provisions and the information entire content reproduction (in writing or orally) related to the object under study; written conclusions, the questions formulation aimed at the object under study, its study process, the results obtained, etc.; the answers preparation. Students' reflection. The student's activities and actions evaluation (self-assessment) in the framework of the proposed method and the results obtained;

8) interdisciplinary communication and connection with the external environment, ensuring an increase in the efficiency and quality of the learner's activities and actions, their training content mastery and the required competencies formation.

After analyzing the data that was obtained during the study, it turned out that, in the comparative analysis course of diagnostic results, as well as an experiment, we were convinced that students had a significant increase in professional competence. This confirms the general system structuring model effectiveness, the study and "minimized" presentation of information about the object in question.

The number of students with a low development level of professional competence decreased only by 26.3%, the average level increased by 0.8%, and the high level of students increased by 13.7%.

The experimental work data comparative analysis indicates the developed system structuring model effectiveness, studying and "minimized" presentation of information about the object in question, resulting in the professional competence formation in the pedagogical education area.

As criteria for assessing the learners' usage of activities and actions, we used three levels: low, medium, high. Special certification cards were introduced in the educational process in this regard, where the questions, tasks, exercises had appropriate three levels (low, medium and high) of their difficulties and complexity (Fig. 1).

Fig.1 Control and appraisal card

h	Questions, tasks, objectives, etc., corresponding to the "excellent" level.
m	Questions, tasks, objectives, etc., corresponding to the "good" level.
l	Questions, tasks, objectives, etc., corresponding the "satisfactory" level. At this level, an indicative framework for action or a "sample" for solving a task, an assignment, etc. is proposed.

Thesystemic skills formation and other thinking modes study was conducted at the same time.

Considerable attention in the experiments was paid to the learned knowledge and skills application: at the level (the so-called by us) "standard" (knowledge, skills and abilities that meet the educational standard); at the creativity level; at the research level.

For example, in the learning process to identify and solve problems and problem situations, we used three-level tasks of the following content:

At the "standard" level, the task was to identify (in the process of studying the object) problems and problem situations, formulate them with the necessary justification, establish a causal connection between them, and write the relevant conclusions in writing.

At the "creativity" level, it was necessary to identify problems and problem situations, formulate them, justify them, systematize and analyze them, establish cause-and-effect relationships, as well as build a problems "tree" and draw appropriate conclusions (in writing).

Fig.2 Specific competencies of training subjects.
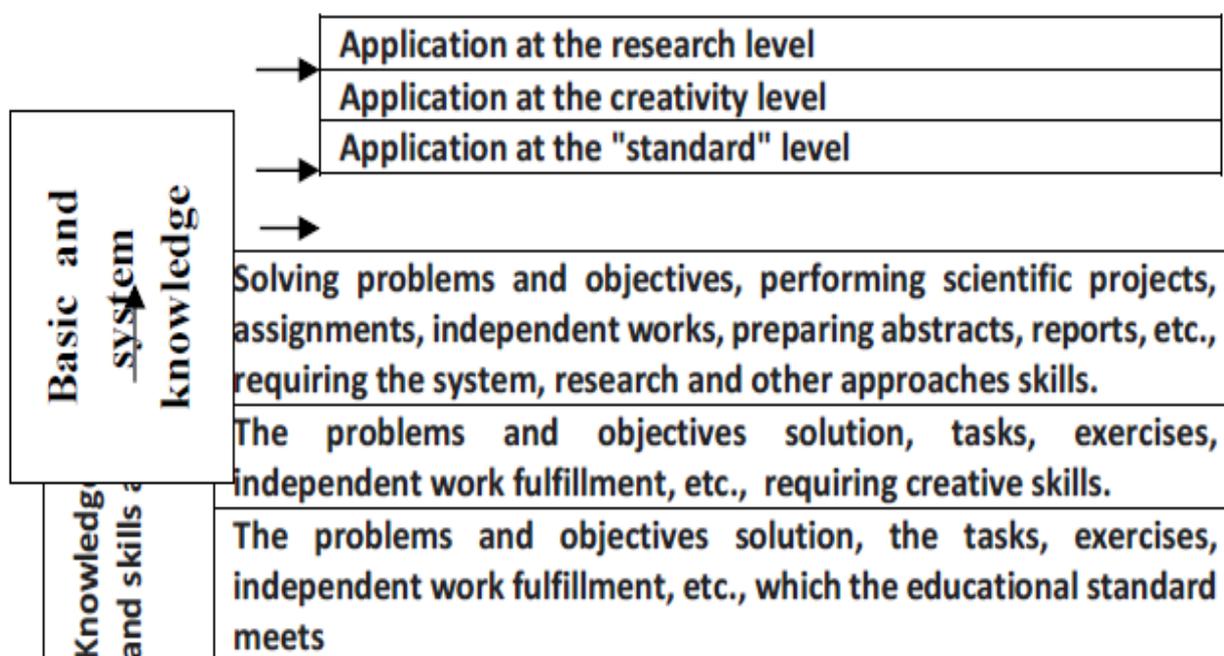
At the "research" level, students should: identify problems and problem situations, formulate them, substantiate, systematize and analyze them, establish cause-effect relationships, build a "tree" of problems, conduct research and (at least - two-variant) solve the key problem and draw the appropriate conclusions (in writing) (Fig. 2).

Study results

The results obtained indicate that the practical implementation of the systemic structuring method, object studying and "minimized" information presentation effectively contributed to:

- surrounding reality objects integral knowledge, taking into account their existing and expected (future) states;

- the formation and development of the ability to collapse (compress) and unfold the studied information, transfer the acquired knowledge (obtained information) and skills to other situations, knowledge and activities areas;

- new knowledge production;

- a systematic approach implementation in cognitive, theoretical and other ongoing and upcoming activities;

- the studied objects consideration in their static and dynamic (taking into account the interaction with the external environment) states;

- various types activities (actions) assimilation and development, contributing to (ensuring) efficiently achieving goals, solving set tasks and problems, as well as corresponding thinking ways;

- students' and specialists' formation and development of system ideas, system-creative and innovative thinking skills and abilities;

- the fundamental and systemic knowledge formation and development, its own knowledge system, adequate to the studied science (discipline, subject);

- the self-management skills formation and development in cognitive, scientific, and other activities;

- to identify certain information about the object under study for the subsequent system model construction;

- improving the studying the object and minimizing objectivity in the process of subjective component.

Discussion and conclusions

Purposeful structuring of basic knowledge and an orienting basis for students' activities in the learning process, allowed us to equip future specialists (separated from basic knowledge, skills, competencies and competences) with specific action guidelines.

Actualization and active implementation of the above specific competencies (the acquired knowledge and skills application at the "standard" , creativity, research level) effectively influenced the future specialists professional and general competencies formation.

As our studies have shown, the systemic representations, skills and abilities of systemic and other relevant thinking ways presence is a factor, a means, and one of the key bases of professional competence and future professionals competitiveness.

Professional competence is a systematically organized set of future specialist's professional and personal potentials, necessary for their upcoming professional activities and effective tasks solution fruitful implementation.

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