

METHODS OF IMPLEMENTING SYSTEMATIC ANALYSIS IN TEACHING SPECIALISTS

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Abstract

The article presents the methods of systematic analysis in the teaching of specialized sciences, the requirements for them, and methods of intensifying the process. The methods of systematic analysis in pedagogical activities have been studied. Conclusions are given on the basis of the scientific-research works carried out in recent years in the field of chemistry.

Keywords: machine creation, document study, activity product study, case study, comparison, observation, experiment, modeling, forecasting, extrapolation.

Introduction

The subject "Technical fundamentals of machine building" 5320300 - "Technological machines and equipment" (machines and devices of chemical and construction materials industry enterprises) is intended for students studying at the bachelor's degree. Chemical industry and construction materials production enterprises based on the needs of highly qualified specialist personnel training, the subject "Technical bases of creating machines" is included in the curriculum as an optional subject. [1-5].

In the training of highly qualified specialists, sometimes insufficient attention is paid to the identification and assessment of the relationship between individual specialties. More often, this situation occurs when studying issues in a number of disciplines. All this leads to the localization of the learned material within individual courses, which limits the level of students, does not help to develop their creative abilities, does not create favorable conditions for comprehensive mastery of knowledge. At the same time, when solving real problems that arise in the design process, it is necessary to use complex knowledge that ensures the high quality of project development, rather than separate information obtained in the study of individual subjects [6-9].

The purpose of the study

Based on the modern requirements of scientific and technical development, the training of highly qualified engineers should be based on the development of skills of creative complex use of acquired knowledge. For this purpose, for several years, the students of the 5320300 - "Technological machines and equipment" educational direction "Chemical technology main processes and devices", "Modern technological lines in the production of chemical industry and building materials", "Technology of construction materials", " Basics of industrial



production and mechanical equipment of enterprises" and "Technological complexes in production" subjects are taught. These disciplines also have the same scientific-methodological basis - a systematic approach and differ mainly in specific examples that reflect the specific characteristics of the specialty [10-12]. .

Research methods

Depending on the normative balance of the curriculum, textbook materials should be considered not only as a separate subject, but at the same time as "Construction machines. Construction processes and technology." , "Interchangeability, standardization and technical measurements", "Mechanical engineering technology", "Assembly and operation of machinery of the chemical and building materials industry", "Chemical engineering", "Fundamentals of use and repair of technological machines", " Engineering technology devices can be studied with "Fundamentals of calculation", "Basic technological processes and devices" and similar subjects.

Taking into account the general and specific aspects of systematic analysis in the teaching of sciences in the field of chemical and construction materials, it is appropriate to use more than four research methods as a tool to implement it within the pedagogical activity of the teacher. Although there is no specific approach to the use of the systematic analysis method within the framework of pedagogical activity, it is desirable to approach this issue in a functional way based on the practical aspects of pedagogical reality.

A method is a practical or theoretical way of studying reality as a means of achieving a certain result. To provide a sequence of actions used to study the problem based on a particular order, has a specific unit of measurement (number, percentage, point, gram, kilogram, shape, color, coefficient, position, etc.) is a set of Different methods can be chosen to perform systematic analysis. The following can be mentioned as the ones that are used relatively more [13-15].

- survey (written questionnaire, oral question-and-answer (distance) method);
- method of studying documents (DTS, report, conclusions, etc.);
- the method of studying the product of activity (essay, article, students' knowledge, etc.);
- the method of studying individual cases (a particular pedagogical situation. For example, the elite, a group of elites, activists, etc.);
- the method of comparison (comparison of numbers, evidence, expressed opinions and relationships);
- method of conversation (obtaining information directly or indirectly using speech communication).
- biographical (studying a person through documents related to his biography) method;
- method of interview (gathering information in the form of answers to questions related to the problem);
- the method of observation (taking into account various situations manifested in a person's actions, obtaining information about the passage of a certain process);



- sociometry (recommended by J. Moreno, the study of interpersonal relations in groups and communities in order to determine the psychological compatibility with the structure of mutual relations. Today, various variants of sociometry have been developed) method;
- test method (it is a standardized test, with the help of which one or another mental process can be evaluated and a person can be studied as a whole);
- the method of experiment (the process of solving a problem situation, it is even possible to study a person's feelings, character, abilities, intelligence. In this, all factors affecting the object are observed under strict control);
- modeling (a method based on indirect learning of the process, which means reproducing the characteristics of an object in another specially designed object);
- method of forecasting (thinking about the future state of an event);
- extrapolation (lat. extra-fast, polio-smooth, correct) a method of applying the conclusion obtained as a result of observing a separate part of a phenomenon to another part of a similar phenomenon, to another region (address, place).

At the same time, biographical and historical-comparative methods can be indicated.

Biographical method (in Greek, bios - life, graho - I am writing) is a method of researching, diagnosing, correcting, and planning a person's life path. The biographical method began to be applied in the first quarter of the 20th century. Using primary biographical methods, historical figures were used for the purpose of retrospective analysis of past political life. Later, they added important and possible future events (future autobiography, controlled fantasy, life planning, causometry), as well as the person's social circle (additional biography, subject's relational circle). Modern biographical methods are based on the study of the personality of a politician within the framework of historical, social and individual existence, and analyze the scenario and life programs of a person's development, his professional, family, spiritual, natural and social space within the framework of "space-time". In the application of biographical methods, questionnaires, interviews, tests, instructions of relatives, memories of contemporaries, study of activity products (content analysis of letters and diaries, lectures, etc.) are used as sources and tools [16-19]. .

Historical-comparative methods include historical description, accurate analysis, comparison, periodization, chronological, problem-chronological, retrospective, perspective setting, historical analog and other methods. Comparative-historical methods make it possible to study how political-psychological evidences and events, when they arise and are realized, change in terms of quality indicators at different stages of development in an integral connection with the historical environment.

In this sense, the term "system" should be understood not only as a set of interconnected components of the system (a control object) and its levels of interdependence. Perhaps it is appropriate to take into account the degree of external relations included in it. This, in turn, requires determining the way to implement a systematic analysis, that is, the approach.



Analysis is the summation of information of different volume and content and bringing it into the form of a source, and a systematic approach to this is desirable. A systematic approach is a methodology based on the study of an object as a whole, a "way" that provides scientific understanding. In science, the systematic approach has been developed by representatives of various scientific fields. A systematic approach is a set of interrelated aspects that can serve as a methodology for analysis [20-24]. These are:

- systematic - characteristic (elemental), what is the system composed of? serves to find an answer to the question;
- systematic - structural, serves to determine the internal structure of the system, the maintenance of its contents;
- systemic - functional, serves to distinguish the system and what tasks it creates;
- systemic - communicative, serves to determine the nature of horizontal and vertical relationships of the system with other systems;
- systematic - integrative, serves to determine the system maintenance mechanism, maintenance factors and improvement;
- systematic - historical, "how was the system formed?", "what stages did it go through during development?", "what is the perspective of the system?" serves to answer the questions.

As you can see, the systematic approach is a complex that serves to define the way to implement a systematic analysis.

It is advisable for the researcher to carry out a systematic analysis of the issue related to the management of the system (object) from the point of view of security in the following sequence:

- taking into account his scientific potential, determining the task and purpose of the research (that is, the desired situation in the future);
- determination of the system selected for analysis (in which the spheres of activity are taken into account) and the way of development and forecast of the external environment in the research;
- researching the factors of the external environment (consumer market, goods suppliers and competitors, etc.) and determining its perspective;
- it is necessary to determine the expression of goals and tasks in the structure (creation) of the system.

Results

A systematic study of problems and changes of any nature that arise naturally during the process of socio-economic development serves to ensure the transition from a quantitative indicator to a qualitative indicator. This, in turn, requires scientific study (knowledge) of the process, which requires the use of methods such as abstraction, induction and deduction [25-27]. .

Knowing is the process of reflecting the world in the human mind, and a person cannot engage



in any type of activity without having knowledge and imagination about the environment that surrounds him. The product and result of B. is knowledge, and knowledge is divided into such types as household, scientific and special. To study any problem, knowledge is needed, and during the analysis, it appears as a necessity, in the form of a professional necessity.

Any knowledge is necessarily related to processes of abstraction. Without these processes, it is impossible to reveal the essence of a thing (process), to get deep into its "inside". Dividing a thing (process) into parts, separating its important aspects into parts, analyzing them in a "pure" state in every way is the result of the abstracting activity of thinking. Therefore, the importance of abstraction in the process of studying the problem is very great. Abstraction serves as a criterion of practice depending on how truly scientific it is.

Abstraction (lat. *abstaktio* - abstraction) is one of the forms of knowledge, which consists in abstracting several properties of things (processes) and the relations between them, and distinguishing any property or relationship. The process of elimination from sight is considered a product of abstraction, and the abstraction of infinity, "enumerated", "finished" abstractions can be used when observing events, phenomena, objects.

In the study of any problem, it is impossible to achieve any result without abstraction. Without it, it is impossible to reveal the essence of the subject (process), to enter into its inner nature. Dividing a thing, event, subject into parts, studying their important principles, dividing into parts is done by the method of abstraction.

In the process of systematic analysis, thought moves from complexity to simplicity, from coincidence to necessity, from diversity to specificity and unity. Therefore, systematic perception takes a special place. Because the purpose of the systematic analysis is to study the parts as elements of a complex whole and determine the degree of connection between them and the laws. However, systematic analysis serves to isolate the essence of the process and reveal unity, unity in diversity, which remains abstract. In this case, the process of synthesis plays an important role in terms of its functionality and serves to bring the parts, properties, and relationships separated during the analysis into a single whole. Synthesis is directed towards unity, difference and diversity, and unites generality and particularity, unity and diversity into a certain organic whole.

It requires the use of induction and deduction in studying the problem. After all, induction (lat. *Inductio* - to eliminate) provides the process of creating general laws and rules based on the transition from several individual or separate judgments to a general judgment or the study of separate events and phenomena. However, when studying events (processes), deduction (Greek *deductio* - drawing a conclusion) acquires a practical meaning as a process of transition from general knowledge to partial knowledge in studying a problem. Because the one who performs the analysis by means of deduction creates separate knowledge about each thing or event from general knowledge about one level thing or event.

At first glance, it seems that these theoretical classifications put the researcher in a difficult situation in terms of expanding the field of perception, but they ensure the meaningfulness of the researcher's analytical activity. Because all the factors (subject, objective) that affect the studied process are determined by the degree of influence (they have a strong influence, can act as a complement) makes



it possible to get Therefore, other types of analysis (graphical analysis, axiological analysis, pragmatic analysis, etc.) are stepwise, time-consuming, and require the use of methods based on metrics (points, percentages, numbers, and other indicators). is distinguished by This, in turn, requires having an idea about the structure of the type of systematic analysis. The success of a systematic analysis depends, first of all, on how correctly the goal of the analysis is set, on the extent to which the researcher understands the problem that needs to be solved, and secondly, on the extent to which the chosen methods are used to study the problem. Only then, it will be ensured that practical recommendations defining its components will be developed, which are considered to be important aspects of systematic analysis in pedagogical activity, and that a set of necessary measures will be developed to eliminate a specific pedagogical problem. The interpretation of the collected data has a special place in it. The interpretation is a short and sequential statement of the most important ones on a certain pedagogical problem (in any media), that is, all the information collected by means of metric methods during certain stages. It is a resource that is studied as a result of summarizing and evaluating data or the main part. The source can take many forms, such as a survey or test result, a complaint or reference letter, numbers, and so on. All of them can be presented in text form [28-30].

Therefore, the text is a summary description of a question or a series of questions, synthesized information, which was prepared during a certain period of time. This, in turn, requires the analyst to use the following types of knowledge.

Empirical knowledge (experimental) is the knowledge obtained during the study of the laws of nature and human evolution in other sciences such as chemistry and physics.

Logical knowledge (analytical) mathematics, astronomy, molecular physics, etc. This is a broad knowledge that is created as a result of the process of deep learning of a person.

Foreknowledge and intuition play an important role here;

Artistic knowledge refers to the activities of writers, musicians, and painters, and reflects objective existence using artistic methods.

Household knowledge is a set of information related to traditions, norms and rules of behavior, national characteristics.

Quick knowledge is information necessary for the daily purpose of the human community about political, military, socio-economic problems, issues of scientific and technical development, natural disasters.

"Protoscience" - archival knowledge.

It is necessary to divide knowledge in this way when carrying out a systematic analysis within the framework of pedagogical activity. Human knowledge is the only process of understanding the world around us, in which one type of information passes to another, old knowledge is replaced by a new one. That is, to put it simply, it serves a practical purpose to know who we are, why we came to this bright world, and what we are obliged to do in it and with it [31-33]. Information is necessary to know all the subtleties of anticipating a problematic situation. They are closed and in a cautionary and perspective-setting spirit, and metric methods must be chosen correctly as a means of summarizing them. The rest is the work of the analyst, who fills



in the missing information with his intellectual ability to analyze.

It is important to note that a document prepared by a specialist (according to his objectivity) can be accepted or rejected by the consumer/customer. This is, from his point of view (explained by the presence of special professional information that is difficult for the analyst to get acquainted with for some reasons), to look at the existing problem from the point of view of professional interests. As a result of these conflicts between the analyst and the consumer/customer, the desired reality emerges.

Human thinking is a product of the activity of his brain, which reacts (reflects) to the surrounding environment. In this regard, it belongs to the subject (individual), that is, it is subjective in relation to the surrounding world. With the help of thinking, a person performs two integral tasks: a) understands the objective world, its inner essence, and through understanding, re-perceives it; b) seeks to know the internal mechanisms of thinking, that is, he understands how he perceives the world and for what purpose he does it.

Important features of analytical intelligence are:

depth - the ability to get to the essence of evidence and events, to know their causes and laws, relevance and development perspective;

critical view - objective assessment of events and evidence, approaching existing views, judgments, decisions with doubts;

flexibility - the ability to move from one idea to another, including ideas that contradict one's own;

breadth of knowledge - the ability to see the connection between events, the ability to see the problem on a broad scale;

speed - the speed of solving tasks;

originality - the ability to find unique solutions, to come up with new ideas that are different from the generally accepted views;

thoroughness - the desire to get to the bottom of events;

intuition - the ability to foresee the development of events after actively using all signs of intelligence [31-32]. .

Within the framework of pedagogical activities, it is desirable for a specialist who conducts a systematic analysis to have a clear idea of the following issues:

- about the functionality of the pedagogical system;
- related to the psychology of education;
- about the management of pedagogical teams;
- about various destructive groups;
- regarding search engines of the Internet;
- about education in local and foreign mass media;
- on special thematic literature, etc.

It is clear that the analysis requires first of all to ensure the quality and content of the available information. Therefore, in this process, scientific (production of new knowledge) and

management (decisions, development of scenario options) is considered a functional intersection point.

The nature of functional intersection (interconnection) in the system of systematic analysis can be described as follows: on the one hand, science and information analysis is an informative method of scientific analysis of knowledge and reality. But there are also differences between them. Therefore, it makes a debate about evidence and events, which requires defining the perspective of their development not only by generalized typical parameters, but also by a number of additional factors. In fact, data processing can be represented as a sequence of independent steps. Below, we present a theoretical model of the implementation of the sequence of actions acceptable for systematic analysis based on various stages in the form of technology [33-36].

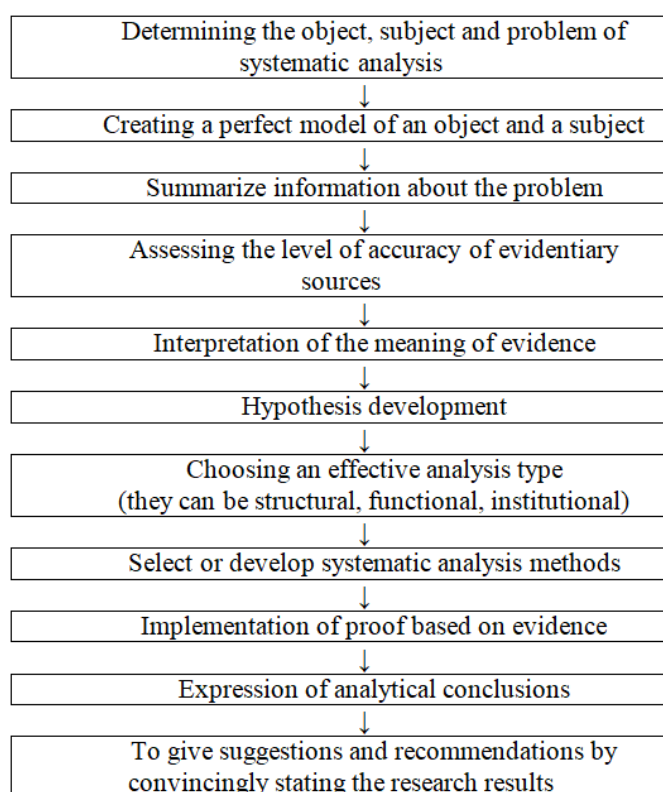


Fig. 1. Systematic analysis results interpretation technology.

In this case, that is, in the implementation of systematic analysis, the research method, more precisely, the method of systematic analysis, ensures the efficiency of the analyst's activity. Therefore, we show that the method should serve for decision-making and formation of decision options in addition to providing in-depth analysis. In this, the method of activation of expert intuition (MIFU) and the method of formal system visualization (TFTEU) are used, which can also be considered as a tact used in the implementation of systematic analysis.

**Main conclusions:**

If we take into account that pedagogical activity is not static, that is, it is dynamic, every change in the life of society is expressed in one way or another in the pedagogical process. Therefore, it is necessary to anticipate and assess personal, professional, methodological, collective, technical, environmental and other similar problems expressed during pedagogical activity. We believe that the following theoretical model can be used for this purpose: "Institutional description of the facility→Functional description of the facility→Strategic description of the facility→Scope, degree, and amount of possible damage to the facility (indicator in the budget, (such as spiritual and psychological score indicators)→Description of the object's relationship with other objects→Description of the existing conditions for the operation of the object→Description of the main directions of cooperation in the operation →Analysis of all descriptions = Prognosis".

As a result, a forecast appears and shows possible problems that can be expressed in pedagogical activity. This, in turn, requires the assessment of resources and determining the procedure for their use.

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