

Pedagogical Research Methods of Training in Higher Educational Establishments: A Comparative Analysis

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ABSTRACT

Competent professionals' preparation is a priority objective and purpose of modern education. The problem is that there is a constant change of educational paradigms in developing countries. That hinders formation of an integrated methodology system for individual subjects, which takes into account their specific features. The article analyzes the main teaching methods, shows cause-and effect linkage. The article proves that paying attention on one particular teaching method and ignoring others creates difficulties in students' comprehensive understanding of the subject. As a result, students can learn the material only to extent the chosen method can provide. The paper also carried professionals' experience generalization in considered issues, conducted interviews with students, in which they gave an assessment of educational program and personal training; statistical survey data are presented in results.

ARTICLE INFO

Article history:

Received 24 January 2022

Received in revised form

28 January 2022

Accepted 14 February 2022

Keywords: Research method, comparative analysis, higher educational establishment, training.

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LITERARY ANALYSIS OF THE SUBJECT: Theoretical methods: specific philosophical, psychological, educational, scientific and methodical literature analysis and study on research issues; Analysis of methodical documentation, general theoretical methods of analysis, synthesis, theoretical modeling. Pedagogical experience study and generalization on the research problem, conceptualization of educational practice. Application of methodological orientations, certain information paradigm and the theory of self-organization. Survey of students of the first and the last courses, statistical data processing. Results Pedagogical research methods are divided into methods of empirical, theoretical and comparative-historical in term of the level of scientific knowledge. Empirical methods are directly related to the practice and provide accumulation, fixation, classification and synthesis of feedstock for any particular educational system development (observation, description of obtained results, their classification and systematization, as well as data analysis and synthesis). Theoretical methods (idealization, modeling, promotion of ideas, and formulation of hypotheses) ensure educational system development as a logically structured knowledge of objective laws of reality. Comparative-historical methods are methods comparing the current state of considered pedagogical process, phenomenon and the state that preface it, as well as the main trends of its development, general and particular manifestation features in certain historical conditions . The boundaries between these groups of methods are rather conventional. For example, empirical level of research is impossible without theoretical, because it requires reflection, advancing ideas, serious analysis. In turn, developed theory must be based on practice. Comparative-historical level is typical for both the empirical and theoretical levels of research. All the methods mentioned above were applied in the study of training effectiveness in terms of students' competencies formation in higher educational establishments. Empirical methods were mainly represented by observation, which refers to "purposeful study of objects and phenomena, specific information selection; knowledge gathering about external sides of studied object's properties and attributes". Observation

method's value is to study the natural course of the process. For example, training session can be videotaped, collected material then is carefully studied. That will not only allow getting the specific data, but also analyzing all their aspects. In this case, high objectivity of results is guaranteed. The observer should not report about the purpose of observation, nor, moreover, intervene into observed process or influence it in any way. Observation method's feasibility is determined by the objective. Herewith, the observer should use observation method's advantages as leverage: conformity to plan, systematic nature, as well as, the possibility of gathering information on pedagogical process in vivo. However, observation method, as well as any other research method, is faulty, it has its own disadvantages. Observation method is limited. That is manifested in the inability to anticipate, predict the appearance of that main point, which is important for finding ways of problem solving. That significantly affect results' objectivity. For example, it was noted during one of the events – the round table – on the impact of human activities on the world around us that some students are avoidant, passive, keep their opinions to themselves. On the contrary, students that are actively expressing their position do not always say something that match with what they think and act; observation method does not help to establish the truth in these and similar to these moments. This requires the use of additional research methods. Another observation method's disadvantage is a variation of results' interpretation, a high degree of subjectivity in observer's position. Situations that cannot receive a clear assessment are quite common. Furthermore, it was necessary to spend quite a bit of time in mathematical treatment of experimental data. This factor is the third disadvantage of observation method. Therefore, observation method was used in our experimental work in combination with other research methods, in particular, with the method of expert assessment. Method of expert assessment – providing expert opinion, opinion of a competent professional in studied field. Training diagnosis had more than once situations when it was not possible to use not only a problem object as a source of information, but also to allocate it. Such a situation occurred at least three times: in predicting dynamics of the process, in assessing the state of the process in few years; in evaluating some of students' individual character, whose self-esteem rises doubts . Specialist with reliable and objective knowledge has the right to act as an expert. The criteria for experts' selection, in addition to competence, position and functions are work experience, level of training, active, indifferent to the problems of higher educational establishment life position, authority and trust of administration, colleagues and students. Experts' special feature in this case was a gradual decrease in number. Thus, method of expert assessment also puts greater demands on correct application in student training diagnosis. Analysis of methodical documentation had an important role in obtaining empirical data. We are interested in both the general documents (minutes, reports, journals etc.) and documents prepared specifically at our request (abstracts, products of creative activity, test papers, students' statements and others). Thus, it is possible to scientifically substantiate the limitations in the use of program training – no more than 30% of class time. Literature analysis showed that the quality of students' knowledge, for example, in physics, depends largely on the quality and effectiveness of lecture demonstrations. University Students were offered to make projected assumptions about the outcome of lecture demonstration immediately after it and in a short time later. The experiment showed that one in five responses does not match the actual results, however, students, who possessed the theoretical knowledge before supervision of demonstration, have memorized and interpreted the results better . Powerful means in training support is the use of interactive methods. Confirmation of this is found in a number of scientific publications. For example, it is proved that interactivity is an essential component of training, as it leads to an increase of its effectiveness and students' training motivation It is desirable to give preference to analytical work, teaching students the basics of analysis. There are many types of analysis – from the analysis as a research means to analysis as its object. That analytical work is the basis of intellectual work. It is necessary to acquaint students with the types of analysis, its possibilities purposefully and systematically. Problem analysis helps to identify the problem, create the problem field, make a classification; system analysis helps to observe the object following system approach as a certain system, which has its own structure and function. Finally, situation analysis implementation will lead to situation modeling, definition of its conditions and possible consequences. In general, modeling method has a special place in the field of pedagogical diagnostics. Problem actuality of modeling didactic possibilities identification and analysis in university students training is related to practice need of university teachers to provide themselves with objective planning methods, organization methods and assessment of three main areas: training in general, their own pedagogical activity and students' educational activity. Modeling is an accurate quantitative method in

terms of its nature; it has predictive capabilities and allows studying a variety of teaching situations on the basis of a model experiment. Diagnosis begins with a purposeful information gain about the objects (1). Scientific study, in addition to information gathering, performs qualitative or quantitative relationships' ordering and establishment, as well as ratios and dependence. Modeling necessity of training arises only in the case of accumulated information, when there is a need of transition from quantity to quality. Literature analysis shows that the issues of modeling of training were studied in various directions: general methodological, psycho-physiological, didactic etc. There were various attempts of training models generation, specific ideas for their further development and improvement, results analysis of modeling . There is an important conclusion that diagrams or verbal descriptions consideration as models reduces the chances of a serious study of the phenomenon . There was indicated a systematic error, when properties, qualities or indications list is used as a model, which are difficult to designate as algorithmic descriptions. Model is known as the result of schematization, the degree of which depends on analysis general objective and purpose of analysis, expected completeness and accuracy of solution. However, purposive model should reflect the most significant features of phenomenon. In other words, quantitative analysis always has to deal not with a real phenomenon in all its complexity, but with a concrete result of schematization. The relationship between theory and model has interdependent nature; there is no theory without the model and no model without the theory. Taking into account that mathematical methods currently are widely used in pedagogical experiments' planning and organization, the relationship between the model and experiment is of great interest. To this end, the means and methods of experimentation are continuously improving, observation character is modified and initial information fixation becomes particularly important. Experiment and modeling have a complex relationship that can be described as inverse and interdependent. Dialectical understanding of irreversible changes is major and determining factor in the need of model study of training, as well as the lack of data availability on the same students. In other words, each data collection reveals irreversible changes in personal sphere, in the nature of students' cognitive activity Modeling also allows identifying the trend and establishing a characteristic interdependence, which can be an integral part of higher educational establishments' didactics. Conclusions obtained on modeling are essential for a better understanding of studied phenomenon. In other words, modeling suggests insertion of models into theory creating process; models are preliminary stage in theorization. In our study, this thesis may be adequate: modeling acts as theoretical and methodological basis of training as models are inextricably linked with scientific hypotheses. On the one hand, hypotheses may be considered as the initial stage of modeling, and on the other, the model should be considered as a form of hypothesis . Models' informative value is that they can predict phenomenon or process development in synthesizing already learned pattern, obtain previously unknown information on the basis of logical and mathematical conclusions. Modeling of training is not a formality, not a goal in itself, but a means of knowledge, a necessary stage of any pedagogical research. Since the person is an open self-organizing system, a synergy effect of all its components can be observed in transferring of knowledge obtained during the modeling to the prototype. Modeling of training structure as an integrated multi-level formation with known autonomous of its components' functioning is not without interest for diagnose of effectiveness of training modernization. Modeling is necessary for training activities analysis, as well as their organization at different stages of learning, including the relationship of training with students' creativity and independence development

In model study of training, there is a possibility to move beyond verbal descriptions to quantitative relations, to determine the effectiveness, identify optimal conditions for training organization that achieve a specified level of studied academic content acquisition with certain properties. Practical value of modeling is determined by ability to review educational process before final results. Training complexity and diversity requires the use of mathematical apparatus that would lead to the progress in the study of many different phenomena that occur on the basis of a large number of factors that are interdependent in a little extend, a relatively small influence of each does not yield to individual account. Studying didactic capabilities of modeling of training, characterized as a stochastic process, it was found that description forms and training characteristics will be complete under modeling of training if they embody the unity and interdependence of objective quantitative and qualitative indicators. The main one is the reflection of qualitative side; quantitative aspect is taken into account later then. Considering different levels of training description promoting regularization, revealing their recurring features, qualitative verbal

descriptions were highlighted showing cognitive modeling capabilities as a form of reality reflection, as a cognitive method required to streamline accumulated information and knowledge development. Highlighting cognitive capabilities of quantitative descriptions (possibility to express training properties and their relations in the form of analytical dependences; the ability to predict in the light of established quantitative characteristics and dependencies, possible changes etc.), we agree that adequate mathematical apparatus that allows describing and indicating learning patterns, analytically representing them, is a unit of probability theory. According to the experience, it is necessary to apply probabilistic and statistical concepts; scientific-theoretical basis of these phenomena requires reliance on dialectic of possible and actual. The reality is reflected in particular events that depend on a variety of reasons. Empirical research of events' frequency allows displaying an increasing number of real-world phenomena that are resistant and characterizing the essence of training. Numerical assessment of events' probabilities in probability theory is just done with this frequency. Practical use of theoretical results Analysis of international experience and standards of transnational education has allowed developing our own training programs on the basis of competence-oriented professional model. To this end, the layout of competences was drawn up.

Conclusion. Choice of a method of students' training pedagogical diagnostics in higher educational establishments by itself is a complex pedagogical research, methodological problems of which are reduced to two major issues' solution: how to implement organic synthesis of theories and how to ensure adequate application. Selection of certain techniques and methods aimed at a comprehensive study of the subject, is undertaking according to its purpose.. Therefore, an essential condition of integrated pedagogical research is to clearly define the role of each method at different stages of research.

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