

THE IMPROVEMENT OF THE QUALITY OF DIDACTIC CONCEPTS COMPREHENSION IN THE CONTEXT OF PEDAGOGICAL INTELLECTICS

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Abstract: *The quality of didactic concepts comprehension is an integrated parameter of a future teacher intellectual self-development. It is based on the unity of content-based, process-based and result-based aspects that have been considered in Meta Semantic description of the didactic concepts. The consideration of process of didactic concepts comprehension from constructive and activity positions allows to take into account features of thinking of the individual.*

Keywords: *Didactic concepts, comprehension quality, Meta Semantic description, independent cognitive activity, comprehension, learning activities of component-wise design, formation.*

INTRODUCTION

Domination of innovative orientation of the various spheres of human activity development causes definition of a new vision of the functions of intellectics, in particular its consideration in the context of innovative educational process.

Pedagogical intellectics is the integrative scientific area, which is a set of knowledge about various aspects of human activity on the solution of the tasks cognitive character using a variety of methods and means of intellectual activity. It is competing solutions of the problem of transformation of the teacher's pedagogical potential from the state of hidden existence to the state of development. In development of didactic aspect pedagogical intellectics we proceed from the idea that the real mentality of a future teacher occurs only when he himself consciously realize progressive changes in his intellectual sphere by means of learning activities of didactic concepts design and making up a smart card. Awareness supposes that a model-facilitator with a function of "false work" should be introduced into the logic of teacher's intellectual self-development. The methods of rational organization of independent students' work [5], [6] as well as the content of the special training for the implementation of computer training [2] can be regarded as this model.

Awareness also allocates the "trial-and-error and accidental success method" by giving preference to the criteria of innovative and pedagogical culture in this sphere. Metacognitive processes suppose that the mentation and used didactic concepts estimation are made by students themselves, which ensure the permanent reflection and self-control. Conceptual thinking integrates the genesis of intellect, as L.M. Vekker noted, "... conceptual thought the highest stage of thinking development and a kind of thinking whose operand is a concept simultaneously" [3, p. 347].

Notion-concept provides a teacher with free operating of abstract didactic concepts under conditions of indeterminateness of pedagogical situations, and also is the basis for making objective decisions and projecting pedagogical reality. A great contribution to the research on the problem of concept forming was made by D.N. Bogoyavlenskij, J. Bruner, L.S. Vigotskij, A.N. Leontjev, J. Piazhe, S.L. Rybinshtein and others. It is proven in their works that concept forming is of the utmost importance for developing thinking: "thinking always moves in the pyramid of concepts" (L.S. Vigotskij [4, p. 20]).

In pedagogical aspect solving the problem of scientific concepts forming is based on one of the following theories: associating and reflectoring (D.N. Bogoyavlenskij, Yu.A. Samarin and others); the theory of gradual forming of mental activities (P.Ja. Galperin, N.F. Talizina and others); content generalization (V.V. Davidov, D.B. Elkonin and others) or on their configurative combination. The characteristics of the main sources and the basic ideas which were carrying out methodological function in the theoretical argumentation of research are provided in Table 1.

Table 1

The main sources and basic ideas of theoretical argumentation and conceptual bases on rational organization of students' independent work on didactic concepts comprehension

Sources	Basic ideas
Cognitive approach	Existence of cognitive representative structures in consciousness of the individual
Andragogical approach	Independence priority in learning
Learner-centered approach	Educational process orientation to personal the structures of consciousness of a future teacher
An active learning theory	Comprehension of theoretical knowledge in the process of educational activity; organization of systematic transition from collective learning activities to individual by a teacher
Cultural and praxeological concept	Innovative culture as morphogenetic basis of education projection and organization
Didactic and methodical	Actualization of students' independent work when forming scientific concepts

MATERIALS AND METHODS

In this research we used: scientific and methodical literature, normative documents analysis, content-analysis, pedagogical modeling, observation, questioning, expert evaluation, method of retrospection sign, analysis of the activities results, "virtual" expert review, pedagogical experiment, methods of mathematical statistics. 363 students of the Belarusian State Pedagogical University named after Maxim Tank, Brest State University and Gomel State University took part in the pedagogical experiment.

The experimental group included 98 students, the control group included 142 students. Groups were randomized by educational opportunities and the level of methodological knowledge of concept structure been formatted. The quality of didactic concepts comprehension in researches carried out earlier (V.V. Buchmanova, V.F. Saharov, T.P. Treschova, L.D. Ustyantseva and others) was studied mainly from result aspect, which characterizes the outcome side of the process. The process aspect of quality, revealing students' actions while comprehension concepts and its content aspect, which reveals how the students define contents of concepts in the process of comprehension and representation, were overlooked. From the positions of the cognitive approach the psycho-physiological basis of the concepts formation process are representative cognitive structures, which are the main means of learning the reality. As it is shown in the conducted psychological researches, the concepts mastered by a person are stored in so-called "semantic memory", which is the basis of language usage, the implementation of abstract thinking and which represents an "intellectual thesaurus". This thesaurus organizes the knowledge of the person.

Representative cognitive structures allow a person to allocate signs of studied objects, to establish links between the phenomena, to acquire ways of obtaining new information. Updating this approach allows one to organize the process of the didactic concepts comprehension taking into account the peculiarities of thinking of the individual.

The consideration of the quality of didactic concepts comprehension in unity of procedural, substantive and effective aspects has actualized the development of didactic concepts Meta Semantic description. The components of didactic concepts Meta Semantic description were considered as the generalized reference point of its comprehension:

- 1) Meta knowledge of didactic concept played a role of an orientation basis;
- 2) Semantic network of didactic concepts system is direct object of comprehension;
- 3) Structural and logical model of didactic concepts defined an order of their formation.

The Meta knowledge of the didactic concept has the following structure:

- 1) the genesis of the concept,
- 2) the main content,
- 3) volume,
- 4) a place in the system of didactic concepts,
- 5) application area,
- 6) ways of operationalization,
- 7) limits of applicability.

The Meta knowledge of the didactic concept reflects the procedural aspect of quality. Semantic network is the cognitive structure of the concepts representation in the consciousness of the individual. It contains the basic didactic concepts, which generate clusters: "learning", "learning process", "the purpose of education", "content of education", "method of teaching", "learning tools", "organizational form of learning", "diagnostics of learning". Semantic network of didactic concepts system reflects the resultant aspect of the quality of their comprehension. The intentional aspect is connected with the essence of the concepts. It is inherent to both procedural and resultant sides. The process of didactic concepts formation in the context of pedagogical intellect involves:

- Stage-by-stage inclusion of students in the learning activity of concepts components projection on the basis of the technological maps been developed. The mentioned maps identify the rate and sequence of didactic procedures at the propaedeutic and main stages of the didactic concepts formation;

- Projection of the independent cognitive students activity management on the basis of definition of the epistemic style of each student, taking into account the specifics of the formed didactic concepts, educational tasks, types of independent work of students, computer application ways (the choice of a strategic line of the independent cognitive students activity management);

- Usage of special methods and forms of teaching (business game, concepts projection, "immersion", the semantic network projection, etc);

- Presence of original systems of tasks for each stage (methodological, genetic, existential, range, reference, applied, diagnostic, limiting);

- Cluster control of the quality of students' didactic concepts comprehension.

To identify the epistemic style (J. Royce, M. Kholodnaya), which reflects the methods of cognitive students' attitudes toward the concept to be learned, the enlarged parameter "training opportunities" (K. Artemyonok) was applied.

It reflects the achieved and the potential level of students' development in cognitive, activity and personal aspects, as well as characterizes the degree of efficiency of the organization of their educational and cognitive activity.

Quantitative estimation the quality of didactic concepts comprehension by students was done on the basis of cumulative index of didactic concepts comprehension.

Quantitative estimation the quality of didactic concepts comprehension in the unity of the aspects mentioned determined the allocation of the following criteria: degree of mastering

the structure of Meta knowledge of the didactic concept, the completeness of stage-by-stage comprehension of didactic concepts content and the way of representation of didactic concepts system in the consciousness of the individual.

The levels of comprehension are defined adequately to criteria: descriptive, formal, conceptual, regulatory and generative. Experimental data were collected from three complementary sources: formalization of expert evaluations («L»-data), the analysis of the activity products («T»-data) and the study of self-appraisal («Q»-data).

Epistemological style, which depended on the educational opportunities of students, pre-scientific understanding of the concept and quality of the previous concepts comprehension, was determined as a result of primary diagnostics, based on the following techniques: the diagnostics of learning opportunities definition, the representation of the semantic space of concepts, formulation of problems, the method of association, etc. Students referred to the "rationalists" were focused on the research cognitive activity. Students referred to the "empiricists", on partly research cognitive activities and those who were regarded as "metaphorists" on simulating, reconstructive and variable activities. In the process of didactic concepts formation the students systematically mastered the learning activities of component projection, on the basis of what they were able to learn concepts independently and incorporated them in the system that had already been formed. At final lesson each student developed and defended the project of the semantic network of the didactic concepts system addition.

RESULTS

In the results of the pedagogical experiment, the average cumulative index rate in the experimental group (0,75) was higher than in the control (0,42). Values of specific aspects of didactic concepts comprehension quality were compared, which showed up that the index values for all the variables in the experimental group (E) are higher than in the control (C): becoming proficient in the structure of meta-knowledge about the didactic concept ($E^{\circ}-0,81$, $C^{\circ}-0,45$), component didactic concepts' content comprehension ($E^{\circ}-0,68$, $C^{\circ}-0,44$), concepts system comprehension ($E^{\circ}-0,77$, $C^{\circ}-0,37$). The dynamics of didactic concepts comprehension in order of their formation is depicted on Figure 1.

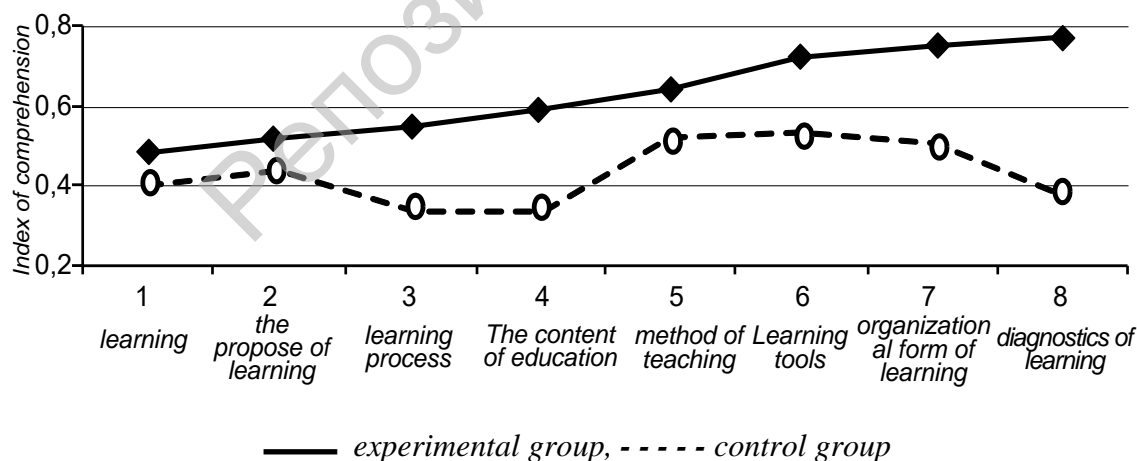


Figure 1: Dynamics of didactic concepts comprehension

The sequence of concepts acquired emergence in comprehension: the quality of the previous concepts mastering determined the higher quality of mastering of the next one, as well as determined the improvement of the quality of mastering of the previous concepts. Thus, the cumulative effect of the developed technique influence on the quality of teaching has revealed this way. Based on the obtained values for each student cumulative index of didactic concepts comprehension conducted their distribution by level of assimilation, which is reflected in Figure 2.

Statistical comparison of the quality of didactic concepts comprehension in control and experimental groups (criterion X^2 , correlation analysis) confirmed the improvement of the quality concepts comprehension in the context of pedagogical intellects on statistical significance level of 0,05.

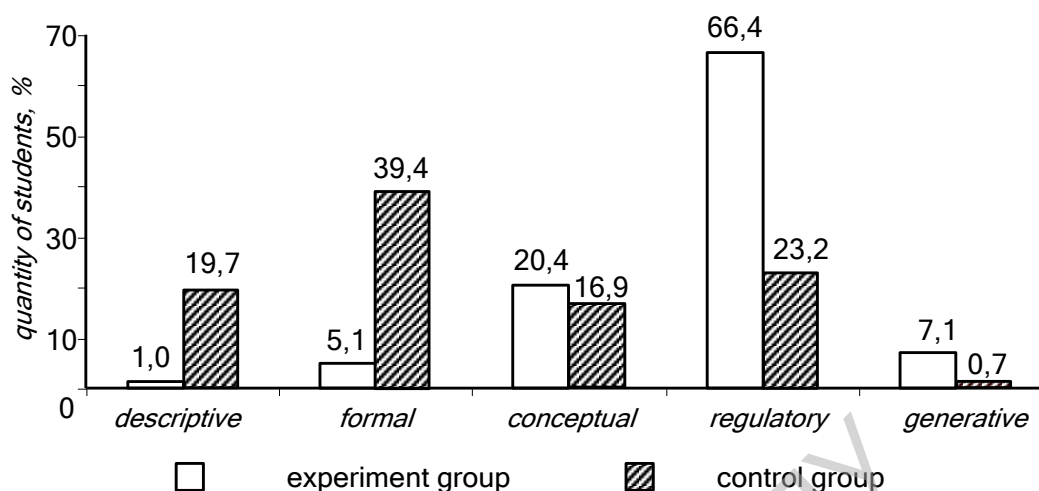


Figure 2: Assimilation of experimental and control group students

DISCUSSION AND CONCLUSIONS

Pedagogical intellects take precedence position in addressing the problems of development of intellectual potential and his future teacher training. The quality of didactic concepts comprehension is an integrated parameter of a future teacher intellectual self-development. It is based on the unity of content-based, process-based and result-based aspects that have been considered in Meta Semantic description of the didactic concepts. Choice Meta Semantic description as a generalized guide comprehension suggests a new approach to the essence of the process of didactic concepts comprehension from structurally-activity position, sensitive for the thinking subject characteristics. This eliminates the main shortcomings of the traditional method of forming concepts: the mastery of relevant content at the time of the study of concepts, formal links between the concepts of assimilation, the formation of an isolated individual concept, inability to operate with the concept.

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