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Scientific Expertise of the Psychological and Pedagogical Definition

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Abstract

The methodology of scientific examination of psychological and pedagogical definitions presented in the article is justified by the need to clarify the content of the basic set of definitions that form the core of methodological, research and innovative work in the field of education. First of all, this applies to those definitions that contain a contradictory interpretation of the psychological and pedagogical concepts. The tools under discussion are (the semantic model of the phenomenon, maps of expert assessment of the model and the results of the revision of concepts) and expert-analytical procedures for various stages of such examination (grouping of existing interpretations of the same phenomenon, wording of interpretations, revision of interpretations). The developed methodology ensures the possibility of a consistent revision of the definition of concepts, progressing from the description of the phenomenon to its normative explanation. The proposed tools and procedures are illustrated by the example of scientific expertise of the psychological and pedagogical phenomenon of “didactic difficulty”.

Keywords: psychological-pedagogical phenomenon, psychological-pedagogical definition, methodologies of scientific examination of the definition of the concept, semantic model of the psychological-pedagogical phenomenon, constructs of the semantic model, integrative characteristics of constructs, procedures of scientific examination, results of scientific examination.

1. Introduction

Many educators today are well aware of the situation when the same psychological and pedagogical phenomena are represented by different definitions, often with contradictory interpretations. As a rule, the discrepancy between the content of definitions and the properties of a real phenomenon makes it challenging to make use of the concept, confusing not only those who

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practice but also many of those who research. Concepts with ambiguous and contradictory interpretation obviously require a certain rethinking and clarification. This is certainly an urgent and far from easy task. Attempts to solve it from the position of intuition and available erudition (as it usually happens) don't always work. To solve this problem, scientific expertise is required with its own special methodology, which could make the assessment of definitions of psychological and pedagogical phenomena more reasonable and constructive.

2. Materials and methods

The methodology of scientific expertise is aimed at identifying the semantic unity of the psychological and pedagogical concept and, in this regard, its pedagogical significance in the educational process. The main means of the conducted expertise are the reference (explanatory) model of the psychological and pedagogical phenomenon and expert maps for assessing the adequacy of the model and the expert information obtained with its help. The basis for a holistic description of the initial psychological and pedagogical phenomenon and the deployment of expert evaluation procedures for its various interpretations are the structural components of the model – semantic constructs, logical and semantic cross-sections, integrative characteristics of a phenomenon.

The research material is various definitions of the concept of “didactic difficulty”, presented in the psychological and pedagogical literature. Theoretical and methodological prerequisites for the development of tools and procedures for the scientific examination of psychological and pedagogical definitions are the theory of negotiation (Shakurov, 2003a), the theory of cognitive activity of schoolchildren (Kirsanov, 1982; Lerner, 1974; Lozova, 1990, etc.), studies of reflection in educational activities (Zuckerman, 1994; Elkonin, 1994, etc.) as well as the study of the nature of the definition (Voishvillo, 2007), methodology and analysis of definitions (Gorskij, 1961; Eremin, 2019; Tunnikov, 2020a, 2020b, etc.), the methodology of scientific expertise (Bolshakov, Shamaeva, 2018; Cherepanov, 1989, etc.).

3. Discussion and results

The main tools of the examination are the reference model of the psychological and pedagogical phenomenon and the maps (matrices) of the expert assessment. The reference model of the phenomenon serves as a universal basis for performing an analytical revision of its various conceptual interpretations, primarily from a semantic and didactic point of view.

The model can be refined for a specific task of examination, taking into account the specifics of a particular psychological and pedagogical phenomenon.

The reference model of the phenomenon in its typical description includes:

- semantic constructs designed to reveal and describe the psychological and pedagogical phenomenon in its entirety. These include:

the original system of the phenomenon;

the form of the phenomenon;

the role of the phenomenon in the original system;

the place of the phenomenon in the original system;

mechanism of functioning of the phenomenon.

- integrative characteristics of the phenomenon, revealing the content and features of semantic constructs. Main integrative characteristics include: *systemic activation, functional significance, functional dynamics, functional localization, individual expressiveness;*

- logical and semantic sections of the phenomenon that establish the interrelationships and relationships of semantic constructs adequate to the sequence of the analysis. The cross-sections serve as a reference point for a comprehensive assessment of the relevance of the psychological and pedagogical definition.

An objective analysis of a definition is possible only if we proceed from the very beginning, from the recognition of the necessity of connection and the immanent origin of the differences in the semantic constructs of the phenomenon. The task is to identify and consider one's own evolution of the original relation to semantic constructs. The initial relation is the relation of semantic constructs, under the influence of which ideas are formed about all other relations of constructs, and, at the same time, about the essence of the phenomenon under study, its origin and functioning. During the transition from one relationship of constructs to another, the original

relationship is refracted and the phenomenon is reproduced as a whole, on a new basis through changing its sides and connections.

Therefore, it is necessary to look at what the sides of the original relationship turn into at the next step of the analysis. Then we will have two sides of a new relationship, from which, through analysis, the desired characteristics of the psychological and pedagogical definition are derived and receive their specific content. The origin of the new relationship in this case will be entirely determined by the connection of the parties to the previous relationship. It means the requirement of the immanent origin of differences is respected. Therefore, each section of the phenomenon naturally expresses a consistent change in the content of the sides of the original relationship, since only from the relationship of these sides to each other is the psychological and pedagogical definitions are derived. Thus, tracing the implementation of logical and semantic sections in a given sequence, we gain access to the reproduction of the reference model of the psychological and pedagogical phenomenon and thereby to the expert verification of its conceptual interpretation.

The reference model of the psychological and pedagogical phenomenon uses two logical and semantic sections, which are based on the initial relation *<form – initial system>*.

The logical and semantic cross-section of the first type is the *type of phenomenon (the form is the initial system) – the role* sets the sequence of examining the role of the psychological and pedagogical phenomenon in one interpretation or another. Indeed, before raising the question of the role of a particular phenomenon, it is necessary to lay out the initial correlation. To do this, its form and the initial system in which this phenomenon occurs and functions are determined. The relation of form and system to each other is considered in terms of the transition to the subsequent relation *<form/system – role>*, through which the role of the phenomenon in this system is revealed.

The logical and semantic section of the second type serves as a guideline for analyzing the mechanism of functioning of the phenomenon: *the type of phenomenon (role – place) – mechanism*. The section sets a consistent discourse, which is based on an assessment of the mutual influence of semantic constructs of the phenomenon on the formation of a holistic view of its mechanism. During the analysis, the initial attitude provides a consistent transition to the *<role – place>* relationship and then to the *<role/place – mechanism>* relationship, as a result of which the peculiarities of the mechanism of functioning of the psychological and pedagogical phenomenon and its conceptual interpretation are revealed.

The procedures for analyzing and evaluating interpretations of the psychological and pedagogical phenomenon are carried out in a sequence of the following stages:

1 – grouping of definitions. Definitions reflecting the essential aspects of the psychological and pedagogical phenomenon are grouped in a similar context of genus-species relations. When solving this problem, one should adhere to Leibniz's law or the principle of identification of things, according to which two things are identical if all their properties are common (*Svojstvo*).

2 – wording of definitions. The content of the selected definitions is fixed according to the set of semantic constructs of the reference (explanatory) model;

3 – revision of definitions. Definitions of each group are analyzed based on logical and semantic sections and integrative characteristics of the phenomenon. The work ends with a group expert assessment of the information received. A group of experts selected according to a special methodology (*Cherepanov, 1989*) gets acquainted with the results of an analytical revision of the definitions of the psychological and pedagogical phenomenon and makes a final conclusion.

Let us illustrate the presented methodology by the example of the examination of the psychological and pedagogical definition of “didactic difficulty” (hereinafter – DD).

The stage of grouping the definitions. As a preliminary analysis of the definitions of DD found in the psychological and pedagogical literature shows, it is advisable to group them in three contexts – cognitive, affective and resource-active.

The cognitive context is relative to the obstacles due to which educational and cognitive activity (hereinafter referred to as ECA) slows down or stops completely.

The affective context unites those definitions of DD, which emphasize the psychological state of students that arises in educational activities when faced with a complex obstacle. By highlighting the affective context, we mean that students reflect their psychological state relative to the ECA, thereby evaluating it as a process (the one in progress or upcoming), and as a result (achieved or predicted).

The resource-active context combines definitions that consider DD as a structural gap in the cognitive readiness of students and, in this regard, as a value-normative resource for the functioning and development of the learning process, a strategic means of achieving pedagogical goals.

To demonstrate the methodology of scientific examination of the concept of DD, we will focus on the definitions of the cognitive group.

The synonymic chain of the definition of “obstacle” usually includes the following words and phrases “obstacle”, “hindrance”, “barrier”, “inability”, “factors preventing the achievement of the goal”, “degree of uncertainty or inconsistency of the task”, “violation of the normal pace of mental development”.

Here are some definitions in which the concept of “obstacle” is generic in relation to the concept of “didactic difficulty”.

“Difficulty is a variety of factors that prevent one from achieving a certain goal or complicate its achievement” (Kostyuk, Ball, 1986: 46).

“Difficulties (cognitive) in the most general sense can be defined as the obstacle that students have to overcome in the process of educational activities, the barrier to understanding, conscious assimilation, reproduction and productive use different pieces of educational material, to establish essential relationships between the studied objects and phenomena” (Korzhuev, 2000: 27).

“The difficulty is a measure of uncertainty or inconsistency for the subject of certain aspects of the problem, so to solve a problem means to find a way and the way out of the difficulty” (Yakunin, 1988: 73).

“Difficulty in learning is the inability of a student to accept, understand and fulfill the substantive and procedural aspects of educational activity” (Isaev).

Similar definitions can be found in many researchers (Matusevich; Pilipenko, 1996; Salavatulina, 2004, etc.)

The stage of wording of definitions. In the above definitions, the didactic difficulty has the form of an obstacle. The obstacle can be both external and internal. As for the initial system in which it arises and functions, in fact, in all definitions, the ECA is distinguished in this capacity.

In the presented group of definitions, the obstacle is assigned not only to the property of blocking the ECA, but also to the property of stimulating it. A number of definitions specify the conditions under which these properties manifest themselves. It should be concluded that, according to the authors, the obstacle plays the role of a determinant factor that causes the start or interruption of the ECA.

How is the DD mechanism presented in the above definitions? Since the mechanism is indicated indirectly in the definitions, it can only be judged by other characteristics of the DD. It is easy to find that the obstacle in the analyzed interpretations is given the place of the primary source (starting point) or the “interruption zone” of the ECA. With a given role and place having in the initial system, the mechanism of DD, according to the authors, is a process of overcoming such an obstacle.

The stage of revision of definitions. Within the framework of the selected group of definitions, we will conduct an audit of the interpretations for each logical and semantic cross-section.

Cross-section: *type of phenomenon (form – initial system) – role.* As follows from the cognitive group definitions of DD, the obstacle and ECA are in a significant relationship with each other. Ultimately, this is a fundamental point with which one cannot disagree. Indeed, the obstacle cannot be considered in isolation from the ECA. However, it is necessary to precisely specify an essential feature. The fact is that the functional connection between the obstacle and the ECA is possible only when the obstacle that has arisen is perceived by the learner as an incentive and a target setting, which means it will become a structural element of the ECA system. If this happens (and it must be admitted that this does not always happen), then we are dealing with a fundamentally different, transformed form of an obstacle. In this case, the transformed form of the obstacle is the cognitive barrier. To distinguish between the definition of “obstacle” and the definition of “cognitive barrier”, let us refer to the opinion of R.H. Shakurov, the author of the negotiation theory: “In general, the concept of “barrier” can be defined as a relationship between the elements of the system that restrict the freedom of one of them. Therefore, the essence of the

barrier lies in the impact. It has an energy potential, manifested in the restriction of a movement” (Shakurov, 2001b: 6).

The cognitive barrier does not just show the presence of this or that obstacle in learning, but what is especially important reflects its relations to the ECA system in a specific way. It is with analytical reliance on the cognitive barrier that we have the opportunity to get a more accurate idea of the actual content of DD in each specific situation. Ignoring the cognitive barrier as a transformed form of obstacle leaves its negative imprint on the proposed definitions. First of all, they do not take into account a number of essential characteristics and indicators of the phenomenon of DD and, first of all, such as motivational, emotional, volitional, as well as important qualities of the student’s personality – independence, responsibility, competitiveness, etc. In this regard, we note that in the definitions of the cognitive group DD, many examples of the identification of a cognitive barrier and an obstacle can be found (Kozhukhov, 2000; Pelipenko, 1996, etc.). For the reason mentioned above, such identification dooms definitions to display the internal relations of the DD phenomenon from the point of view of their external visibility.

As you know, the role of the psychological and pedagogical phenomenon follows its form. The interpretations of the cognitive group DD contain an indication that the obstacle plays the role of a determinant factor. However, in terms of determining the essence of the DD phenomenon itself, this is true only in the most general form, and not in specific projections.

Firstly, as has already been shown, the obstacle is not a structural element of the ECA. Here it is appropriate to emphasize once again, it is the cognitive barrier, being a transformed form of an obstacle, that is a significant regulator of ECA.

Secondly, in order to determine the role of DD in its functional significance, it is necessary to find out what exactly regulates the cognitive barrier. To do this, it is necessary to reveal the relationship between the form of DD (in this case, it is a cognitive barrier) and the system in which the barrier is included (relative to ECA). The cognitive barrier manifests its regulatory quality as a source of information. It means it has some content that is presented to the student in one form or another. Note that the content means not only educational information related to the barrier as a source of educational information, but also information about the barrier itself, its level, nature and features. Therefore, the ECA acquires the quality of the goal, in relation to the barrier, for processing the information received.

Thus, if we adhere to the logical and semantic cross-section, the key role of DD (or the main function) should be in the goal-functional and meaningful regulation of ECA. At the same time, it should be noted that working with educational information due to the presence of obstacles associated with perception, search, transformation, memorization and other cognitive procedures requires certain efforts from the student (intellectual, moral, volitional, emotional). However, as the analysis shows, this kind of role distribution is virtually absent in the given definitions.

Let’s turn to the consideration of DD in the following logical and semantic section: *the type of phenomenon <role – place> – mechanism*. The task of a consistent analysis of the transition of the initial relationship *<form – initial system>* requires shifting the focus to the process of overcoming the cognitive barrier itself, that is, to the relationship *<role – place>*, starting from which, it is necessary to proceed to the disclosure of the mechanism of functioning of the DD.

Discussing the question of the location of the DD in the source system, it is necessary to raise the question of the localization of the obstacle in the source system. The position of those authors who consider the obstacle as a kind of source of ECA is quite clear (Vysotskaya, 1974; Grebenkin, 2006). So, S.I. Vysotskaya writes: “The obstacle that a person faces when performing any activity plays the role of the immediate cause of the difficulty as a special mental state” (Vysotskaya, 1974: 27). But in order for the ECA to receive the necessary impetus, the obstacle, as already shown, must first transform into a subjectively significant barrier. A cognitive barrier can arise and be actualized only within a certain situation. This is a situation of cognitive interaction of a student with an obstacle. In the absence of a situation of cognitive interaction, there can be no cognitive barrier, only signal information about the presence of a potentially possible interference will remain. This means that outside the framework of the situation of cognitive interaction of the student with the obstacle, there is no purposeful activity to eliminate the obstacle itself, and hence the formation of DD.

Consequently, the generating cause of DD and, therefore, the source of ECA is not the obstacle itself, but the situation of cognitive interaction of the student with this obstacle. At the

same time, the situation of cognitive interaction itself is just a picture, a subjective representation of the real situation in the individual consciousness of the student.

Thus, we can summarize. The process of folding-deployment of ECA does not happen due to the occurrence of an obstacle, but, first of all, due to the success or failure of purposeful didactic actions in a situation of interaction with an obstacle, which the student perceives, evaluates, interprets subjectively every time.

It follows from what has been said above that the obstacle, taken as such, is not a process of purposeful processing of information and in this sense is not functional at all. In other words, the obstacle is not connected with the mechanism of functioning of the DD until it is perceived (motivated, goal-oriented) by the student as a cognitive barrier and becomes a structural element of his cognitive activity. And the latter is possible only in the situation of cognitive interaction of the student with the obstacle that has arisen. As for DD, unlike an obstacle, it is a process of purposeful search and processing of information for a specific educational task.

It is quite clear that purposeful educational and cognitive actions play an important role in the dynamics of cognitive interaction with this or that obstacle. But there is more to that. There is a thing to be added here that is often overlooked. Along with the process of acquiring new knowledge, essential to overcome the barrier that has arisen, the didactic efforts of the student himself are also in the foreground, which in turn significantly depend on his psychological state. Educational practice shows that didactic efforts with certain values and an adequate psychological mood contribute not only to solving the educational tasks, but also to the personal development of students.

Therefore, the mechanism of DD is directly related to educational and cognitive actions to overcome the cognitive barrier (as a problematic node of educational information) and didactic efforts to overcome the cognitive barrier (as a transformed form of obstacle). Therefore, when organizing ECA with the solution of specific educational tasks, it is necessary to take into account the mechanism of double regulation of DD, when two sides of the same mechanism act in an interconnected and mutually conditioned way. This is expressed in the fact that actions over the barrier are largely determined by the process of regulating didactic efforts, which, in turn, manifest themselves only within the limits and direction of regulating actions to overcome the barrier. At the same time, the process of interrelated regulation of efforts and ways of overcoming the cognitive barrier indicate an individual scope of the severity of each component of the mechanism of didactic difficulty. This understanding of the mechanism is, in fact, nothing more than a detailed expression of the nature of the didactic difficulty itself.

We present the results of the exposition and analytical revision of the interpretations of the definition of DD cognitive group in [Table 1](#).

Table 1. The results of the exposition and analytical revision of the interpretations of the definition of “didactic difficulty” (cognitive group)

Semantic constructs of the DD phenomenon model	Results of the exposition of the concept of DD	The results of the analytical revision of the concept of DD
Initial system of the phenomenon	ECA	ECA
Form of the phenomenon	Cognitive obstacle	Cognitive barrier
Role of the phenomenon in the original system	Interrupter-stimulator of ECA	ECA Controller
Place of the phenomenon in the original system	Source, root cause of ECA; “interrupt zone” of ECA (DD outside the system)	Structural element of the ECA (DD element of the system)
Mechanism of functioning of the phenomenon	Overcoming obstacles	The process of interrelated regulation of efforts and ways to overcome the cognitive barrier

The final part of the audit involved filling out an expert card. The map records the degree of correlation between the real psychological and pedagogical phenomenon and its interpretation, taking into account the regulatory requirements for the semantic structure of the definition (Table 2). To solve this problem, according to the methodological recommendations (Orlov, 2002; Cherepanov, 1989), an expert group of five people was formed. Previously, the experts got acquainted with the results of the analytical revision of the interpretations of DD obtained using the reference (explanatory) model of the psychological and pedagogical phenomenon. The expert assessment is carried out differentially within the specified framework of the semantic description of the DD. By means of integrity and consistency criteria, the ability of the proposed definitions to perform their logical functions was established, as well as semantic errors made during the formulation of the concept.

Table 2. Expert assessment of the degree of correspondence between the phenomenon of “didactic difficulty” and its definition

Requirements for the semantic structure of the definition of “didactic difficulty”	Degree of correlation between the phenomenon and its definition		
	Full compliance	Partial compliance	Full non-compliance
Correlation between the original system of the phenomenon and its representation in the definition	+		
Correlation between the form of the phenomenon and its representation in the definition			+
Correlation between the role of the phenomenon in the original system and its representation in the definition		+	
Correlation between the place of the phenomenon in the original system and its representation in the definition			+
Correlation between the functional mechanism of the phenomenon and its representation in the definition		+	

First and, perhaps, the main thing is that the results of the group examination confirm: didactic difficulty and obstacle are different concepts and one of them cannot serve as a generic concept in relation to the other.

It can be deduced from Table 2 that there are semantic gaps in the system of relations in which the concept of DD is considered, which in turn indicates a number of semantic errors. The gap in the framework of the <form – source system> relationship and the gap in the framework of the <form/source system – role> relationship indicate an unlawful expansion of the concept of “obstacle” (the error “trade-off of the reference definition”), as well as an incorrect narrowing of the role of the DD (the error “incomplete description”). The gap within the <role – place> relationship and the gap within the <role/place – mechanism> relationship indicate that the concept of “place” is considered outside the framework of the original system (the error “contradiction between the basic definitions”), and not all components are taken into account when designating the DD mechanism (the error of the “semantic gap”).

4. Conclusion

In modern pedagogy, psychological and pedagogical definitions with contradictory interpretations are still often used. This leaves a negative imprint on the development of theoretical positions that are of great importance for solving urgent problems of research, innovation and

methodological activities of teachers. The scientific examination of the definition of concepts, equipped with a relevant methodology, is designed to significantly remedy the current situation.

As our research shows, the reference model can serve as the instrumental core of the methodology of scientific examination of the content of psychological and pedagogical definitions, which reveals the semantic unity of a phenomenon in the main logical and semantic sections through flexible semantic constructs and their integrative characteristics. The proposed methodology of scientific expertise (tools, procedures and results) has been tested on the material of expert revision of definitions of such a complex psychological and pedagogical phenomenon as didactic difficulty. The obtained results direct to the universal nature of the developed approach, as well as the possibility of its extrapolation to a fairly wide set of psychological and pedagogical definitions.

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