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THEORIES OF QUALITY CHANGES OF THE SPEECH AND REASONING MECHANISM IN THE RUSSIAN PSYCHOLOGY

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The efficiency of scaffolding is true for the pedagogic community, but the issues of developing psychological innovations in schoolchildren during such education are out of serious attention. In that connection, it is curious to study the nature of psychological innovations formed during scaffolding as represented in the research by concept's developers. The methodological basis of scaffolding (developmental education) theory was the concept of mutually related development of the speech and reasoning by L.S. Vygotsky [1]. L.S. Vygotsky describes the quality changes of the speech and reasoning mechanism by two ways: via changing perception of a word's meaning in native speakers and via different quality ways to take possession of a word as a notion.

The ontogenesis of the speech and reasoning mechanism is represented as possessing a word as a marker of nominative function (calling function) to perception of a word as a symbol, expressing denotative function (content via name, always the same for anyone using that word) and significative function (meaning disclosing material signs of a phenomenon contained in notion). Study of a word as a significate allowed L.S. Vygotsky to specify three basic stages of conceptual thinking development (from comprehensive to pre-conceptual and conceptual) and respectively to specify three basic ways of abstraction of the speech and thinking experience described as comprehensive (empirical), formal logical (pre-conceptual) and theoretical abstraction. As sharply mentioned by V.V. Davydov, due to L.S. Vygotsky notions, formation process became manifested in its real dimensionality as a comprehensive process of reasoning in pyramid of notions, continuously from particulars to generals and from generals to particulars [2]. Having offered the description of quality changes in the

speech and reasoning in general, L.S. Vygotsky suggested the leading role of education in development of conceptual thinking. That provision created the route for didactic inversion of the theory of mutually related development of reasoning and speech.

L.V. Zankov, having accepted the logic of describing quality changes of the speech and reasoning mechanism of L.S. Vygotsky, concentrated the main efforts on establishment of a didactical invariant of the cultural and historical concept. Based on the provision of L.S. Vygotsky that education always goes ahead development, he introduced *general development* meaning *development of child's personality, all its parts… It should be stressed that general development of a child includes the content of development notion in general sense: moving from simple to complex, from lower to higher, going the upline, from old quality state to new higher quality state, renewal, die-away of old… General development is the formation and quality change of personal features which are the basis for successful studying of any subject and after school – the basis of creative work in any sphere of human activity* [3].

L.V. Zankov sees the core in the realization of the five principles united by internal link criterion and complementarity: - principle of education on a high level of difficulty suggesting development of cognitive activity of pupils; - principle of advance role of theoretical knowledge ensuring holistic and truly scientific view of the phenomenon studied; - principle of awareness suggesting conscious knowledge possession and educational acts formation; - principle of systematics interpreted as the requirement for systematic generalizations of the studied and also as the requirement to maximal approach of educational knowledge to truly scientific knowledge; - the principal of purposeful, systematic development of each student as each student makes a unique and valuable contribution to the common life of the class [4].

D.B. Elkonin, generally accepting the concept of L.S. Vygotsky, developed it greatly regarding detailing the leading role of education in development and regarding the age periodization of quality changes of the speech and reasoning mechanism. He proves that education may determine development and may be totally neutral to it [5, 280]: *education may be not developmental if it oriented at developed forms of child's psychological activity – perception, memory and forms of visual and representational thinking typical for the preceding period of development. The education built this way*

thus fixes the finished stages of psychic development. It lags behind development and therefore does not force it forward [5, 282]. D.B. Elkonin considers developmental education when the educational content is a system of notions on a particular sphere to be learnt with the ways of actions via which notions and their system are formed in pupils. For a scientist, notions formation process is integral to formation of actions with subjects disclosing their material features [5, 283]. Development of visual and representational type of reasoning is linked with pre-school age, development of verbal and logical reasoning, including rationale is linked to early school age, formation of hypothetic arguing reasoning relates to teenage. In general, D.B. Elkonin not only specified the content of the speech and reasoning mechanism's ontogenesis in children of various age, but also specified the provision on the leading role of education in the content of developmental education. A special merit of that psychologist is the theory of developmental teaching activity and further research of awarding scientific notions in the course of activity.

Despite the originality of the theory of quality changes of the speech and reasoning mechanism of D.B. Elkonin, there are a lot of provisions close to the theory of unity of consciousness and activity of S.L. Rubinshtein. Like D.B. Elkonin, S.L. Rubinshtein introduces teaching activity to create a provision different from L.S. Vygotsky on the unity of development and teaching: *To fully and correctly realize the provision on the unity of development and education, it should be taken into account that there are two actual ways of teaching. Teaching as a special activity aimed at teaching as at the direct target is only one of them. Teaching occurs along with that as a result – but not as a purpose – of activity. Teaching in that case is not a special directed activity but a component of other activity containing the teaching process. That second way of involuntary teaching contained in the activity in which teaching is a result but not a purpose is historically original. Only thereafter from the activity aimed at meeting direct human needs as at its target, special teaching activity emerged, in which teaching is not only a result but the direct purpose* [6].

Like D.B. Elkonin and L.V. Zankov, S.L. Rubinshtein is convinced that quality change of consciousness and intelligence is possible only in organization of education in the form of operating the system of scientific notions in teaching activity. S.L.

Rubinshtein, hardly accepting the cultural and historical concept of L.S. Vygotsky, blamed the latter for excess functionalism and artificial opposition of *cultural* and *natural*. In fact, S.L. Rubinshtein continued L.S. Vygotsky's research, having offered to consider the main subject of psychology not the interaction of reasoning and the speech but the unity of consciousness and activity: *Activity and consciousness are not the two aspects oppositely directed. They form an organic whole thing – not identity but unity… The fact of recognition of activity changes its conditions and thus its flow and nature; the activity terminates to be a simple aggregate of responses to external environmental irritants; it is governed the other way; the governing laws are outside physiology only; explanation of activity requires disclosing and accounting for psychological laws. On the other hand, the analysis of human activity shows that actual awareness or unawareness of any action depends on the relations built in the course of actual activity* [6]. L.S. Vygotsky's provision on the leading role of education in development is deemed banal by S.L. Rubinshtein who suggests that development process is identified by a psychologist with the process of growing psychic functions and features.

Comparison of theories of quality changes of the speech and reasoning mechanism of L.S. Vygotsky and S.L. Rubinshtein shows that those scientists rather similarly understand the laws of quality changes of the speech and reasoning mechanism, ways and conditions of their emergence but realize different methodological approaches. L.S. Vygotsky consistently realizes psychological and linguistic approach developing a brand new science of psycho-linguistics. S.L. Rubinshtein realizes philosophic and psychological approach allowing, like A.N. Leontiev, to see the origination of psychic activity not only from communication forms but also from other human activities. Meantime, the theory of S.L. Rubinshtein only confirms the main idea of L.S. Vygotsky's doctrine that psychic activity is built on the pattern of external activity while specific human higher psychic functions originate from verbal communication between people and are marked with signs; mostly and first of all, by language signs.

One should not think that philosophic and psychological approach to the analysis of quality changes of the speech and reasoning by S.L. Rubinshtein did not enrich the general psychological theory. From the positions of the realized approach the scientists

think that psychology should study individual thinking activity in those forms of scientific cognition which are studied by the theory of cognition and logic in the historical development context. At various stages of cognition, the unity of analysis and synthesis acquires various quality forms which, in turn, is related to various ways of abstraction.

S.L. Rubinshtein specified three such ways. *The first way is elementary empiric abstraction as a result of comparison by specifying general/common features of the compared phenomena… The second way is abstraction via analysis and abstract thinking…* That is *the abstraction to which the theoretical thinking rises as a result of disclosing dependent necessary links of phenomena* [6]. *Scientific abstraction is a derivative effect of the analysis related to abstraction. Meantime, abstraction causing generalization is in scientific notion and does not separate generals from particulars. In a scientific notion, in a law, particulars do not disappear and are kept as variables which may gain various particular meaning* [6].

S.L. Rubinshtein's idea on quality changes of the speech and reasoning mechanism as the development of various types of generalizations was perceived and developed by V.V. Davydov in the cycle of his basic research [2; 7]. The novelty of his approach was ensured by the integration of views of L.S. Vygotsky, A.N. Leontiev, S.L. Rubinshtein and P.Ya. Galperin. From L.S. Vygotsky, V.V. Davydov inherited the idea of development of various kinds of abstractions in the pyramid of notions interpreted as movement via the network of formed abstractions. From S.L. Rubinshtein, he accepted the idea on using the cognition theory's data in didactic psychological research which allowed V.V. Davydov to prove that the education process should be built not only as the process of awarding notions in activity but rather as the process of determination of scientific notions in teaching activity ensuring transformation of education into self-learning. Acceptance of the reflection theory of E.V. Ilienkov following A.N. Leontiev, as the scientific basis for explanation of transitions from generalizing things to generalizing thoughts allowed V.V. Davydov to consider modeling as both a way of scientific cognition, a way of teaching, and a psychological and pedagogical principle.

Following V.A. Shtof, V.V. Davydov understands a model as a thought or a materially realized system which, reflecting or representing the object of research, is able to replace it in such a way to let receive new information about that object in the

course of study [8, 19]. In the course of experimental study V.V. Davydov found that models and related model representations are the products of comprehensive cognitive activity including first of all thought-processing of the initial feelings, clearing from accidental moments, etc. Models are the products and means of that activity.

Operating notions in teaching activity by content is the rise from abstract to concrete – the main law of meaningful abstraction.

V.V. Davydov's chief merit is the formulation of the basic psychological and didactic principles of teaching content and methodology arrangement:

1) all the notions constituting a subject or its core sections, should be learnt by children by considering subjective and material conditions of their origination due to which they become necessary (in other words, notions are not given as *ready knowledge*); 2) learning general and abstract knowledge precedes getting familiar with more particular and concrete knowledge; the latter should be determined out of the first as out of the united basis – that principle flows out of the attitude to finding the origin of notions and complies with the rise from abstract to concrete; 3) in the study of subjective material sources of any notions, pupils first of all should find genetically initial overall link which determines the content and structure of the whole object of those notions; 4) that link should be represented in special subjective, visual or sign models allowing for its *pure* study (for instance, general ratios of values may be represented by children in the form of letter formulae suitable for further study of those ratios: internal structure of a word may be represented using special visual schemes); 5) subject actions need to be established in pupils by which they will be able to find in the learning material and model the material link of the object and then study its properties (for instance, to detect a link being the cornerstone of the notion of even, fractional and real numbers, an action needs to be developed in pupils in connection with finding definite proportions of values for indirect comparison); 6) pupils should gradually and timely shift from subject actions to their mental implementation [2].

Such structure of subjects studied, as opined by V.V. Davydov, allows to arrange teaching in the course of which small pupils fully acquire notions and skills typically related to a more senior age. Acquisition of that educational material contributes to the formation of theoretical reasoning in children.

Conclusions made by V.V. Davydov, contradicting to the understanding of ontogenesis of the speech and reasoning contained in works of absolute majority of psychologists are much compliant with the conclusions made by P.Ya. Galperin who created the theory of quality changes of the speech and reasoning mechanism as the theory of stage-by-stage formation of mental actions [9; 10; 11; 12]. P.Ya. Galperin bases on the research of L.S. Vygotsky, A.N. Leontiev, D.B. Elkonin, A.V. Zaporozhets, S.L. Rubinshtein. The term *orienteering actions* is borrowed from A.V. Zaporozhets who studied how orienteering process is arranged in a child in the conditions of action and its process content [13].

As distinct from S.L. Rubinshtein, the scientist considers the subject of psychology *only the process of individual's orienteering in solution of intellectual and reasoning tasks* [12]. *Orientational basis of action*, as opined by P.Ya. Galperin, is a rather comprehensive formation containing two parts:

1. image of the object to be received with certain internal structure, properties and signs, namely, the model of the future result related to the properties of the initial material; 2. image of the system of operations, detailed plan of actions. Using those operations, the structure, quality, state of all the conditions of a task are checked first, then transformations are made required to gradual turning of the initial material to the prescribed product.

In the course of action, this content of its orientational basis is step by step related to the objective conditions and subsequent changes – not only orientationally, by *trying on*, but also by actual implementation of the suggested transformations. Due to that, the theoretical knowledge already incorporated into the orientational basis of action from an object of theoretical activity is becoming an important component of orientational activity and in general, subjective action of an individual is established [12].

P.Ya. Galperin describes in detail the process of interiorization of external activity, implemented by its orientational basis and the quality changes occurring in the activity and its subject. There are six generally known stages of mental actions of pupils of the third type of the doctrine, according to which the full scheme of orientational basis of action is either ready-input or made by pupils together with the teacher. It is important and material that the third type of learning the scheme of orientational basis of action

has full orientation not to the conditions of doing a certain action but to the principles of learning material's structure, subject's units and their combination dependencies. In that context, P.Ya. Galperin is fully compliant with the teaching principles implemented by V.V. Davydov, D.B. Elkonin and L.V. Zankov.

It is as important that P.Ya. Galperin fully rehabilitates the psycho-linguistic approach of L.S. Vygotsky, proving that full focused content of actions is kept only if the implemented activity is spoken out based on action's orientational basis scheme components. It is also proved that modeling an activity visually made by V.V. Davydov reflects the dependencies of acquiring learning activity.

The doctrine of P.Ya. Galperin plays a great role for didactics as it allows to see in detail the processes of managing pupils' cognitive activity and arrange them in good quality and efficiently. Simultaneously, comparison of P.Ya. Galperin's doctrine with the works of other psychologists shows that the solution of quality management of learning activity of pupils does not eliminate the issue of readiness to self-education. Besides, there is one more unsolved issue detected when comparing the theory of P.Ya. Galperin with the works of L.S. Vygotsky, S.L. Rubinshtein, V.V. Davydov and others.

Both L.S. Vygotsky and S.L. Rubinshtein admit that the ontogenesis covers consequential formation and development of three different quality states of the speech and reasoning mechanism and all those basic states are fixed in certain spheres of personality's life and activity. For the common life, visual practical reasoning and empiric abstraction opportunities are used. The learning process often requires formal logical reasoning and respective type of abstraction. The studies of P.Ya. Galperin are initially aimed at the development of solely theoretical thinking and meaningful abstractions.

Absolute majority of psychologists considers activity as the unity of the conscious and the subconscious, while in the theory of staged formation of mental actions the latter is not covered at all. Finally, the use of P.Ya. Galperin's theory in teaching practice showed that the levels of perception of actions in pupils do not coincide, and that condition does not depend on completeness/incompleteness of the orientational basis.

Overcoming this fault, A.N. Leontiev, under his activity concept, created the theory of three levels of perception of implemented activity [14-19]. We think that this

theory creates wide space for description and explanation of the functions and features built in the speech and reasoning mechanism at various stages of its development. In that connection, we consider one more concept of quality changes of the speech and reasoning mechanism born in the course of analysis of the theory of three levels of perception of A.N. Leontiev. The basic provisions of the new theory of formation and role distribution of the basic functions and features of the speech and reasoning mechanism are as follows:

1) Acquisition of any learning activity is implemented on the basis of the formed and continuously developing speech and reasoning mechanism. Learning activity means the system of actions of various abstraction level (structural and componential actions/operations) as a whole structure for the achievement of perceived planned results.

2) The basic stages of the speech and reasoning mechanism development are described in detail by L.S. Vygotsky [1], A.N. Leontiev [14-19], N.I. Zhinkin [20; 21], A.A. Leontiev [22], I.A. Zimnyaya [23] and other scientists. In this research, we would stress in detail on the features gained by the speech and reasoning mechanism in the course of its development which make a developing complementary structure a self-improving tool. In other words, we are interested in the content of heuristic features emergence in developing the speech and reasoning mechanism.

The speech and reasoning mechanism is formed during self-learning a certain language/languages accompanied by intelligence. Development of the speech and reasoning mechanism occurs via various activities done by children. As opined by A.N. Leontiev [14], the process of acquisition of any activity occurs on the three levels of perception: unconscious, in the form of imitation; consciously controlled, accompanied by structuring separate actions into a system; actually perceived, controlling the quality and structure of the activity learnt in compliance with the planned result. The theory of A.N. Leontiev was developed by V.V. Davydov [2; 7] regarding the needs of developmental education who proved that the process of acquisition of any theoretical activity is exercised via acquisition of notions system of that activity also on the three levels of perception: spontaneous (unconscious) operating notions of the acquired activity; intentional (consciously controlled) operating, accompanied by development of

targeting skills; actually perceived operating or construction of notions system in direct activity.

The analysis of the above scientists' works allows to think that in terms of the three types of perception there are three basic functions of forming the speech and reasoning mechanism which, in developed state, turn into the features of established intellectual and speech formation. The process of transformation of the speech and reasoning mechanism's functions into its features will be clear only when there is a view of the activity content of the forming mechanism.

Ontogenetically, the primary function of the developing speech and reasoning mechanism related to the random set of the basic ways to do the acquired activity may be called complexing, following L.S. Vygotsky. At the intellectual level, complexing development flows as acquiring empirical operations, empirical abstraction, empirical participation, prototypes of analysis and synthesis operations – empirical differentiation and analogy. At the speech level, complexing development is manifested in the set of primary speech experience: words-sentences, simple grammar models of phrases and sentences – in general, predicate words serving as text reflections of the linguistic view of the world being built.

The situation of the random set of the basic ways to do an activity in the course of its practical application changes in quality: *hierarchization* stage begins (D.B. Elkonin's term) in the acquired ways to perform an activity, or the stage of setting conceptual relations between them. Conscious control of the actions procedure is exercised as finding intermediary objectives of an activity and checking for correctness of intermediate targeting upon activity's result. It is obvious that the second function of the speech and reasoning mechanism – conscious hierarchization of an activity from componential to structural actions – is reasonable to call *conceptualization*.

It is in the course of conceptualization development where the initial operations of generalization, abstraction, participation not only upgrade but become the ways to do the initial analysis and synthesis – highly generalized intellectual actions. During the development of the conceptual function of the speech and reasoning mechanism, synthesis (*advance synthesis*, as per N.I. Zhinkin [20]) as the planning of ways of doing

an activity from componential to structural actions is improved faster than analysis as the planning of ways of doing an activity from structural actions to components.

In the course of activity-related, consciously controlled adjustment of the functioning speech and reasoning mechanism, activity planning situation *from bottom to top* (from components to structure or from methods of doing an activity to activity's objectives) is replaced by activity planning situation *from top to bottom* (from motives and objectives to ways and results or from structure to components). Considering the content of the occurring processes, it is reasonable to call the third adjustment function of the speech and reasoning mechanism *categorization*. During that function's development, leading intellectual actions in connection with activity planning are redistributed by roles: advance analysis (planning an activity from structure to components) dominates over advance synthesis, causing actually perceived improvement of the activity acquired on both sides. Development of categorization was described by L.S. Vygotsky as acquiring an activity *from particulars to generals and from generals to particulars almost simultaneously*.

The analysis of research of L.S. Vygotsky, A.N. Leontiev, V.V. Davydov, A.A. Leontiev, etc. allows to state that all the three functions of the speech and reasoning mechanism are formed in the course of full acquisition of any activity, but only in acquisition of theoretical kinds of activities the role distribution of the formed functions occurs with their further relatively independent development. Rather independent development of each of the functions specified, in turn, evidences their transformation into the features of the speech and reasoning mechanism while the existence of those features evidences the transformation of the developing speech and reasoning mechanism into a self-improving structure [9]. Function means certain purpose of the forming ways to do an activity by the developing speech and reasoning mechanism, and feature is a characteristic of the speech and reasoning mechanism as a self-developing formation.

First, we will disclose the essence of the theory of role distribution of the formed functions of the speech and reasoning mechanism explaining transformation of functions into features. In ontogenesis, formation and development of the speech and reasoning mechanism is in development logic: complexing as a set of intellectual and

verbal operations contributing to child's socialization; further conceptualization of available experience called for, as per L.S. Vygotsky, by the conditions and success of child's socialization; categorization of the speech and reasoning experience as the factor contributing to child's further successful socialization. Acquiring empirical knowledge, a child mainly develops the way of comprehensive acquisition of an activity, as empirical knowledge is marked by clearly drawn single links: action-result, cause-effect, condition-result, etc. Acquiring formal logical knowledge, a child has to conceptualize the relationships between the actions acquired and find the content of those relationships. In other words, a child has to use the independent conceptualization method built under his/her complexing. In the speech, that discovery flows like finding genus/species relationships (for example, dishware means cups, spoons, forks, plates, etc., or camomiles, poppies, cornflowers, roses are flowers, etc.). In reasoning, that discovery flows as apprehension of classification criteria of objects and phenomena of the world (surrounding objects may be classified by color, form, quantity, size, etc.), their multiversity and internal links. Developing conceptualization affects not only the quality of formed complexing developed but determines the new quality of categorization formation which will be the basic way to acquire scientific knowledge in reality.

Actually perceived role distribution of the basic functions of the speech and reasoning mechanism occurs during acquisition of scientific knowledge because it is conditioned and determined by specifics of scientific knowledge. If all kinds of knowledge (empirical, formal logical and scientific) are systematic, only scientific knowledge is systematic integrally. Systematic integrity of scientific knowledge is manifested in:

- openness (deducibility of the content of scientific categories from particular scientific notions systems and reducibility of particular scientific notions systems to a system of available or discovered scientific categories); - synthesis of operational (how to do) and conceptual (why to do so) parts of knowledge as well as their integration method in the system of notions being scientific knowledge;

- new output knowledge opened in the course of active acquisition of scientific knowledge;

From the above positions, the logic of development and role distribution of the basic functions of the speech and reasoning mechanism during the acquisition of various kinds of scientific knowledge is as follows.

In acquiring empirical knowledge being absolute operational knowledge, the three functions of the speech and reasoning mechanism are integrated in the scheme: complexing – conceptualization – categorization. In acquiring formal logical knowledge being the integrity of conceptual and operational knowledge, not only basic functions are formed but they are consciously distributed by roles in the scheme: conceptualization – categorization – complexing. During true acquisition of scientific knowledge being the integrity of conceptual and operational knowledge and methods for their synthesizing, actually perceived redistribution of pre-formed functions of the speech and reasoning mechanism occurs in the scheme: categorization – conceptualization – complexing.

Creating the theory of development and role distribution of the basic functions of the speech and reasoning mechanism and their transformation in the course of true acquisition of scientific knowledge, we were based on the key provisions of the theory of acquisition and functional use of scientific knowledge, developed by L.S. Vygotsky, A.N. Leontiev and to some extent by V.V. Davydov.

The above scientists opine that the acquisition processes of various kinds of knowledge match in the content as they flow as free operationalization of the acquired knowledge (finding ways to do an activity). Of principal concern there are the processes of initial and correctional functional application of various kinds of knowledge. Role distribution and prevailing development of the conceptual function begin and finish the process of functional application of formal logical knowledge. The functional application of scientific knowledge flows both as the conceptualization of operational part of knowledge in the course of which *discovery* of the integration method of the two parts of scientific knowledge occurs and as the realization in activity of the open method of integration of the conceptual and operational parts of scientific knowledge.

As any scientific knowledge is perceived as an integrated system of notions, it may be stated that scientific knowledge is not acquired immediately (as operation of single notion in activity): the stage of actually perceived operating of scientific notions

system in activity follows the stage of comprehensive set of that system and the stage of conceptual content filling of that system of notions in activity. In other words, arrangement of the functional application of scientific knowledge as free movement through the network of formed abstractions has special logics determined by the dependencies of the speech and reasoning mechanism development.

The functional application of scientific knowledge suggests preliminary perceived modeling of the activity not on the level of conscious control over separate operations but on the level of actually perceived structure and components of the activity. It means that actually perceived modeling of activity is a distinctive feature of the functional application of scientific knowledge and the essence of the integration method of the two parts of scientific knowledge. The process of defining the characteristics of the studied object by modeling only begins the process of knowledge acquisition but *cognition does not end there* (A.A. Leontiev). Transformation of scientific knowledge into teaching model for object's description allows only to fix full definitions to be used further. That action is done on the basis of the comprehensive function supported by the conceptual function.

To specify the characteristics of an object or objects via modeling method, we will need the arrangement of perception of the integrated system of notions represented in the teaching model as well as the arrangement of the functional application of the detected system of notions in the course of activity to prove that an object possesses these but not other characteristics. Here, modeling not only begins the cognition process but determines its further content. That action is done as prevailing development of the conceptual function and its dominance over all other functions of activity's mechanism.

To construct new objects based on known models it is required to synthesize the studied models for the purpose of deducting the content of a new categorical model (deduction of notions/definitions) and synthesis of each known model with the new one to determine and specify the characteristics (deducted notions) of the new model.

The principal difference of a new object construction via modeling method is manifested as follows. The creation of a new model flows as the functional application of the acquired knowledge or as the development of ability to acquire output knowledge.

Otherwise, the construction of a new model finishes the cognition process of the studied models (their functional application) and begins the cognition process (functional acquisition) of a model constructed or being constructed in its new capacity: on the basis of established capacity to gain output knowledge.

A crucial component of the process for establishment of a new model of knowledge is integration definition, clarification of notions' definitions of synthesized models and integration/notion operating the new categorical model. Integration, being an essential feature of the categorical function, ensures new role distribution of the basic features of the speech and reasoning mechanism and the realization of the new model on the basis of the higher function of the speech and reasoning mechanism.

In the logic of the research, the three functions of the forming and developing speech and reasoning mechanism (complexing, conceptualization and categorization) are transformed into the features of that mechanism in the moment when each of them is applied as the leading function in the course of modeling the activity acquired. Meantime, conceptualization used in the leading role changes the complexing quality and serves as the basis for further development of categorization. Categorization as the leading function in modeling the activity acquired in a quality manner improves the developing conceptualization and complexing. Free application of each function in self-learning process or improvement of the acquired activities evidences not only that the functions turned into features but also that the speech and reasoning mechanism is capable for self-improvement while a personality is highly ready to self-learning and self-improvement.

Thus, the process of the transformation of the developing speech and reasoning into a self-improving mechanism is explained by the theory of three levels of cognition of the activity acquired, the theory of formation dependency of the three functions of the speech and reasoning mechanism in the course of doing various kinds of activities and the theory of role distribution of the basic functions of the speech and reasoning mechanism in the course of acquiring theoretical kinds of activities.

The suggested theory not only explains the established scientific models on quality changes of the speech and reasoning mechanism in the contemporary Russian psychology but, which is principal and material, it finds how, in the ontogenesis, the

transition occurs from controlled formation and development of the speech and reasoning to a self-improving mechanism serving as the psychological basis of self-learning. The suggested theory also rehabilitates the psycho-linguistic approach of L.S. Vygotsky to the study of quality changes of the speech and reasoning mechanism, as a thought is made in a word and therefore the role of personality reflects the level of its intelligence. Keeping the integrity of considering the speech and reasoning development will allow to materially move during the course of creating psychological and didactical theory of knowledge.

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