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"There is nothing so practical as a good theory": How to let it work in practice (the case of Galperin's theory)

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One of the most important and sharply discussed aspects of scientific knowledge is the problem of the possibility for practical applications and results. The application of psychological knowledge in different types of schooling, training, and instruction is a representative illustration of that problem's current state. The aims of this paper are (1) to consider the possibilities and difficulties of such an application, (2) to analyze the reasons for both success and failure, and (3) to try to work out a path toward the construction of an applied theory to bridge the gap between psychological theory (in particular, learning and developmental psychology) and instructional practice. Specifically, this article considers practical applications of the fundamental psychological theory of Planned, Stage-by-Stage Formation of Mental Actions, or the PSFMA theory, by P. Galperin as the target case.

Keywords: psychological knowledge, practical application, formation of mental actions, mental models, internalization, applied model-based theory

Introduction

If we consider teachers, trainers, and instructors as the "consumers" of psychological knowledge, we may ask this question: What type of psychology do practitioners need? Certainly, they are not in need of general speculations; rather, they need concrete information about the psychology of learning, development, and instruction, information that can become the core of their practical activity. Recent educational practice has created a real challenge for psychology: the challenge of providing knowledge that is sensitive to the heterogeneity and complexity of the social context in which learning processes take place while at the same time offering to the teacher sufficiently concrete and clear psychological descriptions both of students and of learning/teaching processes and contents. Without answering such a challenge, researchers wonder why teachers and school administrators do not want to use their remarkable and sometimes outstanding ideas, theories, and

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models, while teachers and school administrators (together with the general public) wonder why researchers are not capable of providing them with practical, useful knowledge, expressed in an acceptable and understandable form, that can be applied to everyday schooling activities. More than thirty years ago, Snelbecker (1987) published a "menu" of teachers' justifications for not using educational psychologists' and instructional designers' prescriptions in their everyday professional activity. Evaluating the possibilities of instructional-design "blueprints," several teachers claimed that they were already on their own practicing what was recommended by scientists. Other teachers, while acknowledging the innovative nature of scientific recommendations, still doubted the practical possibility of applying the recommendations in their own classrooms. Snelbecker found that statements such as these were the most common among teachers : "I don't need any help in teaching/training"; "I am already doing what you advise"; "if I use that theory, I'll have to change my teaching methods completely"; "I already know those theories."

It is not easy to get practitioners to accept a system of conditions for applying scientific knowledge. Creating such conditions would mean giving teachers, trainers, instructors the possibility of obtaining more explanation about and practice with that knowledge than they can obtain on the basis of common sense or their own practical experience alone. It means discovering a general intellectual procedure that would not only enable the users to analyze many concrete instructional situations according to the findings of modem psychology (in particular, learning and developmental psychology) but would also encourage them to do it. In other words, it is necessary to offer a sort of "intellectual tool" that practitioners can use to increase their competence in using instructional technologies. This instrument has to be multifunctional and universal. It should direct the attention of the users to changes in and development of the constructive activity of a learner and to focus the users' attention on the mental, internal components of any learning activity. On the procedural (technological) level, such an approach must operate sufficiently so as not to be simply a set of speculative declarations of "good intentions." Thus, applied psychoeducational theory requires a strict and simultaneously more explicit form of psychological knowledge. In other words, it requires nonmetaphoric descriptions of the variables (structural, functional, and developmental) that are most essential and that determine the effectiveness and efficiency of learning/teaching processes as well as a description of the interrelations of those variables. In addition, a detailed and, again, nonmetaphoric and unambiguous description of the psychologically grounded conditions that should be present within schooling environments should be offered. Such descriptions must encompass the whole of the schooling situation and the complexity of the processes and phenomena involved.

It is important to emphasize that these descriptions must also be developmentally sensitive. Two different mechanisms may underlie a lack or even an absence of an ability to act on a mental plan: (1) macrogenetically, a learner's mental plan may be underdeveloped (Galperin, 1992; Piaget, 1970), and thus he/she may be prevented from acting mentally within specific spheres of reality; (2) microgenerically, the mental actions that are the prerequisites for learning specific content may not have been formed at all (or may have been formed with inappropriate and insufficient properties) in the course of a student's past educational experience (Galperin, 1969).

Discussion

The developmental dimensions of instructional content are equally clear. For example, it is generally not possible to assimilate certain subject areas before a certain, identified age or developmental point (Piaget, 1970). However, it is possible to overcome such age-related barriers when a teacher promotes the special formation of a student's mental activity on the basis of functional-development regularities (Galperin, 1992).

In discussing the "developmental sensitivity" of modem descriptions of instructional technology, one has to distinguish two different aspects. First, as an essential and necessary component of the psychoeducational knowledge base, the developmental dimension must be taken into account in developing plans for instruction. Doing so requires (1) planning, designing, organizing the learning/teaching processes in accordance with macro- and micro-developmental regularities, and (2) determining the short- and long-term developmental consequences of these processes and the extent to which learning/teaching processes influence the student's cognitive, personal, moral, social, and emotional development. Second, developmental changes can also be viewed as a direct and immediate aim of the learning/teaching processes. This principle has been formulated in a general, philosophical manner by Vygotsky as "instruction is good only when it proceeds ahead of development" (1978, p. 132).

It's my firm belief that such an approach, in which the above requirements for the "general intellectual tool" are met, and met in a sufficiently complete, sophisticated, and operationalized manner, is the Planned, Stage-by-Stage Formation of Mental Actions approach introduced by Piotr Galperin (1967, 1969, 1989, 1992) .* Galperin's approach is the continuation of a trend in developmental and learning psychology that was started by Vygotsky (1978). However, Galperin's approach introduces the following new elements: (1) the approach considers the nature of human mental life, its coming into existence, and its further development in the context of phylogenetical, anthropogenetical, and ontogenetical processes; and (2) it considers the system of psychological conditions that enable knowledge and skills formation with the desired and prescribed outcomes. According to Galperin's approach, mental action is a functional structure that is continually being formed throughout an individual's lifetime. Using mental actions, a human being plans, regulates, and controls his/her performances by means of socially established patterns, standards, and evaluations. Mental action can and should be considered the result of a complex, multimodal transformation of initially external processes performed by means of certain tools. In other words, from a nomothetic point of view, concrete mental actions and images are the results of the internalization of external processes (Galperin, 1967).

Mental actions and images reflect, and are the product of, both human needs and the demands and conditions of the objective situation. They can, therefore, be characterized by a set of primary and secondary properties. The following properties are considered to be primary: (1) the composition of the action's objective content; (2) the extent of differentiation of the essential elements of the problem

* The first Russian publication of this approach appeared in 1952, while the first more or less comprehensive description of the approach in English appeared in 1967.

situation from the nonessential elements within the problem situation; (3) the degree of internalization of the action; and (4) "energetic" (speed and enforcement) parameters. Secondary properties are: (1) reasonability; (2) generalization; (3) consciousness; and (4) criticism. The secondary properties are the result of specific combinations of the primary properties. Both primary and secondary properties represent socially estimated and evaluated qualities of human activities and refer to any sort of activity, whether individual or collective, material or mental.

The final values of these properties determine the specific action or image that is formed. Galperin considered the values of the properties to be the direct outcomes of the conditions of action formation. He therefore defined a system of conditions that ensure and guarantee the achievement of prescribed, desired properties of the action and image: the "system of planned, stage-by-stage formation of mental actions," or the PSFMA system**.** This system includes four subsystems: (1) the conditions that ensure adequate motivation for the subject to master the action; (2) the conditions that provide the formation of the necessary orientation base of the action; (3) the conditions that support the consecutive transformations of the intermediate forms of the action (materialized, verbal) and the final, end transformation into the mental plan; and (4) the conditions for cultivating, or "refining through practice," the desired properties of the action (Galperin, 1989). Each subsystem contains a detailed description of related psychological conditions, which include the motivational and operational areas of human activity.*

The procedure of the PSFMA (Galperin, 1992) can be presented in the most general form in the following way. In the first stage, the subject's initial attitudes toward the goals and objectives of the forthcoming process as well as toward the concrete learning-teaching situation are constituted. These attitudes may be changed during the formation process. In the second stage, the scheme of orienting, or the scheme of the orientation base of action, is elaborated. Three psychologically different but interconnected levels of the orientation base may be distinguished in considering mental activities of learning: (1) the executive orientation base, a scheme of human orientation regarding how to do something; (2) the goal orientation base, a scheme of human orientation regarding what to do; (3) the sense orientation base, a scheme of human orientation regarding the reason(s) for doing something. The three levels of the orientation base are connected to each other in both ascending and descending order: human understanding of how to do something also affects higher-level sense and goal representations and is in turn affected by the possibilities and execution of the sense and goal orientation bases (Podolskij, 1997). Guided by the scheme, a subject constructs, explores, reflects on, and performs the action being formed. The extent of autonomy of the subject to construct such a scheme may vary from full dependence on a teacher to almost full independence; autonomy is a function of the content and goals of the concrete learning-teaching process and of the learner's characteristics. For instance, the younger the learners are the more necessary it is to present an orienting scheme in a guided form (as a rule).

* For a detailed description of Galperin's system see, for instance, Podolskiy, A.I. (2009). On scientific status and practical significance of one psychological theory. *Psychology in Russia: State of the Art,* 2, 187–209.

The general macrostructure of this scheme is relatively indifferent to the features of the special domain content of the action and to the level of expertise of the learner. Essential differences may be found if one compares concrete specifications of each element of the orientation schemes in the actions of beginners and experts; of disabled, ordinary, and gifted children; and so on. The macrostructure is also relatively indifferent to the kinds and sorts of actions being formed; for example, concrete, specific domain actions; actions that belong to cognitive metastrategies; actions that underlie heuristic methods. The general function of the scheme is to provide the learner with a powerful orientation tool, which enables him/her to plan, to direct, and to control the solving of different kinds of problems related to the field involved. In general such a scheme is not an "algorithm" for solution (although, in some cases and under definite conditions, there are several kinds of "algorithmic prescription"; but this is an exception rather than the rule). This scheme is the learner's tool for his/her orientation in both the objective content of the action and in the operations needed to handle this content in accordance with concrete learning aims and goals.

The construction of an orientation base is a creative task for the participants in the learning/teaching interaction. Furthermore, this scheme plays the role of a synchronizer for the development of knowledge and skills related to the content of the action (see Dijkstra, 1997). The scheme of the orientation base contains the necessary and essential information both for the learner's analysis of the objective content of the action and for the application of this content to the definite problem situation. In other words, it has a function close to the most general function of mental models.

At the third stage, the learner starts to solve different problem tasks, which are organized and presented in a definite sequence and manner (see the fourth subsystem above) by using the scheme of the orientation base of action elaborated at the previous stage. The form of the scheme may vary from detailed descriptions of the order and content of the operations to be executed to general hints and heuristics. As for the external view of the scheme, all kinds of representations are possible: the orientation base may be represented as an arrow scheme, a flow diagram, a "solution tree," a text, a picture, a graph, a formula, and may be presented as a whole or part by part or hierarchically. The representation is dependent on the three variables mentioned above: the objective content of the action, the learning goals, and the learner's characteristics. The constancy of the action's essential general macrostructure, enforced by verbally reasoned solving of the sequence of specially designed problem types, leads to its no longer being necessary for the student to use the scheme of the orientation base as a material (materialized) learning aid. At that time its main content (see earlier—the second subsystem) is fully represented in the subject's socialized speech (*socialized* means understandable to other persons). This socialized speech becomes the base for a new action to be formed. With this step, the action moves into the fourth stage of formation—the level of overt, socialized speech. Once the sequence of varying problem situations has been set, the "melting" of the external phonetic form of speech takes place. The main content of the fifth stage of action formation is the formation of the action's internal verbal mode (covert-speech level).

At the last, sixth, stage of formation, the mental action passes through final changes, which are the result of the introduction of simultaneity and automaticity.

The new mental action begins its own "psychological life." It is able either to be included in other psychological structures, thereby enriching them, or to be subsumed in other psychological structures in order to be enriched and developed itself.

Thus, as a result of a stage-by-stage formation an externally mediated and successive action appears to be transformed into a "pure mental act": after estimating the problem situation a learner makes a decision on the spot. The results of planned, stage-by-stage formation closely correspond to the most desirable aims of contemporary instructional design: the acquisition of generalized, meaningful, synchronized knowledge and cognitive skills is a result of authentic transformations of student learning activity.

Evaluating the state of the art of Galperin's system, one notes that not all the subsystems have been developed and operationalized to an equal extent; the first subsystem, for instance, has not been described in as explicit a manner as the other three. Similarly, not all areas of learning are equally well developed within the framework of the PSFMA approach. Thus, many primary and secondary school subjects are more developed than higher education disciplines, and cognitive ("pure" intellectual, perceptual) action formation has been studied in much more detail than, for example, sociomoral action formation. There are relatively few examples of PSFMA being applied to the conditions of real human activity (professional, military, sporting); however, these cases clearly demonstrate what is missing in the concrete PSFMA model, in which the formation of isolated actions is considered separately from the entire structure of the corresponding activity.

Looking at the history of Galperin's approach, one can see periods of great optimism regarding its effectiveness and efficiency. Indeed, it seems to be possible to transform radically the methods, as well as the traditional results, of the learning/teaching process using this approach. As has been convincingly demonstrated by hundreds of experimental and applied studies, a whole set of the main objectives of any schooling effort have been reached through this approach. For example, (1) the guaranteed acquisition of the curriculum by all learners with the necessary level of preliminary knowledge and skills is achieved without prolonging the time allocated and with essentially no additional cost; (2) the separation of instruction into the acquisition of knowledge and its application is minimized or wholly disappears; (3) learners are able to transfer acquired abilities to new situations and are also able to transfer the process for acquiring new knowledge and skills; (4) by becoming aware of these newly formed abilities, learners become more and more interested in the processes of acquiring knowledge and in knowledge itself (Galperin, 1989; Podolskij, 1993). Studies have been conducted in different kinds and types of schools (primary, secondary, vocational, special schools). Subjects (learners) have been ordinary, disabled, and gifted children of different ages (from 5 to 18). Specific domains have also been different: writing and arithmetic, native and foreign languages, math, scientific and humanitarian disciplines, drawing, music, physical training. And psychologically heterogeneous structures have been the objects of planned, stage-by-stage formation: separate mental actions in specific domains along with concepts and representations; groups and systems of actions and concepts; actions that underlie cognitive as well as metacognitive strategies and heuristics.

However, if one compares publications from the 1950s–1970s to those from the 1980s–1990s, one discovers a significant decrease in the wave of optimism

concerning application of the PSFMA. Moreover, anyone familiar with the current situation of school education cannot find extensive practical applications of the PSFMA in contemporary schools or in schools of the near past. Of course, there were and are many interesting experiences in different parts of Russia and outside it that demonstrate the successes, failures, and problems of the practical use of the PSFMA; however, the scale of usage is rather limited.

Besides the obvious social-economic and social-psychological reasons, a reason of a methodological nature concerns the ways of using Galperin's approach. Historically, the substantial pedagogical results of planned, stage-by-stage formation of mental actions first came to the fore in most psychological research conducted along the lines of this approach. However, the proponents' enthusiasm about unusual and hopeful results had a reverse side: it led to a serious misunderstanding of Galperin's approach. Sometimes the approach is interpreted not as a general description of laws and regularities that try to explain the dynamics and results of the formation of human mental activity but rather as a set of technologies and prescriptions for how to teach. Indeed, such an interpretation distorts reality and transforms the approach to some "absolute" knowledge, like a sort of "philosophers' stone."

In the nomothetically orienting role of the general PSFMA system, the successful application of the PSFMA does not imply a literal reproduction of some abstract, extremely general procedure. Rather, it refers to the creative design of a system of necessary and sufficient psychological conditions for instruction. The elaboration of such a procedure occupies an intermediate position between fundamental psychological knowledge and the actual process of schooling, instructing, or training (Podolskij, 1993, 1997). This intermediate position is operationalized in the consecutive elaboration of three models of the instructional situation. These are the psychological, the psychological-pedagogical, and the methodical, or technological, models (Podolskij, 1993; Podolskiy, 2012).

The *psychological model* includes: (1) a description of the knowledge and skills to be acquired on the basis of the learner's mental actions, images, and concepts; (2) a description of the macro- and microstructure of the multilevel learner's orientation as the basis for a new mental action, concept, or image to be formed; (3) a description of age-related and individual characteristics of the learner that are relevant to instruction and schooling; and (4) a description of the specific system of psychological conditions needed for the formation of the planned action. It is clear that in different applications of the PSFMA system, application emphasis should be placed on different constituents of the psychological model.

The main function of the *psychological-pedagogical model* is to project the psychological model onto the specific objective and subjective conditions of schooling and teaching. Such conditions include instructional activities and the organization and distribution of different organizational forms during a lesson or a sequence of lessons; in-class and homework activities along with individual, small-group, and whole-class learning activities; use of available technical aids for teaching (computer-assisted learning, for example). One might declare that the psychological-pedagogical model represents the "art of the possible"—that is, it reaches an optimal compromise between the strict requirements of the psychological model and the restrictions constructed by objective and subjective components of reality. Sometimes it is necessary to reduce such strict requirements (at least part of them) in

favor of implementation, and sometimes they are necessary to overcome resistance in the traditional learning environment in order to implement innovation.

The last, *procedural, or technological, model* of instructional situations includes a detailed description of the teaching process distributed between units of definite form and time, with a precise description of the goal of each unit and the means to achieve it. It also includes a complete list of teaching documentation: schemes, different types of learning and assessment tasks, a description of the order in which technical aids should be applied, and a number of other materials specified for different types and kinds of schooling/instructional situations. The procedural model looks like the traditional well-done "teacher's lesson plan"; however, one has to remember that this model is based on the considerations outlined in the psychological and psychological-pedagogical models (Podolskij, 1993, 1997).

It is also necessary to consider the three-model framework as an intellectual tool, not just as an algorithm that prescribes how a teacher should act. This framework, when used in an appropriate and sophisticated way, gives a teacher the ability to orient, plan, control himself/herself completely, and correctly design, arrange, and carry out different instructional activities. In other words, this framework may provide us with an applied psychoeducational theory that occupies an intermediate position between fundamental psychological knowledge and educational/instructional practice.

To summarize, in order to bridge the gap between psychological science and schooling (instructional) practice one needs to deal with two categories of mental models. First, one must take into account a hierarchical system of students' mental models; this system forms schemes of action orientation on different levels. Mental models come into existence and acquire necessary features by means of the application of the special procedure of mental-action formation. Second, one must form a system of teachers' mental models, the contents of which are to be constituted by the three-model scheme of the instructional situation. Such a scheme may become a basis for the construction of applied, model-based psychoeducational theory.

Conclusion

It is highly unlikely both practically and theoretically that psychology can prescribe that a teacher or trainer do anything. What psychology can and must prescribe are the definite directions, marks, and "mile stones" for the teacher's (the trainer's) thinking. The most important thing modern psychological and educational science might give teachers is a general intellectual tool that may be used not to prescribe designers' or teachers' executive activity but rather to give them an extended and sophisticated approach to the processes and events that constitute student learning and teacher instruction. Designers and teachers have to be provided with knowledge about all the complex psychological mechanisms that underlie learning/teaching processes and with knowledge about how to "switch on" these mechanisms by creating and using a system of necessary and sufficient conditions.

A possible approach to constructing and using an appropriate general intellectual tool based on Galperin's psychological doctrine, especially on his theory of planned, stage-by-stage formation of mental actions, has been described here. This approach provides a general outlook on different processes that underlie the acqui-

sition of mental actions and concepts. It is based, on the one hand, on a theoretical analysis of the nature of human mental life and, on the other hand, on a carefully elaborated and tested system of psychological conditions for the planned formation of mental actions and concepts with definite properties. This system is sensitive not only to the functional and structural characteristics of schooling and instructional processes and products but also to age-related and functional developmental variables. Once experienced in the use of this system, one may describe the acquisition of any newly formed mental structure in concrete and operationalized terms. Supplemented by a three-model scheme, which bridges the gap between the psychologically described conditions and a variety of actual schooling circumstances, this system gives a teacher a chance to predict the most probable developments both in the realization of the specific teaching/learning process and in the characteristics of the products of this process.

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