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The modeling problem of TRIZ mastering by schoolchildren

The model making of TRIZ mastering by schoolchildren demands studying the following questions:

- defining the problem, the description of contradictions;
- the description of such category as “mastering”;
- the determination of methodological foundation of TRIZ mastering by schoolchildren;
- the model making of TRIZ mastering by schoolchildren as a process, systems, activities;
- the determination of principle system of content formation of TRIZ mastering by schoolchildren;
- the determination of methods and forms of TRIZ mastering by schoolchildren;
- result the diagnostics of TRIZ mastering by schoolchildren;
- the analysis of realization concept results.

The article represents intermediate results of research regarding to the given problem. Let them be submitted in the stated order.

Defining the problem: the model making of TRIZ mastering by schoolchildren demands studying this problem from the point of view of different sciences. They are pedagogics, psychology and TRIZ.

The up-to-date situation in theoretical and practical pedagogics and psychology of creativity can be characterized by the existing contradictions between:

- the determinancy and indeterminacy of person's creative activity;
- productive and reproductive nature of creative activity mastering by schoolchildren;
- the ambiguity of creativity mastering forecast results and necessity in formalization of creativity process mastering aiming to obtain the guaranteed result.

The problem of research is in theoretical model ground of TRIZ mastering by schoolchildren.

The aim of research is to have theoretical ground and experimental monitoring of TRIZ mastering by junior schoolchildren concept.

The object of research is TRIZ mastering by junior schoolchildren as a process, system and activity.

The subject of research is TRIZ mastering by junior schoolchildren as determined system.

The main hypothesis statements are:

- ✓ TRIZ mastering is a process of formation of schoolchild's "creative personal qualities";
- ✓ TRIZ mastering is a determining system on the basis of technical, social, psycho-pedagogical grounds;
- ✓ TRIZ mastering by junior schoolchildren is an activity aimed at solution of personal and socially significant problems, the acquisition of cognition, creation, transformation and application of material and intellectual culture objects as new grade in the process of educational activity, which is organized in cooperation with the teacher;
- ✓ the methodological base of TRIZ mastering comprises dialectic, system, functional, resource, idealisation and reflexive approaches;

- ✓ the stability of mastering process is provided by inter-conversion of internal and external determinants on different grades of TRIZ mastering by junior schoolchildren; the content of mastering is formed on TRIZ pedagogical principles.

“Mastering” as a category. There are some similar categories in psycho – pedagogical literature which are expressed by one term: “learning”, “assimilation”, “appropriation”, “possession” and also by combination. i.e. “conscious mastering”.

Under the term "mastering" appears the whole category range of not distinguished in a sufficient measure, but also not the identical concepts connected among themselves by gender –aspect relations. The learning includes interaction of the pupil and the teacher; learning means not passive perception and acceptance of knowledge transferred by the teacher but their mastering. (Rubinstain L.).

An educational task is a problematic situation, decision of which is connected with opening and mastering new cognitive method concerning wider set of problems than initial ones. J. Bruner describes "mastering" as simultaneously proceeding three processes: acquisition of the new information; alteration (transformation), the information adaptation to the decision of problems, checking and control.

According to Zimnaya I. A., having included control in this process, J. Bruner identifies assimilation and educational activity.

The usage of "mastering" category accents personal meaningful acquisition process and underlines dynamics of double faced character of determinancy process by external and internal factors; i.e., mastering is a transfer of external determinants into internal ones, formation process of personal constructors; the result of mastering is an inverse process, that is a transfer of internal determinants into external ones.

The methodological basis definition of TRIZ mastering by schoolchildren demands first of all a choice of methodological approaches and their description.

The description of methodological approaches to describe person's creative activity is drawn up by us in the following order:

- The description of necessity of methodology studying on the basis of synthesis of sciences: philosophy, psychology, pedagogics, TRIZ;
- the definition of directions (aspects) of problem in a context of subject studying;
- history development of the given approach, the description of consecutive basic theory formation in science;
- the definition of basic theory positions which have received development within the limits of various sciences;
- the analysis of modern condition in theoretical and applied character of mastering approach;
- the conclusions about level formation of methodological approach within the limits of various sciences.

The model making of TRIZ mastering by schoolchildren is developed on the basis of dialectic, system, functional, idealisation, resource and reflective approaches. The choice of mentioned methodological approaches reflects features of TRIZ mastering as determined system.

In psychological research, according to Yaroshevsky M.G., determinism is presented in the following forms: causality as set of the circumstances prior in time to consequences and causing it; systemality as a dependence of separate system components or on properties of a whole; a feedback as a consequence influence on the reason which has caused it; probability or stochastism when at the same reasons there are various consequences in the known limits, subordinated to statistical regularity, etc. Ogorodnikov V.P. has described determination types: conditional, functional, inspiring, system. Each of them is anyhow presented in TRIZ developed theories.

The componential system structure of TRIZ mastering by schoolchildren is presented by the following components:

- the development of creative activity purposes on the basis of TRIZ;
- the content mastering of TRIZ as a science;
- the development of creative activity mastering on the basis of TRIZ;
- the development of results received by means of TRIZ.

The analysis of formation mastering principles formulated in TRIZ-pedagogics (Gin A.A., Nesterenko A.A., etc.): is an openness, dialecticness, systemality, ideality, activity mediation, training «at method level», a feedback, a transition to a full cycle, a productive exit, the creative approach to training to creativity, regular reproduction of tasks, the common conceptual device has shown, that construction of model demands the formulation of additional principles that reflect functionality, reflexiveness, resources, the concepts not presented in TRIZ-pedagogical concepts.

Methods of TRIZ mastering by schoolchildren: the choice is carried out according to the purposes and problems, to the content of mastering; it assumes binarity (system of methods for the teacher and pupils as complementary to each other and focused on the common purpose); the distribution for complexity levels that characterize creative activity of schoolchildren.

The combination of pedagogical, psychological, TRIZ-pedagogical organizational forms of TRIZ mastering regulates common activity of the teacher and pupils, defines individual and collective correlation in educational process, a degree of pupils' actions in creative activity.

The results of TRIZ mastering by schoolchildren are presented by the following directions of diagnostics: the development of creative thinking under which we understand system, dialectic, functional, resource, ideal and reflective; the development of creative imagination (operated, productive); training to skills of organizational creative activity.

The analysis of diagnostic methods of TRIZ mastering has shown, that

TRIZ-researches are oriented towards result estimation of person's development in TRIZ-education - qualities, abilities, knowledge, abilities, skills in the period of TRIZ training; to TRIZ-education estimation as a process (planning, realization, the analysis, correction, etc.); to TRIZ-education estimation as a pedagogical system (components, their connections).

In our research the diagnostics of TRIZ mastering results by schoolchildren has been made by means of pedagogical and psychological methods.

Pedagogical methods are the analysis of creative products.

Psychological ones are techniques of creative level studying (Torrens, Johnson), a technique of personal orientation (Smekal V., Kuchera M.), a technique of person's emotional intensity (Romanov E., Usanova O., Potemkina O. on the basis of Psisahovai I. and Gobdreeva's N. technique), a technique of behavioral tendencies ("Q-sorting"), a questionnaire of dominating style of behaviour in K.Thomas's conflict situation, studying of future image by younger teenagers, a technique of creative potential studying by junior teenagers, a technique of emotional orientation research (Dodonov B.I.), a technique of success motivation studying.

Research is carried out on the base of (Municipal Educational Institution later MEI № 152, 95, a gymnasium № 1, lyceum № 97 of Chelyabinsk; № 24, 78 of Ulyanovsk, a gymnasium № 9, 89 of Tolyatti, the Center of an additional education for children "Rainbow", MEI № 4, 5, 9, 10, 13, 14 of Satka; MEI № 8 of Bakal; MEI sanatorium school of Mezhevoj settlement.

The basic results of work consist in working out:

- Course development of creative abilities for junior schoolchildren, methodical maintenance of its realization, including practice-books «Creativity lessons», methodical recommendations for teachers, for parents, collections of creative tasks;

- pedagogical diagnostics of junior schoolchild's readiness research. (Technique)

- Programs of scientifically-practical seminars for teachers on the themes: «Development of informative abilities for children 3 - 10 years by means of

TRIZ - RTV», 2005 (In the co-authorship with Sidorchuk T.A.), «Formation of the person by TRIZ-pedagogics means», 2006 (in the co-authorship from Nesterenko A.A., c.p.s., Korzun A.V.), «Formation of research skills for children 6-12 years on the basis of TRIZ», 2007 (in the co-authorship with Nesterenko A.A., c.p.s)

- Programs of improvement courses for teachers of the average general education on themes: «The formation of creative activity experience of schoolchildren on the basis of TRIZ» (2006-2007), «Psychological support of educational process in an elementary school» (2007-2008), «the organization of productive activity of schoolchildren on the basis of TRIZ» (2007-2008), «Methods of psycho-pedagogical problems decision of educational institution on the basis of TRIZ» (2007-2008)

- course programs optional for students (for future teachers-psychologists) «Creative personal formation in professional activity».

By results of research it is published more than 70 works.