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DIDACTIC STRATEGIES AND CONCEPTUAL SYSTEM OF STUDENTS IN PARTICIPATORY EPISTEMOLOGY

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Abstract

The text considers instructional approach to research on cognitive correlates and components, as guidelines for new methodological approaches. Possibilities have been considered to encourage metacognitive abilities through didactic instructions, as well as the contribution such an approach could have for insights into didactic incitement of meta-components. The aim of the explorative research is to consider the relation between didactic instructions and metacognitive abilities, along with the influence of this relation on the efficacy in problem solving in teaching, i.e. learning effects. The research was undertaken on a deliberate sample consisting of 365 students enrolled at Teacher Training Faculty (1st to 4th year of undergraduate studies) and Preschool Teacher Training College "M. Palov" in Vrsac. Didactic instructions, intellectual abilities, metacognitive and creative reactions were predictive variables, the effects shown at problem tasks solving was a criterion variable. The method of the research refers to the systematic non-experimental observation. Intentional varying of the variables has not been undertaken, while statistical replacements have been done for experimental control. The following instruments have been used: protocol for metacognition self-observation (MK1 – done for the purpose of previous research and); problem tasks, Urban-Jelen's creativity test, Domino D-48, mostly saturated by G-factor; on the other hand it has been found according to inter-correlation that each item explicates specific part of the variance; it differentiates the above-average well; non-verbal-perceptive material.

Basic findings refer to the following:

- *The relation between intellectual and metacognitive abilities and problem solving has confirmed the interdependence of the variables, leading to the conclusion that the success in problem solving is followed by high abilities. At the same time, meta-components have significantly influenced the success in problem solving (r=0.45 with 0.01 as significant).*
- *It is possible to notice the differences in metacognitive abilities according to the analysis of introspective protocols. They are preserved even when intellectual potentials are controlled. The importance of non-cognitive elements and the possibility to view metacognition as some form of personal complex (even as one of the aspects of individual's cognitive style) explicates the fact that the integrity of metacognition seems to be impossible to seize.*

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- *Significant difference has been confirmed in favour of those with the highest scores in meta-statements. The differences have been manifested in intellectual potential, success in problem solving and creativity.*
- *According to the factor analysis of didactic instructions efficient in provoking meta-statements, 10 factors have been found within which the following observed instruction are classified: classification, information control, error analysis, flexible approaches, encouragement, explication formulation, getting back to given pieces of information, analysis of important moments, evaluation of the possibility reach the aim, overview of previous strategies and patterns, additional reflection on relations in a given situation.*

Key words: *didactic instructions, participatory epistemology, metacognition*

Introduction

As a contemporary epistemological-theoretical conception in pedagogy, constructivism, along with participatory epistemology, as an important turning point in comprehension of knowledge, is nowadays considered to be the grounds of postmodern didactics. Constructivism goes beyond the former traditions of learning with some of its elements as precursors of modern concepts. Having in mind that the traditional concepts of learning and didactic models have already been discussed in other writings (Gojkov 2009: 208), it seems useful here to remind the reader only of participatory epistemology, as a pattern of comprehension of learning viewed as predominating ontology in pedagogy and having a set of accepted practical endeavours based on this learning concept, i.e. in accordance with this epistemology (Stojnov 1998: 98).

The appropriateness of theoretical-methodological groundedness of pedagogic, before all didactic research is another moment significant for the context which would enable understanding and subsequent instalment of practical consequences of participatory epistemology, as a foundation of the decision made in order to manage modern tendencies of changes in modern Europe. Serbia, among other countries, has also been trying to understand those decisions and to accept them in accordance with its tradition and limitations. Pedagogy has on its way gone through various conceptions: from normative, empirical and hermeneutic to the system theory. According to judgements of numerous authors in regard to the importance of these methodological concepts, it seems that there is a consensus that their contribution has not been adequate for their intentions. In other words, they have not to the right extent explicated the phenomena in the field of education and schooling. New chances are seen in the theory of chaos and constructivistic paradigm, but there are also statements emphasizing the outcomes of the researches finding that constructivistic procedures do not develop active, constructive, self-organized processes during learning in the case of all students and regarding all the contents and aims; therefore voices are heard advocating the acceptability of "moderate constructivism" i.e. coexistence of construction and instruction (Wienert 1997: 45).

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Instructional approach to research on cognitive correlates and components, as guidelines for new methodological approaches

Former theoretical traditions and their epistemological-methodological reaches could not completely ensure the possibility of questioning the efficacy of learning models in teaching. At the same time, they did not offer solutions which would take into consideration both the students with their conceptual mechanisms and the interdependence of self-organization of learning and circumstances. A great deal of issues have remained vague which could lead to better understanding of conditions influencing learning, i.e. cognitive mechanisms as those which are significant, but insufficient. In other words, part of the context has not been explicated – the nature of didactic strategies encouraging conceptual systems of learning. Pedagogy is still to empirically validate the standpoints already accepted at theoretical level.

In spite of the fact that the positions of well known constructivists, with E. Glaserfeld (Wienert 1997: 57) as one of them, might seem as diminution in regard to innovative importance of participatory epistemology and constructivism for didactics in general, when we relate them with contextual approach to intellectual abilities (Sternberg), i.e. to instructional approach to research on cognitive correlates and components, they might become guidelines for new methodological approaches.

The paper will consider the possibility to empirically validate constructivism and participatory epistemology, or at least some of their elements, creating a space for making attempts to gain insight into reaches of their practical use. Furthermore, efforts will be made to empirically validate previously outlined theoretical-epistemological grounds in order to get to the elements for argumentation in favour of the need to use some of theoretically conceived elements as starting points for certain changes of education strategies.

Methodological framework

The way to do this seems to be an explorative research aiming at answering the following question: to what an extent constructivism can be considered a new paradigm in didactics and can it be taken as a step further and a principle of change in the system of education?

The explication of this issue indirectly gives answers to the following questions:

- do the changes of the roles of teachers and learners, as well as the nature of learning activities have to imply a curriculum based on activities through which a pupil looks for the elaboration of initial answers;
- to what an extent does the pluralization of didactic scene give the teachers competences of a conductor, an associate, a co-researchers who incites the creation of ideas;
- where is the line where the curriculum based on activities is transformed into research activities by the means of attempt and error;

- do and in what sense tolerated attempts, as a part of learning, contribute to the development of learner's autonomy;
- to what an extent are the didactic views on the models of learning in teaching in confrontation with constructivism as epistemological ground of didactics and what consequences does this have for the curriculum;
- can Sternberg's triarchic theory of intelligence be considered sufficient to "cover" psychological substance of metacognition, which would be regarded as an important element of metatheoretical ground of curriculum;
- does the constructivistic definition of learning as a process of personal construction of meanings mean what has until now been seen as a solution...

The explorative research, of course, cannot give answers to all these questions, but its outcomes might be in a sense used to provoke reflection on them. Our intention was to see to what an extent the instructional approach to the research on intellectual processes, together with the effects of metacognitive components (built into neo-Vygotskian courses of process diagnostics) can be considered adequate for gaining more certain picture on learning process and functioning. According to this, we could make conclusions on the extent metacognition can be encouraged by didactic instructions (Gojkov, 2002b).

Our standpoint is that didactic instructions can encourage metacognitive abilities contributing to overall knowledge on didactic encouragement of meta-components (Benito 1996: 26). Let's mention here the fact that metacognitive abilities are a field where psychology and didactics have recently been brought significantly closer together. We would also like to turn to the statements arising from fundamental research on learning process and learning instructions in a classroom paying special attention to the context (Brown 1987: 39). So, "contextual approach" has shifted the focus from studying abilities, learning and results to studying the capacity of a learner to regulate his/her learning, as well as to the capability of a teacher to create a suitable learning setting (Gojkov 2002a: 24; Levkov 1995: 79).

The reason we have chosen such an approach to the issue we are dealing with is incited but the fact that cognitive system and its development has in the last few decades been viewed as a self-modifying system. At the same time, it is often the case that learning is viewed from the same angle - self-regulated learning (Carver & Scheier 1998: 56). This perspective of pedagogic psychology has, along with the acceptance of contextual approach to intellectual abilities (Sternberg), encouraged those dealing with didactics to search for new mechanisms to enable gaining of knowledge on abilities and to develop abilities into cognition (Gojkov 2001: 125).

What was also the incentive refers to the outcomes of the researches claiming that specialized knowledge of learners, the use of cognitive strategies and self-regulation have significant influence on academic learning (Gojkov 2009: 223).

At this point the aim of the explorative research can be percieved. Its essence refers to the attempt to empirically validate (by the means of critical consideration and theoretical

analysis) the frames emphasizing a new vision of postmodern didactics as an omen of contemporary transformation of educational systems.

The ideas of participation, autonomy, communication, etc. in education are integrated in the systems of education in entire Europe. We are interested in what principles would be significant for the strategy to be used to implement changes in our system and to build models for real processes of decision making.

Metacognition is important for the issues the paper is dealing with since it has a key position in the entire cognitive development. Even though it has been acknowledged that its explanatory potential has only been guessed, yet to be found out (although it is connected with the key segments of personality: self, self-perception, self-awareness), it still is a challenge for didactics, too (Cates 1992: 72).

It is a fact that psychology, aware of the complexity of the nature of cognitive functioning and intelligence has come closer to instructional approach, i.e. didactics. Through Sternberg's analysis of intellectual processes, cognitive correlates and the analysis of cognitive components, psychology has given the cognitive training approach the status of a new methodological approach, having characteristics of didactical approach with the transfer paradigm in its grounds. This leads us to didactical space where intellectual processes are to be decided upon according to the ways of subject's thinking during problem solving.

The previous statement includes a possibility to reflect on the outcomes of the research from the angle of instructional approach in order to give more certain picture on functioning and processes of learning. Our intentions here are not directed to so far-reaching conclusions. Our task is far more modest. We are to consider a relation between didactic instruction and metacognitive ability, in order to come to a conclusion to what an extent metacognitive abilities can be encouraged (Kovac-Cerovic 1990: 68).

We have already dealt with the problem in our previous studies. The underlying issue here is a possibility to use instructional approach in the study on learning process. A step closer to the practical aim is a search for metacognition identity and possibility to encourage its development. Practical consequences are numerous. Some of them are integrated in the documents guiding the first steps of educational reform in Serbia.

Educational strategy of the republic of Serbia until 2020 is based on participatory epistemological approach to learning, i.e. constructivism, as epistemological theory, is an underlying point here, i.e. meta-theoretical grounds of the development of future curricula. Suggesting the principles to be built into educational process, the same document, among other things, states the need for education to be grounded on participatory, active and cooperative methods of teaching and active forms of learning... These and other details give arguments in favour of the assumption on previously stated theoretical-epistemological grounds underlying the changes in educational system in Serbia, i.e. our aspirations. The undertaken research indirectly comes to the findings which could serve as a drive for further thought on the extent the principles derived from the contemporary

trends in postmodern didactics (and in pedagogic psychology before it) that can be seen as certain guidelines for making practical decisions in the endeavours of introducing changes into our system of education.

The direct aim of the explorative research was to screen the relation between instruction and metacognitive ability. Our previous studies have proven the existence of a significant correlation of these variables and the influence this connection has on the efficacy in problem solving in teaching, i.e. on its effects in learning.

The research has been undertaken on **an intentional sample** consisting of 365 students of the Teacher Training Faculty (1st to 4th year of studies) and the Preschool Teacher Training College "M. Palov" in Vrsac. Student population has been chosen due to the fact that the outcomes of our previous research have shown advantages regarding the ability of introspection at older age. Didactic instructions, intellectual abilities, metacognitive and creative reactions were predictive variables, the effects shown at problem tasks solving was a criterion variable.

The method of the research refers to the systematic non-experimental observation. Intentional varying of the variables has not been undertaken, while statistical replacements have been done for experimental control. The following instruments have been used:

- the protocol for metacognition self-observation (MK1 – done for the purpose of previous research and modified to a degree);
- problem tasks;
- Urban-Jelen's creativity test;
- Domino D-48, mostly saturated by G-factor, even though the inter-correlation has found that each item explicates a specific part of variant; differentiates the above average well; non-verbal, perceptive material.

Findings and interpretation

Due to the limited space only basic findings will be given here, without graphs and tables. What attracted our attention in the first place was the number of meta-statements the observed students made. The presence of metacognitive abilities could, according to number of reactions classified as metacognitive, be qualified as weak. Namely, the insight into administrative protocol and the tables shows that the in the case of the observed students there are statements which could be qualified as meta-statements, but their number most often ranges from 1 to 5. The average number of creative reactions in the whole group is 5.7%. Regarding metacognitive reactions, the students have been most successful in the case of following abilities:

- the awareness of the level of understanding and problem analysis (3.8%);
- considering the problem situation as a whole and perceiving the link between what is known and what is being discovered (3.1%);
- elaboration and the awareness of the ways prior-knowledge is used (2.9%);

- finding the optimal structure in the contents to be solved and its organization in the activities of primary and secondary importance (2.8%).

Understanding and supervision of one's own work and activities has been manifested in relation to the manifested metacognitive reactions in the following activities:

- awareness of the aim to be reached (1.9%);
- ways according to which the aim is intended to be reached (1.8%);
- deeper analysis of problem contents (1.7%);
- content and material manipulation, i.e. experimenting (1.6%);
- frequent raising of new questions and checking (1.5%);
- strategy of meaningful organization of the material (differences, similarities) (1.5%);
- reconsideration after having done the task, i.e. dealing with other possibilities, ways and importance of the discovered and the ways of fitting in into the existing knowledge (0.8%).

The awareness of the procedures of problem solving, of its course and mechanisms has been rarely manifested, as well as the levels of consciousness where decisions have been made while the inner mental operations and processes were in function (0.5%).

The average success of students regarding the problem tasks to be solved ranges from 1.9 to 5 tasks.

Having in mind that metacognition is considered to be a specific manifestation of processes of control and that, according to Sternberg, as well as other authors, it plays an important role in intellectual functioning, while, according to other research, it significantly corresponds with the "G" factor, the research in question has focused on the nature of relation between these two variables. The relation between intellectual and metacognitive abilities and problem solving has confirmed the interdependence of the variables, leading to the conclusion that the success in problem solving is followed by high abilities. At the same time, meta-components have significantly influenced the success in problem solving ($r=0.45$ with 0.01 as significant).

The elements of meta-components "knowledge on cognition" and "strategies decision making" are viewed as significant meta-components, having in mind that they have been used to monitor one's own cognitive activities and that, according to the observed students, they have been decisive for further steps in problems solving, as well as for the final outcome. According to Sternberg, these are executive elements, elements of the control process. Introspective reports show the awareness of students and their dealing with the selection of components contributing to problem solving and the ways pieces of information are presented, which served its purpose in the attempts of making versatile combinations. The decisions most often referred to the following:

- the procedure of problem solving;
- sequence and order in the choice of procedures;

- the awareness of subjective experience of the problem and the arising difficulties;
- self-awareness on the efficacy of procedures and ways leading to further levels of problem solving (compare to: Gojkov 2009: 124).

The ways students have experienced the problems are also interesting. The reports of introspection show a great number of activities which one person was going to carry out in the course of solving of various problems. It seems that there are no problem patterns. The ideas how to solve the problem have, according to the statements made by the subjects, imposed themselves with no clear notion where they came from, i.e. without intention to undertake certain activities, while meta-components have been succeeding, disappearing and combining in various ways and different phases of problem solving. The explanation for this most frequently given by the students is found in their statements that the problem, i.e. the context imposed, provoked different metacognitive reactions. Our analysis has not succeeded in identifying the ways of combining; the reasons for this are seen in the conceptualization of the research frame, i.e. in the entire methodological support found in theoretical orientations they belong to and the theories the term of metacognition is based on. Metacognition, as a composite and multidimensional term has once again in this finding proven its complexity, while the "new spirit" in theorizing and research on cognition in the outline of the findings given so far has remained inadequate in the recognition of metacognition in relation to other phenomena. Namely, the entire number of subjects' reactions has not offered a clear picture differentiating between the cognitive phenomena referring to problem contents and those directed to cognition. In other words, the reactions of the subjects directed to the content of the problem through which the problems were supposed to be solved have mixed with those directed to cognition, changing their course, not showing clear dividing lines, finally contributing to the outcome.

It is possible to notice the differences in metacognitive abilities according to the analysis of introspective protocols. They are preserved even when intellectual potentials are controlled. This is another confirmation of earlier impressions we had on the importance of non-cognitive elements, as well as external influences on the development of metacognition. The importance of non-cognitive elements and the possibility to view metacognition as some form of personal complex (even as one of the aspects of individual's cognitive style) explicates the fact that the integrity of metacognition seems to be impossible to seize.

The previous finding could lead us to the following comment: no matter in what way it is conceived at theoretical level, in its practical expression metacognition is a reflection of personal cognitive maturation. In other words, it is constantly developing, with an important role to be played by didactic instructions in teaching in the nurturing of metacognitive functions. The special place here belongs to didactic instructions encouraging the subjects to identify the problems, to explicate their meanings, to consider the sources of dilemmas, to explain the sense of confusion and tension, provoked by controversy, to come to the ways actions are regulated and controlled, behaviour is planned and other circumstances, leading to the solution of a problem (see also Gojkov 1995: 24).

In those previously undertake studies that have been mentioned this has been confirmed by the established differences between different ages of observed subjects.

One of the significant outcomes of the research is a link between metacognitive reactions and intellectual abilities (r=0.56). It has manifested itself in the efficacy in problem solving, as well. The link between the two variables, i.e. the significant difference in efficacy of problem solving in favour of intellectually superior has also been considered from another angle. According to the number of manifested metacognitive reactions, the subjects are classified into tree categories. The first category includes the students with 5 and more than 5 meta-statements (the best ones; n=76; 23%), the second those with 3 to 5 meta-statements (n=165; 40%) and the third included 124 students with less than 3 meta-statements (38%). The difference between those with the highest and those with the lowest scores in meta-components has been studied by the means of T-test for independent samples. Significant difference has been confirmed in favour of those with the highest scores in meta-statements. The differences have been manifested in intellectual potential, success in problem solving and creativity.

The share of meta-components in the variance of scores has been checked according to regression analysis. It has been found that metacognitive components explicate nearly 21% of score variance. It is interesting that the percentage of the explained variance in this one, as well as in previous researches on various samples is similar. Intellectual abilities have explained about 29%, while the contribution of creative reactions has not been statistically significant. Creative reactions are interesting having in mind that the problems to be solved demanded divergence. Therefore, the relation between correct solutions and students' creativity is thought to be relevant. The interdependence of the link is statistically confirmed (r=0.39 at 0.01), in spite of the fact that creativity was lost in regression analysis. I am inclined to believe that this link has cohered with intellectual potentials, i.e. that that creative reactions have amalgamated with intellectual activities.

This leads to a conclusion that, apart from the observed, other variables are hiding as significant ones for problem solving. This opens up a possibility to view metacognition as self-consciousness which has a significant place in cognitive behaviour, but not autonomously.

Having conducted the research, i.e. having come to an end in our search for the identity of metacogntion, we cannot distance ourselves from the definition of the term, "cognition on cognition", although it still leaves us a space for objections claiming that such determination is nothing more but a basic identification of metacognition as cognitive phenomenon. Unfortunately, more precise determination of its substance, even having identified several basic contents and having made an attempt, was not possible for me to focus even after this attempt.

As one possible explanation there is a fact that the problems the students were supposed to solve were open, i.e. they allowed originality in solution, meaning intuitive approach, which might cause the situation in which students could not control their own cognitive strategies, with cognitive reactions having automatic character.

The findings on the positive correlative relations between metacognitive statements and didactic instructions encouraging and leading to greater effects in solving criterion tasks lead to a conclusion that didactic instructions are significant for provoking of meta-statements. According to the factor analysis of didactic instructions efficient in provoking meta-statements, 10 factors have been found within which the observed instruction are classified (67 instructions have been used). Their contents could be sorted according to the following headings: classification, information control, error analysis, flexible approaches encouragement, explication formulation, getting back to given pieces of information, important moments analysis, evaluation of the possibility to come to the aim, overview of previous strategies, patterns, additional reflections on relations and given situation.

At the end of the overview of the basic findings we would like to once again turn to theoretical grounds, i.e. Sternberg's triarchic theory of intellectual abilities which was thought by us and many others to be able to explicate combining of intellectual abilities. Unfortunately, the mentioned theory is not sufficient and cannot allow us to precisely consider the ways cognitive abilities combine. Students are very often not aware of them, they were vanishing and coming back, succeeding one another with an order, combined themselves in various ways, while it seems that they significantly depended on the context, the problem, once again confirming the unrepeatable complexity of cognitive process and the lack of power of undertaken methodological approaches.

Conclusions

Having outlined the empirical part of the paper, a conclusion could be reached that metacognitive abilities, as one of the elements encouraging students' autonomy, resist research and the complexity of problem solving does not allow simplification. The interaction between the elements and multiple relations, i.e. regulations, creates new features, and pausing at one moment leads to a change of meaning of what is being studied. We hold that this is a significant reason explaining why we have still not come to more precise determination of psychological "substance" of metacognition; furthermore, this research has not made a significant step ahead in this sense. Sternberg's triarchic theory of intellectual abilities as theoretical was not in this case sufficient and could not allow us to precisely consider the ways cognitive abilities combine: context – problem has caused various metacognitive components, i.e. varies activities students intended to carry out; metacomponents were interwoven, succeeding one another, they were vanishing and coming back, making metacognition as cognitive phenomenon almost impossible to reach.

Another conclusion, which viewed from the angle of postmodern didactics could also be considered an argument in its favour refers to the fact that the research has come to a statement that there are different approaches to problem solving. Some of them have at one point been complementary and at others conflicting. This has directed our reflections towards the importance of external pieces of information a student interprets. A student has, in our case, construed, but the pieces of information coming from the setting have also been significant (interaction with new data, encouragements to modify one's own mental structure, to elaborate (reformulate), as well as the awareness of the importance of all this for the activity to be undertaken (metacognition). In other words, there is a conclusion

appearing beyond all this insisting on respect of conceptual mechanism of students and interdependence of self-organization of learning and circumstances. Neither the existing didactical models, nor models of learning process study could succeed in grasping the importance of metacognition and its influence on the mobility of one's knowledge. We have in this research dealt with the aspect of conditions facilitating the modification of the existing network of conceptions. We have been searching for the elements which enable efficient self-regulation. Radical transformation of student's concept at some points was automatic, while in others it proceeded slowly, deteriorated by obstacles (previous knowledge...); at other points a whole range of convergent and redundant elements has appeared, difficult to coordinate. Consequently, the mental network, mobilized at those moments, connecting student's conceptual framework with the pieces of available information, did not go in a simple sequence of order (compare Gojkov, Gojkov-Rajic & Prtljaga 2002a: 29). We are ready to accept the standpoints of those who advocate the allosteric model, according to which internal conditions encountered and combined with the external ones, not leading to the simple accumulation of new pieces of information (knowledge). Learning is not a simple accumulating process; new meaning is rather produced through mental transformations with emphasised motivational note (for more details, see: Freire 1972: 56; Gojkov 2002b: 76).

The conclusions above are in favour of constructivistic approaches, theories which are in the grounds of changes in educational system. In the beginning the need to focus on individual student has been emphasised. However, we are under the impression that this research has pointed to the need to pay more attention to the setting. We have seen that the conditions facilitating learning play a significant role in problem solving. **Ten types of didactic instructions have been defined which can effectively encourage mental abilities.** We are not sure that the list of factors is exhausted, as well as the factors participating in the construction of new knowledge. Knowledge does not simply depend only on general cognitive structures, but the process of learning includes strategies, construction and deconstruction, which, being interactive processes, cannot ignore the fact that there are student's prior-conceptions and that they are, according to some views (allosteric models) an obstacle for new levels of organization of ideas; apart from this, the process of problem solving involves numerous multifunctional and multi contextual activities, resulting in mobilization of more levels of mental organization, the student is not aware of. Existing didactic models have not succeeded in explaining the underlying currents and processes (for more details see: Gojkov 2004: 24). I even think that it is not possible to succeed in an attempt to describe the courses of knowledge construction according to certain models, i.e. theories and to explain the flows underlying them. Some of the new attempts, mentioned as so called allosteric models of learning, are actually a try to go beyond constructivistic models, which do have respect for the importance of didactical setting, but its role is considered form the angle of interference with the prior-concepts. What comes on the scene at this point refers to contemplations on practical attempts at intervening in the changes in the sphere of education in Serbia.

If we accept the previous findings and their interpretation as a ground for establishing of principles to have influence on consequences in teaching, the following ones could be outlined in the narrowest sense:

- learner is the one who elaborates, integrates, learns, doing all this through his/her own system of thinking; therefore he/she has to find himself in a situation which demands a change of conceptions;
- a teacher has to pay more of his attention to didactical setting, for it to provoke interference with student's prior-conceptions (to arrange heuristic environment which can bring to interference with the conceptions of students...);
- didactic setting should take into consideration learner's prior experiences (knowledge), as well as learning context, to show significant respect for both individual differences (cognitive style) and significant parameters which have to appear in didactic setting (authentic confrontations, being intrigued, conceptual imbalance should all provoke a learner to go deeper, to check, to search for new data...);
- metacognition is an important parameter, facilitating the process of learning;
- network integration (organization of concepts) should encourage the elaboration of more adequate concepts.

All what has been said regarding the practical aspects of the mentioned findings, their interpretation and conclusions certainly highlights the need for more serious reconsiderations of the following question: is this the right way to reach the answers to the questions raised in the beginning of the text? Instead of providing an answer, the following question is raised: have some of the solutions which are noticeable in the changes introduced in education (advocating of removal of boundaries between subjects, neglecting of the time-table, as an organizational aspect of time structuring, extreme tolerance of attempts as expression of autonomy encouragement...) comprehensively understood the grounds of constructivistic intentions and reaches and will through their transfer into practical currents they manage to contribute to their own validation? As it has already been stated in the text, extreme negligence of didactical context is not a consequence of constructivism.

References:

Benito, Y. (1996): *Capacidad Metacognitiva y Estrategias Cognitivas de resolución de problemas matemáticos y de transforamtión y de inducción de estructuras en superdotados*. Valladolid: Ideacción, revista en español sobre superdotación (7), Centro ¨Huerta del Rey¨

Brown, A. L., *Metacognition, executive control, self-regulation, and other more mysterious mechanisms;* u: Weinert, F.E. i Kluwe, R.H. , (1987), (eds): Metacognition, motivation and understanding, Lawrence Erlbaum Associates, Inc., Hillsdalle, New Jersey.

Carver, C.S. i Scheier, M.F., (1998), *On the self-regulation of behaviour*, New York, Cambridge University Press

Cates, W. M. (1992), *Considerations in evaluating metacognition in interactive hypermedia/multimedia instruction*. Paper presented at the meeting of the American Educational Research Association, San Francisco

Freire, P. (1972), *Pedagogy of the Oppressed, Penguin Books, Middlesex. From constructivisme to allosteric learning model*

Gojkov, G. (2001), *Didaktički aspect metakognicije darovitih*, u: Didaktični in metodični vidiki prenove in razvoja izobraževanbja, Pedagoški fakultet. Maribor,

Gojkov, G., (1995), *Metakognicija i strategijski transfer u didaktičkim kompetencijama nastavnika*, „Inovacije u nastavi", br. 5, Beograd

Gojkov, G., (2004), *Lični kognitivni okviri i metakognicija*, Zbornik br X, VŠV, Vršac, 2004. i Didaktički pristupi podsticanju veština samoreflestivne i socijalne kompetencije, Arad, Univerzitet "Vasile Goldiš"

Gojkov, G., A. Gojkov-Rajić i J. Prtljaga (2002c), *Metacognition Didactics*, In: The 8th conference of the European council for high ability Development of Human Potential: Investment into our Future, Rhodes.

Gojkov, G., (2002b), *Od konstruktivizma do alosteričnog modela učenja*, Zbornik Katedre za pedagogiju Filozofskog fakulteta u Novom Sadu, sv. 17, Novi Sad,

Gojkov,G.(2002b), *Didaktički aspekt nmetakognicije darovitih*, Novi Sad, »Pedagoška stvarnost«, br.1-2

Gojkov,G., (2009), *Didaktika i metakognicija,* Vršac, VVŠ »M.Palov«

Kovač-Cerović, T. (1990), *Zona narednog razvoja kao dijagnostička paradigma*, «Psihološka istraživanja», Institut za psihologiju, Beograd

Levkov, Lj., (1995), *Intelektualni razvoj, metakognicija i škola* u: Saznavanje i nastava, Institut za pedagoška istraživanja, Beograd

Stojnov, D. (1998), *Konstruktivizam, participativna epistemologija i konstruktivnost psiholoških kategorija,* Zbornik, br.30, Institut za pedagoška istraživanja, Beograd.

Wienert,F. (1997) u.: Mandl,H.,*Psychologie der Erwachsenbildung*, Gottingen