THE ROLE OF MEDIATED LEARNING AND METACOGNITION IN THE IMPROVEMENT OF SCHOOL PERFORMANCE ON DISTANCE LEARNING BY MEANS OF IMPLEMENTING INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) – RESEARCH-ACTION PROJECT –

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Abstract: This paper is an outline of an on-going project we are implementing in Romania. This is the first of its kind nationwide, given the systemic integrative approach of the role played by mediation pedagogy, cooperative learning and metacognition in the betterment of school performance by implementing information and communication technology. These all have so far been treated only separately. This project is based on an interdisciplinary approach, and is motivated by the ever increasing interest manifested, in the last decades, in the development of new learning strategies meant to improve school performance of both pupils and students. These strategies should be based on the paradigm set by cognitive psychology and on the research results obtained in developmental psychology, educational psychology, the psychology of learning, modern didactics, the sociology of education, information technology, educational communications and technology, etc. Below is the synthesis of our research, pointing to the interdisciplinary theoretical support on which our project is based.

Keywords: distance learning, mediation pedagogy, cooperative learning, metacognition, information technology

1. Introduction

Research in mediation psychology and in cognitive psychology with a focus on the teaching-learning process, especially on the basis of R. Feuerstein's theory and methodology put forward in 1987, has strongly influenced the understanding and the implementation of didactic principles and educational practice. These emphasized the interaction between the degree of functionality of the cognitive processes and the amount of knowledge accumulated, as well as the role played by the meta-cognitive processes in the process of learning. Feuerstein defined the didactic relations in educational-instructional activities as based on *mediation*, which allows educators to evaluate and mould their attitude and teaching style *based on the particularities of cognitive architecture* and *function of the students' cognitive styles* (Preda, Preda, 2008). Experiments with the Program of Instrumental Enrichment (P.I.E.), carried out in many countries in the world, have proved that intelligence is not invariable (Feuerstein et al., 1987, Netkine-Grynberg, 1999). Still, nowadays, school activities predominantly stimulate only the verbal intelligence and the logico-mathematical one.

The psychogenetic principle of accelerating the stadial development of intelligence should be seen through the lens of H. Gardner's 1996 theory of multiple intelligence. This idea is further supported by research that employs activating cognitive methods, proposed by project didactics,

differential psychology, experimental pedagogy, and interactive/communicational pedagogy (Perraudeau, 1996; Pourtois, Desmet, 1997). Mediated learning is related to cooperative learning, which is based on the socio-constructivist model. To be more effective, teaching-learning activities aim to develop in pupils and students *the ability to access a reflexive adjustment of the learning processes* and *to guide their own learning* (Preda, Preda, 2008).

Metacognition is essential in *knowledge acquisition*, in *problem-solving learning*, and contributes to the development of *interdisciplinary and transdisciplinary transfer* abilities (Perraudeau, 1996; Tardif, 1997, Grangeat, 2007). Two important elements of metacognition can be distinguished: *metacognitive experiences* and *metacognitive knowledge* (Flavell, 1979; Corkill, 1996; Lucas, 1999; Grangeat, 2003). Oubenaïssa (2003 – apud Romero, 2005) outlines not only the structural-functional elements of metacognition involved in the teaching-learning process, but also their interaction. Therefore, meta-cognitive training based on using a reflexive approach is bound to improve teaching and learning strategies. Inter-individual differences are usually expressed during higher level processes, namely *meta-cognitive processes*, which, however, can only be generalized if they may be put into practice in a wide array of domains. Metacognition fosters the viability of *the reasoning involved in problem solving* (Anderson, 1983; Doly, 2002), and of analogical reasoning, respectively. Research has demonstrated the importance of metacognition in the educational process, and many works insist on the role of reflection in metacognition – which brings it close to the *"critical thinking"* trend and to the theories based on cognitive control (Zimmerman, Skhunk, 1998).

The above mentioned facts show that the modern didactics used in schools and universities is beginning to focus more and more on the development and assessment of metacognitive processes and of *effective learning styles*, closely related to the development and assessment of both theoretical and practical competences, and of the creative and innovative spirit (Depover, Noël, 1999; Grangeat, 2007).Various studies emphasize the importance of agent systems based on the use of computers in the active monitoring of the learning process. Examples of such models and systems are, for instance, TETS - Training Environments in Tutorial Systems and ITE – Interactive Training Environments (Putambekar, Du Boulay, 1997).

2. Research Objectives, Hypotheses and Methodology

This project is based on an *interdisciplinary approach*, and is motivated by the ever increasing interest manifested, in the last decades, in the development of new learning strategies meant to improve school performance of both pupils and students. These strategies should be based on the paradigm set by cognitive psychology and on the research results obtained in developmental psychology, educational psychology, the psychology of learning, modern didactics, the sociology of education, information technology, educational communications and technology, etc. Below is the synthesis of our research, pointing to the interdisciplinary theoretical support on which our project is based.

2.1. The objectives are the following**:** (1) To synthesize and re-evaluate the theories on the formative role of mediation pedagogy, of cooperative learning and of metacognition; (2) To re-evaluate, adapt and put into practice some constructivist methodologies based on mediation pedagogy, on cooperative learning and on metacognition, including the implementation of information and communication technologies, in order to improve the school performance of and students. (3) To put into practice a computational model for metacognitive training in interactive

learning environments for problem-solving. (4) To develop some cognitive styles and some flexible learning styles based on problem-solving learning, especially by using heuristic strategies – as a "launching pad" for creative learning (through discovery and research).

2.2. Categories of Objectives in Distance Education

The objectives that can be associated with learning activities proposed to distance learners are divided into five categories or domains: **cognitive, affective, motivational, metacognitive** and **psychomotor**.

The cognitive objectives are based on the knowledge of a conceptual field, on the information processes related directly to the content of the subject. Thus, the cognitive level can be distributed among several tasks: 1) activating knowledge, 2) selection of important information, 3) organization, 4) integration, 5) transfer, 6) generalization or conceptualization, 7) review and 8) recovery of knowledge. The printed text being, by far, the most used medium in distance education, these cognitive operations establish a parallel with the strategies used in active reading and in the learning process (Deschênes et al., 1993).

The metacognitive objectives take into consideration that metacognition includes two dimensions: metaknowledge (knowledge about knowledge) and learning management strategies. Although metaknowledge may seem natural for adult learners, its embodiment for a student is a complicated process (Noël, 1991). The use of the metacognitive strategies of planning, control and assessment is important for the educational success. In distance education, students must demonstrate greater autonomy in the management of one or more aspects of their learning; hence, the necessity of the use of the metacognitive strategies. The autonomous students must know their own strategies in order to use them, to know what they do not know in order to search for the information needed, to plan, regulate and evaluate their own progress. Besides the inclusion of the learning activities based on metacognitive objectives, the use of the metacognitive strategies can be encouraged, allowing the student to control various aspects of training.

The affective objectives – make emotional intelligence work and are based on cognitive and aesthetic emotions and on feelings and attitudes that can change the learning environment through a new view of the conceptual field of the course (Grisé and Trottier, 1997). As part of the professional training, they are translated into lots of socio-affective skills (personality traits, relational skills, professional commitment) that characterize this training. An examination of the distance academic or vocational educational literature shows that the affective objectives do not seem to be an important concern. However, their presence is widely recognized.

The motivational objectives are based on the idea that the learning activities may involve the intervention of motivation by using personal experiences and by appealing to the desire and willingness to act in order to achieve cognitive activity. Motivation is modelled by the learners' representations of the objectives, the tasks and their own abilities: the task aims to learning or assessment, it is useful to learning, but are they able to meet the pre-established challenges? (Tardif, 1992). For the author of the courses, maintaining the students' motivation is an important aspect in the development of all the learning activities or materials.

2.3. The following are **the research hypotheses** to be tested by action-research: a) Applying the principles and methodology specific to mediation pedagogy by means of a tutorial system, including information and communication technologies, leads to the improvement of cognitive and learning styles; b) Promoting interactive cooperative learning, especially in a problem-solving context, increases both the individual and the group performance of students; c) Increasing the efficiency of cognitive activity in problem-solving learning is mostly based on the development of metacognitive strategies and knowledge; d) The meta-cognitive knowledge of people, as a meta-cognitive tool, is instrumental in knowledge building; e) Meta-cognition brings an important contribution to the development of *interdisciplinary* and *trans-disciplinary transfer* abilities.

2.4. In what regards the **research methodology**, in order to reach our objectives and to test our research hypotheses, we will be using: the psycho-pedagogical experiment, the psychological analysis of the activity's products, the questionnaire method, the guided interview, and case studies.

3. The group of participants (N=155) consists of simply-random samples: students from "Babes-Bolyai" University, from the Technical School of Cluj-Napoca, and from Spiru Haret University Brasov.

4. The Degree of Novelty and Originality of Project

We are proposing, for the first time in Romania, a systemic integrative approach of the role played by mediation pedagogy, cooperative learning and meta-cognition in the betterment of school performance by implementing information and communication technology. These have so far been treated separately. Our investigations, based on the paradigms of constructivism and of cognitive psychology, will increase the scientific and methodological support concerning the integration of information and communication technology in mediation pedagogy, in cooperative learning and in the meta-cognitive processes.

The *interdisciplinary action-research* based on the above mentioned methodology is expected to yield an improvement in the school performance of the participants'- pupils and students who will be helped to develop problem-solving learning skills and transfer abilities based on cognitive styles and flexible learning styles of higher efficiency.

This project will also contribute to the development of human resources in the field of pedagogical research, due to the involvement of young PhD students in our project's team, where they will bring their contribution to the elaboration and implementation of the proposed investigation methodology.

5. Conclusions Regarding Project Management Issues

The project's management will be of a consortium type, based on the standard axes: planning, monitoring, controlling and motivating. Each team will have its own coordinator. The contribution of each team will be made on the basis of the objectives and activities outlined in the

project, and pedagogical experiments will be made involving the selected participants. Optimal communication between team members will be fostered, especially since common terminology will be used, and each team will design its own work plan. Each partner will assign the work groups, their responsibility, and a continuous exchange of ideas and expertise will ensure that the set objectives are accomplished. The project director will supervise the clear definition of the project's objectives and activities, the assessment of the results during each stage, the key moments in the development of the project. The following will be ensured: the functioning of the consortium on the basis of a protocol; precise means and times of communication between the project director, the team leaders and the team members; communication will usually be done by means of e-mail lists and in a discussion board on the project's site; clear tasks assigned to each member of every team; suitable assignment of competencies on objectives and tasks; allotment of material resources function of the activity type; thorough planning of activities done in good time, with the duration of each activity clearly specified; feed-back (assessment of activity stage by stage and also on the whole); availability of the project's results for external evaluation.

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