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PROBLEM SOLVING CENTERED LEARNING, A POSSIBLE MODEL FOR EDUCATIONAL PRACTICE

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Abstract: *The importance of learning refers both to explaining and understanding the complex process of learning, and especially the applicability of research results into educational practice. Psychological theories of learning that are descriptive, not prescriptive, can be exploited by converting them into models of learning and instruction with functional-pragmatic meanings. Some of these theories have attempted to verify experimentally implicit theories of learning - those experiencing concepts, beliefs and popular opinions about learning, scientifically unjustified (V, Negovan, 2007). Therefore, learning models focus more on what the learner does , while teaching models focus on what the teacher does to facilitate student learning. Meanwhile, the teaching models interpret psychological theories of learning and are prescriptive, including rules for achieving the objectives and normative, meaning that they propose criteria for objective achievement.*

Keywords: *learning, problem solving, training models*

The problem of learning broadly defined as universal phenomenon in the life of organisms, is the process of acquiring personal behavior experience with the purpose of adaptation (E, Bonchiş, 2004). Learning covers the entire existence of the human being, therefore it is a multidimensional phenomenon and therefore plurilevel with its own structures, which exert a strong influence and permanent inserts on the development of adaptive behavior. Deciphering the learning process and understanding the role of learning in human life, Golu mentions (2001) are operations that depend to a large extent on specific psychological theories of learning on "variables introduced in the experiment and how the experiencewas carried out, on basic theoretical concepts of the schools from which's points of view the data interpretation was made "(p.25).

Constructivism sees knowledge as a building the person accomplishes in his attempt to make sense and meaning of their own experiences. The constructivist paradigm facilitates understanding how learning is facilitated by engaging in "constructive" activities, because it is no longer regarded as a mere conduit of information from teacher to student toward being received and stored by the latter, but knowledge is built on what a person already knows, the new learning is shaped by prior knowledge. A fundamental shift occurring in constructivism "movement" of the locus of control on learning from the teacher towards the student.
The learning environment must provide multiple representations of reality in relation to its complexity, authentic tasks, significant for the person's experience and encouraging work and reflection on experience, fostering collaboration and social negotiation between those involved in the construction of knowledge. *The teacher's role* is not to convey information, but he becomes a facilitator of learning, providing opportunities for active engagement in the discovery and construction of knowledge. The *student*, actively involved in learning, is encouraged to think

independently, to interpret, analyze, make predictions, develop ideas and concepts, the entire training being focused on them (Driscoll, 1994).
In designing a learning experience one needs to take into consideration the fact that:

- *The way of information processing* is influenced by the student's cognitive processes, becoming important not only what is taught, but how this is done:
- *The Cognitive level* reached by the child requires the use of specific methods and a certain organization of content, a certain manner of reporting and so on;
- *The logical structure of information* facilitates learning, forming connections with what is already known with what is familiar, making learning more effective and lasting;
- The student should be helped in his approach of *"learning how to learn"*, to form the metacognitive strategies that would improve cognitive performance.
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Problem solving-based learning (PBL)
Problem solving is considered a crucial cognitive activity both in the academia and in the context of work or daily activities. The type of problems can range from those with a well-defined structure (which can be solved by using algorithmic strategies) to the poorly defined (which involves heuristic solving strategies). Poorly defined problems are the most often encountered in everyday life (Bulu and Pedersen, 2010). Trying to bridge the gap between real-world requirements and academic requirements (content of classroom activities), educators have developed teaching strategies to facilitate the empowerment of students to solve real-life problems. One of these strategies is "problem solving-based learning (PBL)."
PBL is a learner-centered approach, with a very high degree of structuring. The starting point for learning experiences is represented by real issues. The teacher encourages students to be actively involved in learning, exploits their experience and prior knowledge, stimulates initiative and provides guidance for problem solving. (Reynolds and Hancock, 2010). Although the method has undergone various forms, the basic steps are to (Barrows and Kelson, 1993; Duch, 1996, as cited in Reynolds and Hancock, 2010):

- Presenting a real problem to *student team - which assesses the extent to which members are ready to solve the problem using the knowledge they already have*;
- *Redefinition and restructuring of the problem, followed by outlining those aspects of the problem that they do not understand*;
- *Prioritization, by mutual agreement of the issues and planning about who, when, where and how will investigate these issues in the group*;
- Collective attempt to resolve the issue exploring prior uncertainties and establishing new ones - as progress is made in *solving the problem;*
- *Synthesizing collective ideas and deciding on the best solution;*
- *Assessment and self-assessment of team members after completion of the work, but also an assessment of the training process in order to identify what needs to be improved in the future.*

Trying to provide a conceptual framework destined to underpin the design proper issues for any student. Hung (2009) developed a PBL design pattern called **Model 3C3R** (Figure 1.) It is composed of two types of components: ***core*** (*content, background and connections*) and ***processing*** (*researching, reasoning and reflecting*). *The core components* are designed to structure the content of knowledge to contextualize the field and build the conceptual framework around the topic of study. The role of *processing components* is to guide the student towards the learning objectives, to adjust tle level of cognitive processing required in current cognitive skills and reduce the initial discomfort experienced by the student in this type of learning.

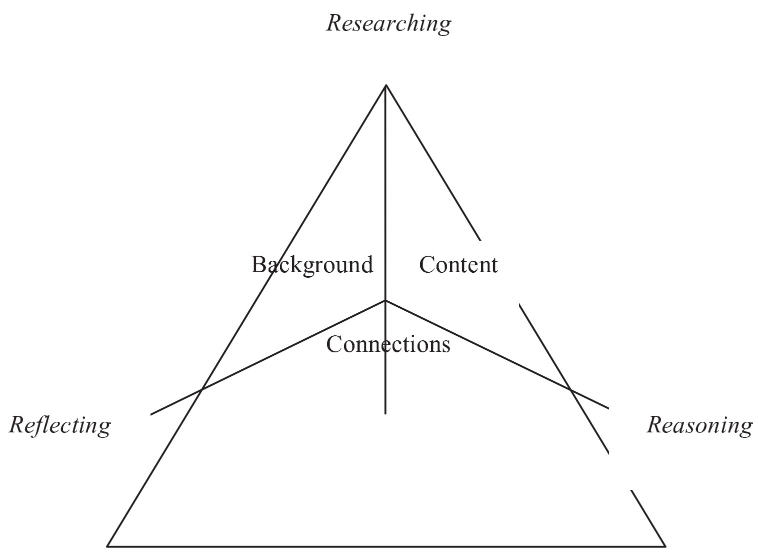

Fig. No. 1. Design of the 3C3R Model
(*Paloş, R., as cited in Hung, 2009, p. 122*)

The new steps taken in the design of this model are (Hung, 2009):
1. *setting goals and learning objectives*, which is achieved depending on the area of knowledge addressed, the difficulty level of problem solving skills that the student would develop and self-directed learning skills;
2. *content or task analysis* - in terms of concepts, principles, procedures - to determine which training methods can be used;
3. *Specific background analysis* to find problems drawn from real life;
4. *selection or generation of the problem*, after the analysis in the first stages, the problem must be motivating for the student, relevant to his interests, his career, the situations he faces; 5. *Analyzing problem possibilities* - needed to identify: to what extent it allows achievement of the learning objectives, if key information involved in solving the problem are consistent with the content of knowledge, if the problem's contextual information is sufficient to place learning in an authentic context or whether relationships between components of the problem have been designed accordingly;
6. *consistence analysis*, which aims to determine if the problem corresponds to the content covered and the level of student skills development;
7. running of the *problem calibration process* after the consistence analysis, concerned with content, background, research and reasoning;8. *building the component of reflection* that aims to cultivate the student's self-directed learning skills, it can have a formative or summative form;
9. *examining the inter-support relationships for the 3C3R model components*, thus ensuring mutual support between the 3C and 3R.

The 3C3R offers, besides the necessary conceptual framework for designing problems, a framework for research into the effects that adapting the amount of information contained in the problem has on: understanding the problem, identifying learning objectives, achieving logical connections between different milestones in solving the problem and appropriate solutions (Hung, 2009).

From a design perspective of a learning experience that is based on the 3C3R model, were explored the views of 78 teachers, holding tenured positions, part of the body of mentors of the University "1 Decembrie 1918" of Alba Iulia, for Pedagogy of primary and preschool education. They carry out practice educational activities with students, offering *teaching / learning models* specific for traditional education.

Without disseminating the model proposed by Hung, we obtained the following information on the design of learning activities based on problem solving, following the application of a questionnaire covering the following areas:

- **Design/ correct formulation of a given problem taking into consideration**: setting learning goals based on the level of difficulty (Fig. 2), it highlights the correlating the objectives with the difficulty level; establishing appropriate procedures and methods of training for the learning task, it is carried out to a large extent at a rate of 65%, the analysis of the context of the problem, only to a lesser extent, 56% and 44% to some extent, the selection of the problem to stimulate the interest and motivation of the learners is followed a little or 55%;

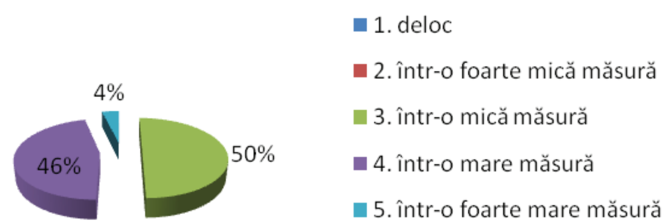

Fig. No. 2. Establishing learning objectives based on the level of difficulty

- **Linking the scientific content of the unit plan, with the requirements of the problem by**: identifying relationships between components of the problem and the content covered by the unit (fig. 3) is a priority for 44% of the teachers, analyzing consistency between content matter and level of development of the student's skill, it is realized to a large extent, only 14%;

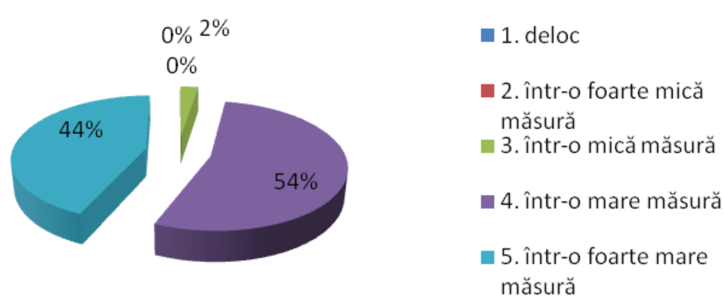

Fig. No. 3. Identifying relationships between components of the problem and content of the unit

- **Monitoring the learning situation based on problem solving, by**: analyzing the elements of content, context and reasoning in solving the problem is a huge concern of 14% of teachers, identification of reflection, with the role of cultivating the students' self-directed learning skills (Fig. 4), is considered important to a large extent, 58%, and 4% of whom consider it to be very important.

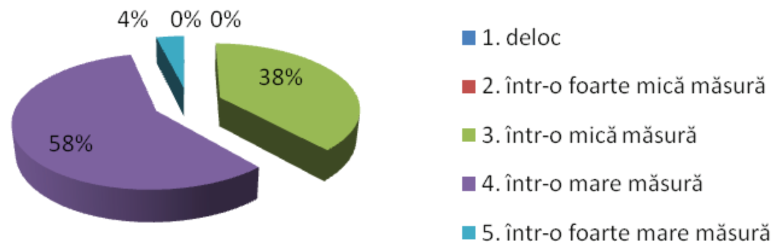

Fig. No. 4. Identification of reflection, with the purpose to cultivate in students self-directed learning skills

Thus, *the learning environment* must provide multiple representations of reality in relation to its complexity, authentic tasks, significant for individual experience and to encourage individual work and reflection on experience, fostering collaboration and social negotiation between those involved in the construction of knowledge. Meanwhile, the teacher's role is not to convey information, but he becomes a facilitator of learning, providing opportunities for active engagement in the discovery and construction of knowledge. And, the student actively engaged in learning, is encouraged to think independently, to interpret, analyze, make predictions, develop ideas and concepts throughout the training being focused on them (Driscoll, 1994).

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