

MANAGING THE UNEXPECTED IN CLASS: AN OPPORTUNITY TO TEACHING AND LEARNING

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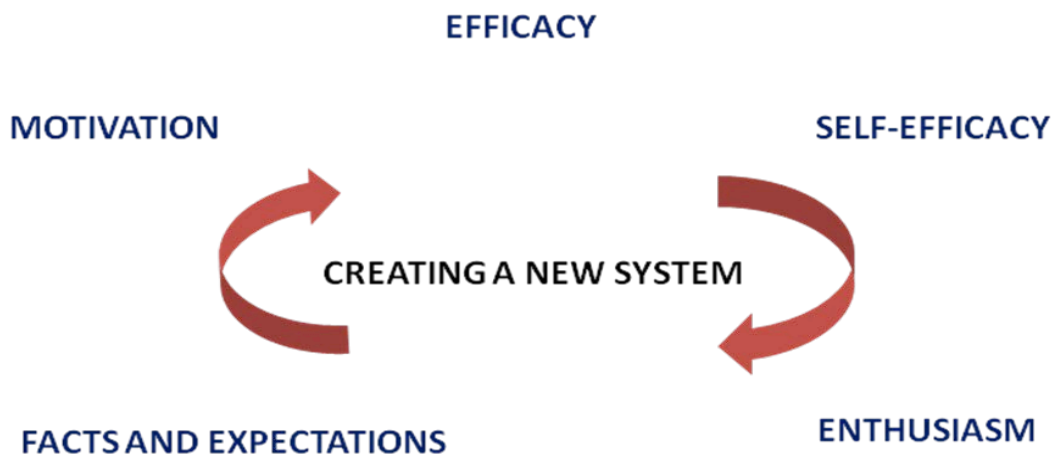
Abstract

Usually teacher prepares the class scheduling, explaining theoretical concepts, problem solving, etc.. When this schedule does not include student intervention a few contingencies can be expected in the development of the class, only doubts and questions. However, when the program includes active participation of students there is the possibility of a more or less expected student participation based on the guidelines of the teacher. When following the method of problem-based learning, teacher presents case studies and problems to study, reasoning and solve in the context of the class. These problems are made available to students in time for their preparation. In this paper, our group of teachers test a new learning methodology based on the unexpected. Students receive cases and problems to study, reasoning and finally solve in class. This resolution involves understanding theoretical concepts so that each case has scored those concepts that should be known. If learning is meaningful, students can reason and / or solve a different case or problem form those initially assigned. In this way the student thinks in class a case or new problem not seen before which requires the understanding and application of the same theoretical concepts. We call this “managing the unexpected” and, based on our experience, it is an excellent opportunity to teach and learn.

Keywords: Innovation, problem-based learning, meaningful learning, attitude, objective.

1 CREATING A NEW SYSTEM

Can we improve our teaching and learning method? More important is the question that the answer.



LOOKING FOR SUCCESS

Figure 1. A model of new learning-teaching system based on attitudes and objectives.

At present the quality assurance systems of teaching and learning are designed to ensure that the learning objectives are achieved. These systems evaluate quality of learning so that the results are the basis for raising the necessary improvements and innovations. In the context of concrete materials,

the teacher has aimed that students achieve meaningful learning that allows them to solve specific problems. However, the results are not always satisfactory so that we can make improvements aimed at building a new system based more on reasoning and the development of skills and abilities in a subject than memorization of concepts. This new learning system would be effective to achieve meaningful learning based on student self-efficacy, motivation and enthusiasm, basing this attitude on fact and expectations. Moreover, the teacher should spread that enthusiasm and motivation making the simple important, that is the daily work of understanding of concepts through problem solving, raising the issue before the concepts (Fig.1).

2 TESTING THE METHOD, ORGANIZING CLASSES

To test this system it is necessary to alter the organization of classes. In the context of problem-based learning, the teacher distributes cases and problems to groups consisting of two students so that, some time later, they bring the resolution thereof. In this way each student group solves a problem in a time determined by the teacher and all students of the class understand the problems that others will solve. This is a possible way of organizing the class. But the results are fairly predictable:

- 1) A high percentage of students only solve their own problem and not study the problems of others.
- 2) Understanding of concepts is very limited so that sometimes only understood a concept in a particular problem or case, but not in another.

To try to improve these results, the design and organization of the class should consider learning concepts to be effective and meaningful should enable students to solve problems in a broader context. Moreover, the understanding of theoretical concepts that allow problem solving in the classroom context, ie, in groups and not individually, makes cooperative learning.

To achieve these objectives, the teacher provides each group of two students a problem or a case to study which resolution will be discussed in class. However, the teacher should have prepared a set of problems or alternative cases whose resolution requires the understanding and application of the same theoretical concepts. Because students do not know these alternative problems until they must present in class the resolution of "their" problem, we call this situation "occasion and opportunity to handle and managing the unexpected" (Fig.2).

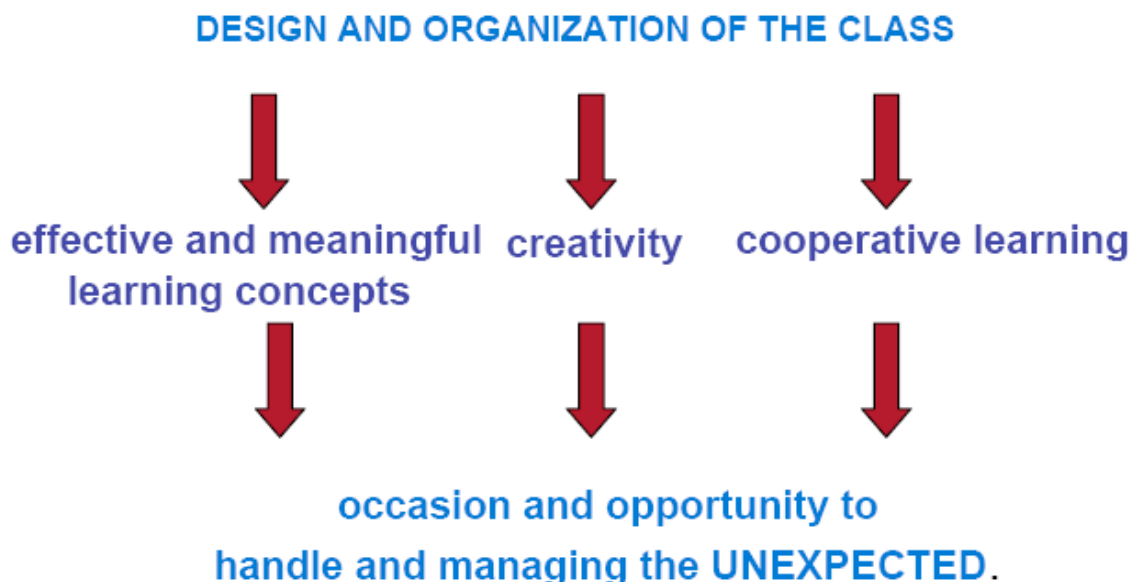


Figure 2. Steps to meaningful learning.

Previously we have proposed a learning system based partly on creativity and believe that the development of this system classes based on the resolution of "unforeseen problems" power both creativity and cooperative learning.

Resolving cases and unforeseen problems means exactly solve problems not previously known: we have a surprise for which we have not prepared in advance. Consequently, suddenly we have to

use our own resolution capabilities demonstrating the understanding of theoretical concepts, reasoning ability and organization of ideas in an effective sequence:

- 1) understand the problem.
- 2) make an approach leading to consider "what I know to solve the problem".

The development of such classes also encourages cooperative learning based on student participation in class.

3 ENHANCING THE UNDERSTANDING OF CONCEPTS, ENSURING MEANINGFUL LEARNING

Currently companies and organizations such as 3M, Dupont, HP, Motorola, Ford, etc., have pointed to the act of innovation as an 'intangible asset' that can stay competitive. The development of this skill is so meaningful to them that have been investing heavily for its development, and provide spaces where people can think, create and target these potential to benefit of continuous improvement. If this is what we are asked to work now and in the future, why not promote it in the context of university education?

Certainly it comes to developing a system of learning without borders or limits own university classroom to develop skills and abilities in students that are required and necessary in the professional workplace. Ultimately it is about developing self-learning ability in a process in which the teacher is a guide, a mentor, providing the tools necessary for that development. These capabilities are critical thinking, organizational strategies, the ability to learn, teamwork, decision making, planning and management of work.

LEARNING WITHOUT LIMITS

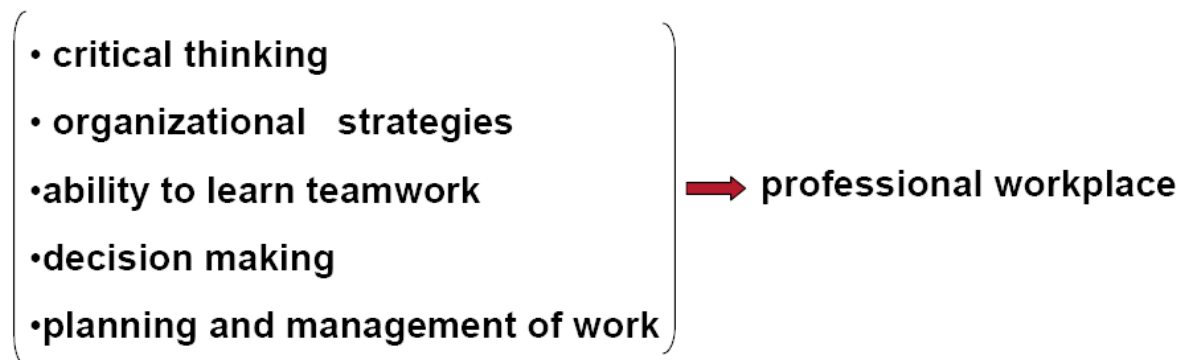


Figure 3. Tools for self-learning in university education and workplace.

The teaching-learning system that this paper proposes is applied in the course of Plant Physiology, Faculty of Biology, Complutense University in the academic year 2012-2013. But it is a system for any area of knowledge. The results at the end of this course are very encouraging and point to the suitability of the system to improve learning and especially to predispose positive attitude in students which facilitates the acquisition and development of skills described above.

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