

# FOSTERING THE CLASSROOM ATTENTION USING COLLECTIVE INTELLIGENCE EDUCATION TOOLS

O. Ortiz<sup>1</sup>, J. Meza<sup>2</sup>, E. Simó<sup>2</sup>, J. Monguet.<sup>2</sup>

<sup>1</sup>*Universidad de las Fuerzas Armadas - ESPE (ECUADOR)*

<sup>2</sup>*Universitat Politècnica de Catalunya (SPAIN)*

## Abstract.

Keeping students' attention in class remains a challenge in the teaching-learning process. The consumption of time trying to focus the attention of the student on the tasks of the class generates fatigue to both teacher and students. Several researchers conclude that using technology in the classroom has proven to be a distraction element of care rather than becoming a supportive element. From the scenario raised emerges the question: Could the ICT tools be used to improve attention and learning in class?

This research explores the application of a web tool called Flash Learning (FL) using Problem Based Learning approach (PBL). Flash Learning allowed implement a strategy with a real-time learning activity that helps in the process of concentrating student attention during a class.

Flash Learning was designed with the aim of integrating classroom management with the attention of its students and allowing self-reflective analysis of students in front of their classmates. On the other hand, the teacher allows him to obtain real-time clues about the tendencies of understanding and learning of the subject matter.

Based on the results, we consider that the use of new forms of teaching and learning based on the emerging paradigms is necessary. Therefore, the combination of Flash Learning could become an effective way to keeping students' attention in class and fostering the collective intelligence.

Keywords: collective intelligence, ICT, education, student's attention, PBL

## 1. INTRODUCTION

The advancement of technology influences educational environments. Rapid technological transformation carried out in the late twentieth century and early XXI, especially in the Information Technology and Communications (ICT), it sets new challenges for the education system [15]

The Collective Intelligence (CI) is occupying, more and more spaces of action in the educative areas [6]. The CI with the use of ICTs, and the application of active teaching methodologies, play a fundamental role in the levels of attention of the students. [2] in their research, demonstrated a positive interrelation between levels of attention and active teaching methodologies, they found that periods of concentration of students increased if the teacher applied active teaching instead of lectures.

Attention in class has been considered as a determining factor for the learning of the students in all the educative levels. Many studies realize that a misdirected technology can become a distracter that attenuates the concentration of students in the classroom. Our question then arises: Can ICTs be used to improve attention and thus to learn in the classroom? In this sense, the combination of CI with ICT and the use of active learning methods would be a viable option for improving classroom learning, and at the same time, understanding the levels of attention of the students in the classroom.

This article explores the evolution of the learning processes of undergraduate students, during the development of the classes of design and execution of projects. Three components are combined: collective intelligence (CI), a web tool called Flash Learning (FL) and the Problem Based Learning (PBL) teaching method. This tripartite combination anticipates progress in student learning, through the improvement of their levels of attention in classes.

The details of the application of the tools, the didactic strategy and its results are presented in the following sections.

## **2. LITERATURE REVIEW**

According to [17] the attention is "a selective process of the necessary information, the consolidation of the programs of action eligible and the maintenance of a permanent control over the course of the same ones".

In the context of the classroom, various factors influence the levels of student attention. [12] indicate that the individual variables of the students, the content, the teacher and the environment, influence the students' ability to maintain the attention. Some studies inform about of student attendance processes in the classroom.[14] notes that the attention of students during a class depends on motivation, that is, motivated students, pay more attention in classes that students unmotivated. Further indicates that students tend to feel unmotivated after 15 to 20 minutes, therefore the teacher should consider a decrease in the attention of their students after 10 minutes. To correct this issue, [14] recommends that lectures should be given in segments of 15 to 20 minutes. [1] states that students may not attend a conference during the first five minutes of the start or the last 5 minutes of the end when their concentration rises and declines. [8] adds that student attention will be dispersed unless the lecturer applies interactive strategies; In this perspective, lectures should be interspersed with periods of time that include interactive activities.

In relation with the active learning, [13] states that the learning process is not a longer an internal and individual activity, but has become an activity that is done collectively and online, therefore, implies that learning strategies need to be redefined to impact on student learning The active learning has a dual purpose, one the one hand is to avoid that the student become to passive subject in their learning, by the other hand achieve that the student to learn to conceptualize, understand principles, and apply knowledge [12]. There are several active learning methods used in classrooms. Problem-based learning (PBL) is one of them; this method originated as didactics of medicine in 1970 and is currently applicable in all disciplinary fields. For the context of PBL higher education, it stands as an *active* and innovative learning method, in order to provide solutions to the demands of the new knowledge societies. [9].

The studies conducted by [7] [5] report a systematization of the evolution of the PBL. Moreover [3] points out that currently PBL is not only used in more than 60 medical-related schools but is also used in middle schools and rural and urban primary schools. PBL focuses its learning on the student and not on the teacher or the content, and also stimulates the collaborative work. For instance, when students are motivated and understand the importance of a topic for their own lives, the teacher can introduce a carefully crafted problem that gains their full attention. [3]

PBL is an active learning method, since captures the attention of the student, the teacher participates in the process as a tutor that supports a small group of students who are predisposed to solve a specific problem related to a topic of study. In this process, students are empowered by the process, since they choose the teaching materials, define the order of their learning and participate in the evaluation processes. The focus of this methodology is the student, who enriches his knowledge through collective work and individual study [16]. In PBL, the role of the tutor is to pose questions to the students that help them to ask themselves and find for themselves the best route of understanding and managing the problem, which induces students to assume this role.

Finally, it is important to highlight the success of the Real Time Evaluation Systems (RTES), which have presented satisfactory results in education as a way to focus the attention of students. [4] present the results of the application of Clicker technology, in addition they conclude that the use of Clicker technology generates a more effective commitment and learning of the students, if it is supported by the development of its inputs by the teachers and Their subsequent formative use during the teaching process.

## **3. METHODOLOGY AND DIDACTIC STRATEGY.**

The work consisted of an exploratory study, in which the levels of learning of the undergraduate students of the race of physical activity sciences in subjects inherent to the planning and management

of projects were analyzed. In order to obtain improvements in learning, and to focus the attention of students, a didactic strategy was designed and implemented, which was supported by ICT tools for CI, and the PBL methodology.

Flash Learning (FL), which is shown in Fig. 1, is a tool that is used in real time, helps to keep the attention of the students in the classroom and therefore produces improvements in learning. It is designed with the aim of integrating the teaching management and the levels of attention of the students in the classroom, it also allows the self-reflection of the students in front of their peers. FL encourages active student participation through interactive communication and real-time analysis of results. FL fosters the collective intelligence through the collective evaluation and self-reflection of result presented in real time to the students.

The next section explains the use of the tool in a learning activity from planning to validating results.

Planning.- These are activities prior to the use of the activity in the class, in which the teacher in the development of his curriculum or syllabus in the class should:

- Establishing a bank of questions to be used or in the planned theme for a class, the questions should not focus on memorization but on the critical analysis of a scenario on the subject under discussion.
- Preparing the class material in such a way that in each key concept of the academic explanation, a question is inserted to validate either the concept or the understanding of the advanced in the subject.
- Establishing the frequency of occurrence of each question, to achieve concentration of learning and not become a distracter, it is recommended that the intervals are in the range of 10 to 15 minutes [2].
- Setting the maximum time allowed to answer a question, the time will be set according to the type of question; the default value is one minute. This value cannot be general value, since it depends on the difficulty of the topic in which that the teacher wish focusing the attention.
- Defining whether the same questionnaire will be sent to the whole class to a group, or to a specific student.

Execution.- The execution of the class is developed through an academic presentation by the teacher. The Fig. 1 details the activities to be accomplished by the teacher (s), and the activities that the students develop during the lecture.

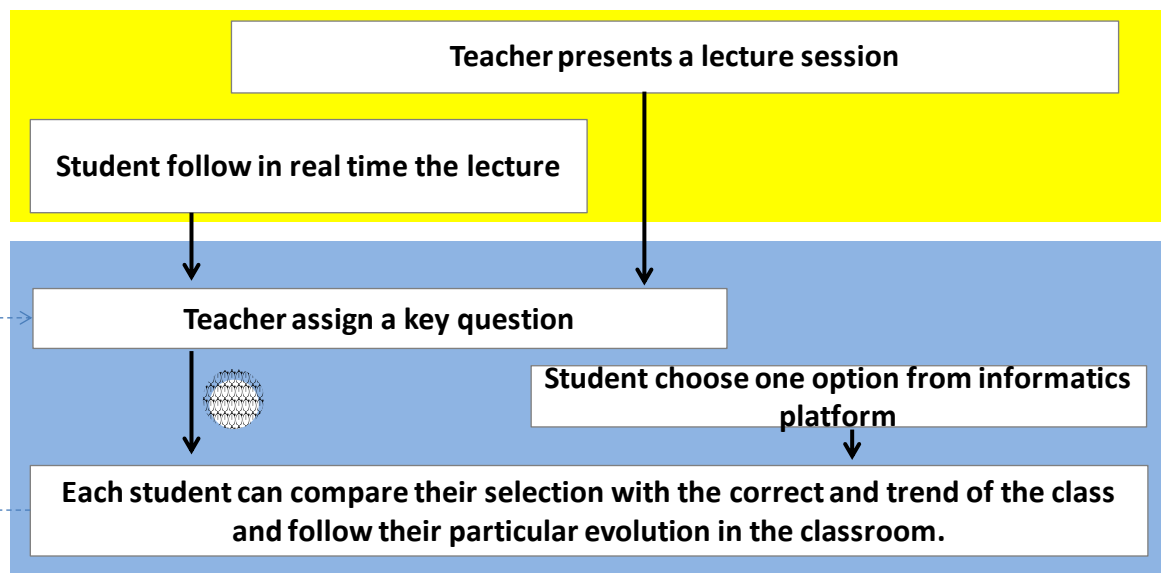


Fig 1. Flash Learning execution process

#### 4. EMPIRICAL EXPERIENCE AND RESULTS

The didactic strategy was applied to a group of students of the physical activity sciences career at the University of Armed Forces - Ecuador (ESPE), the group consisted of 24 students (6 women and 18 men), who counted The date with an average age of 22 to 25 years. At the head of the process was

the teacher of the subject of design and execution of projects. The challenge of the didactic strategy used was that the students improve their learning about subjects related with Design and Execution of Social Projects using Logical Frame Matrix approach.

The didactic strategy used includes learning objectives, topics, contents, activities carried out by the students and by the teacher, the resources and methodology used and the evaluation strategy. The contents were treated in three sessions; the first: central problem definition and stakeholder analysis, the second: problem and goal trees and the third session: strategy matrix, and logical frame matrix, with this, the topic was covered to the management cycle of the logical framework. The Table 1 shows the didactic strategy used, whose objective was to improve the teaching-learning processes of undergraduate students in the subject of Design and Execution of Social Projects.

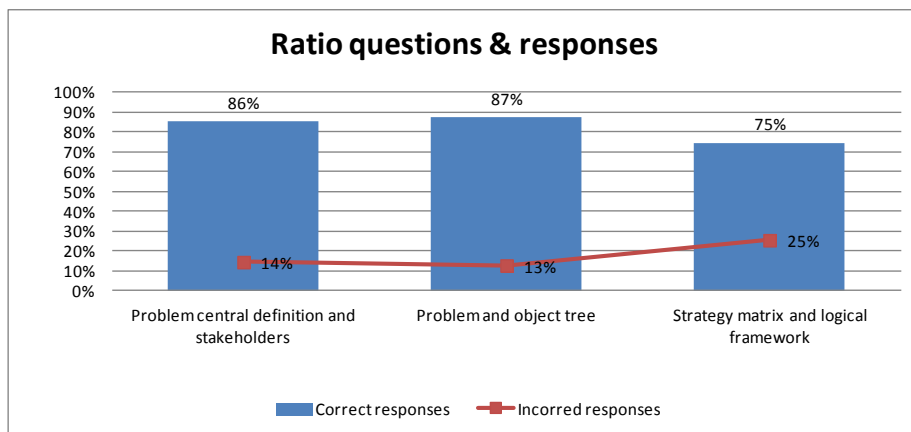
**Table 1.** Didactic strategy

Name	Description
Objectives	<ul style="list-style-type: none"> <li>• Analyzes, contextualizes and recognizes a central problem</li> <li>• Properly identifies those involved in a project.</li> <li>• Correctly poses problem and objective trees</li> <li>• Knows the systemic relationship of sustainability</li> <li>• Can differentiate levels of objectives, indicators, ways of verification and Logical Frame Matrix (MML) assumptions.</li> </ul>
Topic and Contents	<ul style="list-style-type: none"> <li>• Logical Framework Management Cycle</li> <li>• Definition of the central problem</li> <li>• Stakeholders Analysis</li> <li>• Problem and object tree</li> <li>• Strategy Matrix</li> <li>• Logical Frame Matrix</li> </ul>
Students activities	<ul style="list-style-type: none"> <li>• Reading study material.</li> <li>• Enter to informatics platform called FABRICIUS<sup>1</sup></li> <li>• Pay attention to the subject that through a master conference</li> <li>• Observing the flash question posed by the teacher every 10 minutes, approximately</li> <li>• When the question is shown, the student has 90 seconds to answer the question in FABRICIUS using FL.</li> <li>• Select one of the options proposed in the question.</li> </ul>
Teacher activities	<ul style="list-style-type: none"> <li>• Publishing material of study on the raised contents (videos, readings, guides, etc).</li> <li>• Preparing presentation, the presentation will have the key questions and register it in FABRICIUS.</li> <li>• Every 10 minutes, present a slide with a question and answer options.</li> <li>• Discovering the correct answer and discuss it with the class.</li> <li>• Repeating the last two steps to complete the topic of the day</li> </ul>
Resources/ methodology	<ul style="list-style-type: none"> <li>• Fabricius</li> <li>• Flash learning</li> <li>• PBL</li> <li>• Survey and Presentation</li> <li>• Laboratory and internet access</li> </ul>

<sup>1</sup> FABRICIUS is a collaborative learning informatics platform (<http://movil.eciem.org/DCIIMOVIL/WebLogin.aspx>)

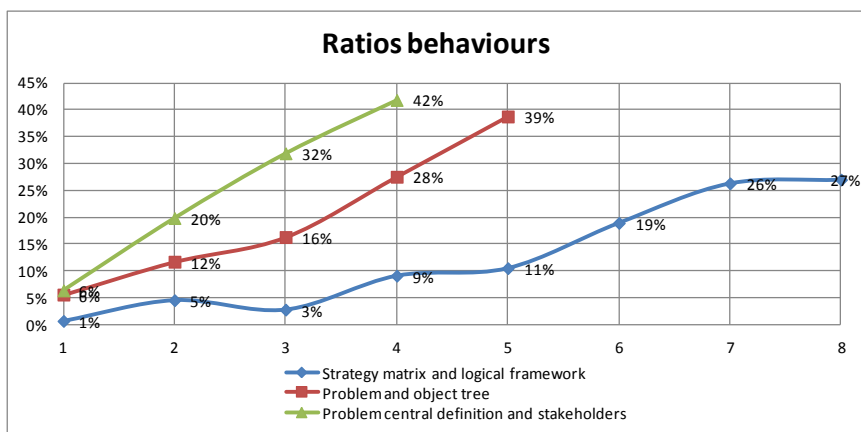
Name	Description
Strategies Evaluation	<ul style="list-style-type: none"> <li>• Compare your answer with the correct answers presented by the teacher.</li> <li>• Analyzing the information of the master talk and builds its own conceptualizations from case studies and multiple-choice questions.</li> <li>• Observing and registering the students behaviours in relation to levels of attention</li> </ul>

The Fig. 2, shows a summary of the results of real-time responses in the classroom. It's established that 82,6% of the answers are answered correctly, which would prove that FL is effective for learning achievements and improvements in the levels of attention in class in the classroom.



**Fig 2.** Ratio questions & responses

FL allowed getting some patterns of student's behaviors in each class Fig. 3. As we can see in the Fig. 3 each topic used different number of questions. The number of question by class had influence in the ratio between correct & incorrect responses. When the number of questions was short the understanding index<sup>2</sup> was bigger that in the last topic. According to the Fig. 3, the understanding index in the session of class with the topic "Strategy matrix and logical framework", the average of increasing of understanding index was 2%, however in the others 20%.



**Fig 3.** Ratios behaviours

<sup>2</sup> The understanding index is the average of index of correct responses by question. Where correct response index are the ratio of total correct response with total responses.

## 5. CONCLUSIONS

The evaluation strategy used by a teacher varies according to their regulations, customs, and methods. At the moment there is no consensus about the best way for to assess individual knowledge, and the measure of knowledge catching is given as a result of correct or incorrect answers to a specific test. According to the results of FL, which presupposes that the individual is learning the concepts presented, FL was effective for improve the students understanding.

The numbers of question have presented influence in learning levels. The learning levels were measured through the ratio between correct & incorrect question, therefore for each question in real time the teacher should redefine the strategy according with the trend of the last question, he could reinforce in the feedback or proposing new questions.

Improving the anxiety levels that could by generated by the use of ICT tools, should be consider by the teacher, he must balance the opposing restrictions when applies FL during the execution of the class. In this sense, the teacher should develop some complementary tasks:

- Develop previously the action plan for relaxing the class
- Include every certain time span, interactive activities.
- Preparing challenges of interest to the student through PBL.
- Giving constant support in the use of ICT tools.

The combination of three components: Collective Intelligence (CI), a web tool called Flash Learning (FL) and the Problem Based Learning (PBL) pedagogical method, produces progress in student learning and maintains attention levels in classes.

In line with the results, we believe that innovative teaching-learning strategies based on emerging paradigms can be implemented. We argue that FL could become a supportive tool for the teacher in order to maintain attention in the classroom, foster collective intelligence and improve learning.

The use of ICT tools such as Flash Learning, coupled with an adequate didactic strategy, and the use of active learning methods, is an open field of exploration with great potential for Higher Education.

## ACKNOWLEDGEMENTS

We thank the Department of Human and Social Sciences of the University of the Armed Forces ESPE.

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