Use of "Inverted Classroom" in Colleges of Technology: Comparison Between the Traditional Model and Flipped Classroom Model Using the LMS Moodle as the Support Tool.

Marco Antonio Alves Pereira
Faculdade de Tecnologia de Taquaritinga
Av. Dr. Fávio Henrique Lemos, 585 – Portal Itamaracá
CEP. 15.900-000 – Taquaritinga – SP - Brazil

and

Ana Teresa Colenci Trevelin
Faculdade de Tecnologia de Taquaritinga
Av. Dr. Fávio Henrique Lemos, 585 – Portal Itamaracá
CEP. 15.900-000 – Taquaritinga – SP - Brazil

and

Diogo de Almeida
Faculdade de Tecnologia de Taquaritinga
Av. Dr. Fávio Henrique Lemos, 585 – Portal Itamaracá
CEP. 15.900-000 – Taquaritinga – SP - Brazil

ABSTRACT

The Information Technology and Communication (ITC) has been considered an important support for the presential education on Higher Education Technology Courses because it embraces different learning manner. The *Flipped Classroom* is a methodology which emphasizes the technologies usage for the learning improvement, in a manner where professors can use your time in the classroom at interactive activities with their students instead of waste it showing content on traditional expositive classes. Aiming the learning improvement in the classrooms this work has as objective to compare the results of discipline entitled Operational Systems taught sometimes on traditional way and sometimes taught through the *Flipped Classroom* methodology. The methodology is made of a bibliographic review about this theme and a Case Study at the Technological College of Taquaritinga where a group called "control" had classes ministered on a traditional manner and another group called "experiential" had classes through the *Flipped Classroom* methodology application. The results has showed a reduction of the numbers of students who failed in the "experiential" group and satisfaction reports between the involved students. The researches are still being made.

Keywords: Learning Style. Information Technologies and Communication. Flipped Classroom.

INTRODUCTION

Teaching and learning activities aren't exclusive of presential environments. According to Kenski (2007), since the Information Technology and Communication (ITC) began to expand itself through the society, several changes related to the teaching and learning manners have occurred . Independent of the didactic equipment's usage in classroom, professors and students have opportunities to establish contact with the most several medias and so they absorb incorporated informations from these interactions being this fact the one which entails the establishment of new references . These mediations point out that the teaching and learning activities aren't exclusive of presential environments. However , inside virtual environments they become much more meaningful by the interpretation resources they offer.

Kenski(1999) reinforces this point by affirming that on reality the educational process is predominantly semipresential once it's impossible to think of that all the educative activities which lead to the knowledge, though foreseen they come to occur exclusively at the school environment, in the classroom and right before the professors.

The technologies extend teaching possibilities besides the short and delimitate space of physical presence of the professors and students in the classroom and yet according to Kenski(1999) the interaction possibility among professors, students, people, objects and informations which are involved in the process redefine all the dynamic of class and create new bounds between its participants. But yet, once available to the students since their childhood, the potential level of anteriority and readiness on the future student of technology are more developed predisposing them for a good reception of the "new" and to the facilitated access to relevant sources of informations.

What happens is that as pointed out by Martins (1991) the new Information Technologies show consequences such leaded to docent practical as to the learning process what creates the need

of continuous adaptation related to the learners and the professors as well to follow the innumerous changes.

Data from ABRAED (2005) show that the modality of Distance Education is the one which has been more worried about the methodology and its continuous improvement, taking in consideration the features of its students and the need to show better results.

In this context, this work has as objective to discuss the perspectives and contributions the methodology *Flipped Classroom* can offer to the improvement of the learning on the Higher Education Technological courses offered by FATEC-CEETEPS.

DEFINITION OF FLIPPED CLASSROOM

The widest definition to Flipped Classroom is the one which emphasize the usage of the technologies to the learning improvement, in a manner to professors put a better usage for their time in the classroom in interactive activities with their students instead of spending it just showing contents in traditional expositive classes (Barseghian, 2011).

In a more practical vision, we can define it as a model of teaching where the presentation of discipline content is performed through recorded videos by professors and available for the students, normally with the use of internet tools for the storage . This way the complementary activities proposed by professor ("the homework"), are performed in classroom, in groups, with support of themselves. This way the students have the opportunity to solve their doubts right after they happen with the help of their partners and professor, which provide a collaborative environment of learning.(TechSmith, 2013).

On BERGMANN, OVERMEYR and WILIE's vision (2012), the Flipped Classroom goes beyond the simple video recording inside the classrooms performed by professors. These authors affirm that on the other hand of what we can think of, this model can: improve the interaction between professor and student; provide a learning environment where the students begin to be responsible for their own learning; provide a constructivist learning; offer a manner for the content be permanently available to students in a manner they can watch it anytime. According to the authors this method can't be understood as a substitution of professor for videos, much less as a model that provide isolation of the students, where they'll spend hours and hours in front of the computer, because actually this's going to be only part of the process.

According to BENNET at. al. (2012), the implementation process and the usage of this model can be something not too easy to perform, once there aren't defined models for such thing. However, in its experience the effective utilization of the model shall have many of the following features: the discussions in the classroom are carried by the students; these discussions often get superior order of critical thoughts; the collaborative work occur between the students thanks to the occurrence of several simultaneous discussions; students challenge each other during the class, thanks to the acquired knowledge; leaders and tutoring students rise spontaneously , thanks to the collaborative activities; the students have possession of their material; the students make exploratory questions and they have the liberty to go beyond the discipline; students are actively engaged on problems resolution and critical thoughts which goes beyond the traditional scope of the course; the students become from passive listeners to active students on the learning process.

HISTORY OF FLIPPED CLASSROOM

The discussion and the utilization of this model aren't recent . The first studies were performed by Eric Mazur at Harvard University in the 90s. He said on that time that "soon the computer will be integral part of the education".(Mazur, 1991).

Another work that showed positive results on the usage of the method was published in 2000 by (Lage, Platt and Treglia, 2000). As Miami's University professors applied the method called "Inverted Classroom" in disciplines of introduction to the economy.

In 2004, Salman Kahn started to record some videos by request of his cousin, who requested him that, as pretext of having access to determined contents anytime she needed to. He accepted her request and kept making the materials, Nowadays the Khan Academy (www.khanacademy.com) is an entity with nonprofit ends which available more than four thousand class videos to youngs and adults of miscellaneous issues, as math, biology, chemical, physical, economical and history(in English).

In Straver(2007) the author describe the experience of the method application in Higher Education courses, The experiment occurred at Midwestern Christian Liberal Arts Universit, being the data collected in 2004. With this study the author showed at his PHD's thesis that (page 180) "the students […] felt a great innovation and cooperation spirit if compared to the traditional classes". However this same study concluded that it's necessary for the professors to organize their work very well, because many students had said that they "felt less satisfied […] felt so many times lost if compared to the traditional classes".

According to Tucker (2012) in 2008 two chemical professors from Woodland Park High School, Aaron Sams and Jonathan Bergmann, developed a project that aimed to attend those students that for any reason had absented from the classes. They started to make videos of the classes content in a manner to the

absent students follow the classes as well. For their surprise, not only the absent but also the other students started to access the published material using it as study reinforcement. They realized this moment that there would be a great opportunity to remodel and to propose changes at the learning process, which they called as Flipped Classroom. Since then, they've been making efforts to disseminate this concept with a huge recognition in the education environment (in the US), being even created an organization for such objective, the *Flipped Learning Network*, which can be visited at www.flippedlearning.or.

But there are also critical about the model. Many of them referring to the fact of the students would spend more time in front of the computer than before, or the extra class work would be increased . The enthusiasts answer to these questions saying that actually the students already spend many time using the computer. Therefore, why not to use it for your own benefit ? (Gobry 2012).

There are still an argument that can really put a doubt on the utilization: the fact that the model assume that the student must have a good internet access in terms of speedy and availability, such as a good computer or other access device (Gobry, op.cit). This's really a problem that can compromise the students participation in a manner effective in a *Flipped Classroom*, however the internet popularization as well as the constant facilities offered for the acquisition of these equipments show us that soon this might not be a problem.

CASE STUDY: THE UTILIZATION OF FLIPPED CLASSROOM IN A TECHNOLOGICAL COLLEGE

As representative Universe, the Study Case was performed in a Technological College, the Technological College of Taquaritinga-CEETEPS, chosen by its level of performance and consolidation offered. The sample was composed by 304(Three hundred and four) students of the course Analyzing and Systems Development, being 148 students from the morning period and 156 students from the night period, all they signed for Operational Systems I(OSI) discipline. The time for the samples collection was 2 years.

The field research consist in ministering the discipline OSI at the morning and night periods, using a methodology of class developed with the utilization of the Information Technology resources based on the model "Flipped Classroom" and comparing the final results of these groups with the results of the three past semester, as objective to verify if there could be differences on the reprobation and satisfaction results of the researched groups.

The used methodology consists in developing modules of weekly classes. Each module was composed by a set of slides formatted according to the patterns based on the theories of HMI(Human Machine Interfaces).

The set of slides of each module was composed by texts, carefully selected by the discipline professor on Internet websites and books (properly referenced , aiming the respect for the copyrights). The texts were mostly rewritten aiming the objectivity of reading of the student.

To complete the study of the subject, each module obligatorily offered: links to websites which addressed the studied subjects (Section learn more), selected videos on the Youtube®(Section: Let's see a viedeo ?) and the relation between the theory and the student daily(section theory in practice !) and fixation activities (Section let's think ?).

Each set of slides was divided in two parts: one of them containing an explicative text and the sections Learn More and Theory in Practice, being this one published at the College's Moodle environment always a week before the presential class; the second part, containing all the sections, including videos and the activities, published only on the same day of the class, immediately right after the class.

This way, the class dynamic has changed compared to the traditional model. IN every classes the professor encouraged the students to access the Moodle environment and the weekly content of class, the content was showed, however not on the traditional way because considering that the students had ever studied them previously, there would be much more interaction and the doubts raised were answered, many times by the own students colleagues. Yet, during the class, some videos were shown and the exercises proposed, always inserted in planed moments in a manner to never allow more than 15 to 20 minutes of theory discussion.

Yet at the Moodle environment, a forum of the discipline for discussion was created, and the students were encouraged to participate putting doubts which raised during the material reading and studying and also helping the colleagues. The weekly monitoring of this forum by the professor's side was very important , because many doubts which were raised were common and many students reported that they had ever answered their doubts by reading the forum.

RESULTS

The table 1 describe data collected by the eight groups researched, in other words, through the utilization of traditional methodologies used on the six groups respectively on the 1st and 2nd semesters of 2011 and on the 1st semester of 2012 ad also in two groups of the 2nd semester of 2012, through the methodology application based on *Flipped Classroom*.

	Traditional classes utilization						Flipped Classroom	
OSI - Morning	**1o./2011**	**%**	**2o./2011**	**%**	**1o./2012**	**%**	**2o./2012**	**%**
# of students	34	100	42	100	37	100	35	100
Approved	26	76,5	34	81,0	22	59,5	31	88,6
Failed	8	23,5	8	19,0	15	40,5	4	11,4
OSI - Night	**1o./2011**	**%**	**2o./2011**	**%**	**1o./2012**	**%**	**2o./2012**	**%**
# of students	48	100	38	100	38	100	32	100
Approved	27	56,3	27	71,1	25	65,8	23	71,9
Failed	21	43,8	11	28,9	13	34,2	9	28,1

By the observed data we can verify that through the utilization of traditional classes, on the first and second semesters of 2011 and first semester of 2012, the students failed rate was of 23,5%, 19% and 40% respectively, and only 11,4% on the second semester of 2012 where it was used the Flipped Classroom technic(morning period groups). On the groups of night period on the first and second semesters of 2011 and on the first semester of 2012, the failed rate was of 43,8%, 28,9% and 34,2% respectively, and of 28,1% on the second semester of 2012, where it was used the Flipped Classroom Technic.

CONCLUSION

It's in the classroom that concentrates the time of true of the student capacitation and on its preparation to actuate in the society and in the labor market. It's up to the professors while in the class period to make efforts to reach relevant results. That demands preparation and creativity for always look forward the improvement and the class methods.

Though at the first moment the learning theories look like abstract, limited to education of difficult comprehension and application at the technological teaching, after the withdraw of the informations from the bibliographic review there was a concern in verifying if the application of methodology Flipped Classroom could present indicatives of improvement on the collected results in the classroom.

By the shown data, we can observe that there was a quantitative improvement of the results because the number of students who failed decreased and also there was a qualitative improvement because the mostly of students, on the other hands, 90% of them said through the questioner they have preference by the new methodology applied .

Continuously to the research, it'll be developed a more depth work involving other professors and other disciplines in a manner to verify the efficiency of application of these methodologies in Technological courses.

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