

Teaching Mentoring Program for the application of active methodologies and ICT tools

Nonie E. Salazar
Educational Innovation Department
Tecsup
Trujillo, Perú
nsalazar@tecsup.edu.pe

Abstract — This research is characterized by the effectiveness of the Teaching Mentoring Program for the application of active methodologies and ICT tools in Tecsup Norte teachers, Trujillo, Peru. A goal was set for the three locations of Tecsup Norte (Trujillo, City), Tecsup Centro (Lima, City), Tecsup Sur (Arequipa, City), to achieve that in 2016, 80%, apply at least one active methodology per semester and make use of ICT tools. The result for Tecsup Norte after completing the first semester was that 28% of teachers used an active methodology and 16% used ICT tools. At the beginning of the 2016 II semester, the Teaching Mentoring Program was designed, consisting of five stages: 1. first contact and interview with the teacher, 2. personalized training, 3. programming and revision of class material, 4. accompaniment in classroom and evaluation by rubrics, and 5. feedforward and recognition. For this, psychological strategies such as rapport, positive reinforcement and behavioral modeling were adapted, as well as the tool of coaching feedforward and evaluation rubrics were designed for the application of active methodologies. To guarantee the effectiveness of the program was a team of two specialists in active methodologies and ICT tools. Work schedule and control of man hours was approached using Gantt diagram. The results of the implementation of the program are relevant, since 95% of the teachers of the semester 2016 II applied active methodologies and ICT tools; in comparison to the result of the 2016 I semester. Tecsup Norte becomes the first site that exceeds the established goal of 80% in application of active methodologies and ICT tools, through the Teaching Mentoring program, the other venues that did not apply the Teaching Mentoring Program were: Tecsup Centro 62% and Tecsup Sur 50%. This educational innovation contributes a program for the training, accompaniment and evaluation of the teaching performance through active methodologies, such as: Flipped learning, case-based learning, problem-based learning, guided-learning project and the use of ICT tools.

Keywords— *Mentoring Teaching; personalized training; evaluation rubrics; active methodologies; ICT tools; feedforward.*

I. INTRODUCTION

Most academic institutions classrooms, the typical scenario of a day of classes is that the teacher goes to the front, to explain the contents and write on the blackboard or develop exercises to teach his subject. The teacher is the central figure in the learning model, while his students take notes and take homework at the end of the class, Hamdan, McKnight, McKnight and Arfstrom, [1]. This is an example of traditional teaching.

While in the teaching-learning model using active methodologies the teacher assumes a new role as a facilitator and guides the learning through discussion of real cases related to the labor field, problem analysis and challenging activities that require the development of projects to evaluate the knowledge application.

Now a day, the education offers a great majority of institutions of higher education is based on the exposition of the contents to the students, the fulfillment of class hours and the demonstration of knowledge through exams. This traditional model can be somewhat artificial and far from the work reality that the graduates will face, Conchado and Carot [1].

On the other hand, teaching through the use of active methodologies such as Flipped Learning, Problem-Based Learning, Case-Based Learning and Project-Oriented Learning encourages participation, shifts the responsibility of learning to the student because it depends directly on the development of personalized activities. Likewise, the student's involvement and commitment is more formative than informative, thus generating deeper, meaningful and lasting learning and facilitating the knowledge transfer and work contexts experiences.

II. THEORETICAL BASES

A. Active Methodologies selected

The four active methodologies selected for the implementation of Teacher Mentoring Program are described in more detail below:

- Flipped Learning: Karl M. Arfstrom, [1], defines as a pedagogical approach that transforms the dynamics of instruction. An interactive environment is developed where the teacher guides the students as they apply the concepts and actively engage in their learning classroom. It involves a shift towards a student-centered learning culture. Sometimes refers to as Inverted Classroom 2.0. Also, Hamdan, McKnight, McKnight and Arfstrom, [1], that mention four key elements that make possible the Flipped Learning.

a) Flexible Environments: Students can choose when and where they learn; it gives more flexibility to your expectations on the rhythm of learning. Teachers

allow and accept the chaos that can be generated during the class. Appropriate assessments are established that measure understanding in a meaningful way for students and teachers.

b) Learning culture: There is evidence of a deliberate change in the approach to learning of a class centered on the teacher in the student. Time in the classroom is to deeper into topics, create more enriching learning opportunities, and maximize face-to-face interactions to ensure understanding and synthesis of the material.

c) Intentional content: In order to develop an appropriate instructional design, we have to the following question: what content can be taught in the classroom and what materials are placed in a student setting for those who explore for themselves? Answering it is important to integrate learning strategies and methods according to grade and subject, such as problem-based design, mastery learning, Socratic, among others.

d) Professional teacher: In this model, documents are more important than ever. They should define what and how to change the instruction, as well as identify how to maximize face-to-face time. During class, you should observe and test feedback at the time, as well as continually evaluate student work.

- Case-Based Learning: It is the narrative description that makes a group of observers of a particular situation of real life, incident or event, involving one or more decisions. It should contain, in addition to the fact or problem, the appropriate basic information that leads to the decision or decisions that lead to a solution, or several options, Abad A. Darío, [2].

Sessions can last between twenty minutes and two hours, groups of students should be organized to socialize the case before the general meeting, to socialize ideas, detect leaders, detect shy students. The aim of this confrontation in small groups is to find antagonistic points of view. The usefulness of the case method is to approach the individual closer to the conditions of real life, to prepare it by developing latent talents of vision, authority, communication, and leadership, to enable them to engage in civilized confrontation with agile and effective communication, information processing rational and objective and decision making in conditions of uncertainty.

- Problem-Based Learning: A methodology focused on learning, research and reflection that students follow to arrive at a solution to a problem posed by the teacher. Generally, within the educational process, the teacher explains a part of the subject and, next, proposes to the students an activity of application of these contents. However, PBL (Problem Learning Based) is proposed as a means for students to acquire this knowledge and apply it to solve a real or fictional problem, without the teacher using the lecture or another method To transmit this diary.

PBL helps the student to develop and to work diverse competences, among them, De Miguel, [2] emphasizes:

- a. Problem resolution.
 - b. Decision making.
 - c. Teamwork.
 - d. Communication skills (argumentation and presentation of information).
 - e. Development of attitudes and values.
- Guided Learning Projects: It is a learning model in which students plan, implement, and evaluate projects that have real-world application beyond the classroom Blank, [4].

For the Directorate of Research and Educational Innovation, Tec de Monterrey, POL, called Project Oriented Learning, seeks to confront students to situations that lead them to build, understand and apply those knowledge And skills of the discipline, combining skills, attitudes and work values under the project scheme (mainly planning, administration, time pressure, work culture, collaboration, critical thinking and communication).

The practical aspect of this technique allows it to be used as a tool to solve real problems and / or to propose improvements in the communities where they operate. When using the project method as a strategy, students stimulate their more developed skills and create some new ones. They are motivated by their passion for learning, a sense of responsibility and effort, and an understanding of the important role they play in their communities.

B. ICT tools selected

According to the nature of the courses of 3 technical courses 20 ICT tools were selected, which are detailed below:

- Smartpen: Notes and exercises written on paper, appear instantly on mobile devices
- Powtoon: Animated presentation of the video explaining the class.
- Gmail: To maintain formal contact with students.
- Turniting: The system that reports the similarity of a report presented to the teacher, in what source, on what website. The student is forced to write.
- Zoom: To record videos using any type of presentations.
- Google Classroom: Where the complete information of the course will be placed.
- Socrative: Teacher can launch questions, quizzes, games, which students can respond to in real time from their devices,

- Kahoot: It is a game-based mixed learning platform, allowing educators and students to research, create, collaborate and share knowledge.
- Go Conqr: A personalized learning environment that allows you to create, discover and share learning resources.
- Google Form: Create and analyze surveys.
- Google Drive: Upload information type text and presentations.
- Blogs: Website that includes content of interest, frequently updated and often commented on by students.
- Youtube: Video Channel, teachers uploaded their videos and shared links.
- Windows Media Editor, Camtasia recorder: Video editing.
- Social networks (Facebook, Google +): To follow the group closed, through social network.
- WhatsApp: Participants send their recorded videos by this means.
- Classdojo: Behavior management platform in the classroom.
- Webex: Meetings and web presentations online.
- Emaze: Dynamic and interactive presentations.
- Technological Software: Multisim 12.0, LiveWire, Electronic Circuit Simulator.

III. METHODOLOGY

A. Specific Objectives of the program:

- Promote positive attitudes towards educational change in teachers.
- Accompany teachers in the application of active methodologies and ICT tools for the development of their subjects.
- Create permanent conditions for innovative experiences to become an institutionalized practice.

B. Description of the Teacher Mentoring Program

At the beginning of the 2016 II semester, the Teaching Mentoring Program was presented to the area of Sub Teaching Management, which consists of accompanying the innovative teacher and is a systematic proposal to approach educational practice, be it in the dimensions of active methodologies, ICT tools, didactic communication, educational software, evaluation tools and others in order to achieve qualitative and quantitative improvements.

C. Innovation Elements for the development of the Program:

In order to achieve the specific objectives, psychological strategies such as rapport, positive reinforcement and behavioral modeling were adapted, as well as the tool of coaching feedforward and evaluation rubrics were designed for the application of active methodologies.

- Rapport: It is the phenomenon in which two or more people feel that they are in psychological and emotional "attunement" (sympathy), because they feel similar or relate well to each other. The theory of rapport includes three behavioral components: mutual attention, mutual positivity and coordination. . Stewart, Dorothy [6].
- Positive Reinforcement: It is the procedure by which the application of a stimulus (called a reinforcer) increases the likelihood that a behavior will recur in the future. It occurs when a response is followed by a reward or any other positive event, and increases the likelihood that it will recur. Skinner, (1990). It is a positive reinforcement to publicly congratulate a teacher when the application whit effectiveness methodologies; so the behavior of applying a second methodology increases, because the teacher receives something that pleases him (the public congratulation), also reinforces the mentor. V. Caballo [6].
- Modeling behaviors: Cormier and Cormier (1994) define modeling as "the process of observational learning where the behavior of an individual or group - the model - acts as a stimulus to the thoughts, attitudes or behaviors of another individual or group that observes the execution of the model ". Therefore, along with the public congratulations were sent links to learn more about the class of the teacher. The other teachers of the same profession and with similar courses were encouraged in the application of methodologies. V. Caballo [6].
- Feedforward: Most teachers confuse feedback with criticism. And for reasons of ego and personal reasons of the recipient, it is usually taken as a direct attack on his person or his ways of teaching. Precisely to avoid these disadvantages, we used the technique created by Marshall Goldsmith [7], the feedforward or "feed forward", which is a structured way to help people find new ideas regarding a situation. Feedforward helps focus on a positive future, not a past full of mistakes. Future options for success can be increased, generating ideas about how to achieve better results. In this process, all kinds of ideas are sought through the question: If you had to re-apply this class would you improve? Therefore, the feedforward, in most cases is received as positive because it focuses on solutions and not on problems. It is more productive to help do the right thing than to prove what was wrong.
- Evaluation rubrics for the application of active methodologies: It is a qualification tool used to carry out objective evaluations; a set of criteria and standards linked to the learning objectives used to evaluate the

performance of students in the creation of articles, projects, essays and other tasks. The rubrics allow standardization of the evaluation according to specific criteria, making the classification easier and more transparent, Herman, J.L., Aschbacher, P.R., & Winters [8]. In this case, rubrics were designed for the evaluation of the four methodologies mentioned above, it narrates the process of application of the methodology and gives the percentage of effectiveness. [9].

D. Stages of Teaching Mentoring Program

The program was given in five stages, which alternated with each other, according to the initiative and progress of the teacher.

- **Contact and interview:** During the first 4 weeks of the beginning of the 2016 II semester, were sent e-mails to the 61 teachers requesting their availability for an interview with the area of Educational Quality. If they did not respond, they were tracked by phone calls and messages to WhatsApp. The aim of the interview was to raise the awareness of the teacher about the importance of applying active methodologies, as well as to show him the evaluation rubrics of active methodologies and finally to evaluate the interest in the application of these methodologies. For this reason the technique of the semaforo was designed, which projected the teachers' perception of the program, through the following indicators:
 - a. **Green:** teachers with good attitude towards active methodologies, do not know ICT tools, but do not show rejection to use.
 - b. **Amber:** teachers with limited time to develop a class session using active methodologies.
 - c. **Red:** teachers resistant to change, prefer to develop a traditional class.

It was observed that 77% (green color) of teachers showed good attitude and interest in the application of active methodologies, 20% (amber) presented difficulties for the application, characterized by difficulties with time for preparation and 3% (red), Showed resistance to active methodologies.

- **Personalized training:** In parallel, from week 3 to week 6, personalized trainings were developed in the use of ICT tools and active methodologies, as well as face-to-face trainings according to the scheduling of previously agreed teachers, a virtual training through the google classroom platform (online educational tool that seeks to simplify the workflow between teachers and students). The result was that 100% of teachers received training in active methodologies and ICT tools.
- **Programming and revision of class (previous):** Also, from week 4 to week 12, teachers were asked to send virtual material of class (virtual links with proposal of elaboration of class) for the development of class

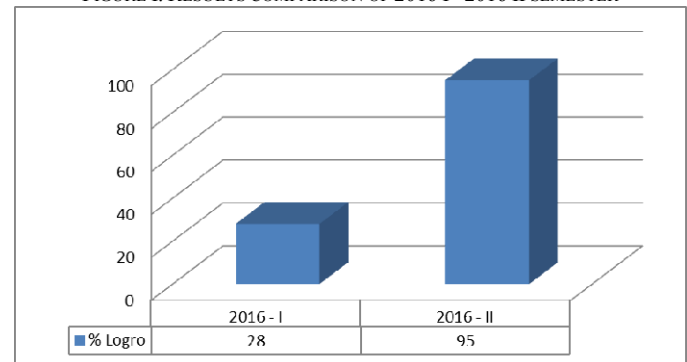
through active methodologies, as well as the schedule of visit to class session. Accompaniment was immediate, and according to the form of communication established by the teacher: by mail, phone calls or messages in WhatsApp. Teachers had the opportunity to improve the material of the session, even days before the application.

- **Accompaniment in the classroom and evaluation by rubrics:** The specialist accompanied the teacher during the class (approximate average 3 teaching hours). Also, it gave technological support: links, signal of wifi, difficulties in the use of the ICT tools. On the other hand, the rubrics were known by the teacher and the score for each indicator.
- **Feedforward and recognition:** After the class session, the specialist met with the teacher to evaluate the class session, using the feedforward technique, which we explained earlier. During the same week of application congratulations emails were sent to the new innovative teachers as well as the links of their classes to encourage others.

IV. RESULTS

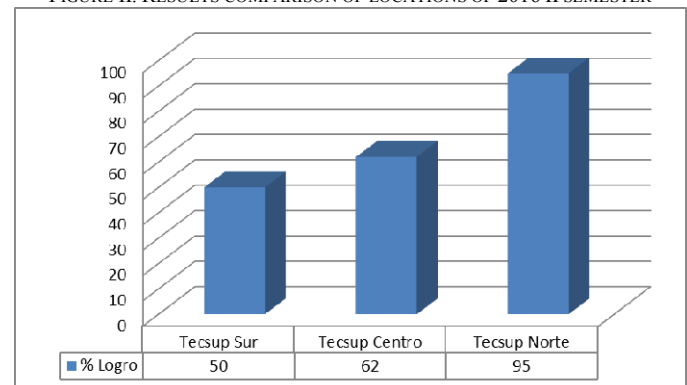
A. Teaching Mentoring Program

FIGURE I. RESULTS COMPARISON OF 2016 I - 2016 II SEMESTER



The result for Tecsup Norte after completing the first semester was that 28% of teachers used an active methodology.

FIGURE II. RESULTS COMPARISON OF LOCATIONS OF 2016 II SEMESTER



The results of the implementation of the program are relevant, because 95% of the teachers of the 2016 II semester applied active methodologies and ICT tools; in comparison to the result of the semester 2016 I. Tecsup Norte becomes the first site that exceeds the established goal of 80% in application of active methodologies and ICT tools, through the Teaching Mentoring program, the results of the other venues that did not apply the Teaching Mentoring Program were: Tecsup Centro 62% and Tecsup Sur 50% [10].

B. Relevant cases in Tecsup Norte:

In Tecsup Norte there are several initiatives in teaching - learning through active methodologies and ICT tools. It lists some experiences and results of teachers who addressed these issues:

1) Pedro Benites – Flipped Learning

pbenites@tecsup.edu.pe

In courses of Industrial Electrical Engineering and Electric Machines I, Flipped Learning was used, the teacher developed videos where he explains the contents of the session using camtasia recorder. The videos of the course are shared with the students via google drive. The information is located on a webpage created especially for the subjects. Various technological tools are used, for example for electrical circuits in AC current, simulation software such as multisim 12.0, LiveWire, programs that help to the best understanding of the subjects. Before beginning the class, an online test is taken to evaluate the learning learned at home using Socrative, after the test, students' doubts are solved; During the class the students work in equipment using intelligent devices, generate activities where the students develop and explain the contents. After classes, students develop exercises, observe videos related to the subject and verify their learning through on-line evaluations, all with the purpose of reinforcing what has been learned. The impact on the students has been favorable due to the development of autonomy in the activities prior to the class and greater skill in the use of technological tools specific to their career. Likewise, the percentage of students disapproved by a traditional class was 5.8%, however the average decreased to 0.6% using the methodology

2) Jose Fernández – Gamification

jfernandez@tecsup.edu.pe

A group of teachers from the Preparatory Program, including José Fernández used gamification [11] (it is the application of principles and elements of the game in a learning environment for the purpose of influencing behavior, increase motivation and encourage student participation) in Mathematics, Physics and Chemistry subjects, through the use of ICT tools. A Gamma system was developed with points, levels and badges through the Classcraft platform (platform of game that incites the students with real risks and rewards in class and observes them becoming better as they are progressing in the game) the point system was awarded to students according to their grades on the quick exams through Kahoot and Socrative. These points accumulate and make them level up. The results

were characterized by 90% of students who show interest and enthusiasm for learning, and during the learning sessions they actively participate and communicate their concerns and doubts in a timely manner. At the same time, dropout decreased by 57% in relation to other groups of previous years. This experience motivated us to design a Gamification workshop with the teachers of the first year, as well as to share the lessons learned, better use of ICT tools, main difficulties and to generate knowledge about the dynamics of the game that allow to increase participation levels and motivation to students.

3) Nonie Salazar – Performance Evaluation

nsalazar@tecsup.edu.pe

This innovation characterizes the effectiveness of a system based on performance evaluation [12] by Flipped Learning Methodology during Induction Working Market Program, specifically to develop work skills and be selected through a job interview. These methodologies were adapted and four sessions based on experiential dynamics, assessment centers, evaluation of teams and personal interview were made; plus monthly by the heads of race, coordinator of educational quality and responsible professional development center assessments. Also, for guarantee evaluation processes it had a team of consultants Manpower Peru.

The results of the implementation of the program are relevant, 94% of students in the experimental group step job interview in 1st and 2nd chance. While 68% of the control group interviews went 2 chances.

This educational innovation provides a program to evaluate the performance upperclassmen cycle as well as instruments to measure job skills, being: effective communication, teamwork and innovation; and course information based learning methodology flipped.

CONCLUSIONS

Tecsup Norte becomes the first site that exceeds the 80% target established in the application of active methodologies and ICT tools, through the Teaching Mentoring program. 95% of teachers used active methodologies, the most used being case-based learning. On average, teachers used 4 ICT tools in class sessions developed with active methodologies. The most used ICT tools were Google Drive (90%) and Google Forms (79%).

The percentage of students disapproved in the courses of Industrial Electrical Engineering and Electrical Machines I, using the active methodology of Flipped Learning decreased to 0.6%, in relation to 5.8% through a traditional class. The dropout rate in Preparattec decreased by 57% using the Gamification methodology in the Mathematics, Chemistry and Physics subjects. The percentage of graduates who passed a job interview was 94%, they developed effective communication skills, teamwork and initiative, in relation to the 68% of graduates who were not applied the methodology of assessment by competencies and flipped learning .

REFERENCES

- [1] Edutrends, Aprendizaje Invertido, México, Tecnológico de Monterrey: México, 2014
- [2] D. Arango, El método de casos: enfoque pedagógico activo, participativo e innovador, Interconed Editores: Colombia, 1991
- [3] De Miguel, M., Metodologías de enseñanza para el desarrollo de competencias. Orientaciones para el profesorado universitario ante el Espacio Europeo de Educación Superior. Madrid: Alianza, 2005
- [4] Blank, W. Authentic instruction. Promising practices for connecting high school to the real world. Tampa, FL: University of South Florida, 1997, pp. 15–21
- [5] Stewart, Dorothy. Gower handbook of management skills. Gower Publishing. USA: 1998 p. 282
- [6] V. Caballo, “Manual de técnicas de terapia y modificación de conducta” Madrid: Siglo XXI, 1991, pp 349 – 391
- [7] M. Goldsmith, Feedforward, Writers of the Round Table Press, USA 2012
- [8] Herman, J.L., Aschbacher, P.R. & Winters, L. (1992). A practical guide to alternative assessment. Alexandria, VA: Association for Supervision and Curriculum Development, 1992
- [9] Calidad Educativa, Rúbrica de Evaluación de Metodologías Activas Tecsup: Perú, 2016
- [10] Calidad Educativa, Aplicación de Metodologías Activas y Herramientas Tic, Tecsup: Perú, 2016
- [11] Edutrends, Gamification, Tecnológico de Monterrey, México: 2016
- [12] Edutrends, Aprendizaje basado en Competencias, Tecnológico de Monterrey: México, 2015