

Analysis of the Use of Technological Tools in University Higher Education using the Soft Systems Methodology

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Abstract—This article analyzes the professional training of students according to the current situation. Students are experiencing a new modality of study due to the Covid-19 and specialists have to evaluate which would be the best solutions in order that students achieve greater understanding, because they are one of the most affected today. Therefore, we will be able to analyze in a detailed way each one of the causes that our problem presents to evaluate and thus to be able to obtain the different points of view of those who are involved in this problem. In this study we will apply the methodology of the soft systems with a systemic approach and a holistic vision to analyze the situation presented by all those involved. Having as results that it is necessary to evaluate in a better way the solutions that are given to higher education institutions, since it should have as main objective the achievement of a better teaching towards the students and thus opting for the use of good methodologies of learning.

Keywords—Soft system; involved; university; virtual classroom; students

I. INTRODUCTION

This research reveals the work done based on the virtual classroom. The work consists of determining each of the procedures to be followed and controlling the regulations to be complied with through the implementation of a methodology that feeds the teachers. The complete study shows the results for the correct use of the platform that is the classroom virtual, helping both the university and all those involved. The updating of information and communication technologies in the educational field has allowed redesigning the scenarios where the teaching-learning processes takes place, which has caused the barrier between face-to-face, blended and virtual education to be increasingly shorter and equally between formal, non-formal and informal education; where the roles of teacher and student must change as stated by Salinas [1]. For instance, in Peru ICT are allowing to the population to access more easily internet [2]. In this way, a true revolution in the way of conceiving learning experiences is produced when compared to the way it was done before. It is important to indicate that a global level there is a massive identify of LMS (Learning Management Systems) platforms in practice [3]. The conditions of the new world, where knowledge is the most important heritage of humanity, make the educational

models and, therefore, the institutions that have the social responsibility to form, radically renew their pedagogical practices and their ways of handling the learning. These aspects require the presence of teachers with more interdisciplinary training, with new and renewed methodological visions and with more capacity for the rational and adequate use of the available means, especially of the new information and communication technologies (ICT). Today's universities are recognized for their qualities: among others, for the quality of their teachers and, above all, for their ability to cope with the permanent changes demanded by the globalized world [4] in this perspective the use of (ICT) as a didactic and pedagogical strategy in teaching practices takes on great importance [5]. The fundamental concept implicit in the latest online education experiences is the "VIRTUAL CLASSROOM", we wanted to do an analysis to propose and incorporate the use of Virtual Classrooms in Education as a technological support for teaching-learning that goes beyond what traditional classroom attendance represents [6]. Dr. Bello Díaz [7] calls virtual environments for learning "classrooms without walls" and affirms that it is a virtual social space, whose best current exponent is the internet, it is not face-to-face, but representative, it is not proximal, but distal, it is not synchronous, but metachronous, and it is not based on spatial enclosures with interior, border and exterior, but rather depends on electronic networks whose interaction nodes may be scattered throughout different countries [8]. In recent years, technological innovations and social needs have become part of the difficulties of the environment, and these, together with those of the political sphere, are what make universities aware of the need to redefine their mission. Faced with this, Information and Communication Technologies (hereinafter ICT) not only allow universities to transform their administrative procedures, innovate their teaching-learning methodologies or facilitate access to new groups of people - especially adults, but also promote a transformation in your organizational system. In this way, the ICTs affected by the structure of the university organization, its processes and its value chain [9] is why the use of the virtual platform will be implemented to speed up the teaching process. The objective of this article is to analyze the use of technological tools, as well as the strategy in virtual teaching, using the soft systems methodology.

different subjects or branches of science and art, or any other area that can be put in study. Bearing in mind that the student carries out both the reading and the practice of the subject or theme on which he is learning [21].

C: Student, Teacher, University

A: Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the students, as seen in Fig. 2.

T:

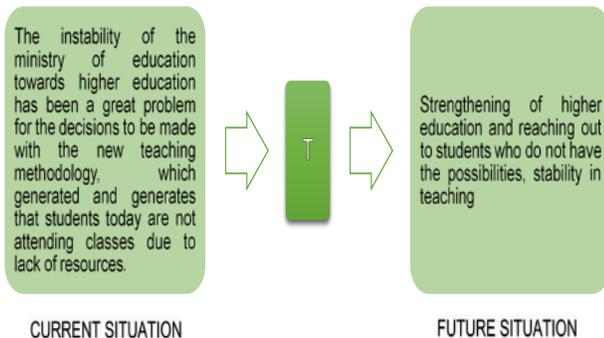


Fig. 2. Basic Definition of Students.

D: Government, Teachers, University.

W: To establish good learning among all students, the teaching methodology should be better evaluated, as well as the necessary resources that should be implemented in each higher education center.

E: Ministry of Education, Government.

- **W2. TEACHER:** An individual who teaches an art or a science, who carries out actions related to teaching at a professional level, since his work in transmitting knowledge and techniques, which are achieved by promoting student learning [22].

C: Student, Teacher, University

A: Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the teacher, as seen in Fig. 3.

T:

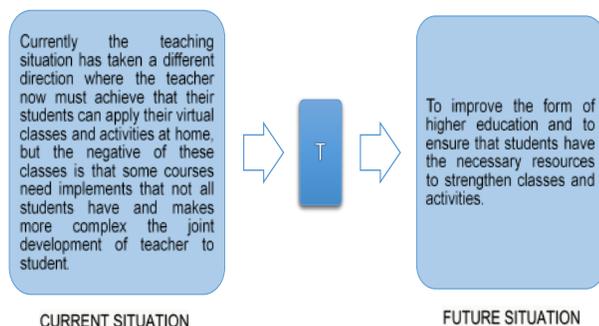


Fig. 3. Basic Definition of Teacher.

D: Government, SUNEDU, University

W: Better use should be made of all the possibilities so that the objectives associated with the professional preparation of the student can be met and that training in work skills can be provided for positive integration into the knowledge society and lifelong learning.

E: Ministry of Education, Government

- **W3. UNIVERSITY:** A university is an institution of higher education, which is divided into faculties according to the specialties of study that it can offer. The term also applies to the building intended for higher education, that is, an institution organized for the mutual benefit and legal protection of this group [23].

C: Student, Teacher, University

A: Government, Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the university, as seen in Fig. 4.

T:

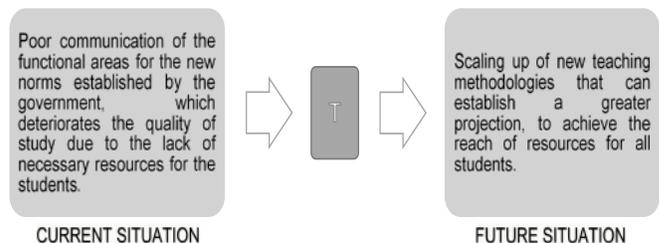


Fig. 4. Basic Definition of University.

D: Government, Ministry of Education, Sunedu, University

W: The problem has taken an exponential turn very quickly which has generated that communication in the academic environment has become difficult to manage and the delimitation of the resources of each student for the production of learning has not been handled correctly so there should be a reinforcement in the selection of regulations according to study methodologies.

E: Government, Ministry of Education, Sunedu

- **W4. MINISTRY OF EDUCATION:** The MINEDU is a main body that governs national education policies, which aim to generate opportunities as well as quality to all students to achieve greater development and national competitiveness and teachers strengthen their ability to exercise professionally [24].

C: Student, Teacher, University

A: Government, Ministry of Education, SUNEDU

T: In the transformation, two different visions can be observed, such as the current and future situation of Ministry of Education, as seen in Fig. 5.

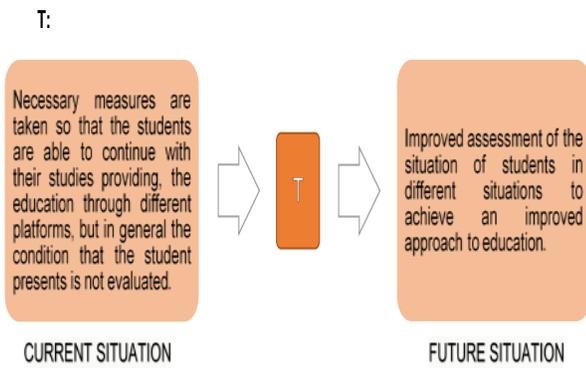


Fig. 5. Basic Definition of Ministry of Education.

D: Government, Sunedu, Ministry of Education

W: To be able to evaluate the different situations that students in general can present is very difficult, since in our country there is a large percentage of students who do not have the resources or economic means necessary to continue with an adequate education.

E: Government, Sunedu

- **W5. SUNEDU:** SUNEDU is responsible for providing licensing to achieve a good service in university higher education, being thus the organization to evaluate the basic conditions of quality as well as to control public resources and correctly administer the national records of degrees and titles [25].

C: Student, Teacher, University

A: Government, Ministry of Education, SUNEDU

T: In the transformation, two different visions can be observed, such as the current and future situation of the SUNEDU, as seen in Fig. 6.

T:

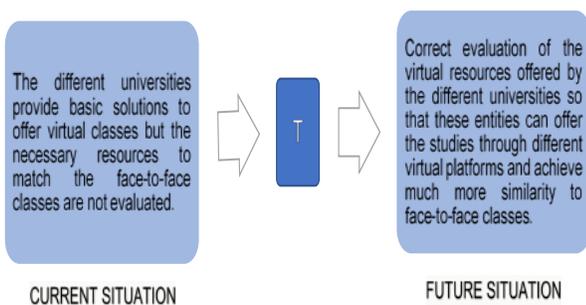


Fig. 6. Basic Definition of SUNEDU.

D: Government, Sunedu, Ministry of Education

W: The different universities evaluate the best way to offer their virtual classes, but many of them do not manage to facilitate or resemble certain activities as they would be in a face-to-face way.

E: Government, Ministry of Education

- **W6. VIRTUAL PLATFORM:** It is known as a system, which can be considered in a technological environment, this achieves the execution of different applications, making the user access through the internet, that is to say that to be able to use it it will not be necessary to be in a specific place, since the only thing that we would need for its due use would be the safe connection to the web. These virtual platforms are generally used for everything related to distance education, because there is a tendency to register the learning in the classroom [26].

C: Student, Teacher, University

A: Ministry of Education, SUNEDU

T: In the transformation, two different visions can be observed, such as the current and future situation of the Virtual Platform, as seen in Fig. 7.

T:

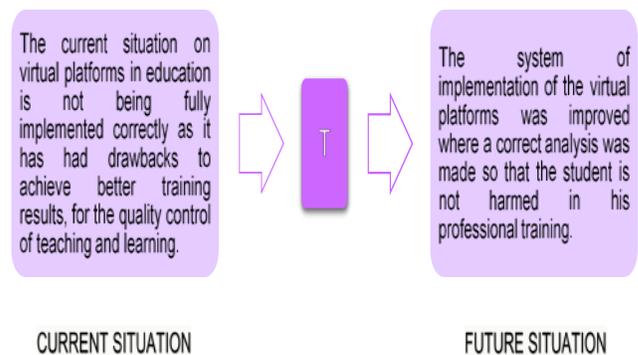


Fig. 7. Basic Definition of Virtual Platform.

D: University, SUNEDU

W: To establish a good use of the virtual platforms between teacher and student it would be necessary to have an evaluation system where the students can count on the necessary resources and so they can have a stable professional education to their working life.

E: Ministry of Education, Government, SUNEDU

- **W7. PARENTS:** These are individuals or groups of people who are considered a minimum social unit, consisting of a mother and a father, who promote behavior through education in accordance with moral and social values, thus forming the child's educational process [27].

C: Student, Parent, University

A: Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the Parents, as seen in Fig. 8.

T:

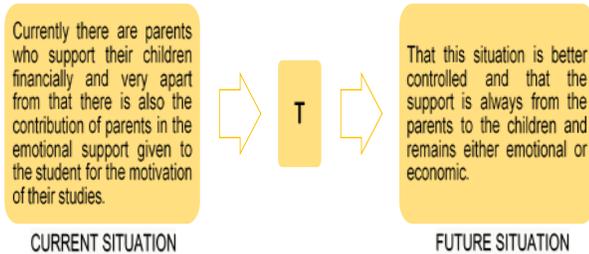


Fig. 8. Basic Definition of Parents.

D: Government, Students, University

W: This situation has harmed the student in such a way that he or she cannot pay the resources of the university since many of them have the financial support of their parents and apart from the emotional support that they give them and the student's performance improves because of the situation many have been affected considerably.

E: Ministry of Education, Government

- **W8. Virtual classroom:** It is known as a digital environment with the possibility of achieving a good development of learning processes. Therefore, information and communication technologies (ICT) allow the student to quickly access the uploaded material and in turn interact with the teacher or other students. [28].

C: Student, Teacher, University

A: Ministry of Education, SUNEDU

T: In the transformation, two different visions can be observed, such as the current and future situation of the Virtual classroom, as seen in Fig. 9.

T:

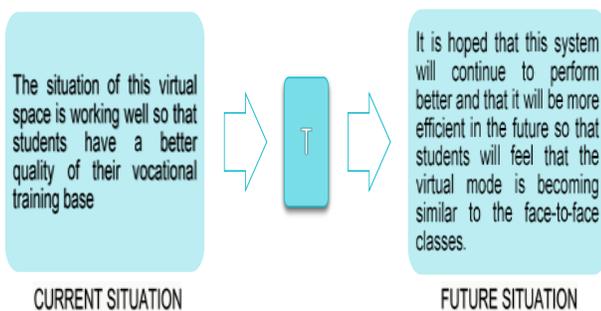


Fig. 9. Basic Definition of Virtual Classroom.

D: SUNEDU, University

W: It offers us as students facilities such as a more centralized site where we can access the introduction and objectives of learning, also with this modality you can have interaction with colleagues and with the same teachers who can absolve our doubts.

E: Ministry of Education, Government, SUNEDU

D. Conceptual Models

After analyzing the CATDWE, which has an input and output formed in the transformation, for this reason a conceptual model was carried out for each of those involved, which are made up of activities that start with an action verb, thus having a total of 33 activities, with which after an analysis 9 confirmed activities were achieved.

– List of Confirmed Activities

1) To achieve better development by classifying students who have resources and those who do not in order to achieve better education.

2) To implement methodologies to improve the effectiveness of student teaching by achieving active participation and progress in the practical environment.

3) Provide public recognition and incentives to entities, which establish alliances for the benefit of the student by providing them with scholarships and technological resources.

4) Provide guidance to students and teachers of the different virtual platforms that can be implemented for virtual classes.

5) Determine the mastery of the content presented by the teacher for students in individual and group work according to the resources used in class

6) Improve the use of study tools so that the student has his knowledge reinforced with the implementation of forums and videos to support the classes taught.

7) To carry out surveys and evaluations to the students in order to know in a fast and efficient way with the help of computer tools, obtaining results about their current situation.

8) Carry out a support plan with the help of parents to evaluate and encourage the academic performance of students by visiting the facilities.

9) Monitoring Activities.

E. Primary Task Model Confirmed

BASIC DEFINITION: A concept that has been developed since the 1980s, this term is attributed to ROXANNE HILTZ who defines it as "the use of computer-mediated communications to create an electronic environment similar to the forms of communication that normally occur in the conventional classroom". [29].

CATDWE ANALYSIS:

C: Students, Teachers, University

A: Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the primary task model confirmed, as seen in Fig. 10.

T:

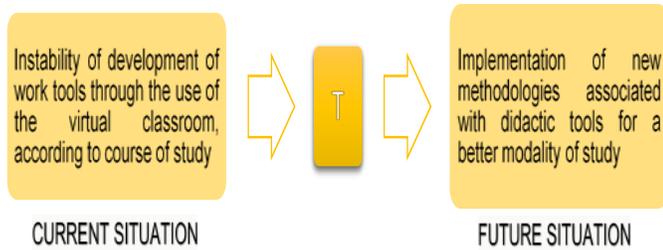


Fig. 10. Primary Task Model Confirmed.

D: Government, Teachers University

W: The use of the virtual classroom speeds up the progress of teaching, but more work tools must be implemented to improve this modality of study.

E: Ministry of Education, Government

In Fig. 11 shows the conceptual model of confirmed and validated tasks, which are related between the control of activities, fearing the situation of the present as input and the future situation as output.

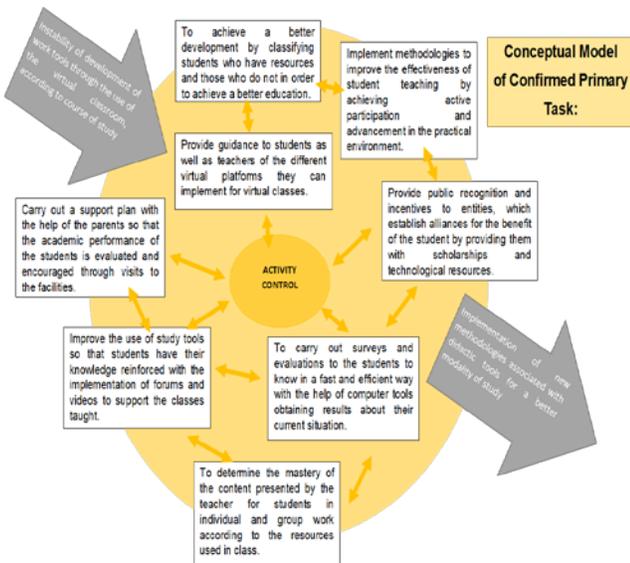


Fig. 11. Conceptual Model of Confirmed Primary Task.

F. Confirmed and Validated Primary Task Model

BASIC DEFINITION: It is a platform that gives the users the necessary tools to learn, it is a very efficient way to obtain information, and it supports the students with the materials that the teachers use [30].

CATDWE ANALYSIS:

C: Students, teachers, universities

A: Ministry of Education, Sunedu

T: In the transformation, two different visions can be observed, such as the current and future situation of the confirmed and validated task model, as seen in Fig. 12.

T:

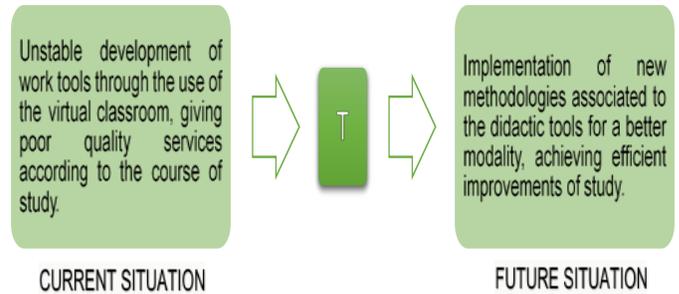


Fig. 12. Confirmed and Validated Primary Task Model Confirmed.

D: Ministry of Education

W: This provides information to the different students, in addition to the face-to-face class and because in this one can add books, videos as a reference to complete the information explained previously, the knowledge obtained can also be evaluated.

E: Ministry of Education, Government.

In Fig. 13 shows the conceptual model of confirmed and validated tasks, which are related between the control of activities, fearing the situation of the present as input and the future situation as output.

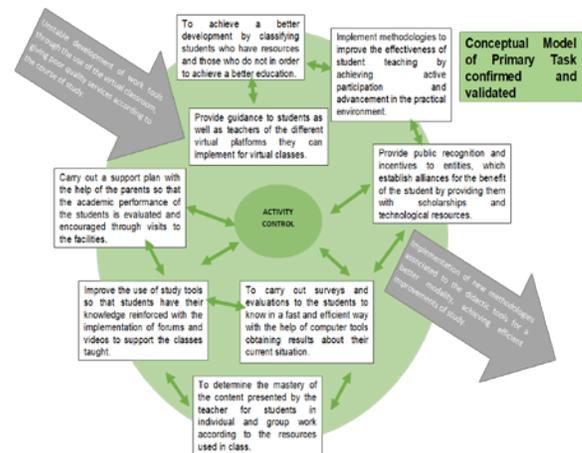


Fig. 13. Confirmed and Validated Primary Task Conceptual Model.

G. Categories of Information

In this section we analyze the activities that we have confirmed and validated in which different activities were assigned within the inputs as outputs, as can be seen in Table I.

TABLE I. (A) CATEGORIES OF INFORMATION

Activity	Achieve better development by classifying students who have resources and those who do not to achieve better teaching.	Implement methodologies to improve the effectiveness of student teaching, achieving active participation and advancement in the practical environment.	Provide public recognition and incentives to entities that establish alliances for the benefit of the student, provide them with scholarships and technological resources.	Provide guidance to students and teachers of the different virtual platforms that they can implement for virtual classes.
INPUT	Conduct surveys of the tools that will be used.	Implement study models.	Establish alliances with academic value.	Carry out an orientation schedule.
	Make a report of the notes.	Implement much more student participation	Establish the correct use of these platforms	
OUTPUT	Evaluate survey	Evaluate students and review improvements	Generate academic proposals for students.	List of participants.
	Evaluate notes	Answer the students' doubts.	Winning awards regarding your high competition.	Topics to play.

(B) CATEGORIES OF INFORMATION

Activity	Determine the mastery of the content that the teacher presents for the students in individual and group work according to the resources used in class.	Improve the use of study tools so that the student has their knowledge reinforced with the implementation of forums and videos to support the classes taught.	Carry out surveys and evaluations to the students to know quickly and efficiently with the help of computer tools achieving results on their current situation.	Make a support plan with the help of parents so that the academic performance of students is evaluated and encouraged by making visits to the facilities.	Control Activities
INPUT	Survey students about classes.	Survey on programs less used by students. Make support videos of the classes.	Carry out some surveys for the students.	Invitation to parents.	Coordination report
					Work plans.
					Schedules for activities.
OUTPUT	Evaluate the results obtained for possible improvements.	Survey on programs less used by students. Make support videos of the classes.	Quickly obtain and evaluate results.	Encourage improved student development.	Report progress.
					Activity control report.

IV. RESULTS

A. Malta Cross

The Maltese cross is mostly used to be able to analyze the different cardinal points that the problem presents, making combinations between them and thus achieve a good proposal for improvement, as seen in Table II.

B. Analysis Regarding the Malt Cross

- **NORTH WEST VS. NORTH EAST:** Universities need quality education that can adapt to situations such as when students have to have materials for their studies, as well as establishing awards to encourage their development and help with different methodologies that help even in the platforms that are being used.
- **SOUTH WEST VS. SOUTH EAST:** Different systems should be implemented to help control students. In addition, materials and information should

be available and assessments should be established to help monitor student progress.

- **NORTH EAST VS SOUTH EAST:** To monitor the progress of the students it will be necessary to implement different methodologies that help with their progress, they will also have to be evaluated and use the different tools they have.
- **NORTH WEST VS SOUTH WEST:** To keep us informed about what students need and have, it is necessary to establish surveys in addition to promoting student progress.
- **NORTH WEST VS SOUTH EAST:** Taking into account the willingness of those involved to complete the various surveys that will be sent to you, so that you can help the collective progress and keep track.
- **NORTH EAST VS SOUTH WEST:** They want to implement better education and support in the different services they need.

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