# Systematization of Educational Experiences in the Technologies and Information Management Course at the Autonomous University of Chihuahua, Mexico.

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## *Abstract*

*Systematization fulfills a formative role because, through shared strategies, it teaches professors how to recover and assess their own practices, acquire new knowledge, and transform their teaching strategies. The research objective was to systematize educational experiences in the field of technologies and information management (TyMI) through educational scaffolding, in order to achieve higher and better learning in students according to the educational level corresponding to this exercise. The work had an ethnographic qualitative approach. The information harvesting techniques used were participant observation, structured field journals, documents, recordings and rubrics. The unit of analysis considered was made up of the scaled actions offered to students for self-regulation in their learning and the conditions required to enable such actions. The population consisted of a community made up by a group of first semester students of different races from the Faculty of Accountancy and Administration of the Autonomous University of Chihuahua, in the city of Chihuahua, Mexico. The use of educational scaffolding in the systematization of educational experiences, was of great value due to the fact that the proposal was open and flexible, and each teacher was able to customize and appropriate elements relevant to his or her instructional design, based on the challenges and problems faced in the course. The significance of this proposal lies with the incorporation of strategies for the development of complex thinking, linking with the current problems and relevant use of ICT in learning.*

*Keywords: Systematization of Educational Experiences, Scaffolding, Technologies and Management of the Information and Communications.*

## Introduction

Today, the growing development of information and communication technologies has changed the way we communicate with each other, and particularly how people see the world. These new technologies with great information storage capacities, make students develop new skills, such as how to search, select, discriminate, understand, categorize, use and transform information, which becomes more valuable than memory capacity by itself (Innova-Cesal, 2011).

This reality forces the teacher to restructure pedagogical strategies focusing its practice in learning, without neglecting transdisciplinarity, students' integrity, and the current global scenario. At the moment, there is an ongoing project regarding the renewal of the teaching-learning process called Network of Communities (RECREA by its Spanish acronym). It is an initiative developed by the Department of Higher Education, coordinated by the General Directorate of Higher Education for Education Professionals and the General Directorate of Higher Education, receiving technical support from nine Normal Schools and eight public universities in Mexico.

As part of this national initiative, a research project entitled "Systematization of Educational Experiences of Innovative Communities of Practice" emerges. The proposal is for the project to be developed in RECREA and it is generally intended to form communities of practice and innovate educational practice through complex reasoning. The project also concerns itself with the systematization of educational experiences related to innovation in teaching practice from a complex reasoning perspective, incorporating intervention and research in the classroom, as well as the use of digital skills.

Therefore, the aim of the present work was to systematize through instructional scaffolding techniques the educational experiences in the technologies and information management course (TyMI by its Spanish acronym) in order to improve learning in students according to the level of education of the current exercise. The TyMI course is one of the four core subjects of University common subjects. It is taught during the first half of all programs of the university.

The course outcomes include for the student to understand the impact and significance of Information and Communication Technologies (ICT), identifying social problems that allow each individual to internalize the impact of said technologies in society and education. This is achieved through the development of competencies that enable, along with social responsibility and ethics, the handling of tools, computer equipment, and digital resources in order to build projects that lead to the solution of problems. All of the above is achieved through a collaborative process and assertive communication.

Currently, technology is implicit in many educational activities, regardless of the area of knowledge, and it is for this reason that in the field of technologies and information management, transdisciplinarity is heavily implicit.

The introduction of the paradigm of complexity and Edgar Morin's proposal of complex thought in the contemporary scientific panorama, has resulted in the need to reform ideologies and educational institutions in order to promote an education that aligns itself with the needs of contemporary society (Barberousse, 2008).

Not long ago, education focused on teaching, and in the classroom the teacher was considered the being with knowledge that transmits what should be known. On the other hand, the student was regarded as a passive actor, a mere receiver assessed through examinations (Innova-Cesal, 2011).

The relatively new term of transdisciplinarity, in the context of teaching refers to the crossing of borders between disciplines (Nicolescu, 1996). That is to say, the courses are not isolated, but interrelated, providing different approaches to the same issues. Bernal (2010) pointed out that is required to integrate

knowledge by doing research in varied groups that are able to transcend their discipline and generate new knowledge through transdisciplinarity.

Morin (1994) pointed out the fact that a complex system, understood as a global unity, has properties that cannot be explained from their components. They all express emergent properties, collective properties that cannot be found in their components. Complexity appeared, precisely, as a result of the organization of every component under the shared pressure of infinite combinations of simultaneous interactions, which abounded in non-linear interrelationships. Complexity was born of the interaction of its component parts, that is, complexity is manifested in the system itself. This is why a new challenge arose when it became time to develop a training program geared towards the systematization of educational experiences and the process of intervention in the classroom, taking as a frame of reference this paradigm of complexity. The main beneficiaries of this project are the higher education institutions participating at the moment (universities and normal schools), given that they will design, develop and test the project RECREA in their particular contexts. Finally, the students are also benefiting from educational programs being implemented in their classrooms.

## Theoretical Framework

Systematization is a reflection process that aims to sort and organize the processes and results of a project, in such a way that it is possible to explain the action course that was followed in order to comply with the work demanded (Martinic, 1984). Systematization is a critical interpretation of one or several experiences. Through a classifying and reconstruction process, it discovers or makes explicit the logic of a previously experienced endeavor, including factors that were involved in said endeavor, how they relate to each other, and why the people in charge acted the way they did (Jara, 1998).

### Systematization of Learning Experiences

Systematization allows teachers and teams of educational institutions to identify, describe, and analyze their experiences of change. Systematization has a formative function because, through shared strategies, it teaches them to recover and assess their own practices, to build on them through new knowledge, and eventually transform them. Systematization is a valuable resource for "looking at oneself," in order to be critical, recognize successes and continue learning; it integrates reflection on one's own experience and is an opportunity to grow professionally (UNESCO, 2016).

The dynamics of higher education, regardless of modality and level, requires the constant scanning of contexts and subjects in order to achieve detailed descriptions and explain the subjective reality that underlies their actions; this requirement encourages the educational agents to "watch" and "follow" practices. This task can be assumed with rigor if performed as part of a research agenda, in this case, one focused on investigating education. To observe and follow-up to educational reality, is a complex process that responds to strategies defined for this purpose; one of them is the systematization of experiences (Barbosa-Chacon, Herrera, and Villabona, 2015).

In order to carry out the systematization of experiences Guzman, Uribe, and Inciarte (2014) developed a strategy based on eight stages, which have been grouped around the Spanish acronym APRENDER (analyze, plan, review, implement, negotiate, document, evaluate, refine) and have been developed in various scenarios: as a group, as a triad, individually, with the support of tutor, and with a student group.

The authors point out that it is important to mention that the project design, intervention in the classroom, and its corresponding research, have been undertaken following the eight phases, which should not be carried out in a prescriptive fashion, but as guiding elements.

Guzman, Uribe, and Inciarte (2014) describe the eight phases as follows:

1. Analyze. In this first phase, participants will face the construction and analysis the situations/problems that will shape the project or guide the student.
2. Plan. In this phase of the project it is very important to define, in a timely fashion, the situation/problem with which the students are going to interact, what will be the performance evidence and the end results or products that must be achieved, as well as the resources and activities to be carried out among students of the group.
3. Review. At this point, the members of the groups shall review and decide together the best strategy for implementing the project they have built.
4. Implement. This phase is the realization of the project. At this moment, the guiding action and research takes priority. Creative, autonomous, and responsible action is exercised and analyzed. Each member of the groups plays its role and carries out its task in accordance with what was planned and agreed in the previous phase.
5. Negotiate. This phase aims to ensure the proper implementation of the project, seeking at all times to count with the participation of every student.
6. Document. This phase, also parallel to the realization López of the project, corresponds to the moments of investigation carried out by the teacher. In addition to the tasks that develop competencies in students, a systematic process of collection must be undertaken to compile valuable information and document a job rich in experiences that deserve to be registered. Thus, the evidence of student's performance during their learning process, is added to incidents and the results of the application of measurement instruments (surveys, interviews and observational records).
7. Evaluate. In this phase, evaluation can be understood in two senses. One, the evaluation of the attainment of competencies in students, which will be measured according to the instruments and criteria set out in the evaluation device established during the planning stage. A final reflection on what has been learned must be included, as well as another one, once the classroom experience is over, where teacher and students assign a value to the results obtained; that is to say, they carry out an exercise in reflection on action.
8. Refine. At the end of the work with the pupils, the groups must meet and submit the draft for discussion and analysis.

The systematization of educational experiences is carried out in scripts or tutorials that are based on a typology, cognitive scaffold, or proposal of instructional design that collects the main elements that the literature highlights as necessary conditions for students to acquire the ability to learn and address, by themselves, situations and problems in the contemporary world (Guzman and Marin, 2015).

## Methodology

The nature of the research approach was qualitative ethnographic, since according to Denis and Gutiérrez (2002), Ethnography seeks to discover and describe the actions of the groups (objects of study) within a social interaction in context, with the sense and meaning that given to them the by same participants of the group through their actions, in addition to describing the understanding and interpretation of the phenomena, facts, and group situations (Cited by Bernal, 2010). The harvesting techniques of information used were participant observation, structured field journals, documents, recordings and rubrics. For Estalella and Ardèvol (2007) the ethnographic method is characterized by the involvement of the researcher in the research context, integrating his or herself as naturally as possible as a member of the collective they study. To do this, the ethnographer must work reflectively from his or her own experience, through the participant observation technique and other techniques such as interviews and life stories. The unit of analysis was constituted by the scaffolding actions offered to students for self-regulation of their learning and the conditions under which such actions took place. The population and sample was comprised of a complex community formed by a group of students from the first half of different majors at the Faculty of

Accountancy and Administration of the Autonomous University of Chihuahua in Chihuahua, Chihuahua, Mexico, as well as the documentary resources and technological advances that were offered as educational scaffolding to students. The project was divided into six phases defined by Rodriguez and Valldeoriola (2009): 1) Exploratory phase and reflection; 2) Planning phase; 3) Input phase on the stage; 4) Collection phase and analysis of information; 5) Withdrawal from the stage phase; and 6) Research report phase.

## Results

The results arising from the application of the redesign to the TyMI course during an academic cycle, as well as those resulting from a follow-up period of innovation, are described. Additionally, a report of student learning outcomes and the effectiveness of the systematization design of educational scaffolding experiences is given. Said process took place in the following phases:

**1) Exploratory phase and reflection:**

This phase addressed the research group participant (community of practice) the themes related to the concepts, approaches, and justification of complex thinking, with the aim to develop an approach to instructional design that considered the components of complex thought. The problem and object of study were defined. An exercise of reflection, discussion, and the appropriation of strategies for the design of learning tasks was undertaken, all in the context of a curriculum based on competencies and with views to develop complex thought. The basic principles of reflection were: If you want deep-thinking, questioning students who are also entrepreneurs and innovators working in collaborative virtual communities, the learning activities being carried out by the students must promote these attributes and attitudes. A literature review was performed in order to be up to date on how to design "learning tasks" for the development of competences and complex thinking in the context of a particular course. The following elements were identified in the syllabuses: A) sets forth the graduate profile; (b) describes the relationship between the course and the graduate profile; (c) describes the course competency that emphasizes the aspects of complexity, research and use of Information and Communication Management Technologies (ICT); (d) states competency units by group and hierarchical order.

**2) Planning phase:**

Subsequently, the theoretical-methodological elements for the design of new processes to renew teaching-learning practices, were integrated. As a first approach, it was planned to innovate together in the community of practice the teaching-learning process for a course to be implemented in the academic period from January to June 2018. A course based on "learning tasks" was established, with a focus of complexity and with integrated aspects that would favor research attitudes, and the use of the relevant and appropriate management of Information and Communication Technologies (ICT). Learning tasks were embodied in an educational scaffold that was previously used with students from the Technologies and Information Management course at the Autonomous University of Chihuahua, Mexico in a computer lab where they had access to information sources and the use of computers able to perform the tasks that the teacher indicated. The methodological proposal was open and flexible. The important thing about this proposal was: a) the incorporation of strategies for the development of complex thinking; b) the linking with the advances and current problems that are being addressed in research; 3) the appropriate use of ICTS for learning and collaborative work; c) the community of practice that ponders together on the design; d) the monitoring strategy and e) the careful reporting of results.

**3) On stage input phase (beginning of the study):**

In this phase, the intention of the study was explained to the students. Their authorization regarding video recordings and live broadcasts via Facebook was asked for, and they were also instructed in how everyone in the classroom was part of the project RECREA. At the same time, the purpose and working modality for

the semester was made clear, through the presentation of the scaffold designed for the student in the TyMI field.

They were also presented with the activities, tasks, problem situation, and projects they would be working on during the school period. The presentation was attractive and structured in such a way for students to be clear on what they had to do throughout the course. It included the following elements: a) the activities to be carried out and the support that would be provided for each activity; b) the information presented and worked on during and after class, available online for consultation at any given time; (c) the products that should delivered, as well as due dates; d) the criteria and instruments with which the products would be evaluated; e) via online, they were also provided with support materials, so as to ensure that they were available for the students to use or consult at any moment.

The situation/problem established as the work base, was the lack of water in the city of Chihuahua. The aim was to generate an integrated research work and a video presentation of the results regarding said theme. It was explained the importance of the work and video presentation, and how this had to be shared with the community. Student questions were answered regarding the evaluation criteria as well as the evidence of performance. It was clearly pointed out to students the importance of ensuring that what they learn should not be contained in themselves or the classroom, but that it should transcends reach the community.

### 4) Collection and analysis of information phase:

At this stage participant observation was used, as well as a review of documents, and evaluation of knowledge and skills. For this phase a performance evaluation was also used, in this case one based on the set of evidence obtained from the tasks preformed while addressing the problem/situation which gave students the opportunity to investigate and demonstrate their understanding and reflected application of knowledge and skills in their community. The products that were used to examine the students were written examinations, a set of assignments fulfilled, an investigation, and a video. The evidence requested contained elements that were considered in order to evaluate, as well as the criteria that would be used for the assessment. The evaluation was based on tangible and observable products and it encompassed rubrics, a format that was used to record daily observations of student activity, and examinations to assess the learning achieved.

### 5) Withdrawal of the scenario phase:

In this phase the students concluded with activities that involved a research process in the classroom. From here, students went to different elementary schools in the locality, where they raised awareness on the importance of caring for water among younger students. Subsequently, university students conducted a video recording to document the experience.

### 6) Preparation phase of the research report:

This phase describes the activities carried out during the TyMI course sessions, using the systematization of educational experiences. During the sessions, the points required for the development of the research work were analyzed. They were: a) objectives; b) background of the problem; c) problem research questions; d) hypothesis; e) theoretical framework; f) key concepts; g) method; h) findings and conclusions and i) references. It was noted that students lack the necessary knowledge and skills to write down a research objective, let alone the final document, which is why each section had to be carefully explained.

The process began by pointing out that the goals, research questions, and hypotheses are the first thing that needs to be written down in a research work, and that the title is not what is written first. However, the title should express what the research is about. It was pointed out that justification is the reason why the research work is carried out, without expressing feelings and avoiding platitudes. The session was

continued with the description of the objectives, both general and specific. The role of specific objectives, which are considered small goals to achieve the general objective, was explained with a hurdle race metaphor. It was highlighted that the objectives should always begin with a verb in infinitive and the existence of Bloom's taxonomy was indicated as support for the completion of the task. It was also noted that objectives should never start with the verbs 'to know' and 'investigate'; likewise, objectives must be achievable in the time provided for research. The background and how it is placed in context to research was also commented, relating it to previous situations without generating history irrelevant to the investigation. The difference between situation and problem was explained with an example of a situation in the Roman circus and how through questioning a problem one can arrive at the solution, the hypothesis, which is the possible answer to the question previously exposed. The frame of reference was also reviewed, which students were supposed to know already, as well as how to search for information, thanks to the courses previously taken regarding TyMI. In them, they had practiced how to use the University databases. They importance of key words was stressed, as well as the content of the method. The session closed with an exercise to develop research work objectives.

In later sessions students were tasked to develop the objectives of their work, as well as the justification, which were discussed in class. However, one of the teams did not comply with the task. The situation highlighted the importance of commitment to teamwork and how distance and lack of time are no obstacles thanks to information and communication technologies. The explanation was repeated in for the topic "research", and questions were asked as in the previous class. It was noted that students pay little attention to the explanations so that there were no specific doubts but instead very vague questions, because the class is in a computer lab, which enhances the risk of students being distracted, either by working in assignments for other classes or by just surfing the internet. It was recommended that students used a methodological matrix to relate methodological objectives, questions and hypotheses, so that once these were written down in the box, students could transport them to their work.

After several sessions continued with the development of the theoretical part of the investigation from the students' part, while the teacher attended doubts among work teams. It was noted that four of the five teams worked collaboratively, but one of the teams made up of only men, remained distracted without working. Most of the session was spent with the only team comprised entirely by women. Apparently the mixed teams were more balanced in terms of distribution of time and work.

In order to understand the concept of critical thinking, an exercise was conducted in which each team compared three different digital newspapers in the city. The exercise allowed the students to analyze the way in which these newspapers write the news, ranging from an objective point of view, to the most sensationalist press. It was pointed out that the newspaper most criticized by students was "El Peso de Chihuahua", for the crudeness of the images that it presents and the unethical language it uses in terms of drafting and managing images. It was observed that the students do not have the habit of reading and rarely review local news. They are apathetic to the search and analysis of information despite the fact that it is within reach through ICT.

In the following sessions, another exercise was conducted in which each team were asked to analyze the candidates for the presidency of Mexico, at that time the number of candidates corresponded to the number of teams. It is drawn to the candidates and each team had to defend the proposals of the candidate, as well as establish defense strategies to respond to the attacks of the other teams. They had an initial round of three minutes each team to expose the proposals of the candidate and in the end, each team would have a minute to criticize and/or attack the rival candidate. The exercise was very enriching as it strengthened the part of the program of critical thinking as well as incited the debate. Except one of the teams, made up in the entirety by men, who did not do the job they were called much attention for its lack of commitment. Even so, took part in the discussion criticizing the other candidates.

## Conclusion

The use of scaffolding in the systematization of educational experiences, was of great value due to the fact that the proposal was open and flexible, and each teacher was able to customize and appropriating those elements relevant to your instructional design based on the challenges and problems you face in the course. The significance of this proposal was the incorporation of strategies for the development of complex thinking, linking with the current problems, and the relevant use of ICT in learning.

Marin and Guzman (2012) comment that digital technologies of information and communication enable new ways to approach and understand the world, society and the human being; and that have transformed life habits and of interaction between them learning effects, favoring the collective construction of knowledge and collaboration. In this way, in the present investigation, through ICT were provided to students the scaffolding and this allowed the interaction between students and teacher. As well as the ways to access information generated in the social and academic environments. In this way opened various learning spaces in which they participated.

A strategy that was fundamental to the development in the research project was to find information in different electronic and physical sites for search and for the selection of suitable sources to work. The use of the problem situation was used as the basis for the design of learning tasks, which was rich because the student shared with the community the experience of learning, not left alone in the classroom.

This systematization of educational experience, served as the basis for sharing the results with the community of practice, where raised and improvements for the next period and repeat the experience to implement, monitor and share results in community in a continuous cycle.

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