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ELECTRICITY AND INDUSTRIAL ELECTRONICS; MODULE OF THE INDUSTRIAL ENGINEERING DEGREE AT THE TECNM, VERACRUZ CAMPUS, PREPARED THROUGH COLLABORATIVE LEARNING

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Abstract: Understanding what an educational project is involves identifying a problem, its causes and consequences and from there planning a process to achieve the objective that solves it totally or partially. This process involves from the selection of the problem, its treatment and the presentation of the results report: conception, planning, formulation of actions, implementation and evaluation.
Collaborative learning is the instance of learning that takes place through the participation of two or more individuals in the search for information, or in the exploration aimed at achieving a better understanding or shared understanding of a concept, problem or situation. (scagnoli, 2005). Thus, in the subject of Electricity and Industrial Electronics taught in the Industrial Engineering degree, everything related to the field of collaborative learning has been used, so that all the students in the group prepared the textbook for the module, complying with the official career program approved by the National Technology of Mexico. In this order of ideas, Leidner and Jarvenpaa (1995) point out that collaborative learning, in addition to helping to develop critical thinking in students, also contributes to improving interpersonal relationships, since it implies that each of the members learns to listen, discern and communicate your ideas or opinions to others with a positive and constructivist approach. On the other hand, Barab, Thomas and Merrill (2001) refer to collaborative learning as the construction of meaning that results from sharing personal experiences. These authors insist that virtual environments help educational models to be more participatory, and expand opportunities for research, communication and distribution of knowledge.
Keywords: collaborative learning process, dynamization, didactic model, teaching tasks

INTRODUCTION

University education promotes one of the most outstanding educational transformations, and is also a way to expand the field of knowledge of all the young people who enter it.

Learning is "... the essential part within this dialectical process of appropriation of content and ways of knowing, in the field of educational planning, the idea of modifications in study plans and programs for the best use has predominated, and this way address some problems that may arise in the system, students, educators, pedagogical theory and teaching practice and obviously an organizational structure are well involved in this process.

The dynamization of the teaching-learning process of the science is considered as a comprehensive and systemic approach to the process, related to the functioning of the dynamic components: methods, forms, means and evaluation, which enhances autonomous and self-regulated learning and promotes greater quality of this, taking into account the individual particularities of the student. and its context of action. The didactic model presented includes the principles and ways to structure and develop the process.

In the January - June 20215 semester, a methodology was used in which the following was programmed:

- A notes manual for the Electricity and Industrial Electronics Module
- The development of each thematic unit in PowerPoint
- A CD with the material in the manual

And as an essential point to encourage, in the student, the development of intellectual activities of induction-deduction and analysis-synthesis, which direct them towards research, the application of knowledge and the solution of problems through this methodology that

was distributed in in such a way that each of the students could take advantage of each of the knowledge, the scheme of which will be mentioned later in the course of the article.

DESCRIPTION OF THE METHOD

The Industrial Electricity and Electronics module corresponds to the core of professional training, is of a specific type and is taught in the second semester of the higher level degree in Industrial Engineering. Its purpose is for the student to apply the knowledge and skills associated with Electricity and Electronics, identify the function of both scientific knowledge, understand the basic elements of electricity and basic electronics, such as the operation and application of motors and transformers as well as its field of application in the industry, within the established parameters, complying with the generic and disciplinary competencies, as well as the specific contents of the module.

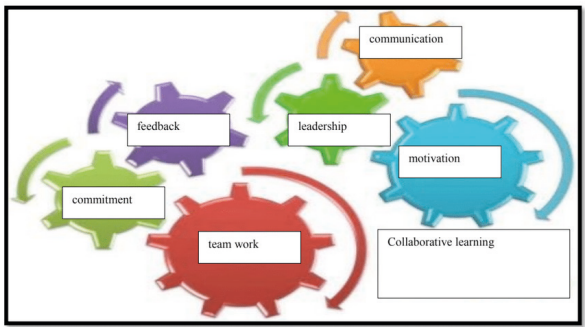

Figure 1.- Interpersonal skills in collaborative learning

The program of the Electricity and Electronics Module is described in figure 2, which shows the topics to be developed through the didactic strategy, as well as the competencies to be provided in the student.

DIDACTIC SEQUENCE

In the Industrial Electricity and Electronics module, it is related to the knowledge of some scientific foundation of some specialty subjects or the branch of the specialty, to give it a better application to the development of designs in Industrial engineering.

The didactic alternative consists of preparing an anthology with the practices carried out in class, as well as the preparation of works that help the student understand the development of the program units of this subject.

To make student learning more effective, each team worked with the 4 units indicated in the curriculum.

SUBJECT DATA

Name of the subject	**Electricity and industrial electronics**
Signature key	**INC-1009**
SATCA	**2-2-4**
Career	**Industrial Engineering**

Theme

Number	Themes	Sub-themes
1	Fundamentals of industrial electricity	1.1 Introduction to electricity 1.2 Concepts of electrical quantities 1.3 Ohm, Kirchoff, Lenz, Faraday and Watt's Laws 1.4 Concept of direct current and. alternating current 1.4.1 Series, parallel, mixed circuits 1.5 Electrical measurements 1.6 Interpretation of electrical diagrams
2	Motors, transformers and control devices	2.1 Sustainable generation of electrical energy 2.2 Direct and alternating current motors 2.3 Single-phase and three-phase transformers 2.4 Industrial electrical installations 2.5 Official Mexican standards 2.6 Electrical elements of industrial control 2.6.1 Relays 2.6.2 Solenoids 2.6.3 Automatic switches
3	Industrial electronic	3.1 Introduction to analogue and industrial electronics 3.2 Basic elements of analog electronics 3.2.1 Diodes 3.2.2 Transistors 3.2.3 SCR and TRIAC 3.2.4 Optoelectronic devices 3.3 Basic elements of digital electronics 3.3.1 Logic gates 3.3.2 Truth tables 3.3.3. Timers 3.3.4 Counters 3.3.5 Adders
4	Field of application of electricity and industrial electronics	4.1 Electrical sensors and transducers 4.2 Concepts of electropneumatics and symbols 4.3 PLC operation and characteristics 4.4 Basic PLC programming 4.5 Industrial electricity and electronics project

Fig.2 Study plan for the subject "Industrial Electricity and Electronics" UNIT

SKILLS TO DEVELOP

It poses and solves problems that require the concept of a function of a variable to model a problem.

It is applied the principles of industrial electricity and electronics to integrate production systems and establish appropriate industrial maintenance programs.

Each of the teams carried out work in Word and PowerPoint for the units and at the end a presentation was given in class (The organization of the teams is shown in Figure 3.

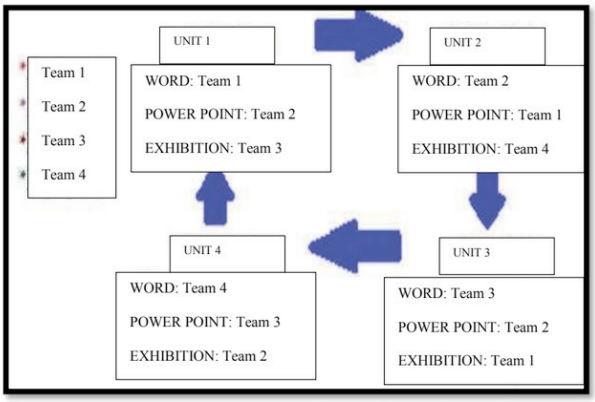

Figure 3. Activity distribution diagram.

Techniques: Teaching supported by laboratory practices, team research, interaction of the topic by teams of 5 students, compilation and format in a single edition. The group of the subject electricity and industrial electronics consists of 20 students, for this reason 4 teams were formed with 5 students to whom the subtopics to be investigated were designated to fulfill the purpose of the strategy that entails the preparation of an anthology.

Activities to do:

- Preparation of the sections that will make up the anthology, such as index, introduction, bibliography and conclusions
- Compilation of information through the internet, books on electricity and electronics, as well as field studies.
- Demonstration of the results of each topic through a presentation to the group.
- After having collected the information, the main objective of the skills in this subject will be carried out, which is the preparation of the anthology.
- Presentation of the result.

TRAINING AND SKILLS DEVELOPMENT

In this process it will be guaranteed that the student obtains the appropriate tools for optimal performance in all the aspects required both in their professional training and in every aspect where they can apply the knowledge provided, taking an ideal role as well as obtaining correct ethics.

The investigations carried out by the students must obtain truthful information, not forgetting to note the source from which it was carried out.

Next, the teacher will proceed with the review in order to continue obtaining main ideas and then show them to the other teams.

After this, the construction will proceed based on the main ideas and then proceed to the exhibition.

DIDACTIC RESOURCES

In this matter, to achieve the objectives of the program, the essential teaching resources for carrying it out will be: Internet, software (computer programs) for carrying out activities in the demonstration and obtaining data such as Word, Excel or PowerPoint, as well as such as, some storage device such as USB, Computer, projector, email, social networks.

Documentary and electronic research, as well as field work; provides the student with the necessary information through the use of bibliographic and electronic media and

promoting research, as well as at the same time supporting what is being presented.

Information analysis; When the student is going to carry out the research, he/she simultaneously collects correct and assertive information that is supported by authentic sources, thus eliminating any bad information.

Underlining and locating main ideas; Through this resource the student will be able to identify the main ideas, leftover material or some repetition of topics.

Team work; The teamwork strategy promotes harmony, as well as learning to guide, organize and distribute tasks among its members, as well as correct and good communication to achieve objectives.

Exhibition, Conference; It helps students to better understand the topic, as well as obtain adequate oral expression to be able to adequately communicate what they have learned.

Text analysis; essential process for selecting the appropriate information with which the topic will be demonstrated, as well as what will be presented to the group.

THE EVIDENCE THAT THE STUDENT HAS TO DO TO SOLVE THIS PROBLEM ARE

- Researched material for each subtopic of the subject.
- Material chosen from the bibliography selected for the manual.
- Selected bibliographic references, internet and technical manuals of the equipment described.
- Presentation of the assigned topic in PowerPoint, since each team must share the researched material with the other teams.
- The material is provided or delivered to the team that carries out the final recapitulation, this way everyone has the complete material for each subtopic.
- Show the information and graph on the computer so that the teacher can check the development of the unit assigned to him and that he follows the correct requirements for its development.
- Once endorsed by the teacher, printing continues.

FINAL COMMENTS

Throughout this school year of the subject of "Electrical and Electronics" in the Industrial Engineering career where a dynamic was proposed in a more didactic way, with the intention that one as a student gets involved in a more concrete and profound way throughout about the topics of the subject mentioned above in such a way that we can understand.

SUMMARY OF RESULTS

With the alternative proposed and developed in this section, the "Didactic implications for the training and development of skills" edited in the working document - Guide for the didactic instrumentation of study programs for the training and development of professional skills are met. - in December 2009 by the TEACHING DIRECTION of the GENERAL DIRECTORATE OF TECHNOLOGICAL HIGHER EDUCATION.

Based on the aforementioned article, the following didactic strategy was planted, this in turn managed to strengthen, reinforce and make the information used clearer and more concise, in the defense of its results: "PRESENTED DIDACTIC"

1.- The teacher acts as a manager of the process, verifying this research; (In this part it must be clarified that this aspect only covers the practical project) The Tutor or Teacher "Teacher" also managed to propose a more complex learning

model.

2.-It consists of forming work teams (thus forging a joint work environment) Giving them as an objective or rather as a research topic an entire unit (of the subject in progress).

3.-It is intended to use research as a strategy for the construction of learning. Based on the module program, the topics are assigned to the 4 teams of the group of 20 students, beginning the research process carefully, to decide what type of information is useful, complex or simply not necessary for the preparation of the teaching material.

4.- Once the objective of the extensive but concrete investigation has been achieved, it is time to present all that information in a written document using the "Word" office program (Here it is developed a document management skill)

5.- Having the document already prepared and in correct conditions (examined to perfection) It will be exchanged with the successor team Example; team one's document will go to team 2 And the information from this to the next and so on until you reach team 4.

6.-The third level of this elaborate didactic program. Now the teams with this new information will have to prepare a new document in a presentation format ("PowerPoint") which will have the same exchange process already carried out between the teams (team one receives the presentation from team 4 and sends its presentation to team 2 which sends its work to team 3 and so on until the cycle ends).

7.- The teams will study the presentations of their classmates and present them as if they had made them. This is where the strategy proposed from the beginning begins to bear fruit. All this change of information means that each member of the 4 Teams there managed 3 of the four units of the program.

8.- They exercise the development of relational and systemic thinking. More than data and decontextualized information, they establish relationships. By trying to comply with each topic established in the program, the development of thinking is exercised, relating the various bibliographic references and making decisions about the material to use within the great breadth of information found in ICT. The last level will consist of the understanding of the only unit that was not handled (each team a different one) since by seeing the presentation presented by their classmates they will be able to have knowledge of each unit of the program already marked. This will only be achieved by following the Algorithm already raised.

9.- Thanks to the Didactic Program, values for coexistence will be exercised. Each of the 4 groups performs different styles of work; That is to say, someone from team 2 has internet at home and they meet there, and that's how they live together, team 5 meets in a library, etc.

9.- Promotes creativity since the organization of work is left to the team.

10.- Exercise autonomy When activities are distributed within the team according to its possibilities, topics to be discussed, place of residence and other attributes.

CONCLUSIONS

The purpose of this article was to argue the need to develop teaching competencies and the implication of a competency-based teaching profile.

In general, it is organized as follows: an introduction to the topic, a development that in the first section presents the study problem based on traditional teaching, purposes and

question, to continue with the empirical references, what was observed in teaching practice, to continue with the theoretical framework analyzing different authors and their proposals for teaching competencies as well as the normative documents for Mexico, followed by the methodology and the presentation of the new teaching profile and finally the conclusion presenting a proposal.

The central thesis is that teachers must develop teaching competencies marked by the SEP (2010) to improve their performance and a competency-based profile is reflected.

The teacher must be able to plan what is going to be taught and evaluated, as well as select and design teaching strategies, activities for all types of learning and use different materials that promote critical and scientific thinking; demonstrating their teaching skills in performance in the classroom, here is when we can make inference to the various study plans that were previously applied and in which some types of comparisons can be made with the educational systems applied in Mexico:

We are currently applying the competency plan prior to this era plan in liquidation. We will make this small comparison of both educational systems based on THE TEACHING OF GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE PERCEPTION IN THE NATIONAL SYSTEM OF TECHNOLOGICAL HIGHER EDUCATION, A REVIEW OF ITS STUDY PROGRAMS.

The study plans and programs of the careers of the National System of Technological Institutes related to space are analyzed, the website of the General Directorate of Higher Technological Education was visited. Reviewing the educational offer, study plans and programs, grid of subjects and topics.

Finding that 13 careers are related to space, 9 subject grids are analyzed, with a total of 53 units, including 29 hours of theory and 34 hours of practice that distribute 61 credits every semester. 31% of the 41 majors analyzed present at least one unit related to the subject, in addition to there being an increase of 116.6% in the presence of subjects among different study plans, the results denote a growth that needs to be measured in the graduates. of the careers analyzed.

The distribution of majors by study plan is: 2004-2007 Plans in liquidation present 30 majors (24 engineering and 6 Bachelor's degrees), while the 2009-2010 Plan by professional competencies presents 41 Majors (35 engineering and 6 bachelor's degrees)

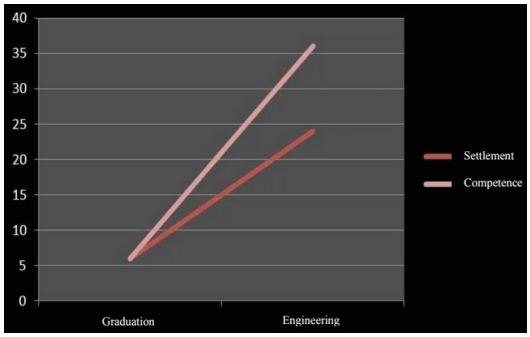

Figure 4. Statistics between liquidation plan and competition plan.

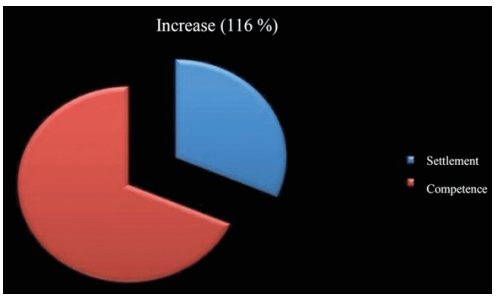

Figure 5. Pie chart contains liquidation plan and competition plan.

When comparing both study plans, it was found that it has 6 and 13 subjects respectively, this implies an increase of 116.6% from one plan to another.

RECOMMENDATIONS

In the current teaching framework, teachers continue to use traditional methods such as theoretical classes and written evaluations; There is still a Traditional Teaching Profile that requires memorizing concepts, it is imposing, it teaches processes mechanically, it does not promote reflection, it does not provide feedback on student performance, it does not develop critical thinking, the Student only receives instructions, has no initiative, does not participates, does not use imagination and therefore does not have critical or reflective thinking; all this based on the observation of the work of the observed teachers.

It is convenient for teachers to consider that with the Comprehensive Reform of Basic Education RlEB; A new Teaching Role is required, which implies putting professional skills into practice, as it is the first step to achieve a change in the educational paradigm; if teachers do not develop their skills and much less put them into practice

- How can they develop life skills in their students?

- How to acquire a teaching role that provides students with quality education?

- What to do to change an educational paradigm?

- What to do with resistance to change?

These questions lead me to reflect that communication is important, teachers are currently facing a challenge with their students, a globalized world that requires updating, commitment, that the teacher's work is properly organized, that it is done by the students under the direction of the teacher, as leader.

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