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Asimilar mejor con el relevador Zelio mediante el uso del aprendizaje significativo

Assimilate better with the Zelio relay through the use of meaningful learning

Assimilate melhor com o relé Zelio através do uso de aprendizado significativo

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Resumen

Una de las preocupaciones en la Universidad Tecnológica de Altamira (UTA) es que sus alumnos egresen desarrollando habilidades que los conduzcan a pensar, lograr más y asimilar mejor mediante la enseñanza conocida como aprendizaje significativo aplicado a un relevador Zelio; el fin es lograr capacidades para conciliar los requisitos de nuevos programas de estudio con la facilidad de abordar los temas que se involucran, desarrollando contenidos que cumplan los objetivos de estudio con el objeto de dejar explicado lo que puede resultar de difícil comprensión. El trabajo va dirigido a estudiantes de Mecatrónica, por lo que se buscaron problemas ilustrativos de cada contenido, lo que constituye un apoyo asombroso al aprendizaje.

Palabras clave: aprendizaje significativo, PLC, relevador zelio, sistemas automatizados.

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Abstract

One of the concerns at the Technological University of Altamira (UTA) is that their students graduate developing skills that lead them to think, more achievements and assimilate better by the knowledge known as: significant learning applied to a Zelio relay; the goal is to reach capacities to reconcile the requirements of new study programs with the ease of addressing issues that are involved, developing content that meets the study objectives in order to explain what can be difficult to understand. The work is directed to the mechatronic´s students, so they looked for illustrative problems of each content, which is an amazing support for learning.

Keywords: significant learning, PLC, zelio relay, automated systems.

Resumo

Uma das preocupações da Universidade Tecnológica de Altamira (UTA) é que seus alunos se formaram em desenvolvimento de habilidades que os levam a pensar, alcançar mais e assimilar melhor ao ensinar conhecido como aprendizado significativo aplicado a um relé Zelio; O objetivo é alcançar a capacidade de conciliar os requisitos de novos programas de estudo com a facilidade de abordar as questões envolvidas, desenvolvendo conteúdo que atenda aos objetivos do estudo, a fim de explicar o que pode ser difícil de entender. O trabalho destina-se a estudantes de mecatrônica, então eles buscaram problemas ilustrativos de cada conteúdo, o que é um suporte incrível para aprender.

Palavras-chave: aprendizagem significativa, PLC, zelio relay, sistemas automatizados.

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Introduction

At present, education is mainly directed to the transmission of information, leaving aside aspects such as interaction, the development of one's own thoughts, collaboration, meaningful learning and practice; although it is true that changes have been made in the study programs according to the needs of the productive sector, there is still a long way to go. This is why the UTA seeks in its students to apply the meaningful teaching to assimilate better with the Zelio relay.

Zelio relays are used in automated systems and are managed in residential and industrial applications, replacing the use of timers, counters and physical relays, also acting as a PLC programmable logic controller.

Programmable logic controllers are solid state members of the computer family, which use integrated circuits instead of electromechanical devices to implement control functions, and are capable of storing instructions, such as sequences, times, counts, data manipulation and communication to control machines and industrial processes (Bryan, 1997).

Making use of meaningful learning, it is intended that the student think, analyze and build their knowledge based on the ideas and situations they have, presenting the difficulty and then identifying the learning needs, giving meaning to a new content with solution results, Focusing on assimilating better with the Zelio relay to achieve more and learn better in automated systems.

The Technological Universities in Mexico require that their teachers look for teaching techniques that make the didactic classes, entertaining, where all the students collaborate without letting any one be isolated, taking them by the hand not only in the academic but also in the development and integration of personal, social and ecological values, that is why changes in the teaching process are required in order to satisfy the needs of our students in the productive sector, starting from a cognitive point of view. The question that guides this investigation, then, is:

How to assimilate better with the Zelio relay through the use of significant learning in the career of Mechatronics in the UTA?

In this work situations of daily life are presented to students, where they understand and build their own knowledge taking into account the previous knowledge they already have about a real life inconvenience, presenting the difficulty and identifying the need that leads to solutions of learning in automated systems of industrial application.

Theoretical fundament

Automated systems aim to replace man with the machine in specific tasks. This situation is very censored and has more complex connotations than it may seem in a first approximation. The advantages offered by automation are: producing a constant quality, providing the necessary quantities at the right time, increasing the safety of the personnel that works, increasing the productivity and flexibility of the tool.

DiFrank (2007) defines the term automation as "those automatic operations performed by an apparatus, process or system that are controlled by mechanical or electronic elements that act as the organs of the human being". Automation is the basis of disciplines in areas such as: pneumatics, hydraulics, programmable logic controllers, instrumentation, automation and process control whose industrial applications are important for the daily life of students and society.

This project is focused on assimilating better in automated systems with the Zelio relay, leading students to the knowledge of electropneumatic processes through meaningful learning; in 1963, Ausubel made his first attempt to explain a cognitive theory of meaningful verbal learning by publishing the monograph "The Psychology of Meaningful Verbal Learning"; In the same year, the Congress Phi, Delta, Kappa was held in Illinois, where he spoke with the paper "Some psychological aspects of the structure of knowledge". We can consider the theory that concerns us as a psychological theory of learning in the classroom (Ausubel, 1973).

Meaningful learning is the process by which a new knowledge is related to the cognitive structure of the learner in a non-arbitrary and substantive or non-literal way. This interaction occurs with relevant aspects, which are called subsuming or anchoring ideas (Ausubel, 1976).

According to the definition proposed by Ausubel, we realize the capacity of meaning that is made with the new information, obtaining deductions between the interaction of relevant subsumors of the cognitive structure and the new information; as a consequence, these subsumers are enriched and modified, giving rise to new subsummers or anchor ideas, enhanced and explained, used for subsequent knowledge.

Knowledge necessarily includes a process of assimilation to previous structures; that is, an integration with previous structures. In this way, assimilation handles two elements: what has just been known and what it means within the context of the human being who learned it. For this reason, knowing is not copying the real, but acting in reality and transforming it (Alonso, 2010).

Meaningful learning is a psychological theory because it deals with the very processes that the individual puts into play to learn. But from that perspective, it does not deal with issues related to psychology either from a general point of view or from the perspective of development, but rather emphasizes what happens in the classroom when students learn, in the nature of that learning. , in the conditions that are required for this to occur, in its results and, consequently, in its evaluation (Ausubel, 2002).

Pozo (1989) considers the theory of meaningful learning as a cognitive theory of restructuring; for him, it is a psychological theory that is constructed from an organicist approach of the individual and that focuses on the learning generated in a school context. It is a constructivist theory, since it is the individual himself who generates and builds his learning. The origin of the theory of meaningful learning is in the interest that Ausubel has to know and explain the conditions and properties of learning, which can be related to effective and effective ways to deliberately provoke stable cognitive changes, capable of endowing individual meaning And social.

Given the above, it is observed that the learning that takes place in educational institutions must be realistic, scientifically practicable, taking care of the character of communication and symbolic, with the sense of finding questions that make them provide meaning, paying attention to each one of them. the factors that lead to the solution.

Meaningful learning is the process by which a new knowledge or information is related to the cognitive structure of the learner in a non-arbitrary and substantive or non-literal way. This interaction with the cognitive structure does not occur considering it as a whole, but with relevant aspects present in it, which are called subsummers or anchoring ideas (Moreira, 1997).

The presence of ideas, concepts or propositions inclusive, clear and available in the mind of the learner is what gives meaning to that new content in interaction with it (Moreira, 2000a). But it is not a simple union, but in this process the new contents acquire meaning for the subject producing a transformation of the subsumors of their cognitive structure, which are thus progressively more differentiated, elaborate and stable (ibid.).

For significant learning to occur, according to Rodríguez (2004), the following fundamental conditions must be met:

- Potentially significant attitude of learning on the part of the learner, that is, predisposition to learn in a meaningful way.
- Presentation of a potentially significant material. This requires: on the one hand, that the material has a logical meaning, that is, that it is potentially related to the cognitive structure of the learner in a non-arbitrary and substantive way.
- Existence of adequate anchoring ideas in the subject that allow interaction with the new material that is presented.

It seeks to motivate students in the process, focusing on understanding instead of memorization, promoting the development of ideas, helping to pose questions that change their way of thinking in the search for solutions; To do this, teamwork is essential, highlighting the trainee's exposure with alternative points of view, stimulating them to consider new questions by sharing responsibilities in the handling of situations.

Meaningful learning can be considered a supra-theoretical idea that is compatible with other constructivist theories underlying them. With the above we can realize that the construction of knowledge is concluded significantly when the mental model is more explanatory (Moreira, 1997).

According to Maya, Ocampo, González and Medellín (2012), the mental model is the internal form of thought, and that is where its reality starts, developing its learning potential; However, the conditions to achieve this are its positive attitude and content, so that the model is the interior and the exterior is the idea captured on paper through a diagram that develops creativity, efficiency and productivity, facilitating memory and understanding. , allowing the brain to work in an associative way, so that it is better to analyze, think and learn.

Methodology

In the present investigation, a problem was proposed that would awaken students' interest by deeply recognizing concepts and objectives that need to be learned; the exercises were related to difficulties and situations of daily life so that the students could find meaning in the work they were doing. The questions of daily life direct the students to the decision making making judgments based on facts; in this way their reasoning with the learning objectives is justified.

Rules and work roles were established in advance by sharing them with group members. When facing the problem, the students analyzed the context presented in the exercise the following: discussing in teams the way of perceiving the scenario, identifying learning objectives that covered the difficulty posed by the teacher, recognizing the information that is had,

elaborating a list of what is known about the subject, determining the learning among the different members of the group and proposing a solution to the problem based on generated ideas.

The team favored addressing the problem taking into account the initial questions of the difficulty where the links with previous learning were identified, thus keeping each student working, taking ideas and new knowledge.

According to Glaser (1991), three principles related to learning and cognitive processes can be clearly established: learning is a constructive and non-receptive process, the cognitive process called metacognition affects the use of knowledge, and social and contextual factors they have an influence on learning.

Semantic networks are not only a way of storing information, they also have an influence on how they are interpreted and memorized. For example, when a new text is read, certain passages will activate the networks that contain the existing knowledge necessary to build and retain the meaning of the new text. If this does not happen, reading comprehension is inhibited (Gijselaers, 1996).

Metacognition affects learning

This second principle indicates that learning is faster when students possess skills for self-monitoring, that is, for metacognition. Metacognition is seen as an essential element of expert learning: setting goals (what am I going to do?), Selecting strategies (how am I doing?) And evaluating achievements (did it work?). Successful problem solving depends not only on the possession of knowledge, but also on the use of resolution methods to achieve goals. Good students detect when they understand a text and know when to use alternative strategies to understand the learning materials.

It was proposed to use a difficulty using the Zelio relay that followed the student during the development of the process by examining the characteristics of the meaningful learning applied to the problem in order to provoke the understanding of concepts in the academic

performance; proposing the problem to analyze it, placing itself in the context of the discussion in each work team. It was sought that the objectives of the course were incorporated into the design of the problem, connecting the previous knowledge to new concepts, motivating the independent search of the information through the means available to the student.

Proposed problem

Design a program that responds to the input elements connected in a Zelio relay. Table 1 indicates the required configurations that when pressing switches cause a double-acting piston to activate and return to its retracted stem position; with this it is indicated that the output of the Zelio relay will be activated every time the combination is true.

Tabla 1. Configuración de tabla que muestran la activación del pistón de doble efecto.

ENTRADA 1	ENTRADA 2	ENTRADA 3	ENTRADA 4	ENTRADA 5	SALIDA
0	0	0	0	1	1
0	0	1	1	0	1
1	1	1	0	0	1

Fuente: elaboración propia.

We worked on teams with student opinions by brainstorming the theories about the causes of the problem and how to solve it. These were written in notebook to be accepted or rejected, also generating the following questions with marked frequency in the work teams: How is the solution of the process carried out? What is the difference between a switch and a push button? What are the differences of using an element as input or output? Why is the electrical connection made in didactic module?

During the development of the practice, four teams of the third four-month period of six people each were formed; the teacher allowed them to work with whomever they chose and felt comfortable; The time that was provided to solve the situation was a two-hour class in the automation laboratory in the area of Mechatronics.

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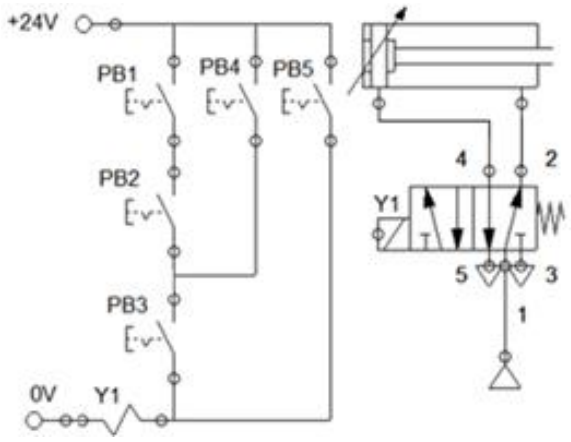
The students organized a report with the things they needed to do to solve the difficulty posed by the teacher, using their mind and way of thinking, clearly defining the previous knowledge and the need to incorporate the new based on the questions of each one, answering and testing the combinations in order to find the right answer to the solution.

The time that was provided to solve the problem was a two-hour class, based on previous knowledge in class; a practical demonstration of the subject was also required in the laboratory which was demonstrated in a Kinesthetic way with the students, in this way the knowledge is amalgamated as the students bring the classroom ideas and check them when they have contact with the test equipment.

The indications for this test are the following: students must use their knowledge of programmable logic controllers to make the connection that is requested, reaching to understand the concepts of the problem, automation, connection of switches, identification of input elements, elements output, double effect piston, 24 volt power supply, alternating current power to the outlet and use of the Zelio relay. Figure 1 shows the electrical diagram proposed for the search for a solution to the problem.

Figure 1. Diagrama eléctrico-neumático propuesto por el maestro.



Fuente: elaboración propia.

The assessment instruments were applied to four questions most frequently asked by each of the teams measuring the results and finding favorable learning effects, which served to measure the progress of achievement of the students of the third quarter of the Mechatronics career.

Tabla 2. Preguntas generadas por los estudiantes en la solución del problema.

	Preguntas planteadas por los estudiantes	**Aprendizaje adquirido por parte de los alumnos**
1	¿Qué diferencia hay entre un interruptor y un pulsador?	24 alumnos entendieron el concepto.
2	¿Cuáles son las diferencias de utilizar un elemento como entrada o salida?	17 de 24 entendieron las diferencias.
3	¿Cómo relaciono el diagrama eléctriconeumático propuesto con la solución del problema?	20 de 24 relacionaron el diagrama.
4	¿Por qué se realiza la conexión eléctrica en módulo didáctico?	24 alumnos comprendieron la conexión en módulo

Fuente: elaboración propia.

Discussion

One of the strengths of the meaningful learning method is that it requires personal interaction measured by the language students express among themselves with the teacher; for that reason, language is claimed as a superior cognitive function that characterizes the human species, acting as a mediator between thought, action in a social environment; determining the concepts and conditions of cognitive development.

Knowledge, language and reality go hand in hand, highlighting language as such, because it demonstrates what the student has inside and brings it to light, in this way the teacher detects the level of knowledge that has to support it; in the case of requiring advice, it is reinforced and if their knowledge is good, the student shares what is known with his colleagues as a collaborative work to reach the goal set at the cognitive level that is required.

Based on the proposed problem, comprehension was observed in the situation to be solved, working as a team, fostering the habit of thinking, understanding among the knowledge that is useful in order to improve meaningful learning.

The restrictions that were presented in some students was that they did not have a significant learning attitude, so it was observed that the anchoring ideas pertinent to the cognitive structure of the learner were not present and, if that was the case, the significant learning was not reinforced To solve this situation there was a personal interaction of meanings between different protagonist students, which determined its achievement.

Finally, it was possible to assimilate better with the Zelio relay, but taking into account the previous knowledge that the student possesses, this answers the research question, confirming that meaningful learning is an effective form of teaching in the UTA.

Conclusions

The use of meaningful learning in the UTA showed progress in the academic achievement of the students, shown in table 2, questions one and three: What is the difference between a switch and a push button? How do I relate the proposed electric-pneumatic diagram to the solution of the problem? In the first, the 24 students understood the questioning, in question three 20 of 24 related the electropneumatic diagram with the solution of the difficulty; his comments were a reflection of what he learned in other subjects such as: electrical circuits and electico-pneumatic systems where they related previous knowledge with current knowledge reinforcing meaningful learning.

In table 2, ask two: What are the differences of using an element as input or output? It is observed in this questioning that 17 students of 24 understood; we can deduce that the new knowledge that is integrated into the previous one needs to be reinforced, then they approached the interlocutor to receive an explanation where it was stated that all the input elements are: switches, sensors of any type and limit switch; the output elements are solenoid coils in solenoid valves, lamps of any type and buzzer.

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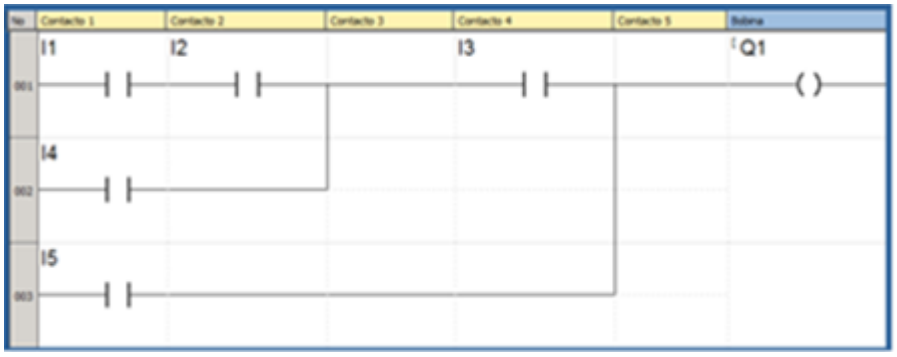
In Table 2, question four: Why is the electrical connection made in didactic module? The student is interested in going further with his didactic application, expressing his feeling of security at the moment of making connections with electrical energy without fear of receiving a discharge.

The results of the research with significant learning yielded a good method of used for the benefit of the students. Figure 2 shows the students' solution proposed in the final program with the Zelio relay.

Figura 2. Solución de diagrama de escalera.



Fuente: elaboración propia.

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