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Learn by doing as a didactic strategy through the codecademy web portal in pedagogical practice to promote creative thinking and significant learning in students

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Abstract. The work developed is action research type, framed in the qualitative paradigm. It designs a didactic strategy for the development of a different pedagogical practice to the traditional one that allows a greater autonomy in the student during the learning process, since the apprehension of knowledge is done in a more personal and practical way. The didactic proposal is developed from the diagnosis of the student's creativity and their ability to interact with academic platforms. Its implementation allows the student to learn by doing in a process of trial, error and correction in order to promote creative thinking while achieving meaningful learning.

1. Introduction

Technology has been present in man since prehistory; its importance was associated with survival, obtaining food and its preparation. Its evolution has contributed to the improvement of communication, transport, the standard of living, the acquisition of knowledge, etc. Contributing with it in the solution of daily problems and supplying the basic necessities for the development of humanity. In this sense, the latest technological advances show Web 2.0 as a pedagogical resource that offers great benefits as a teaching tool for teachers, making them innovative and creative. Current education shows digital natives as self-taught, as they generate their own cognitive development, demanding new skills in the teacher for the teaching process [1].

At the national level, the "Ministerio de Educación Nacional de Colombia" shows the functionality of technology in the sense that it seeks to solve problems and satisfy individual and social needs, transforming the environment and nature through the rational, critical and creative use of resources and knowledge [2] and includes, for the tenth and eleventh grades of secondary education, a component of problem solving with technology, which involves developing skills in the student to solve technological problems and evaluate the solutions taking into account the conditions, restrictions and individual specifications of each problem, also, to make the student see technology as an important tool for the applicability of science.

Contrary to the above, researchers have observed that tenth grade students of the "Institución Educativa San Francisco de Sales de San José de Cúcuta, Colombia", in spite of having basic knowledge about information technology, have difficulty handling digital platforms, since they are unaware of their usefulness and the lessons they can acquire or reinforce. Added to this, it seems that teachers do not pay attention to the creative process of students before starting a planning or developing their pedagogical practice.

Thus, since creativity is a factor on which teachers should focus their attention in order to constructively develop meaningful learning, it is interesting to generate innovative proposals that, when executed, stimulate and motivate students to discover and experiment. Technological platforms with tools that are interesting to interrelate skills, abilities, knowledge and undoubtedly promote creative thinking [3]. For this reason, teachers today must have a reflective and responsible attitude towards understanding the different ways students approach knowledge, and how to facilitate, orient or guide self-taught actions, which represent basic qualities because they expose processes of construction, elaboration, selection, conceptualization, organization and transformation of information from sources, which induces ideas by relating them to previous knowledge [4].

Considering the above, one of the aspects considered important by the researcher is to develop a pedagogical work, through the methodology learn by doing through the Codecademy portal to achieve significant learning with exercises in page design, starting from the creativity of students, considering that at present it is urgent to manage digital knowledge, such as web designs, but for this creativity is fundamental [5]. From this perspective, it is necessary for the teacher to be trained and visualize the importance of knowing the creativity of students to provide an innovative and transformative education where what is intended is to pose challenges. For this reason, one of the challenges of the teacher of the XXI century is to know the strengths, the weaknesses, the creativity, the abilities of its students, to obtain positive academic results, where the biopsychosocial development of the student is underlined and he can have access to an education more consonant with the digital reality that surrounds him.

To achieve a solution to this possible problem, students are required to develop a creative process being one of the highest and most complex potentialities of human beings, this implies thinking skills that allow to integrate the less complicated cognitive processes, up to those known as superior for the achievement of a new idea or thought [6]. Therefore, the creative process is an ability that must be in continuous stimulation on the part of the teacher, in order to develop potentialities, abilities and skills in the students. In addition, the latest theories on creativity present as a fundamental principle that all people are creative. From there, it is important that the teacher activate alternatives in the development of a didactics so that in the student creativity is stimulated. As a teacher, it is sought in the students that the learnings are enduring and meaningful. Ausubel [7] postulated it in the theory of significant learning.

Thus, in order to allow students to improve their cognitive structure, this research considers the use of learn by doing in pedagogical practice through the web portal Codecademy, in such a way as to promote significant learning in students. Since, from the pedagogical practice of teachers, in the area of technology and computer science, are developed within a particular didactics and different from the other areas of knowledge, linking the student directly to technology, the use of computer equipment and programs. This allows the student to acquire basic skills in the handling of computer packages, necessary in the academic, professional and labor fields.

As students work with the web portal they develop creative and innovative thinking, initially based on activities that represent a reproduction of the work assigned by the teacher. Learn by doing, in the pedagogical practice of the area of technology and information technology, is a didactic strategy that allows the student to make autonomous and asynchronous digital productions, which can be linked to the web portal such as www.codecademy.com for the development of the theme and then apply it on a website, thus symbolizing an emerging educational dimension. The dynamics of the work will be carried out in semi virtual environments, with contributions from learn by doing working in the virtual web portal www.codecademy in which the student learns to program by doing. The process will be accompanied by the teaching orientation, while the students acquire knowledge and conceptual formation on the subject for the development of works with web pages, pretending to stimulate the creative thought and the significant learning in the students.

2. Method
In the present research, the qualitative approach was proposed to deepen the problem under study [8], in order to develop a pedagogical proposal that promotes creative thinking and meaningful learning in tenth grade students, using learn by doing through the Codecademy web portal, as a didactic strategy.

The implementation of learn by doing in pedagogical practice in the area of technology and information technology sought to generate didactic impact, stimulating the creative thinking of the tenth grade students in the "Institución Educativa San Francisco de Sales, San José de Cúcuta, Colombia". Therefore, the paradigm to which the present study obeyed is of qualitative cohort, supported in the action research method, for this methodological treatment the focused interview was used as an instrument for the collection of the information, to obtain the necessary data that were later systematized [9].

It should be noted that action research was considered a methodological resource that allowed the strategies based on learn by doing to be deployed through the Codecademy web portal and subsequently systematized its impact on the creative thinking of the tenth grade students of the "Institución Edcativa San Francisco de Sales, San José de Cúcuta, Colombia". Thus, it was possible to produce information to broaden the knowledge about the object of study, with the purpose of improving or transforming reality, providing the technological means that lead to this end [10].

From this contribution, action research is conceived as a research method whose purpose is intended for teachers to reflect on their pedagogical practice to work it in a didactic way and according to innovative approaches. The purpose is to reflect on reality in order to transform it; the intention and meaning of all educational research is the transformation and improvement of practice. Action research facilitates the formation of people who are critical and reflective of the reality that surrounds them and to postulate the alternative solutions according to the viabilities [11].

2.1. Phases of the investigation

2.1.1. Planning. It is related to the diagnosis by means of the Torrance creativity test, which once carried out, and analyzing the information, allowed planning aspects necessary to work with the didactic strategy to promote creative thinking and meaningful learning in the tenth grade students of the "Institución Educativa San Francisco de Sales, San José de Cúcuta, Colombia". In this way, the researcher presented a pedagogical proposal based on Learn by doing through the web portal Codecademy. This was developed in a short period of time and served as the basis for completing the research.

2.1.2. Action. At this stage, strategies based on Learn by doing were developed through the Codecademy web portal to promote creative thinking and meaningful learning among tenth grade students at the "Institución Educativa San Francisco de Sales, San José de Cúcuta, Colombia".

2.1.3. Observation. In this phase, evidence was gathered by observing and recording the effects of the implementation of the strategy in a pedagogical journal, adding all the information in order to transform this reality. In this sense, the necessary data must be obtained in relation to the objective of diagnosing the knowledge of the tenth grade students of the "Institución Educativa San Francisco de Sales, San José de Cúcuta, Colombia" regarding the use of the Codecademy web portal and web programming.

2.1.4. Reflection. This phase corresponds to the process of critical-argumentative reasoning in relation to the achieved results, serving as support in the presentation of the final reflections. Therefore, this stage is important for the analysis and assessment of the impact caused by the pedagogical proposal to promote creative thinking and meaningful learning in tenth grade students at the "Institución Educativa San Francisco de Sales, San josé de Cúcuta, Colombia" through the use of learn by doing through the web portal Codecademy as a didactic strategy.

In the present study the interviewees were the tenth grade students of the "Institución Educativa San Francisco de Sales, San josé de Cúcuta, Colombia". In the case that occupies the study the sample was not probabilistic or directed, whose purpose is not the generalization in terms of probability. In this sense, we worked with a representation of subjects, with the intention that they provide relevant information to reflect on the impact that the Codecademy web portal has on the creative thinking of

students, which was inserted into a diagnostic criterion with a view to developing a pedagogical proposal in tenth grade students.

3. Results

To consider promoting students' creative thinking through technological platforms is to project a didactics that emancipates the student, because it postulates the creative function from the cognitive structure that agglomerates a set of ideas. The research was nourished by the application of the Torrance Creative Thought Test, which highlights that the tenth grade students of the "Institución Educativa San Francisco de Sales, San josé de Cúcuta, Colombia" are located in the 77.2 percentile, that is to say, that the creativity of the group is in a high average, that the students are creative, highlighting the component of fluidity, which qualifies the facility to generate a high number of ideas, therefore it is a skill that they have developed and that allows to give answers in a determined field, through verbal or figurative stimuli.

Positive results are also observed in the flexibility component, which is of utmost importance because it evidences that students have the capacity to transform or find the solution to creative problems from reinterpretation. While in the component of originality positive results were also obtained when detailing that they choose to originate unique and different products from the others. These results show that the students stand out in the various components that develop creativity and that by combining these skills with the didactic strategy Learn by doing and the management of the web platform Codecademy, it is thought that the development of the pedagogical proposal represented an innovative resource of interest for the students and therefore it was flagged as potentially significant and attractive, succeeding in suggesting them in the elaboration of blogs with skill and creativity and therefore obtaining more knowledge.

With the answers given by the interviewed subjects, it was found that they deserved to deepen their knowledge with reference to the Codecademy web portal and the programming language. It is therefore inferred that it is crucial to take advantage of this lack of knowledge to promote interest in its use for the development of creative thinking and meaningful learning. In this sense, Penagos and Aluni [12] expose that it is possible to develop creativity with the passage of time and for this, there are exercises, techniques, practices, workshops, which help people to encourage their creative power.

In the educational context, it is easy to develop creativity as long as teachers are aware of the fundamental role they play in their pedagogical practice and recognize it as a methodological notion or the teacher establishes a relationship between discourse and practice that allows him or her to reconstruct pedagogical knowledge from the tensions generated by this relationship [13]. Since students are receptive to innovative work schemes that capture their attention, due to the high level of curiosity, interest, and reflective thinking that they handle, their sense of humor and need for adventure, in addition to their self-confidence, helps them to be flexible in accepting changes and transformations, and even more so if they are positive [14].

4. Discussion

Through research, it could be considered as a finding that students are motivated and are able to create if they have technological materials, able to modify the way of teaching and learning. The learn by doing methodology is presented as a didactic scheme that is expressed through the Codecademy portal, which reinforced learning with page design exercises, considering that nowadays it is almost urgent to handle digital knowledge, as web designs, where creativity was the essential factor, thus observing a characteristic of natural learning based on practice, since for the students the learning process was facilitated and was very satisfactory in the results that were obtained making something that did not exist before. From this perspective, creativity is the element that the human being has developed to satisfy his ideas and geniuses, so it is related to originality, fluidity, which lead to the creation of something unpublished or complements something that is already done from another perception.

It is important to note that the tenth grade students of the "Institución Educativa San Francisco de Sales, San josé de Cúcuta, Colombia" through the proposal conceived the stimulus of creativity as an

experience that offered educational independence and allowed, through the technological platform, to develop cognitive processes such as observation, memory, selection, organization, understanding, emphasizing the value of individual creative products, characterized by imagination and spontaneous generation of ideas.

Based on Waisburd [15], creative thinking is that which is used in the creation or modification of something, introducing novelties, that is, the production of new ideas to develop or modify something existing. The blogs developed by the students are close to the creative thinking of young people since they have developed from personal tastes and free themes, seeking to apply novel elements such as music and animation, they have liked to investigate and organize information on their preferred topic in a blog and are receptive to the suggestions of the teacher. Blogs are very useful because they have the possibility of freely expressing and organizing the information on the topic of their choice.

Returning to Ausubel [7], which states that the student's learning depends on the previous cognitive structure related to the new information, by cognitive structure should be understood the set of concepts, ideas that an individual possesses in a given field of knowledge, as well as its organization, It was evidenced that the students are very receptive with the initial exposition and it serves as previous cognitive structure, they value how short and punctual it was, they attend to the teacher's own discourse because it serves them to develop and solve the module to work with the explanation of the subject that brings codecademy which is considered new information. The motivational and individual factor is very important for the student and they recognize the effort that the teacher makes so that they advance in the matter and thus to obtain a significant learning [16]. The good relationship between the teacher guide and the students throughout the academic period is fundamental, since the teacher gives them confidence to ask them what they do not understand and to be able to continue with the development of the module.

The fact that all the Codecademy modules are solved with the help of the initial explanation and the clarification of doubts during the development of each module by the teacher, makes the students value the sufficiency of knowledge that the teacher has. The practical work in the classroom is vital for better learning and the development of the learning by doing methodology, the good Internet connection of the institution and the good condition of the equipment helped to ensure that the development of the class was given without any setback and that the objective and development of this one was not lost.

5. Conclusions

The research concludes that the development of academic activities based on learning by doing as a didactic strategy through the web portal Codecademy promotes creative thinking and meaningful learning in students, as well as allowing them to interact with the software and develop skills to overcome the different setbacks that are presented.

It can be noted that the use of the Codecademy portal, gave students the opportunity to learn through interaction with the program, and at the same time developed creativity because through the design of a page could apply the fluidity, flexibility and originality, demonstrating creative skills and abilities, which meant for them a better learning and more different opportunities to learn.

Finally, the students with the learn by doing methodology and the Codecademy web portal were able to develop competences for autonomous learning that they each achieve at their own pace and with this it can be seen that results were also obtained from the theory of self-regulation since the students developed a competence that allows the students to activate the learning strategies necessary to achieve the established objectives.

References
[1]   Depablos L 2016 El Twitter y la Web 2.0 como para la enseñanza de la sociopolítica en el doctorado en educación *Revista Heurística* **19** 53
[2]   Ministerio de Educación Nacional (MEN) 2008 *Ser competente en tecnología ¡una necesidad para el desarrollo*! (Colombia: Ministerio de Educación Nacional)
[3]   Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO) 2005 *Formación docente y las tecnologías de información y comunicación* (Santiago de Chile: Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura)

[4] Ahedo J, Danvila I 2014 *Las nuevas tecnologías como herramientas que facilitan la educación formativa en la educación* (Guadalajara: Instituto Tecnológico y de Estudios Superiores de Monterrey)

[5] Morales V 2013 Desarrollo de competencias digitales docentes en la educación básica *Revista de Innovación Educativa* **5(1)** 88

[6] Esquivias M T 2004 Creatividad: definiciones, antecedentes y aportaciones *Revista Digital Universitaria* **5(1)** 2

[7] Ausubel D, Novak J, Hanesian H 1983 *Psicología educativa. Un punto de vista cognoscitivo* (México: Trillas)

[8] Hernández R, Fernández C, Baptista M 2014 *Metodología de la investigación, 6 edición* (México: MCGraw-Hill)

[9] Gallardo H, Vergel M, Villamizar F 2018 Investigación intervención y enfoque multimétodo en ciencias humanas y educación matemática *Logos Ciencia y Tecnología* **9(2)** 84

[10] Rojas B 2014 *Investigación cualitativa* (Caracas: Universidad Pedagógica Experimental Libertador)

[11] Gimeno J, Pérez A 1992 Comprender y transformar la enseñanza *Historia y Comunicación Social* **1** 338

[12] Penagos J, Aluni R 2000 Preguntas más frecuentes sobre creatividad *Revista Psicología* **Edición Especial** 1

[13] Zuluaga O 1979 *Colombia: Dos modelos de su práctica pedagógica durante el siglo XIX* (Medellín: Universidad de Antioquia)

[14] Martínez A 2012 *Práctica pedagógica: Historia y presente de un concepto en práctica pedagógica: Perspectivas teóricas* (Bogotá: ECOE)

[15] Waisburd G 2009 Pensamiento creativo e innovación *Revista Digital Universitaria* **10(12)** 2

[16] De Bono E 1994 *El Pensamiento creativo: el poder del pensamiento lateral para la creación de nuevas ideas* (México: Paidós)