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Experiential learning in higher education. A student-centered teaching method that improves perceived learning.

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Experiential learning in higher education. A student-centered teaching method that improves perceived learning.

Abstract

There is an interest in involving psychology students in early practical activities, which allow them to learn in a more meaningful and authentic way. In these instances, they must apply knowledge, solve problems and demonstrate professional skills associated with the graduate competencies that they are expected to achieve. The present work seeks to position experiential learning as a means to reach these goals. With this aim, an intervention on experiential learning with second year students from a developmental psychology course is presented, describing its design, implementation and assessment. The students observed and interviewed schoolchildren to determine an area of development in which they needed stimulation and enrichment for a healthy development. Then, they created a pedagogical tool to do so, testing its application on the same children sample. The results showed a positive perception from the students, teachers and beneficiaries of the proposal. Likewise, the students reported the perception of having learned more than in a subject in which this methodology is not used; this difference was statistically significant.

Keywords

Experiential learning, developmental psychology, learning process, competencies

Introduction

One of the objectives of higher education is to improve the ability of students to apply knowledge and solve everyday problems that are close to their professions. It is not enough to ensure that they gain the required knowledge, it is also necessary to provide them with opportunities to deploy skills in real contexts (Huang & Jiang, 2020; Kalyuga et al., 2010). Even the American Psychological Association (APA) includes the ability to solve problems in context within the graduate competencies required in psychologists' (American Psychological Association [APA], 2017).

However, there is often a mismatch between students' expectations and their training. In general, they want more practical activities and abilities' training, and instead, they receive mainly theoretical and scientific knowledge (Goedeke & Gibson, 2011; Green et al., 2017). Upon graduation, they feel insecure about their abilities or the tasks and roles they should undertake as psychologists (Borden & Rajecki, 2000; O'Connor & Hansen, 2009).

The application of experiential learning has brought benefits to the development of transverse skills, and it is an educational strategy consistent with the learning outcomes expected from psychologists in training (Carroll, 2007; Morris & Bilich-Eric, 2016). Muir and van der Linder (2009) found that the application of this methodology, in an *Introduction to psychology* course, made it possible for students to achieve, in a better way, the expected learning outcomes. In a study by Zelechowski et al. (2017), psychology students who participated in experiential learning activities performed significantly better than students who did not participate in such activities, also increasing their interest and motivation in the subject.

Higher education has to respond to the changing demands of today's world. To accomplish this, it needs to modify the core of the educational process: the teaching and learning process (Bridgstock, 2016; Jollands, 2015; Mitchell, & Rost-Banik, 2020). Experiential learning is a process that enables students to learn through 'doing', 'learning while experiencing', and learning through 'hands on practice' and 'reflection' (Fry et al., 2015). It is a powerful tool for making that change in higher education (Miettinen, 2000). This methodology allows students to transfer what they have learned in class to authentic situations (Guo et al., 2016), achieving an in-depth understanding of the contents (Baker et al., 2005; Kayes et al., 2005). This way of learning implies providing the student with greater autonomy and responsibility, involving them personally with their learning process and the context in which it takes place. Also, emphasize learning flexibility to encompass all learning modes for full cycle learning, developing students' meta-learning capabilities and adaptive learning (Kolb, & Kolb, 2017).

Regarding its benefits, experiential learning helps students to establish connections between experience and theory (Earnest et al., 2016; Romero, 2010), facilitating the transition between undergraduate education and the world of work (Friedman, & Goldbaum, 2016). In addition, due to the use of different learning modes (abstract, concrete, reflective and active), the content is deepened, allowing the achievement of significant learning (Calvert et al., 2016; Zhai et al., 2017). For these reasons, the present article shows the results of the application of experiential learning in a developmental psychology course, for third semester psychology students. The aim was to describe how, the implementation of the experiential learning in the course, influenced the perception of the students about the ability to apply the knowledge of developmental psychology to solve real problems. Likewise, how it affects the perception of teachers and beneficiaries of the intervention on the quality of the product delivered at the end of the experiential learning activity.

The Experiential Learning Model

Experiential learning theory (ELT) is a holistic theory that defines learning as the major process of human adaptation involving the whole person. Also is a multi-dimensional model of a dynamic view of learning, based on a learning cycle driven by the resolution of the dual dialectics of action/reflection and experience/abstraction. The foundational scholars of experiential learning were William James, John Dewey, Kurt Lewin, Jean Piaget, Lev Vygotsky, Carl Jung, Mary Parker Follett, Carl Rogers, and Paulo Freire (Kolb, & Kolb, 2017).

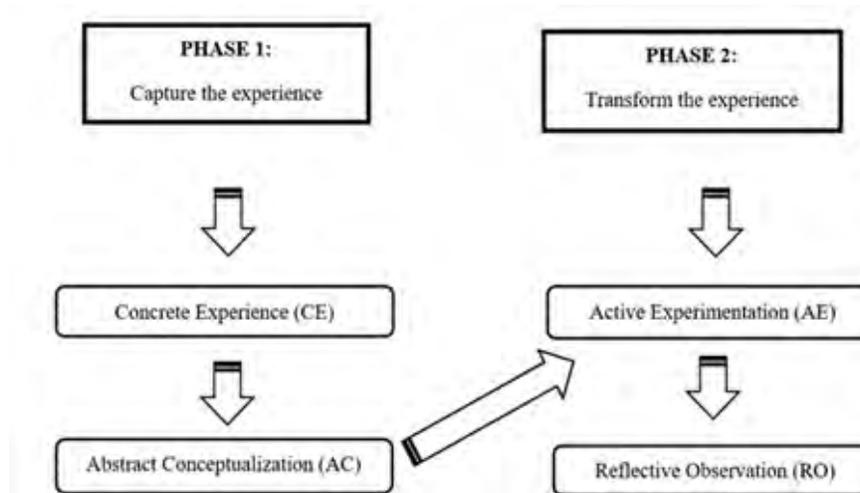
Thus, experiential learning is a continuous process whereby the learners will bring individual learning needs and experiences to their learning environment and communities (Kolb, 2015). Involves the acquisition of knowledge through the capture and transformation of concrete experiences, which originates new abstractions and applications (Kolb, 1984; Kolb et al., 2001). This learning produces changes at cognitive, behavioral and attitudinal levels in students (Cayne, 2014; Illeris, 2007; Wright, 2000; Yeo & Marquardt, 2015). Moreover, it offers the opportunity to put into practice the knowledge acquired in real situations, modeling the appropriate behaviors and procedures to be carried out (Knobloch, 2003).

Through this methodology, students go beyond memorization, moving towards the analysis and application of what they have learned, reflecting on the conditions in which the transference of their knowledge is useful (Bransford et al., 2000; Zelechowski et al., 2017). The student plays an active role in the construction of knowledge through learning by doing (Newns et al., 2015), and the translation of implicit into explicit knowledge (Abdulwahed & Nagy, 2009).

Experiential learning is often related to activities associated with practice such as work-integrated learning, work-based learning, cooperative education, collaborative learning, service learning, professional development learning, internships, and practices (Harvey et al., 2016). Indeed, there are many teaching and learning strategies that respond to the theory of experiential learning; however, it is relevant to resurface the core aspects of the model. Specifically, experiential learning involves four learning modes, which occur within two phases. In addition, there is a dialectical process within and between each phase. Furthermore, there is a cognitive conflict within each phase, since in the first phase the concrete and abstract are in dispute, going from observation to the conceptualization of a phenomenon, whereas in the second phase, the active and reflective are in conflict, experiencing and then reflecting on the action (Kolb, 1984). Figure 1 shows this model.

Figure 1

Experiential Learning Model



The two phases of this model and the two learning modes within each phase are described below:

Phase 1: Capture the experience.

This is a stage, in which students must carry out an inductive thinking process, going from concrete or specific experiences to abstract experiences. Experience is related and deepened, integrating contents to make a more complex analysis (Kolb, 1984). The two modes that conform this phase are the following:

- a) *Concrete experience (CE)*: it consists on experiencing through one's own personal involvement in a specific situation, making use of observation, reading authentic records, and informal conversations, from which a question or problem arises (Calvert et al., 2016). For example, the concrete experience of visiting a nursing home, talking with elderly people and their caregivers, and observing their encounters with their families, may lead to an interest in a particular subject linked to seniors.
- b) *Abstract conceptualization (AC)*: it considers giving meaning to the experience in an abstract way when examining different symbolic means that refer to it. For example, reviewing scientific articles on human development during old age, opinion columns in newspapers, films and documentaries on the subject. Based on this, students write an essay.

Phase 2: Transform the experience.

In this stage, students must display a process of deductive thinking, in which they move from action to reflection (Kolb, 1984). The two modes that conform this phase are the following:

- a) *Active experimentation (AE)*: it emphasizes practical application and implies that students return to the "ground" or reality, to deepen their search for the understanding of a topic, or to

test theories. The idea is that they apply their new knowledge in real-life situations. For example, students can design and apply an interview for elder adults, inquiring about their life experiences and the fulfillment of their cycle tasks, at the stage in which they are.

- b) *Reflective observation (RO)*: the understanding of the studied phenomenon is sought, also, conclusions are drawn on how the previous stages facilitated or limited this understanding (Calvert et al., 2016). Reflection is a process to supports learning, developing higher-order cognitive and stimulating self-regulation and metacognition processes. In addition, reflection on experience provides a link to praxis (Harvey et al., 2016). For example, students can analyze the interview they conducted and make a personal reflection in which each of the previous stages, and the personal experience on the evolutionary stage of older adulthood, are integrated.

It is ideal to have an adequate balance between these four modes of learning. The learner must go through all of them (experience and think, act and reflect), recursively, based on the situation and learning content. The learning process implies that the student moves gradually from actor to observer and from active participation to general analysis (Itin, 1999)

Current Study

The study was conducted in a developmental psychology course that is taught in the third semester of a psychology major. It is the second subject of the developmental area (the first is related to early childhood and the third to adulthood). This subject seeks that students analyze children and adolescents' human development from a relational and situated perspective, considering different development areas (physical, cognitive, emotional, social, and moral), as well as the conceptual and empirical contributions of theorists and researchers who help understanding the changes between these stages.

The implementation of the experiential learning methodology aimed to promote the ability to apply the knowledge of developmental psychology to solve real problems that are close to their profession. Thus, students were asked to build didactic-educational materials that promote children development, considering their interests, characteristics, and the school context in which they learn.

This activity was supervised by the teachers and assistants of the subject and was carried out throughout 17 weeks of classes. The students were divided according to affinity in groups of 4 or 5 people. All of them worked in the same school, but in different grades (first, third or fifth grade). Each group was randomly assigned to a class and a developmental area to work on. The students visited the school and their respective classrooms, carrying out activities of observation, interviews, application and testing of the material. The implementation of the experiential learning activity is described below, considering each of its phases and modes.

Phase 1: Capture The Experience.

1.1. *Concrete Experience (CE)*. After their appointments to each class, the students attended the school to carry out the first stage of visits. They conducted observations during class and break time, along with informal conversations with children and teachers (guided by a semi-structured interview guideline). The objective of the observations and interviews was to investigate children's interests, strengths and weaknesses in the developmental area that was assigned (eg. physical, emotional, cognitive, moral, or social), as well as in educational tasks that required development in that area. This stage considered a minimum of 2 visits and lasted 4 weeks.

1.2. *Abstract Conceptualization (AC)*. Each group organized the information obtained from their interviews and observations. From the analysis of this data collection, they determined contents in which they needed to pay attention to. Accordingly, they reviewed scientific articles and literature, as well as information about existing didactic-educational materials that may be related to the area and questions of interest. This stage lasted 4 weeks and ended with the construction of a prototype of didactic-educational material that integrated the information collected during the visits with the reviewed contents. Each group presented their prototype in their tutorial class in order to receive feedback from the assistant and their classmates.

Phase 2: Transform The Experience.

2.1. *Active experimentation (AE)*. This stage took place at the school. The students presented their material to the children, to assess the didactic-educational resource. On this visit the students had to test their prototypes, in order to see if the objective of the material, the presentation format and its rules, were clear. Likewise, feedback was received regarding its originality, attractiveness and entertaining features, to improve the prototype. This stage lasted 4 weeks and also included a minimum of 2 visits.

2.2. *Reflective Observation (RO)*. Each group had to integrate all the information collected in both stages of the visit, as well as in the bibliographic review. The objective was to improve their didactic-educational material, in order to fulfil the aim of promoting the development of the selected area, responding to the children's interests and motivations, the characteristics of their developmental stage and the challenges they face in that developmental area in particular. Each resource was presented by the group, to an external teaching commission, in which they theoretically and practically had to justify how the material helped to promote school-age development. For this phase, each group was expected to be able to reflect on the whole work process and how they were integrating the information captured through the experience, the bibliographic search and the theoretical classes.

Method

Aims and research questions

The broad research questions aimed to discover if the experiential learning methodology: a) promoted a greater application of the contents, b) improved the ability to solve real problems, and, c) generated a positive perception of teachers and field supervisors regarding the achievement of student learning outcomes.

In this way, the main objective of the study was to describe whether the implementation of experiential learning in a subject makes it easier for students to perceive that they learn better to apply the knowledge of developmental psychology to identify and solve real problems.

Participants

The sample consisted of 57 third semester psychology students, who studied developmental psychology at the Faculty of Psychology of Universidad del Desarrollo in Chile. 33 were women, while 24 were men, with an average age of 19.9 years old (19 being the lowest and 25 the highest age, with a standard deviation of 1.36). 100% of the students took the subject for the first time. 21.1% of students had a grade average between 6 and 7 (outstanding performance), 61.4% between

5 and 5.9 (good performance), 15.8% between 4 and 4.9 (sufficient performance), and 1.8% equal to, or below, 3.9 (insufficient performance). The average grade in the experiential learning activity was 5.9 (the minimum average was 3.9 and the maximum 7.0).

Procedure

Before the semester started, teachers in charge of the subject contacted and interviewed the school requesting authorization to carry out the experiential learning activity. Once authorized, the teachers met with the school's psychologist to explain the objectives and coordinate the activities. Three courses of different levels were selected (first, third and fifth grade). The psychologist contacted the teachers from each grade to explain the activity and its objectives.

During the development of the strategy, their teachers and assistants guided the psychology students. Each data collection instrument (observation guidelines and interview script) received feedback during tutorial sessions. There was coordination with the school psychologist at each stage of the visits, who was present and monitored the students at the school, together with a course assistant. The teachers of the course maintained permanent contact with the institution.

Once the semester was over and the experiential learning activity was evaluated, each group delivered their didactic-educational material to the teacher of the class in which they worked, delivering instructions for its use.

Instruments and Measures

A self-report survey was applied to all students who enrolled in the developmental psychology class and who participated in the experiential learning activity. The survey had 3 parts: the first consisted of 8 questions that assessed the students' perception of their learnings in the activity of experiential learning. These first questions were constructed by the researchers and inquired information about the application of knowledge, the ability to solve problems and give contextualized answers. It was presented in a Likert scale format, in which the students had to select an answer from the 5 options provided (strongly disagree to agree completely).

In this scale, an exploratory factor analysis was performed showing the existence of a single factor (an eigenvalue greater than 1 was presented). The eigenvalue of the component was 6.9 with an explained variance percentage of 74%. This ensures the content validity of the construct that is being studied.

Furthermore, to check the reliability of the instrument Cronbach's alpha was applied. The scale showed a Cronbach's alpha index of 0.89, which ensures that the instrument accurately measures what it claims to measure.

In the *second part* of the survey, the Perceived Learning Scale (PLS) was applied for the subject of Developmental Psychology, and in the *third part*, the same PLS was applied in another subject (Social Psychology), without an experiential learning activity, which the same 57 students took in the same semester. The PLS was constructed by Rovai et al. (2009). It consists of 9 items, which present a series of statements related to knowledge, skills and attitudes that students have developed from their participation in a subject. The scale was also in a Likert scale format, with 5 response options. It was validated in Chile by Herrera (2017), showing a Cronbach's alpha index of 0.80, which ensures the reliability of the measurement.

In addition, a brief survey was applied to the two teachers and three assistants in charge of the developmental psychology course, that consisted of five open-ended questions. These questions inquired about the most achieved learning results, how these outcomes were related to the ability to apply and solve real problems they will face of their future professional performance, as well as, the characterisation of an outstanding and an insufficient performance in the experiential learning activity.

Another survey, with four closed questions, was applied to four professionals from the institution who benefited from the experience, asking about the strengths and limitations of the activity carried out, the quality of the product delivered by the students and the learning results achieved.

Quantitative research methodology was used. Data analysis was made with the IBM SPSS Statistics Version 25 for Windows, IOS and Linux, performing analysis of descriptive statistics and comparisons of means through ANOVA and t tests.

Results

1. Learning perception in the experiential learning activity

The results of the survey related to experiential learning showed an average of 4. The category associated with 4 points means "in agreement" (minimum score 2.25 and maximum 5, with a standard deviation of .76). The highest scores were given in the items referring to the possibility of applying the contents learned and making a contribution from the future profession. The lowest scores were given in the items referred to find meaning and motivate oneself with the topic being studied, but, it is important to note that the score for both was equally high (3.81 and 3.82) and close to the average (4). The fact that these items are slightly lower can be explained due to the requirement and the effort that the experiential learning activity demands. The results are shown in Table 1.

Table 1

Students' perceived learning in experiential learning activity

Items Perceived Learning	Average
This experience allowed me to apply the contents I learned	4.21
In this activity, I felt that I made a contribution from my future profession	4.14
This experiential learning activity allowed me to learn the contents of the subject in greater depth	4.07
I think I will remember more of what I learned, due to the activity	4.07
In this activity, I felt closer to my role as a psychologist	3.96
Because of the activity, I understand the material of the subject better	3.86
The experience motivated me, allowing committing myself more to the subject	3.82
The experience helped me to make sense of what I should study in this subject	3.81

1.1. Gender Differences

To analyse the results of the survey regarding the sex of the students, the ANOVA test found significant differences. Women had a significantly more positive perception than men ($X = 4.17$ vs $X = 3.75$, respectively) of the experiential learning carried out. Results are shown in Table 2.

Table 2

Gender Differences in Perception of Experiential Learning

	Sum of squares	Gl	Root mean square	<i>F</i>	Sig.
Inter-groups	2.47	1	2.46	4.86*	.03
Intra-groups	27.81	55	.51		
Total	30.26	56			

* $p < .05$.

In other hand, no significant differences were found in the perception of the experiential learning activity according to the average grade of students or their age.

2. Comparison of perceived learning

Student learning perceptions and possible impacts of the experiential learning activity were analysed for two subjects conducted in the same semester. The analysis focused on students' ability to apply the knowledge of the course and solve real problems using the theories and concepts. Students answered the Perceived Learning Scale (PLS) for the subject *Developmental Psychology* and for another subject, *Social Psychology*, taught by teachers with equivalent expertise in their disciplinary area, as well as with equivalent duration and academic load (credits), but without experiential learning. Thus, the results of the PLS were compared between two subjects, one which used experiential learning (*Developmental Psychology*) and one that did not (*Social Psychology*). The same 57 students attended these courses during the same semester and year.

The t-test was used for the same sample to perform this comparative analysis. The results show significant differences between the students' perception of learning in the subjects with ($X = 4.35$) and without ($X = 3.81$) experiential learning. The students perceived greater learning in the subject of development psychology that involved an experiential learning activity.

As this was a non-experimental study, this post-intervention comparison (with and without experiential learning) does not allow us to account for the impact of experiential learning on the learning achieved in a subject. There are other intervening variables, such as the content of the subject (developmental psychology vs social psychology), variables of the teachers in charge and the associated teaching-learning process. Therefore, despite having the same students, academic load of the subject, institutional guidelines for the programming of classes and assessments, and belonging to the same program and educational cycle, these results should consider the limitations of not counting with a control group in the subject of developmental psychology. Table 3 shows these results.

Table 3*PLS comparison between groups with and without experiential learning*

	Difference of means	Gl	<i>t</i>	95% Confidence interval for the difference	
				Lower	Higher
PLS with EL	4.35	56	65.69**	4.21	4.48
PLS without EL	3.81	56	34.66**	3.59	4.03

***p* < .01.**3. Perception of teachers and assistants**

The opinion of the course's teaching team regarding the development of the experiential learning activity, as well as the systematisation of the answers, is presented below.

Teachers showed high internal coherence in the answers to each of the questions. They considered that the experiential learning activity was consistent with the learning outcomes that the course should develop in the students. As this subject is responsible for developing diagnostic skills and students' sensitivity to social welfare, experiential learning allows them to transfer knowledge to promote children's development, as well as to practice interviewing and observation skills that involve active listening and group management. In addition, they pointed out that

"to account for the learning objective of the activity, students should achieve: a) identify the main development indicators to be promoted, b) contrast the different development models or theories related to the development area in which they will work, c) integrate the diagnosis with the theory and respect the technical and ethical considerations involved in the interaction with children".

Technical, theoretical and methodological aspects that are central to psychological evaluation processes.

Faced with the question of how this activity is linked to the professional skills that psychologists must develop in the world of work, the team said that it allowed the development of transverse and specific psychologist skills. At the transverse level, the activity led students to develop skills and strategies to detect the needs of a specific group, to communicate with different audiences (children, school teachers, and university teachers), to plan and work in a team. They pointed out that at a specific level:

"it allows them to get to know child and adolescent human development in its different areas, to understand the development in a social, cultural and educational context in which children develop, to search and revise updated theoretical knowledge, and to integrate the theory and practice to favor people's quality of life".

Regarding the limitations of the activity, the team pointed out that, in future experiences of this nature, they hope to provide greater flexibility in the first phase. The teachers said:

"now we think that, after the first visits, we should have allowed the psychology students to define, themselves, which areas of development were necessary to stimulate in schoolchildren, according to the diagnosis made. The assignation of topics could, perhaps, limit their creativity or motivation with respect to the activity, in some groups". On the other hand, they also pointed out the need to consider more educational establishments to enhance the greater variability and diversity of products.

Based on the information collected from the teachers regarding the positive and negative characteristics of the work carried out by the students, Table 4 seeks to differentiate the skills involved in an outstanding and an insufficient performance.

Table 4

Performance characteristics of students in experiential learning

Outstanding Performance	Insufficient Performance
Ability to integrate the theoretical contents, with the diagnosis to identify the problem that would be addressed with the construction of the didactic material	Difficulty relating the theories of developmental psychology with practical, procedural and contextual aspects.
Ability to justify their decisions in relation to the school context, the needs and interests of children and theoretical knowledge in developmental psychology.	Having difficulty integrating the diagnosis with the theory, so the product (didactic material) was very theoretical, unattractive and did not catch the opinions of the children, or it was playful, but it did not respond to the theory, but rather to common sense decisions.
Autonomy in the search for information related to the work area, as well as the development of each of the work stages.	Difficulties to organise and plan their work and monitor its proper compliance.
Systematic work throughout the semester that demonstrated teamwork, planning and commitment.	
Good group management when conducting group interviews with the children, which allowed them to gather valuable information from them.	
The ability to solve problems by finding clever and original solutions to the problems that were posed to them.	

Table 4 shows that integration capacity is one of the characteristics present in an outstanding performance and is absent in one rated as insufficient. Therefore, the ability to integrate theory with practical activities that allow diagnosing and identifying a problem (in an area of human development) is a crucial point for a good performance in experiential learning. Also, to the ability to justify their decisions and solve problems through intelligent and original solutions, showing autonomy, planning and commitment.

4. Perception of the beneficiary institution

It was possible to survey 3 of the 4 professionals in charge of the school courses in which the psychology students carried out the experiential learning activity. The survey average was 4.2, between 5 and 1 points. The evaluation of the activity was positive, highlighting the quality of the product developed by the students, the approach to their professional role and that the work was contextualized to the reality of the institution. In all of these items, two of the teachers rated the achievement as "good", and the third as "very good". Regarding the contribution to the institution and how much the work responds to the needs of the school itself, two of the teachers gave a positive evaluation (at the very good and good level) and the third was undecided.

Discussion

This article allows to develop a broad knowledge about the experiential learning model and understand how it can be implemented, step by step, throughout a subject in vocational training. In this experiential learning activity, students are forced to use different approaches to knowledge, transforming it from the concrete to the abstract, as well as from the inductive to the deductive. In this dialectical and intellectual work, they face cognitive challenges and solve problems that allow them to arrive at a product that shows a deep understanding of the studied phenomenon.

The results show that, following the phases and modes of experiential learning, the students' had a positive perception about the quality of their learning. Specifically, they valued the opportunity to apply their knowledge, learn in greater depth, remembering it better, as well as being able to make a concrete contribution, from the discipline, to solve a real problem.

The people of the institution, who benefited from the activity, had a positive perception about the experiential learning process that the students experienced. They highlighted the progressive approach that they had to the study phenomenon through a data collection process to identify a problem situation that could be addressed in the subject. They also valued the ability of students to synthesize the experience in a specific product that would allow solving the problem encountered.

This type of pedagogical innovation implies a greater work on the part of teachers, who must initially identify which of the contents and learning outcomes of their course are feasible to be achieved through an experiential learning activity. In addition, they must plan and monitor the development of each of the phases of the activity, assessing the fulfillment of knowledge transformations and providing feedback to the students. Along with this, they require maintaining some contact with the institution or community where the activity is carried out on the ground.

For students, experiential learning constitutes a challenging activity that demands time and effort. It requires working in a team, carrying out work outside the classroom, learning and integrating subject content to make decisions, adapt procedures, contrast different sources of information to identify a problem and apply them to create a product that seeks to solve it.

All this makes experiential learning a valuable tool to teach complex learning that involves cognitive, procedural and attitudinal aspects. It allows students to contextualize disciplinary knowledge and approach the professional role. It also allows teachers to assess competencies in an authentic situation.

What aspects contributed to this experiential learning activity being successful and achieving the desired learning outcomes? Along with the aspects already mentioned in this study, it is relevant to highlight the rigor with which the teachers implemented the activity, following each of the stages and ways of working with knowledge. It is not about implementing any type of work or practice in the field, but precisely promoting the questioning and transformation of knowledge by giving an active role to the student, providing her with agency and autonomy. On the other hand, the selection of the subject, the undergraduate program, the context of application and the teaching work of mediation and guidance, are fundamental.

As future related lines of research, it would be interesting to carry out a study, with the same general design, that includes a control group of students who study the same subject but without applying an experiential learning activity to them. Also, have experiences in other disciplines, from different areas such as engineering or courses in the health area. Experience can also be gain in courses from the first years of an undergraduate program, compared to implementing it in higher courses. This would allow us to conclude more directly about the effect of this teaching and learning strategy. Furthermore, it could be explored, for example, why women have a more positive perception of activity compared to male students.

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