EDUCATING FOR SUSTAINABLE DEVELOPMENT THROUGH INTERDISCIPLINARITY: CONTRIBUTIONS OF EXPERIENTIAL LEARNING IN MANAGEMENT EDUCATION

EDUCANDO PARA O DESENVOLVIMENTO SUSTENTÁVEL POR MEIO DA INTERDISCIPLINARIDADE: CONTRIBUIÇÕES DA APRENDIZAGEM EXPERIENCIAL NO ENSINO DE GESTÃO

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ABSTRACT

When considering the context of unsustainability that we experience, going beyond the reproduction of current social, environmental and economic problems requires a transformation of the education and life approaches, which highlights the importance of Education for Sustainability (EfS). When analyzing the training of management professionals, the importance of EfS is even more evident, considering the impacts of these professionals' decisions on the environment and society. Thus, for the results and objectives of EfS to be achieved, new pedagogical proposals are necessary; EfS finds opportunities in constructivist epistemology learning approaches, such as Experiential Learning (EL). Thus, the present research aims at analyzing the contributory capacity of Experiential Learning for Education for Sustainability in an interdisciplinary initiative developed in management education. Based on interviews with professors and questionnaire application with students, data were collected regarding an interdisciplinary initiative, composed of two courses (Interdisciplinary Project 1 and 2) and its relationship with the EL. The results indicate that, by adopting EL as the background for the development of the initiative, it is possible to achieve the results sought by EfS.
Keywords: *Education for sustainability. Experiential learning. Professional and technological education. Management and business teaching.*

RESUMO

Ao considerar o contexto de insustentabilidade que vivenciamos, ir além da reprodução dos atuais problemas sociais, ambientais e econômicos exige uma transformação da maneira de abordar a educação e a vida, o que evidencia a importância da Educação para a Sustentabilidade (EpS). Ao analisar a formação de profissionais de gestão, a importância da EpS fica ainda mais manifesta, considerando os impactos das decisões destes profissionais sobre o meio ambiente e sociedade. Assim, para que os resultados e objetivos da EpS sejam alcançados, novas propostas pedagógicas são necessárias, a EpS encontra oportunidades nas abordagens de aprendizagem de epistemologia construtivista, como a Aprendizagem Experiencial (AE). Assim, a presente pesquisa tem como objetivo analisar a capacidade contributiva da Aprendizagem Experiencial para a Edu-

cação para Sustentabilidade em uma iniciativa interdisciplinar desenvolvida no ensino de gestão. A partir da realização de entrevistas com docentes e aplicação de questionário com os alunos, levantou-se dados a respeito de iniciativa interdisciplinar, composta por duas disciplinas (Projeto Interdisciplinar 1 e 2) e sua relação com a AE. Os resultados indicam que ao adotar a AE como pano de fundo para o desenvolvimento da iniciativa é possível alcançar os resultados almejados pela EpS.

Palavras-chave: Educação para sustentabilidade. Aprendizagem experiencial. Educação profissional e tecnológica. Ensino em Gestão e negócios.

INTRODUCTION

Increasingly, the world needs for innovative solutions that provide economic growth, social well-being, and equity and also take the environment into account with its needs and limitations. In 2015, the United Nations, along with governments, civil society and other partners, has developed a post 2015 development agenda, the 2030 Agenda, in which countries have had the opportunity to adopt the new agenda of sustainable development and reach a global agreement on climate change and other sustainability challenges. The final version of the 2030 Agenda proposes 17 Sustainable Development Goals (SDGs) with 169 goals on sustainable development issues (UN, 2015).

Through its proposed goals, this work is mainly related to goal number 4 - ensure inclusive and equitable quality education and promote lifelong learning opportunities for all - given that this aspect may be valuable both to support the development of innovative and knowledge-based societies, as well as to address current global challenges and make progress in sustainable development (COLGLAZIER, 2015). Thus, it is considered essential for the achievement of sustainable development to educate with a purpose of fostering thoughts and knowledge towards sustainability, making it the center of the educational process, in which students, through an interdisciplinary approach, can not only learn about the challenges of sustainability but also develop capacities to become agents of change in the legitimacy of sustainable development (ROWE, 2007).

For Leal Filho (2015) education for sustainable development (EDS) seeks to encourage awareness building on the four perspectives that involve sustainable development - ecological, political, social and economic - through an educational process that uses methods and specific teaching approaches. Although there is no consensus in the literature on the conceptual definitions of the terms Education for Sustainability and Education for Sustainable Development, with epistemological differences, it is noteworthy that this study assumes both as synonyms, considering sustainability as a consequence of development. sustainable.

In 2030 Agenda, in the specific field of education for adults, the role of Technical and Professional Education and Graduation in promoting sustainability (UN, 2015) is highlighted. This fact reveals the importance of transforming the business technical training into a training oriented to developing professionals with an expanded and committed vision about the challenges of sustainability, at all levels and modalities of teaching.

Thus, internalizing sustainability in the training of future managers reveals itself as a relevant subsidy for a conscious decision making by the individual (SILVA et al., 2013), considering the significant impacts of these professionals' decisions on their physical, biological and social environment. That is why one of the significant challenges of sustainability education is to educate individuals beyond their professional and managerial roles, given the challenges that humanity is facing and will face, being an extra responsibility for management education to reinvent itself (JACOBI; RAUFFLET; ARRUDA, 2011).

Given this, EfS requires participatory teaching and learning methods that motivate and enable students to change their behavior and act towards sustainable development (CARS; WEST, 2014). In this sense, for some authors experiential learning (EC) is one of the most effective ways to promote positive change in individuals and organizations (BADEN; PARKES, 2013; UNESCO, 2017; CORSCADDEN; KEVANY, 2017).

From the EfS perspective, the EL becomes essential for involving the students, developing their critical thinking, problem-solving capacity, and decision-making in contexts of their interest (UNESCO, 2017). Also, one of the characteristics of EL is reflexive action, which is very important when it comes to sustainability. According to Tilbury (2011), critical reflective thinking in EfS is a process that involves an in-depth examination of unsustainability causes and enables learners to recognize the bias and assumptions underlying their knowledge, perspectives and opinions.

Regarding the presented scenario, the general objective of the present study seeks to analyze the contributory capacity of the Experiential Learning for Education for Sustainability in an interdisciplinary initiative developed in management teaching. This is relevant since Brunnell, Brun-

stein and Jaime (2015) affirm that, in the area of management and business, EfS has the objective of ensuring that students consider not only economic issues, but mainly environmental, social, cultural and ethical issues in their decision-making processes, and become active participants in building a fairer society. In addition, for Leal Filho (2015) there is a dearth of studies that document and promote successful EfS initiatives in order to inspire others. Thus, this research seeks to contribute to the consolidation of EL as a tool in the promotion of EfS, considering that in the literature there are few studies that investigate the role that experiential learning can play in EfS (WRIGHT, 2006).

To operationalize the scope of the proposed objective, the study is characterized as qualitative, exploratory type, adopting the case study as a research strategy. As a source of data collection were used documentary research, semi-structured interviews with teachers directly involved with the initiative, participant observation and questionnaires, which were applied to students.

Therefore, this paper is structured in six sections; this introduction is the first one. In sequence, the second section reviews the main concepts and the literature on the themes of education for sustainability and experiential learning. The third section approaches the course and the methodological procedures used to carry out the research. Thus, in the fourth section, the results obtained with the study are presented; they are then discussed in the fifth section. Finally, the sixth section presents the final considerations.

EDUCATION FOR SUSTAINABILITY

The concept of sustainable development (SD) became popular through the Brundtland Report - "Our Common Future", created by the World Commission on Environment and Development (WCED) in 1983. In 2002, the World Summit on SD expanded its standard definition with the three widely used pillars of sustainable development: economic, social and environmental (KATES et al., 2005). Elkington (1999) called the sustainability tripod the "Triple Bottom Line", model of social change that starts from the idea that organizations must measure the value they generate or destroy in the economic, social and environmental dimensions. As the studies on the subject move forward, Ignacy Sachs includes in his definition of SD some other dimensions, such as: social, ecological, environmental, economic, national and international, cultural and territorial politics (SACHS, 2002). Thus, Sachs (2002) turns it clear that, in order to achieve sustainability, we must value people, their customs and their knowledge.

In this sense, education is seen as a fundamental piece in seeking reflections and responses about reality in order to modify old unsustainable practices (FIGUEIRÓ; RAUFFLET, 2015). Reinforcing, Dubey, Gunasekaran and Deshpande (2017, p.34) argue that "public awareness, education and training are fundamental to moving society towards sustainability". In 2005, UNESCO launched the "Decade of Education for Sustainable Development" (DESD) initiative, characterizing EfS as quality education, which must be holistic and multidisciplinary, aiming the acquisition of values, stimulating participatory decision-making, being closely related to local life, developing critical thinking and problem-solving ability, resorting to multiplicity of methods and possible to be applicated.

The 2030 Agenda for sustainable development sets goals (SDGs) clustered in essential areas of crucial importance for humanity and the planet according to UN (UN, 2015), such as people, planet, prosperity, peace, and partnership. To achieve success in the SDGs, Colglazier (2015) focuses on three main issues: (i) using the Global Sustainable Development Report (GSDR) process - which has the role of monitoring and reviewing the 2030

Agenda - to link the SDGs and the scientific society, (ii) choosing goals, indicators and roadmaps related to science, technology and innovation, and (iii) the imperative of building knowledge-based societies.

It is remarkable that, in order to achieve sustainability, it is of the utmost importance to think about strategies for sustainability education, in view of which "our greatest legacy for future generations, besides avoiding wars and conflicts, may be building knowledge-based societies and accelerating the expansion of scientific knowledge and useful technologies" (COLGLAZIER, 2015, p.1050). Because of this, the fourth objective of the Agenda (Quality Education) seeks to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for all. According to the Agenda content, education plays a key role since "promoting empowerment of individuals is the core of this goal, which aims to widen the opportunities of the most vulnerable people on the road to development" (UN, 2015).

Cars and West (2014) acknowledge that the nature of EfS is interdisciplinary, dealing with multiple dimensions. For the authors, EfS allows individuals to acquire knowledge, skills, attitudes, and values that are needed to shape the sustainable future, which requires teaching and learning participatory methods that motivate and enable students to change their behaviors and take action in favor of the SD. Thus, the EfS promotes competences such as critical thinking in order to predict future scenarios and make decisions in a collaborative way (CARS; WEST, 2014). Likewise, Jacobi, Raufflet and Arruda (2011) claims that the actions of EfS should be based on pedagogical approaches aimed at criticality, change of attitudes and behaviors, participation of the entire society and the development of social organizations. In this way, the integration of sustainability in teaching is strictly linked to knowledge development, abilities and emancipatory skills, in order to provide conditions to understand and transform the world for the students (Wals and Jickling, 2002).

However, the implementation of sustainability in educational institutions faces several challenges. Jacobi, Raufflet and Arruda (2011) highlight three main ones: i) fragmented approach to sustainability, not addressing

in depth all the necessary dimensions, ii) courses grouping in universities, which makes it challenging to promote interdisciplinarity (a mandatory condition for EfS), requiring new teaching and learning approaches, such as experiential learning, and (iii) an organizational process within institutions, which should address sustainability in a broad and systemic way to involve all stakeholders. According to the authors, the experiences and educational practices of this new way of education are still recent and incipient, which makes actions that aim to stimulate the interaction and interdependence among the courses and between the people essential as they seek the development of new interactive methodologies.

Down (2006) addresses in his study the main challenges of integrating EfS into the curriculum. Among the challenges, the author highlights the team involvement in the reorientation of the course to address sustainability, from the need for awareness to recognize the legitimacy of the issue and the development of a holistic and interdisciplinary pedagogical approach. In addition, it also highlights the challenge of making EfS no longer a personal initiative of a teacher but rather a policy within educational institutions. The author points out that this process is slow and should be continuous, starting from the construction of dialogues between teachers and school councils, working with concepts and programs of environmental education and attitudes and values campaigns focused on sustainability.

Corroborating, Thomas, Hergarty, and Holdsworth (2012) identify some key inhibitors of EfS as lack of understanding and training for academics, nature of contested sustainability, already crowded curriculum, time and resources required for knowledge dissemination, and development of knowledge. ability for the academic community and cultures and disciplinary premises. For the authors, there is no clear action that is able to remove these inhibitors, there are a number of elements that need to fit together, like a puzzle, to aid the implementation of EfS in a particular university.

Brunnquell, Brunstein, and Jaime (2015) state that in the area of management and business, the EfS's goal consists in broadening the decision-making processes of the students, beyond the economic issues but

also for the environmental, social, cultural, and ethical issues, demanding for active participation in building a just society. Thus, Vasconcelos, Junior and Silva (2013, p.56) affirm that management education in the context of sustainability is a socially constructed process that requires "a set of changes that encompasses curricular reform in the broadest sense, which implies on changes in the learning approach and locus concerning frequency, methodologies, content, and processes used".

According to a study by Berchin et al. (2018), inter and multidisciplinary approaches are indicated by the scientific literature, as well as by the research topics investigated in the research, as essential for sustainability, since they provide a holistic view on the subject. Jiji et al. (2015) state that interdisciplinary relationships, dialogue and integration between the curricular components of various areas of knowledge, are essential for the success of sustainability projects. Therefore, according to Howlett, Ferreira and Blomfield (2016), an interdisciplinary approach focuses on the promotion of different ways of looking at the world, encouraging autonomy, self-determination, critical thinking, reflective capacity and the development of what could be called "planetary consciousness."

Thus, seeking to work with interdisciplinarity and more practical approaches, from the perspective of EfS, one opportunity is the development of EL (JACOBI; RAUFFLET; ARRUDA, 2011), focus of the next section.

The Experiential Learning Theory and EfS
From what was previously exposed, EfS requires not only instrumental learning but also one that looks at the changes in students' perception, values, and attitudes. These changes require the implementation of active methodologies in the classroom that bring students closer to their environment reality (BRUNNQUELL, BRUNSTEIN, JAIME, 2015). Brundiers and Wiek (2013) highlight that the literature emphasizes the potential of collaborative, contextual and constructivist approaches for the development of possible solutions to real-world sustainability problems, being the most suitable for the students' sustainability training. Howlett, Ferreira, and Blomfield (2016) states that constructivist learning approaches assume that

students learn best when they are actively involved in building knowledge in a framework of their own experiences, rather than passively receiving information passed on to them through books or professors.

Still, when analyzing and documenting several studies, Tilbury (2011) shows that active and participative learning processes are perceived as the most appropriate for learning EfS. According to the author, active and participatory learning encourages students to i) ask reflective and critical questions; ii) clarify values; iii) project a more positive future; iv) think systematically; v) respond through the application of learning; and vi) explore the dialectic between tradition and innovation, which makes them commonly considered one of the main processes underlying EfS.

Within the approaches aligned with the objectives of active learning, there is the experiential learning (EL) (KOLB, 1984). The author presents six main propositions about the experiential learning theory (ELT), according to Figure 1.

Figure 1 Propositions on the experiential learning theory

Proposition	Definition
1 Learning is best conceived as a process, not in terms of results.	Knowledge is a transformation process that allows people to change their vision of the world from their experiences.
2 Every learning is a relearning.	Knowledge is derived and tested constantly in the experience of the individuals, and this process is continuous.
3 Learning requires resolving conflicts among dialectically opposed modes of adaptation.	In the learning process, the student is invited to move among opposing modes of reflection and action, feeling and thinking.
4 Learning is a holistic process of adaptation.	Learning involves the integrated functions of the whole organism, not limited to a single or a few human functions such as cognition or perception.
5 Learning involves synergistic transactions between people and the environment.	The transactional relationship between people and the environment implies a more fluid, interpenetrated, relationship among the subjective and objective conditions of experience.
6 Learning is the process of creating knowledge.	Knowledge is the result of the transaction between social and personal knowledge.

Source: Based on Kolb (1984).

Kolb (1984) also highlights the reflexive/active dialectic, which consists of two opposing ways of transforming the apprehension or "figurative representation" of experience: i) internal reflection, called intention, in which the student seeks to reflect on previously acquired knowledge and; ii) external active manipulation of the external world, called extension, which requires the individual to seek interaction with an external environment (KOLB, 1984; KOLB; KOLB, 2005). For Kolb (1984) the EL process comprises a four-step cycle, according to Figure 2.

Figure 2 Experiential learning conceptual model
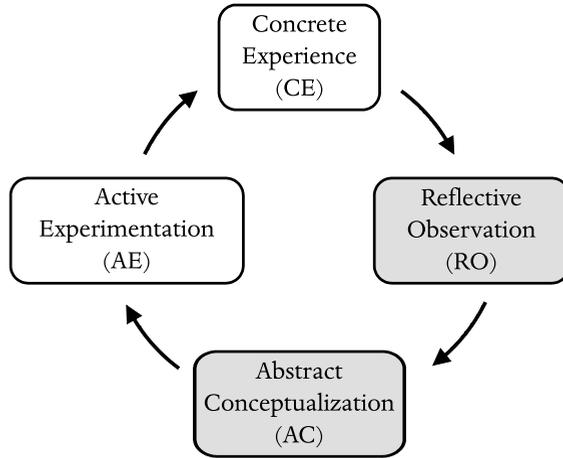
Source: Adapted of Young (2002)

In this cycle, we observe the Concrete Experience (CE), in which there is full and without bias involvement of students in new experiences, followed by Reflective Observation (RO) which consists in the reflection and observation of their experiences, from several perspectives, and then it comes the Abstract Conceptualization (AC) involving the ability to create concepts that integrate their observations into theories and, finally, these theories should be used for decision making and problem solving in Active Experimentation (ALVES; TOMETICH, 2016).

It is noteworthy that in this study, the conceptual model for business learning developed by Krakauer, Serra and Almeida (2017) was adopted, considering that the Kolb (1984) model was developed for postgraduate students and the model of Krakauer, Serra and Almeida (2017), as shown in Figure 3, was adapted for undergraduate students, getting closer to the reality of a technical course.

Figure 3 Conceptual model of experimental learning
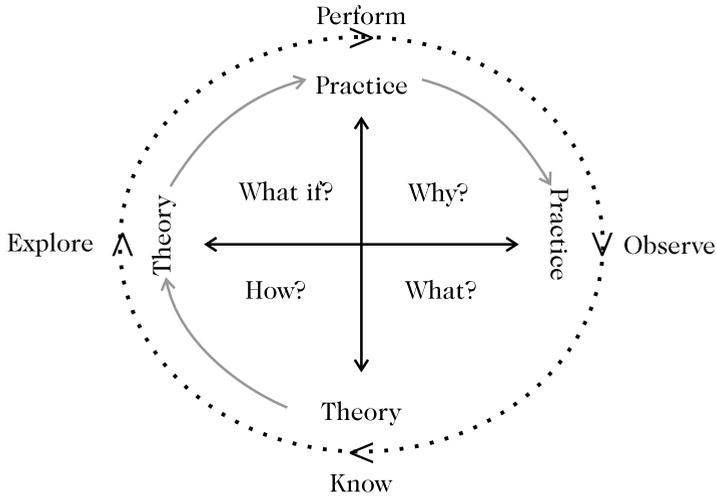
Source: Krakauer, Serra and Almeida (2017).

In this study, it was adopted the conceptual model for business learning developed by Krakauer, Serra e Almeida (2017) (Figure 2) since it was adapted for undergraduate students, approaching the reality of a technical course. According to the authors, the model supports Kolb (1984) in addition to the studies of Sharlanova (2004) and incorporates elements of Belhot (1997), rethinking the four main stages of the cycle of EL, whereas it considers not only concrete experiences but mainly the substitutive experiences for the student's reality. Students who for the most part do not have professional experience outside the academy.

According to Krakauer, Serra and Almeida (2017), the model safeguards the one advocated by Kolb (1984) added to the studies by Sharlanova (2004) and incorporates elements from Belhot (1997), incorporating the quadrants "Why?", "What? "," How? "And" What if? ". Thus, the four main stages of the EL cycle are rethought considering that it starts to consider not only concrete experiences, but mainly substitutive experiences for the students' reality, since most of them do not have professional experience abroad of academy.

METHOD

Based on the proposed objective - to analyze the contributory capacity of Experiential Learning for Sustainability Education in an interdisciplinary initiative developed in management education – the current research is exploratory qualitative, using the case study as the strategy.

According to Sampieri, Collado and Lucio (2013) the qualitative research aims to understand the phenomena explored from the perspective of the participants, deepening their experiences, their points of view, opinions and meanings about the subjectivity of their reality. Regarding the exploratory nature of the research, it is justified by the objective of examining a little-studied subject, about which there are many doubts or has not been addressed before (SAMPIERI; COLLADO; LUCIO, 2013). Besides, the case study is adopted as a strategy in the present research in order to "investigate a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined" (YIN, 2015, pp. 32).

The unit of analysis defined is the Technical Course on Integrated Administration for Secondary Education of the Federal Institute of Education, Science, and Technology of Rio Grande do Sul (IFRS) in the Canoas campus. The study included four professors of the Technical Course in Administration integrated to the High School of the Canoas campus and also forty-five students, of whom twenty-five participated in the Interdisciplinary Project 1 (IP 1) and twenty on the Interdisciplinary Project 2 (IP 2). Professors were named E1, E2, E3, and E4; students of the discipline PI 1 as A1, A2, A3 and so on. Yet the students of the discipline PI 2 as B1, B2, B3 and so on.

As a source for data collection, it was used documentary research, semi-structured interviews with professors directly involved with the initiative, participant observation and questionnaires, which were applied to the students. According to Yin (2015) the reliability of a case study may be guaranteed through the use of several sources of evidence. The triangulation process ensures that discoveries in this type of study are convincing and accurate, in order to allow a corroborative style of research.

For the development of documentary research, documents linked to the unit of analysis were collected, such as the Pedagogical Political Project of the Technical Course in Administration integrated with the Canoas High School and the teaching plans of the disciplines Interdisciplinary Project 1 and 2. The interviews were conducted with four professors directly involved with the disciplines of Interdisciplinary Project, namely:

Figura 4 People interviewed in the study

Interviewed	Description
E1	Professor who was responsible for the discipline in the period prior to the research. Area of training: Administration.
E2	Professor responsible for the course during the research period. Area of training: Administration.
E3	Coordinator of the Technical Course in Administration integrated with High School during the research period. Area of formation: Law.
E4	Professor who was coordinator of the Technical Course in Administration integrated with High School in the period prior to the research. Area of formation: Chemistry.

Fonte: Elaborated by the authors.

The scripts of the semi-structured interviews were previously prepared based on the problem, research objectives and literature review. The first one, applied to the professors who teach the course, consisting in two blocks: the elements of experiential learning and the components of education for sustainability. The second on, directed to management professors, is composed of only one block encompassing the learning process in general focusing on EL. All interviews were recorded and transcribed for later analysis.

According to Minayo (2004), in participant observation the researcher is present in the observed social situation, collecting data and being part

of the context that is being observed. From the presence of the researcher on campus and in some classes of the subjects studied, notes were taken in a field diary of aspects related to the principles of EfS and ELT.

The students answered questionnaires, once they were applied during class and aimed to collect data about the students' profile, their previous knowledge about sustainability and their perception about the inclusion of sustainability in teaching management. The questionnaire consisted of eleven questions, six questions related to the profile, three questions about previous knowledge of sustainability (one closed and two open) and two questions about the inclusion of sustainability in management education (closed with space to justify the answer given). In possession of the data, they were tabulated and organized in Microsoft Excel software for further analysis.

In order to organize and summarize the data obtained, it was used the content analysis (GIL, 2017). Thus, according to Ferreira and Loguecio (2014), content analysis is related to text manipulation, interpreting it with the objective of inferring the meanings that go beyond its objective content, going beyond what is in the informed manifestations, identifying subjective elements derived from the conditions of production / reception of the content and the conditions of production of the analysis. The definition of the analysis categories was performed a priori, based on two theoretical frameworks, the first referring to the main components of EfS and the second based on Kolb (1984) with the six basic assumptions of the ELT. It is noteworthy that these categories served as the basis for the researcher to make records and annotations in the field diary during the participant observation in order to systematize the lived experiences for further data analysis.

RESULTS

This section is intended to present the main results obtained with this research. It is highlighted that it is structured in order to initially present the data regarding the professor's perception of both education for sustainability and aspects related to the learning process. In the sequence, the findings are related to the students involved in the initiative studied.

Interview with professors

This analysis is based on documents of the Institution and interviews conducted with four professors directly involved with the courses Interdisciplinary Project 1 and 2. Initially, the interdisciplinary initiative studied is presented and, later, the analysis is divided into two categories: i) Education for Sustainability and; ii) Learning process.

The study was carried out in the Technical Course in Integrated Administration at High School of the Federal Institute of Education, Science and Technology Rio Grande do Sul (IFRS) – Canoas Campus. The Campus was founded on August 25th, 2007 and had its classes started in August 2010. Among the purposes and characteristics of the Federal Institutes defined by Law 11.892/2008, it is possible to perceive a concern with the formation of critical individuals able to observe their reality and act on it through teaching, empirical research, and extension (BRASIL, 2008).

Canoas Campus of IFRS aims to develop a process of insertion of man in society, in a participatory, ethical and critical way, following what is established by the Law 11892/2008. Following these principles, the Technical Course on Integrated Management seeks to qualify professionals in order to meet the demands of the region. Regarding the objective of the course, it is sought to train professionals for administrative functions, as well as to the four axes of the Administration, with technical capacities to perform the functions and activities inherent to the profession. Also, it is possible to note the concern regarding the formation of an autonomous individual, capable of seeking constant improvement and developing crit-

ically to adapt itself flexibly to constant changes in a human, ethical and citizen way (IFRS, 2012).

When observing the curricular presuppositions of the Course, it is possible to perceive a concern with the development and resolution of socioeconomic problems focused on the particularity of the region in which it is inserted. This aspect shows an awareness of local issues value, such as culture, economy, and community needs. It follows some of the prerogatives of EfS, which state that the learning process should be closely related to local life (UNESCO, 2005).

Also, it is possible to perceive a concern about integration and dialogue among curricular components of the several areas - technical area (administration) and three significant areas of knowledge (codes, language, and its technologies, human sciences and their technologies and natural sciences, mathematics and its technologies). These interdisciplinary relationships, according to Jiji et al. (2015), are essential for sustainability projects success. This concern is also evidenced in the interviews, as Professor E4 affirms that "the theoretical proposal of what is an integrated course is very interesting, it appears as a proposal for the integral formation of the subject, in addition to the technical area". Also, regarding the way in which sustainability is approached in the pedagogical project, several references to the theme throughout the text are addressed, covering the three pillars - environmental, social and economic.

Based on the need for knowledge integration, the disciplines Interdisciplinary Project 1 and 2 emerged as a way of ensuring that there was a space in which professors could plan joint activities with other areas of knowledge, in order to make possible, through the research methodology, the integration between the technical formation and the basic formation of the students, which is in agreement with the one defended by Berchin et al. (2018) and Howlett, Ferreira and Blomfiel (2016) regarding interdisciplinarity.

Therefore, the courses in question are structured according to Figure 4, looking at interdisciplinarity and sustainability education.

Figure 5 Interdisciplinary Project courses structure

Interdisciplinary Project	
Stage 1 - Interdisciplinary Project I	Stage 2 - Interdisciplinary Project II
3rd year	4th year
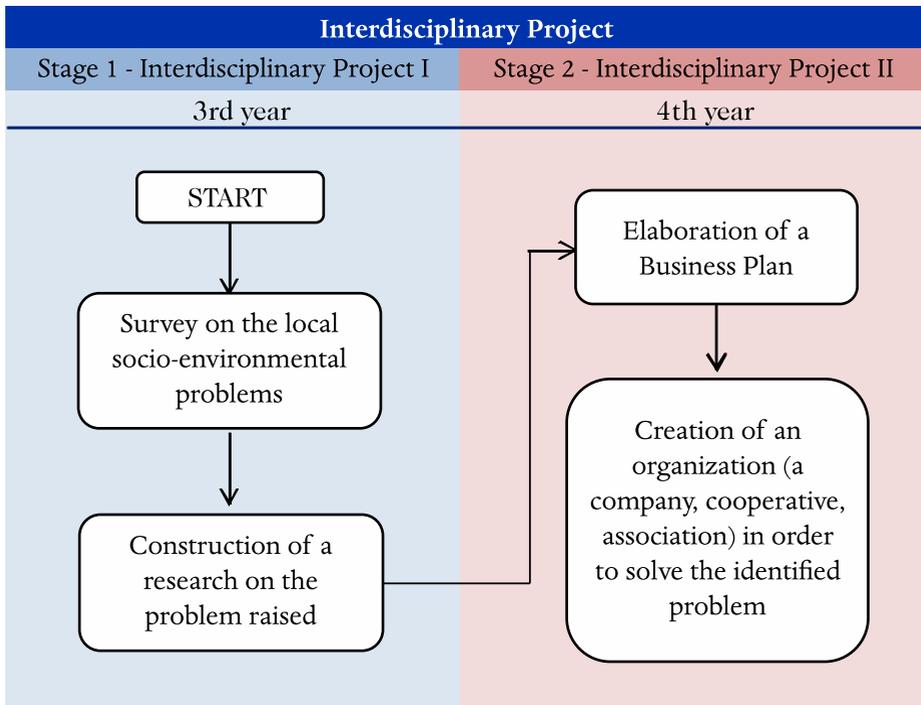
Source: The authors, based on IFRS (2011).

The courses titled Interdisciplinary Project seek to encourage research both to survey socio-environmental problems in the region and to propose sustainable solutions that promote economic, social and environmental balance (IFRS, 2011). Thus, as shown in Figure 5, the Interdisciplinary Project disciplines take place in two stages. The first stage is developed with students who are attending the third year of the course, in which students must raise social and environmental problems in their region, and then, in the fourth year, develop a business plan for an organization that seeks to minimize the problems identified. (PALMA; ALVES; SILVA, 2013).

Thus, Interdisciplinary Project 1 and 2 focus on sustainability, reinforcing the idea of integration among different courses when working together with collective entrepreneurship, social innovation, and sustainability. Thereby, it is intended to integrate theory and practice and, at the

same time, to encourage students to be active and transforming agents of the reality in which they are inserted, using the knowledge constructed throughout the course for the exercise of citizenship and professional practice (IFRS, 2011). From the interviews, it is possible to perceive that the discipline focuses on promoting curriculum research and integration, bringing together the concepts of sustainability.

In presenting the objectives: i) to enable students to understand the systemic relationship that exists among organizations, society and the environment; ii) to present the characteristics of the different types of organizations, as well as individual and collective entrepreneurship; iii) to develop interdisciplinarity and critical sense; iv) to foster Social Innovation and the construction of Sustainable Innovative Organizations, the Interdisciplinary Project courses represent an essential tool for Technical Course in Administration integrated to secondary education to include issues related to EfS in the curriculum.

Education for Sustainability

When considering that Education for Sustainability should seek three primary outcomes, namely: i) students should be knowledgeable about sustainability issues; ii) students must have the skills to act sustainably if they wish and; iii) develop personal and emotional assumptions, beliefs and values that make them behave in a sustainable manner (CHALKLEY, 2006), this section seeks to show how sustainability is treated within the courses Interdisciplinary Project (IP 1 and IP 2) in which refers to the search for such results.

Initially, it is possible to perceive the existence of a significant concern in offering it to the students when concerning knowledge about sustainability issues. The E2 professor, responsible for the courses, when reporting the activities that were being developed at the time of the interview, highlighted the need to present sustainability-related themes in order to legitimize and perpetuate a broader worldview, what goes against the one related to instrumental and reductionist reality typical of contemporary organizations. Thereby, it aims to turn self-aware the individuals of the

society and the world, seeking meaning and questioning previously known ideas and concepts through adopted teaching-learning process. That is, the teaching process seeks to involve an examination of unsustainability causes and enable learners to recognize the bias and assumptions underlying their knowledge, perspectives, and opinions (Tilbury, 2011). Thus, the discipline provides knowledge and encourages critical analysis so that management students can rethink their decisions as consumers and future professionals by emphasizing the role that companies and organizations play in sustainable development.

In addition, Cars and West (2014) show that one of the central points of EfS is its interdisciplinary nature, and EfS should be based on pedagogical approaches that develop student criticality, changes in attitudes and behaviors, as well as participation in society and in the development of social organizations (JACOBI, RAUFFLET, ARRUDA, 2011). Then, when pursuing to attend to these findings, the activities developed along the discipline seek to encourage students to think about different models of organizations, as evidenced in professor E2's manifestation "the idea is that they create organizations that will bring a contribution to society as well, having this more sustainable approach taking care of the economic, environmental and social questions". Thus, the initiative seeks to broaden the students' perceptions about the possibilities of professionals working in the management area aligned with the principles and objectives of sustainability.

On the other hand, some barriers can be identified in the process of sustainability insertion into pedagogical practice, whereas in order for this to be accomplished in a complete way and becoming part of the bases of management education for sustainability, it is necessary to review the models already disseminated in the business world (BOECHAT, GRASSI, 2005), which is portrayed as a difficulty in the professor's statement "I have had difficulty in [...] because the tools I had for the development of a Business Plan were rather traditional tools "(E2). Also, for the success of experiences and educational practices, actions that aim the interaction and interdependence among the courses and among people are essential when approaching sustainability, (JACOBI, RAUFFLET AND ARRUDA, 2011).

However, difficulties such as the curriculum organization by courses and the lack of understanding from the professor on the subject itself are identified as inhibitors in the initiative studied.

Moreover, another aspect that need to be highlighted is the dependence shown by the discipline with the person who teaches it, evidencing a link between the promotion of EfS and the interests of specific professors, demonstrating the difficulty of educators in understanding these educational practices for sustainability, as in: "The objective of this discipline, started by professor E2 in a period when I was absent, and then I assumed the professors discipline, after two or three t had tried it, but it didn't work very well due to lack of focus "(E1). This indicates that all professors, not just those who currently teach the subjects, need to be aware of the necessity and importance of handling sustainability issues in the discipline, so that they are prepared and instrumented to face this challenge, making it without losing the perspective of sustainability in the initiative. Besides, professor statements demonstrate this problem and others such as the crowded curriculum and the high demand for time and resources that inhibit advances in the development of interactive methodologies for the dissemination of EfS.

The stated so far reflects the existence of these courses guarantees an opportunity to work with an interdisciplinary project that evidences the relation among sustainability and other areas of knowledge, it is an auspicious beginning towards the transversal presence of the theme, but there is still a need for a curriculum defragmentation in order to facilitate the visualization of how all areas can relate to sustainability. This finding goes towards the need of adopting differentiated teaching methods that favor the students' learning process. In the next section, it is described how the learning process currently occurs in the courses based on EL.

Learning Process

As mentioned earlier, one of the most complex challenges for EfS is addressing the issue in a multidisciplinary way. With this in mind, the Interdisciplinary Project courses propose the research methodology adoption

to generate a new perspective in the learning process, suggesting collaboration and interaction among professors, students and, the community. According to Professor E2, the research becomes appropriate since the student has the opportunity to "appropriate the subject to understand more about what they have brought, as a problem of their daily lives" (E2).

Thereby, there is a rescue of the apprentice life events in the activities provided during formal education. Then it is expect the development of independent thinking and critical reflection for the construction of new worldviews, as evidenced by professor E2, "to widen their perception, to learn the perception they have is not necessarily what happens in reality, they may be seeing things from the point of view that they live in, show through research that they can start looking at things differently." Then it is possible to associate Professor E2's manifestation with what Kolb and Kolb (2005) assert, that the educator's job is not only to introduce new ideas but also to work with the modification of students' beliefs and perceptions on a theme that can be examined, tested and related to new ideas.

One premise from Kolb's EL (1984) assumes the learning process involving interaction between individual and environment. When asked about how this interaction occurs in the initiative, professor E2 evidenced that the same still happens in an incipient way, since, for most, the interactions are limited to a specific stage of the work carried out during the discipline, which suggests the interest to think in different strategies that seek this greater interaction between the individual with his environment, what makes him feel capable of changing the reality he lives in. In a complementary way, this concern is portrayed in the manifestation of professor E2, who states that "she would like to work closer to the action research and have them intervene in their realities" (E2), the interviewee further states that it is an approach more difficult to be developed due to the demand of time and people to accompany students outside the formal teaching environment. Professor E1 also highlights this problem by stating that "Perhaps if we had another infrastructure like an incubator, something like this [...] I still say that it is not their lack of interest (students) or incompetence, it is often lack of time both of them and ours (professor) "(E1).

Experiential Learning also emphasizes that learning is a human being adaptation process in relation of world changes, being a conception that goes beyond classroom, what involves various stages of human life, its mental, behavioral, and sentimental intelligence (KOLB 1984, LEITE, GODOY, ANTONELLO, 2006). When questioned if they perceive this full involvement of the student in the experience, both professors E2 and E1 agreed that it depends on the profile of each class, and students in the fourth year become less involved with the process since they are endowed with numerous end-of-course assignments. This fact shows, once again, the negative impact of crowded curricula and too much curricular fragmentation in the development of active teaching pedagogy.

Considering that reflection is central to experiential learning process, when asked about this, professor E2 considers the existence of informal spaces for reflection. However, these spaces are limited to the end of the course, not permeating the entire learning process, and it is essential to think about strategies to insert more spaces for reflection during the development of activities. Professor E1 believes that reflection moments with students is "tough because they do not [...] the end of scholar year is right by the corner, there is only the graduation left, they do not even care anymore, they do not even want to hear about classes on their last week... it is a bit complicated "(E1). This fact reveals a limited view of the process of reflection integrated to the educational experiences lived in the course and the need to think about the learning process from the four stages of the EL cycle of Kolb (1984) - Concrete experience, Reflexive observation, Abstract Conceptualization, and Active experimentation.

As Jiji et al. (2015) found in their study, the development of interdisciplinary projects is challenging, evidencing the high demand for experienced and dedicated professors of the most diverse courses. According to the authors, these professionals should be prepared and willing to guide students' groups to go beyond their usual disciplinary boundaries. This challenge is latent in the initiative studied, since all the interviewees reported difficulty in the professors' group work to enable the dialogue among the areas. Although there are still behavioral and curricular components that hinder

this active teaching-learning process, such as the need for professors willing and engaged with the cause and the challenge of these in working in a multidisciplinary way in a logic of integration of knowledge, the initiative is evolving and constituting in relation to professors and students.

Students' perception
Initially, it is necessary to present the configuration of investigated classes, from data collection with participating students in the research, in order of the results understanding is complete. Table 1 presents profile data of students separated by classes, Interdisciplinary Project 1 (PI 1), which corresponds to students in the 3rd year of the course, and Interdisciplinary Project 2 (PI 2) referring to the 4th year of the course.

Table 1 Students' profile data

		Interdisciplinary Project 1	Interdisciplinary Project 2
Gender	Female	**96% (24)**	**85% (17)**
	Male	4% (01)	15% (03)
Age	16 y/o	28% (07)	-
	17 y/o	**64% (16)**	40% (08)
	18 y/o	8% (02)	**50% (10)**
	19 y/o	-	10% (02)
Ever studied sustainability?	No	-	-
	Yes	**100% (25)**	**100% (20)**

Source: The authors.

In addition to the sociodemographic data presented, it is noteworthy that, as far as the contact with sustainability, the totality of students says they have already studied the subject. When questioned about where and when they studied sustainability, the majority, in both classes, claimed it was in the 3rd year of high school, in the discipline Interdisciplinary Project

1 in the IFRS Canoas Campus. Regarding the prior knowledge of the students, when questioned about what they understand by sustainability, the answers are highlighted in Figure 6.

Figure 6 Answers of PI students to "What is sustainability?"

% of students	Connect the concept of sustainability to the	Examples
44%	Environment	A10 - Sustainability is how we take care of the environment by separating the trash, recycling and acting in ways that do not harm the environment. A25 - For me, it is knowing and acting positively with the cycle of things in the environment.
36%	Concept f the Brundtland Report	A5 - To meet the current human needs without the future generations being harmed. A22 - Sustainability is a set of practices that aim to use resources without compromising future generations.
20%	Tripod of sustainability	A8 – To take into account the economic, social and environmental aspects, not harming either party. Always thinking of the good of all parties and especially in not harming the environment. A11 – To maintain the balance between social, economic and environmental, giving due importance to each, without giving greater importance to one or the other.

(IP 1)

to be continued...

... continuation

IP 2	50%	Environment	B2 - It is the modern subject that deals with the preservation of nature and the world we live in. It tries to transform man's relationship with the environment so that this relationship does not become a nuisance. B11 - It is about preserving the environment and knowing how to direct operations in a way that affects it the least possible.
	20%	Society and economy	B3 - It is the balance between environment, society and economy (or capital). B4 - It is the ability to grow economically in harmony with the environment and the society.
	15%	Enterprises and organizational environment	B13 - It's when something isn't useful for one sector, but it may be for another. This way the remains are destined to transforming a product. B14 - It is something necessary to try to preserve the world and bring awareness and a sense of obligation to the companies.
	15%	Other factors	B9 - Attitudes/measures taken to make the world cleaner and better to live in conjunction with technological advances. B17 - Take make use of something in a way that you do not run out of resources so it can always be used.

Source: The authors.

From the answers, it is possible to perceive that the majority of the students of both courses linked their vision of sustainability to the

environmental dimension. Thus, it is interesting to look for advancement alternatives in this perception, in order to include the other dimensions mentioned by Ignacy Sachs: social, ecological, environmental, economic, national politics, international, cultural and territorial politics (Sachs, 2002). So, to make clear that in order to achieve sustainability, people need to be valued, as their customs and knowledge (SACHS, 2002). That is, it becomes necessary an integrative and multidisciplinary knowledge on the most varied aspects of life, in order to think collectively about human development on Earth.

Beyond knowledge about the concept of sustainability, it was sought to investigate how much students relate sustainability with Administration areas. In this way, the following question was asked: "What is your opinion regarding the insertion of themes related to Sustainability in all areas of Administration (Finance, Marketing, Production, People Management)?". The responses are presented in Figure 5.

Finally, the last question asked was *"In relation to your training, you believe that the Sustainability theme is:"*. The answers are shown in Figure 8.

Given the stated above, it is possible to notice that although the students are quite young, aged between 17 and 18 years old, there are already indications of the sustainability incorporation in their formation. As Wals and Jickling (2002) have already stated, sustainability education is linked to the development of knowledge, skills, and abilities that enable students to understand the complex world of which they are part. From the data presented it is possible to note that this is contemplated in the initiative studied. Furthermore, most of the students consider it essential that the sustainability theme is integrated into the teaching of the Administration since it represents an essential dimension in the training of the professionals who will work in companies. However, there is still a need to evolve the understanding of the concept of sustainability in order to cover all of its dimensions.

Figure 7 Students' answers to "What is your opinion on the insertion of topics related to Sustainability in all areas of Administration?"

	% of students	Consider	Examples
IP 1	68%	Very relevant	A1 - Management is directly linked to economic issues, and economics and sustainability must go hand in hand. Nowadays, it is extremely important for managers to have a sustainable thinking that is geared towards all business processes.
	32%	Relevant	A16 - I think the subject is relevant, and that if everyone had access to this knowledge, both compulsory (in the case of insertion in management areas) and optional, since much of what is done wrong is due to lack of instruction.
IP 2	40%	Very relevant	B4 - I believe that sustainability must be integrated into all areas of administration in order to have positive effects in the world, since management is an ever more present and necessary science. B19 – As for managers, we must understand our role in the society and the environment by adjusting our values and behaviors towards sustainability.
	60%	Relevant	B1 - There is no way a company can be completely sustainable, because its activities are not all sustainable, however, it is important for the company to carry out its activities even with few resources, besides not harming the environment in which it is inserted. B7 - It is more relevant in some areas than others, but I consider it a very important topic to be remembered and related in courses.

Source: The authors.

Figure 8 Students' answers to "In relation to your training, you believe that the Sustainability theme is:".

	% of students	Consider	Examples
IP 1	72%	Very important	A3 - Sustainability should be addressed in all educational institutions. From it, society can come into harmony with its surroundings. And for it to be achieved, it needs to be more widespread for society, especially for those who are being introduced into the work activities. A8 - It gives us the perception that not everything is about profit and that we need to think about the world around us and how much we are hurting the environment and the people who live in it.
	28%	Important	A12 - I think my perceptions of what's really important in life begin to change the moment we stop being selfish and start thinking that cooperation must be in the first place. A22 - As I studied the subject, I was able to rethink some things as well as broaden my worldview and critical sense. Still, it has contributed to my growth as a person and a citizen of the world.
IP 2	60%	Very important	B3 - When former student in Management, I must be prepared to perform the functions of the area; the business world often forgets the environmental side, and it is important to promote equilibrium (sustainability) even, and above all, in carrying out those functions. B4 - It is vital for our training as a citizen and person to understand the consequences of our actions in the world, and studying sustainability is a way of thinking about the future and possible alternatives to reverse the current scenario.
	40%	Important	B19 - Because we will be future employees/bosses, we will be in the business market enjoying goods and services that must be thought and manufactured with responsibility.

Source: The authors.

DISCUSSION

The general context for the initiative creation, the courses Interdisciplinary Project, is based on an essential concern with curricular integration and unsustainability of the development system, which culminated in the application of teaching methodologies that could contribute in searching for theory and practice integration, encouraging students to be transforming subjects of their realities through the application of knowledge developed during the course. By using participatory, innovative and interdisciplinary approaches, the need to work with beliefs and value assumptions other than the reductionist and mechanistic views emphasized in traditional approaches emerges.

For Kolb (1984) the learning model consists in a system or complete set of exercises and theories that enables students to go through all phases of learning process, based on experience. Figure 9 illustrates how the four phases of this system are identified in the Interdisciplinary Project (1 and 2), based on the model developed by Krakauer, Serra and Almeida (2017). The initial stage of experiential learning cycle identified in the PI 1 discipline is configured at the moment "to know", in which the students have contact with theory. This stage includes activities in which the professor transmits knowledge related to content concepts such as Organizations, society, and the environment; Sustainability and Organizations; Environmental education; Individual and collective entrepreneurship; Social Innovation and Sustainable Innovative Organizations. The courses development takes place from expository-dialogue classes with a board and audiovisual devices help, for which the responsible professor seeks to involve the students in the classroom.

In the second cycle stage, which comprises the "explore" moment, students are encouraged to relate theory to practice, discussing new possibilities and different contexts. Here, they must map and raise a socio-environmental problem present in their reality, to subsequently become involved in the moment of "accomplish." In the third stage, the students are involved in the elaboration of a research project on the thematic of the problem previously raised. Finally, the last stage of the cycle consists of a

"observing" moment, where students should reflect on the experience in its various aspects.

Currently, no formalized activity embraces this moment, which shows a significant gap, since for Kolb (1984) an activity is only considered an experience if there is a reflection on what has been experienced. It marks the moment when individuals feel and think about what they have just done. Thus, it is important to plan activities for the end of the discipline that seeks to value this moment, such as self-assessment, group and discipline evaluation.

Figure 9 Interdisciplinary Project 1 experiential learning cycle
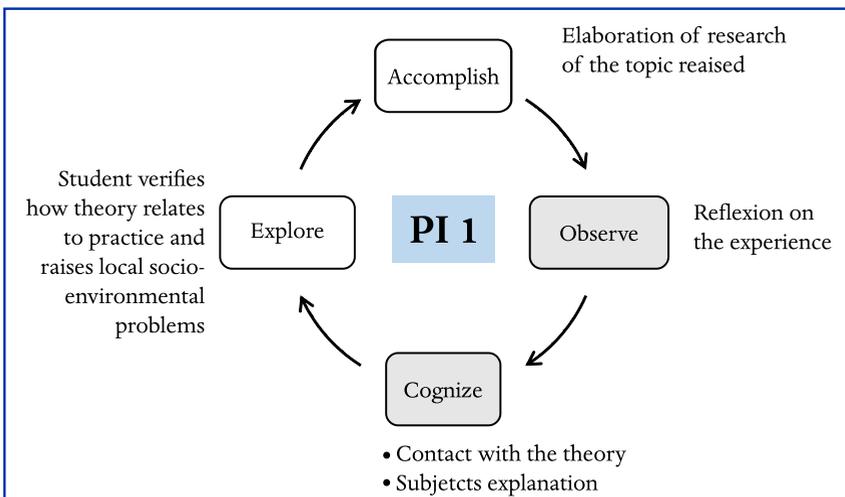
Source: The authors.

In considering that learning is a spiral process, as understood by Dewey (1929), in which previous experiences condition present and future experiences, it is emphasized that experience of the IP 1 discipline is closely related to that developed in IP 2, which is represented in Figure 10. As in IP 1, the experiential learning cycle of Interdisciplinary Project 2 begins at the moment "Cognize", in which the students are put in contact with theory about contents such as entrepreneurship, technological innovation and social, cooperation; joint ventures and; stages of the Business Plan

elaboration. From this, the "exploring" moment begins, and students must relate the theory seen in IP 1 and IP 2 with the practice, so they are asked to think about developing a product or service aiming to solve or minimize the problem identified in IP 1.

Figure 10 Interdisciplinary Project 2 experiential learning cycle
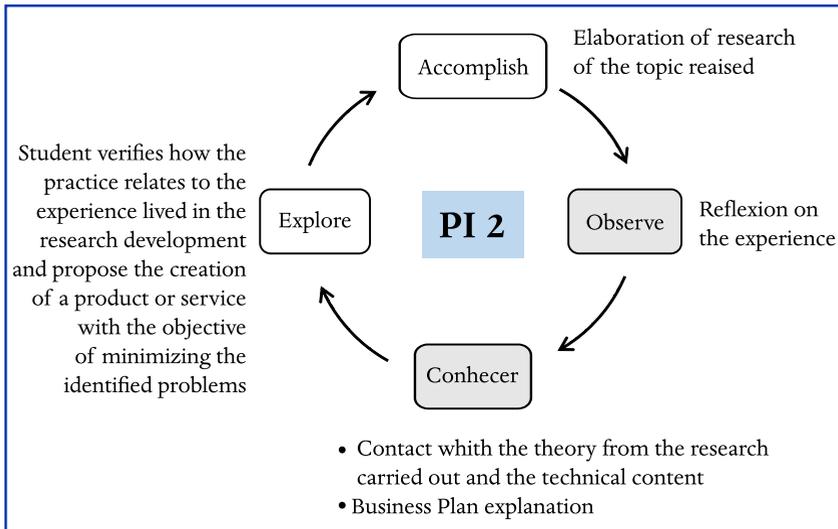
Source: The authors.

Then, at the moment "Accomplish" students must draw up a sustainable Business Plan of the organization that will provide the product or service created. This way, it is worked with Administration technical contents and with the development of creativity to propose sustainable solutions. Finally, as in PI 1, it is necessary to give the students time to think and reflect on the experience in order to observe the details while questioning concepts and theories. For Harvey, Coulson and McMaugh (2016) this process of reflection to try to understand the theory results in a mental structure change, which allows the individual to develop different ways of thinking. Thus, EL is strengthened as a tool in the teaching of sustainability, since it allows the student to develop independent thinking with new perspectives and world perceptions.

FINAL CONSIDERATIONS

This study aimed to analyze the contributory capacity of Experiential Learning for Education for Sustainability in an interdisciplinary initiative developed in management education. Based on data collected and, as portrayed in the responses, it is noted that the discipline has an essential contribution to the development of awareness and knowledge about the sustainability theme. However, it is also possible to perceive the need of making more use of the action dimensions of the experiential learning model in order to approach the theme more practically, and then to develop student's sustainability skills, incorporating them in their daily actions. However, it may be noted that, despite manifesting more superficially, there was development of criticism, systemic view, perspective of future, autonomy, and sense of responsibility on the students who participated in the initiative.

Along the way, research limitations were observed, namely: regarding the number of professors researched, which did not cover all the professors of the course in question and; data collection with students was limited to the questionnaire, which did not allow to have a depth in detail in the collected data. Based on the theoretical approach and results presented, the need to investigate these students as ex-students of the course was identified as a suggestion of future research in order to verify how the former students appropriated the concepts. It is also recommended for a broader study with the professors on the best ways to include sustainability in both fundamental and technical education.

Besides that, it would be interesting to explore the development of competencies for sustainability in other levels of education as in graduation and postgraduation. It is also suggested that other existing initiatives are studied in the light of experiential learning in order to enable the strengthening of ELT in the promotion of EfS from different shreds of evidence of reality. Finally, it is interesting to replicate the study in a private educational institution so that a parallel comparison can be drawn between the results obtained in different contexts.

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