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The construction of interventions based on experiential learning to promote education for sustainability in management teaching

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Abstract

This article employs the experiential learning theory (ELT) through the construction of interventions to promote education for sustainability. This work contributes to understanding how constructivist approaches to learning can lead to a new proposal for management teaching, fostering sustainable development. Observing the need to develop a model, design science research was used as a research method to elaborate and test an artifact. The results demonstrated the effectiveness of the model. They indicated that, by adopting the ELT as a background to develop the initiative, it is possible to achieve the outcomes expected from the education for sustainability, especially encouraging reflections to change behaviors, increasing knowledge, and developing competencies for sustainability.

Keywords: Education for sustainability. Management teaching. Experiential learning. Design science research. Constructivist approaches to learning.

Construção de intervenções a partir da aprendizagem experiencial para promover a educação para a sustentabilidade no ensino da gestão

Resumo

Este artigo tem como objetivo aplicar a Teoria da Aprendizagem Experiencial (TAE), por meio da construção de intervenções, visando a promoção da Educação para a Sustentabilidade. Assim, este trabalho visa contribuir para a compreensão de como abordagens construtivistas da aprendizagem podem levar a uma nova proposta de aprendizagem em gestão, capaz de colaborar com o desenvolvimento sustentável. Para isso, e observando a necessidade de desenvolver um modelo, a *Design Science Research* é utilizada como método de pesquisa, desenvolvendo e testando um artefato. Os resultados demonstram a eficácia do modelo, indicam que ao adotar o TAE como pano de fundo para o desenvolvimento da iniciativa é possível alcançar os resultados almejados pela Educação para a Sustentabilidade, principalmente no que se refere aos aspectos de despertar reflexões para a mudança de comportamento e conhecimento sobre o tema e desenvolvimento de competências para a sustentabilidade.

Palavras-chave: Educação para a sustentabilidade. Educação em gestão. Aprendizagem experiencial. *Design Science Research*. Abordagens construtivistas de aprendizagem.

Construcción de intervenciones desde el aprendizaje experiencial para promover la educación para la sostenibilidad en la enseñanza de la gestión

Resumen

Este artículo tiene como objetivo aplicar la teoría del aprendizaje experiencial (TAE), mediante la construcción de intervenciones orientadas a promover la educación para la sostenibilidad. Así, este trabajo pretende contribuir a la comprensión de cómo los enfoques constructivistas del aprendizaje pueden conducir a una nueva propuesta de aprendizaje en gestión, capaz de colaborar con el desarrollo sostenible. Para ello, y observando la necesidad de desarrollar un modelo, se utiliza la investigación en ciencias del diseño como método de investigación para desarrollar y probar un artefacto. Los resultados demuestran la efectividad del modelo al indicar que, adoptando la TAE como telón de fondo para el desarrollo de la iniciativa, es posible lograr los resultados deseados por educación para la sustentabilidad, especialmente en lo que se refiere a aspectos como despertar reflexiones para el cambio de comportamiento, conocimiento sobre el tema y desarrollo de habilidades para la sustentabilidad.

Palabras clave: Educación para la sostenibilidad. Educación gerencial. Aprendizaje experimental. Investigación en ciencias del diseño. Enfoques constructivistas de aprendizaje.

Article submitted on December 07, 2020 and accepted for publication on May 17, 2021.
[Original version]
DOI: http://dx.doi.org/10.1590/1679-395120200234

INTRODUCTION

Given the ecological, environmental and social crisis that humanity has been going through, educational institutions have increasingly been considered an indispensable component to transform the reality we have been living. In the meantime, especially when it comes to the administration degree, which is responsible for training professionals who will be in charge of local and global organizations, the importance of educational institutions lies in the role of training students on, and for, sustainability.

It is noteworthy that in the context of Education for Sustainability (EfS), the specialized, disciplinary and fragmented thinking that was the basis for organizational management, lose space for the needs of multidisciplinary and holistic thinking, thus, overcoming traditional teaching practices is essential for EfS (Brunnquell, Brunstein, & Jaime, 2015). Czykiel, Figueiró, and Nascimento (2015, p. 359) highlighted that "undergraduate courses in Management must be prepared for students with a greater awareness of social and environmental issues and of their own role within them". Current patterns of education can often contribute to the perpetuation of the unsustainable of the economic development model, resulting in social and ecological crises.

From this perspective, for some authors experiential learning (EA) is one of the most effective ways to promote positive change in individuals and organizations (Baden & Parkes, 2013; Corscadden & Kevany, 2017; Svoboda & Whalen, 2004; United Nations Educational, Scientific and Cultural Organization [Unesco], 2017). That is because it involves the individual completely in the process: his mental, emotional and somatic intelligence, treating the person as a complex living system, in which "EL can be the most ecological type of learning experience, beyond the real-life experience itself" (Svoboda & Whalen, 2004, p. 172).

Therefore, this study aimed to apply the Experiential Learning Theory (ELT) through the construction of interventions, in order to promote EfS in the teaching of Administration. This work aims to contribute to the understanding of how constructivist approaches to learning, especially EL, can lead to a new proposal of learning in management, that is able to collaborate with sustainable development.

Education for Sustainability

Both education and sustainable development are complex issues, which makes it difficult to define a concept when it comes to education based on sustainability. Pidlisnyuk (2010) also considers that there is an obvious interrelationship between education in general, environmental education and EfS, since any real education should work for sustainable development. However, the author points out that the EfS approach is a unique opportunity to review and strengthen education, seeking to encourage and incorporate values, skills and behaviours for a sustainable future.

Considering that the pursuit of sustainable development is an integrated natural, social and economic objective, EfS should also integrate natural, social and economic knowledge (Pidlisnyuk, 2010). Thus, EfS focuses at reorienting education on a global scale which, as outlined in Chapter 36 of Agenda 21, seeks to: reorient education towards sustainable development; increase public awareness; and promote training to develop human resources to facilitate the transition to a sustainable world (Barbieri & Silva, 2011).

For Wals and Jickiling (2002), education should be a way to make individuals self-aware of society and the world, seeking meaning, developing their own potential and creating solutions together. From this perspective, a sustainable world without participation and democracy is unthinkable, and questions about cultural identities, social and environmental equity, respect, relations between society and nature, and tensions between intrinsic and instrumental values must be incorporated to it.

In view of this, to achieve quality education, it is necessary to develop emancipation, local knowledge, democracy and self-determination, which conflicts with the scientificism and technical rationality disseminated in the current educational paradigm (Wals & Jickling, 2002). That is why EfS is an opposite approach to current conceptions of education, as Jacobi,

Raufflet, and Arruda (2011) point out, EfS requires new pedagogical proposals, which are "focused on the criticality of subjects, with a view to changing behaviour and attitudes, developing social organization and collective participation" (Jacobi et al., 2011, p. 28).

Experiential Learning

From the above, the teaching and learning process is especially important in the context of EfS. For Svoboda and Whalen (2004) EL is one of the most effective ways to promote positive change in individuals and organizations. For D. A. Kolb (1984), the individual is integrated into the natural and cultural environment, capable of shaping or reinventing the world, of learning from the transformation of experience, with conscious reflection on experience and not just developing specific skills. From this capacity of adaptation to the physical and social world, the author calls attention to the role that learning has.

In ELT, experience is key to development, it is part of a dialectical and uninterrupted learning process that is present permanently throughout an individual's life (D. A. Kolb, 1984). For Kayes (2002), David A. Kolb's theory covers the life cycle of human development from childhood to adulthood and encompasses activities such as career choice, education, problem solving and interpersonal relationships. Thus, D. A. Kolb (1984) summarizes the fundamentals of the theory in six main propositions (Box 1).

Box 1
Fundamentals of ELT

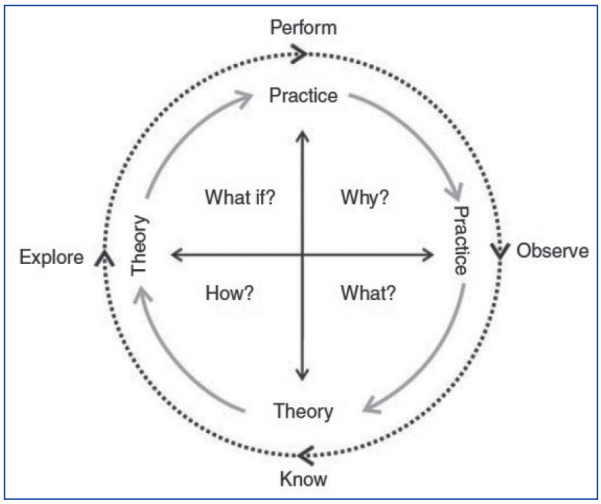
Premise	Description
1) Learning is best designed as a process, not outcomes.	Unlike the idealistic approaches of traditional education, EL does not see ideas, elements of thought, as fixed and immutable, but sees them as elements that are formed and reformed through experience. D. A. Kolb (1984) quotes Freire (1974) to criticize the "banking" conception of education as a mere transmission of fixed knowledge.
2) All learning is relearning.	Knowledge is derived and tested constantly in the experiences of individuals. The process is continuous, occurring throughout life (Dewey, 1938 as cited in D. A. Kolb, 1984).
3) Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.	Conflicts, differences and disagreements are the guides to the learning process. In the learning process, the learner is called to move between opposite modes of reflection and action, feeling and thinking (A. Y. Kolb & D. A. Kolb, 2005).
4) Learning is a holistic process of adaptation.	Learning involves the integrated functions of the whole organism- thought, feeling, perception and behaviour, not limited to a single or a few human functions such as cognition or perception (D. A. Kolb, 1984).
5) Learning involves synergic transactions between people and the environment.	Traditional approaches treat learning as primarily an internal, personal process, limited to the classroom environment, books and teacher. It shows a totally decontextualized learning model (D. A. Kolb, 1984).
6) Learning is the process of creating knowledge.	Knowledge is the result of the transaction between social knowledge and personal knowledge (D. A. Kolb, 1984).

Source: Adapted from D. A. Kolb (1984).

The EL model is based on a four-stage cycle of adaptive learning: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). In this model, both CE/AC and RO/AE comprise two distinct dimensions, each representing two dialectically opposite adaptive orientations.

Considering D. A. Kolb's learning cycle, the conceptual model for business learning developed by Krakauer, Serra, and Almeida (2017) was adopted in this article, as it was adapted for undergraduate students, rethinking the four main stages of the cycle, especially about the moments of "perform" and "explore", since it considers not only concrete experiences but mainly the substitute experiences for the students reality, given that most of them have no professional experience apart from the university. Figure 01 shows the representation of the model used.

Figure 1
EL conceptual model



Source: Krakauer et al. (2017).

In addition to the adaptations made during the stages of the D. A. Kolb cycle, the Krakauer et al. (2017) model incorporates the "Why?", "What?", "How?" and "What if?" quadrants recommended by Belhot (1997), which function as a means of transition between the moments established in the cycle. The Box 2 shows the description of the stages of the conceptual model adopted and its relationship with the quadrants.

Box 2
Description of learning stages model

Moment	Quadrant	Description	
		Students	Teachers
Perform: The student participates in an experience, concrete or abstract, with possibility of using vicarious devices.	**Why is that?** Students integrate their personal values and knowledge with experience.	They exercise creativity, perceive existing problems.	They motivate students by stimulating interest in the topic.
Observe: The student reflects on the experience, observing points of interest, relevant information and other aspects.	**What?** The students work with details, assimilate new ideas and begin to appreciate theory.	They work out the details, look for practical solutions, and start questioning the theory.	Transmit knowledge, discuss and offer information
Know: The student has contact with the theory, understands it and seeks to relate theoretical concepts.	**How?** Students relate theory to practice, seeking optimal answers and solutions to the event.	They consolidate theoretical concepts and solve problems.	They convey skills and tools for solving perceived problems.
Explore: Students check how theory relates to lived experience and try to move forward to understand what could be different in other contexts.	**What if?** Students should be able to transpose what has been presented to them, using knowledge acquired in other contexts.	They apply the knowledge in new situations.	They stimulate the student through the discussion of new possibilities and different contexts.

Source: Adapted from Krakauer et al. (2017).

The model is composed by four moments that help to decide which of them should start the teaching-learning process, according to the predominant learning styles among students (Krakauer et al., 2017). In this regard, the combination of the two dialectical axes results in four possible learning styles: accommodating, divergent, asymmetrical and convergent. According to Cerqueira (2000) the learning styles can be described according to Box 3.

Box 3
Learning styles

Convergent	It combines AC and AE learning steps. People who are inclined to this kind of learning stand out when it comes to finding the practical use of ideas and theories. These learning skills are important because they are effective in technical and specialist careers.
Divergent	It combines the learning steps of CE and RO. People who are inclined to this kind of learning act best when it comes to observing concrete situations from different points of view, and their way of facing situations that require a wide range of ideas, as in a brainstorming session.
Assimilator	It combines the learning steps of AC and RO. People who are inclined by this Learning Style stand out when it comes to understanding a wide range of information and giving it a concise and logical form.
Accommodator	It combines the learning steps of CE and AE. People who are inclined to this Learning Style can learn primarily from practical experience.

Source: Cerqueira (2000, p. 89).

The learning style can be determined by applying the Learning Styles Inventory, a tool developed by D. A. Kolb (1984) and adapted by Cerqueira (2000). The completion of the inventory results in a grid of scores that allows identifying a score for each axis of the ELT. The score determines the aspects that the student most values in their learning process.

In this dialectic, existing in the Kolbian cycle, reflection is a central element in the learning process, since reflection makes learners recognize the bias and assumptions underlying their own knowledge, perspectives and opinions, which is essential when teaching sustainability (A. Y. Kolb & D. A. Kolb, 2005; Tilbury, 2011). In other words, experiential learning theory provides a learning model for adult development, being considered by Kayes (2002) as one of the most influential theories of management learning.

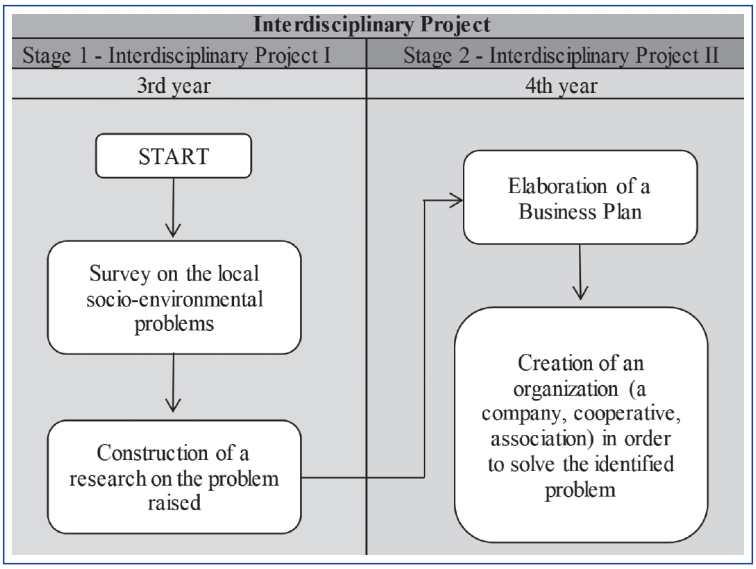
METHOD

In order to achieve the purpose of this study, a research with a qualitative approach was developed using the Design Science Research method. In addition, due to the use of Design Science, the prescriptive character is present, with the conception of artefacts (Dresch, Lacerda, & Antunes, 2015). The proposed design of the research is a conceptual model, considered an artefact, developed to promote the issue of teaching sustainability in management education, in a given context.

A total of 47 students from two classes from the Technical Course in Administration Integrated to High School of the Federal Institute of Education, Science and Technology of Rio Grande do Sul (IFRS) in Canoas participated in this study, as well as 9 teachers from the respective course. The choice for the unit to be analyzed is justified since it stands out in the context of federal institutions for developing several initiatives of EfS (Palma, Alves, & Silva, 2013).

Among these initiatives, work was carried out with subjects that present sustainability as the central theme and aim to work with themes such as collective entrepreneurship, social innovation and sustainability. They were conceived from a constructivist logic and seek to involve students in the creation of solutions to socio-environmental problems mapped in the environment around them (Palma et al., 2013). The subjects are structured according to Figure 2.

Figure 2
Structure of Subjects Interdisciplinary Project 1 and 2



Source: Elaborated by the authors based on Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS, 2011).

In Figure 2, the Interdisciplinary Project 1 e 2 (IP 1 e IP 2) classes take place in two stages. The first stage, in which the students must raise socio-environmental problems of their region, is developed with students attending the third year of the course, to later in the fourth year they are able to develop a business plan for an organization that seeks to minimize the problems identified (Palma et al., 2013).

Of all the students, twenty-seven were enrolled in the subject IP 1 and twenty in IP 2. The working groups of the students will be identified during this study by acronyms. For the groups from IP 1 we have G1 (PI 1),..., G7 (PI 1) and for the groups from IP 2, G1 (PI 2),..., G6 (PI 2). In addition to the students, 9 faculty members described in Box 4 participated in the survey.

Box 4
Teachers of the Technical Course in Administration integrated to High School interviewed in the study

Interviewed	Description
E1	Teacher responsible for the class in the period prior to the research. Training area: Administration.
E2	Teacher responsible for the class during the research period. Training area: Administration.
E3	Coordinator during the research period. Training area: Law.
E4	Teacher who was coordinator in the period before the research was carried out. Training area: Chemistry.
E5	Training area: Biology.
E6	Training area: Mathematics.
E7	Training area: Languages/Spanish.
E8	Training area: Production Engineering.
E9	Training area: Mathematics.

Source: Elaborated by the authors.

Based on the Design Science Research, we used the cycle proposed by Van Aken and Romme (2009), whose procedures were: mapping of the problem to be investigated; systematic review of the literature to enable the development of the model; development of the conceptual model to serve as an artefact; testing of the artefact with empirical application and analysis of results.

To test the artefact, three interventions were developed from the conceptual model. Initially, interventions were performed in the classroom with the students and then, one with the teachers. It should be noted that an intervention was carried out with each class of students.

The intervention with the students was designed to reflect on the concepts and issues of sustainability, relating them to the activities that were already being developed in IP 1 and 2. That is established by considering that learning is a spiral process, as understood by John Dewey, in which previous experiences condition present and future experiences, and reflection plays an important role in this process.

In order to elaborate the interventions with the students, there was a survey of data regarding 1) student profile; 2) previous knowledge about sustainability by means of an individual questionnaire and 3) inventory of student learning styles (Box 3), using the cycle developed by D. A. Kolb, translated and adapted by Cerqueira (2000). The choice was made to survey the learning style inventory since, for D. A. Kolb (1984), the learning cycle can begin at any step, and the learning style can influence that decision.

In the same way, the intervention performed with the teachers approached the reflection on the concepts and problems of sustainability and the importance of the Interdisciplinary Project subjects. It sought to reinforce the initiative with the teaching staff and, concomitantly, collectively build learning on EfS and ELT.

Finally, it should be noted that there were an exploratory stage of research to collect primary data on the reality surveyed. This stage took place through interviews with four professors directly involved with the subjects: E1, E2, E3 and E4.

For the empirical application of the set of interventions seven teachers (E2, E3, E5, E6, E7, E8 and E9) participated. Regarding the qualification of these professionals provided in Box 4, it is possible to note that there were teachers of both basic and technical subjects, as well as those in management positions within the course, which enriched the collection of data.

Finally, a content analysis was performed, with the aims to organize and summarize the data obtained. The interventions were analysed according to the defined categories of analysis: Accomplishment, Theory presentation, Discussion of the subject, Significance and Creativity based on Krakauer (2014). The next section is dedicated to exposing the results found in the study.

RESULTS

Student profile and prior knowledge on sustainability

When it comes to profile, most students were female (96% at IP 1 and 85% at IP 2), aged between 17 and 18 years old and living in urban areas. In addition, it is noteworthy that in IP 1 60% of students do not work and in IP 2, 65% of them do.

As for students' previous knowledge on sustainability, 100% of them have already studied the topic, with the classes being the main channel for this. The data collected indicates the students have knowledge on the subject, which is quite linked to the environmental dimension of it, and consider important that the sustainability theme be integrated into the teaching of the Administration, as it represents an important tool in the training of professionals who will work in various organizations. However, it is still necessary to evolve when it comes to understand the concept of sustainability, in order to cover all its dimensions.

Finally, it should be noted that the projects in which the students are working on the subjects cover the most varied topics. Those that stand out are related to quality of life, health (mental and physical) and food. In addition, social themes are emphasized, mainly, by the groups of IP 1, that deal with issues related to the adoption process, gender identity, standardization of female aesthetics, among others.

Learning styles

From the application of the Learning Styles Inventory (Box 3), it was possible to identify the learning profile of each class, which formed the basis for the construction of the interventions to be performed with the students. The importance of this survey lies in D. A. Kolb's (1984) perception that the learning cycle can start at any moment, and that the learning style can influence such decision. The scenario shown in Table 1 was obtained.

Table 1
Student Learning Styles by Class

Class	Assimilator	Convergent	Accommodator	Divergent	Not conclusive	Total
IP 1	10	14	01	-	-	25
IP 2	05	06	02	05	02	20
Total	15	20	03	05	02	45
Percentage	33,3%	44,4%	6,7%	11,1%	4,4%	100%

Source: Elaborated by the authors.

From Table 1 it was observed that, predominantly, the classes present the convergent and assimilating style, with a greater tendency to the convergent style when considering the total percentage. It is noteworthy that classes that have a predominantly convergent style feel comfortable at the time of AC and AE, are easy to find a practical application for ideas, are great decision makers and like challenges, preferring didactically experimentation, games and simulations (Krakauer, 2014). According to Cerqueira (2000), these learning skills are important because they are effective in technical and specialization careers, which is the reality of the researched classes.

Also, according to Cerqueira (2000), D. A. Kolb's Learning Style Inventory measures how much the student leans on the four stages of the learning cycle. Krakauer (2014) states that classes that begin in the "Know" stage are consistent with the learning style of assimilators and convergent students, since they are in the lower quadrant of the cycle, which makes them feel more comfortable in that stage. The previous information served as basis for the design of the interventions that will be addressed next.

Construction, empirical application and reflection on the interventions

Based on the data presented in the previous sections and aiming to reach the objective of the research, the development of a set of interventions was carried out with students in classes IP 1 and IP 2 and the respective teachers. Thus, initially, it presents the path taken for the conception and execution of the interventions and, later, it analyses the experiences of the students and teachers in terms of initiative and experience.

Design of interventions

For the construction of the interventions performed with the students, we used the data obtained from the the students' identification profile, their previous knowledge about sustainability and learning styles. Considering that both classes, IP 1 and IP 2, present the convergent style as the predominant style, the interventions were planned in order to start at the moment "Know".

Seeking to make sustainability constantly present during the discussions and activities during classes, the interventions were performed on purpose at times where there was no specific focus on the theme. They were carried out when IP 1 students

were focused on writing their research projects and IP 2 students were working with the operationalization of the business plan. During this period, the reflection on sustainability was in the background, not being a central subject of discussion in class in both cases.

Thus, aiming to approach the reflection on the concepts and problems of sustainability, relating them to the activities that were already being developed during IP 1 and 2, the following contents were approached with each of the classes:

1. The various dimensions of sustainability: social, ecological, environmental, economic, national policy, international, cultural and territorial policy (Sachs, 1992, 2002);
2. Sustainability and organizations: the role of companies and the management professional;
3. Sustainable businesses.

The contents were defined as the data obtained from the identification of students' previous knowledge indicated that their views were limited to linking sustainability with purely environmental dimensions. Thus, one of the objectives of the interventions was to broaden the students' perceptions and make them realize how much their projects were related to the theme. In order to accomplish this, different class proposals were used, one for each class.

The first proposal made with class PI 1, part of the AC-AE axis of the ELT, i.e. it starts at the moment "know" of the model used. An activity was chosen in which the students, initially, were exposed to the explanation of the subjects, since individuals in the convergent style prefer understanding the theory and the relation of concepts. We used a Power point presentation was developed to introduce the topic. After, at the "explore" moment, which relates theory to practice with the aim of analysing what could be different and consider new possibilities, the students were divided into their working groups, and should discuss together how sustainability is evident in their research projects.

In the sequence, for the moment "perform", in which the student participates in a concrete or substitute experience, an activity was carried out in which the groups received paper sheets and post-its of different sizes and colours and should build a conceptual map to represent the interrelations between sustainability and the subjects studied in their projects. At this stage, students go through the "what if?" quadrant of the model, where they should be able to transpose what was presented to them, using previously acquired knowledge.

During the activity, the students experienced the "why?" quadrant as they integrated their personal values with what was being creatively analysed for the construction of conceptual maps. Thus, completing the cycle, at the moment "observe" the groups were invited to reflect on the experience by filling out a form, the results obtained are presented in the next section.

The intervention with class IP 2 had the same sequence as with class IP 1, since both have a predominantly convergent learning profile. Thus, it was based on the CA-EA axis of ELT, starting with the "know" moment, in which students were exposed to the concepts of the various dimensions of sustainability, the relation between sustainability and sustainable organizations and businesses. Passing through the "how?" quadrant the students, who already had acquired knowledge throughout the year, sought to integrate theory with practice to find an optimal solution to the problem that was proposed, which in this case consisted of discussing and improving the business proposal they were already working on. They should also insert sustainability and its various dimensions in the practice of their plan, at the "explore" moment of the cycle.

Afterwards, at the "perform" moment, the groups received sheets and post-its of different sizes and colors with the task of proposing sustainable actions/processes/practices in their business model that would be incorporated in the final project, for each of the Administration areas (finances, people management, marketing and production/logistics). Like in IP 1 class, the students experienced the "why?" quadrant as they integrated their personal values with what was being creatively analysed to propose sustainable actions for each of the four areas of Administration. Finally, looking at the students' reflection on the experience in the "observe" quadrant, the groups were invited to answer a form about the activity, the results of which are also presented in the next section.

Regarding the intervention performed with the teachers, it was also structured considering the moments in the conceptual model of Krakauer et al. (2017). It is worth notice that the content to be addressed in this intervention arose from the exploratory stage of the research, which revealed the need to create a space in which teachers' awareness of the initiative and of EfS itself could be strengthened, given the need for trained teachers who are willing to work in an interdisciplinary manner, seeking to advance in the complex learning process guided by the principles of EA and adopting the research methodology as the basis.

The intervention started in the "observe" moment, in which there was the explanation about both Interdisciplinary Project classes, using a Microsoft Power Point presentation to show the conception, structure and objectives of the classes. Going through the "what?" quadrant of the adopted model, teachers were encouraged to talk about their understanding of the interdisciplinarity concepts and EfS. Questions such as, "*After all... what is interdisciplinarity? Why address sustainability issues? What does the Interdisciplinary Project represent within the course? What does each of us have to do with it?*" were used.

Thus, to understand the theory, the "know" moment started with a presentation on interdisciplinarity and EfS, bringing concepts about the theme to integrate them into the observations made. Going to the "how" quadrant and aiming to relate theory and practice, questions such as *"How can I contribute to Interdisciplinarity? How can I contribute to EfS? How can I adapt/bind my classes/subjects to the Interdisciplinary Project?"* were made to teachers so that they could think of an action plan of how they could commit to the discipline and contribute to EfS.

In the next moment of the cycle, "explore", we established a comparison between theory and practice, analysing what could be different and new possibilities for the development of the Interdisciplinary Project. Based on what was said about the Interdisciplinary Project, teachers were invited to think about an ideal scenario and about the need for adjustments, criticism, suggestions, improvements, weaknesses that need to be overcome, which fit in the "what if?" quadrant of the model. During the last moment "perform", teachers were asked to develop an action plan for their performance in class.

Results obtained from interventions with students

As mentioned above, in order to reach the "observe" moment during the interventions with the students, the groups were invited to reflect on the experience by filling out a reaction and feedback form, the results obtained are presented below, just as the analyses of the application of the interventions. The interventions were analysed according to the defined categories of analysis based on Krakauer (2014).

In the first category, *Accomplishment*, both IP 1 and IP 2 groups carried out the activity in accordance with what was requested. It should be noted that when they received the activity, some groups reacted strangely because they could not answer the questions. In IP 1 class, as soon as they were asked to solve the activity, the groups were reluctant to find a solution to the proposed problem, stating that they did not see any link between their project's study topic and sustainability. Similarly, some groups in IP Class 2 stated that their "businesses" were small and did not have well-structured activities for each administrative area, and that they could not therefore define sustainable actions and operations for all areas of management. However, after conversations and research via computers and smartphones, there was considerable progress in the resolution of the exercise.

When analysing the *Theory Presentation* category, which seeks to observe whether the groups researched the authors and materials offered, discussing the theory that supports the theme, we discovered that it occurred partially in class IP 1, considering that the students only used the slides to explain the content. In class IP 2, the groups researched the authors and materials offered, and reports on two companies that integrate sustainability throughout their structure were made available for them. In addition, the slides used for the presentation of the theme were also consulted by the students. Finally, as this was an activity to be constructed and inserted in the final work of the groups, they had to research on the theory that supported the insertion of the theme in their work.

Regarding the category *Discussion of the experience*, in which we analyze whether the students perceive relevant aspects about the experience and show interest in such stage and/or theme studied, there was a positive result, since most of the groups stated to have broadened their vision regarding sustainability and its interaction with the projects that were being developed. The following are some of the responses from the groups in IP 1 class.

> G4 (IP 1) - We understood more about the cultural and social side of sustainability and were able to relate it to our project on aesthetic standards.
>
> G7 (IP 1) - Our perspective on the subject addressed in the classroom has expanded to such an extent that the meaning of sustainability is much broader and more important than we imagined, so that we can correctly conceptualize the impact of our work on society.

Similarly, the following responses were collected with the groups in class IP 2.

> G1 (IP 2) – Before that, we thought sustainability was something related only to the environment, and now we see that it is something bigger.
>
> G4 (IP 2) - With the class, our vision of sustainability was expanded, allowing us to think differently about the decisions made in our organizations.

When it came to the *Significance* category, which tries to provide evidences that students explore the theme to the point of showing new paths or other possibilities for a different context, it was possible to perceive a positive result, considering the groups reported that the theme would be inserted in the final project they were developing. Example:

> G1 (IP 2) – It will influence (our work) since we will change some topics because we used the conventional ones only for not knowing others.
>
> G3 (IP 2) - The group thought about (inserting) actions during the provision of service, supplier relations, marketing, which can collaborate with the environment.

The *Creativity* category aims to identify if the groups brought new elements beyond those requested by the teacher, showing the intention to search for extra knowledge. There was an absence of activities in that sense, since the students focused on what they have been working in class, presenting difficulties in thinking about new ways to solve the problem proposed in the activity.

Finally, in the reaction and feedback form the groups were asked what they thought of the subject and activity being incorporated into the class program for the coming years. The answers can be seen in Table 2.

Table 2
Insertion of the subject and activity in the class

What do you think about this subject and activity being incorporated into the class program for the coming years?			
Class	Not Very Pertinent	Relevant	Very Pertinent
Interdisciplinary Project 1	14,3%	14,3%	71,4%
Interdisciplinary Project 2	-	50%	50%

Source: Elaborated by the authors.

As can be seen, all groups (in some way) consider it pertinent the insertion of the subject and activity in the class, when pondering that the subject contributes to their training as technicians in Administration and also regarding the insertion of the various dimensions of sustainability in their projects, seeking to develop actions that go beyond the conventional ways. In the next section, the main results obtained from the intervention performed with the teachers are discussed.

Results obtained from the intervention with teachers

As well as for those performed with the students, the intervention was analysed according to the defined categories of analysis.

In the first category, *Accomplishment*, which seeks to observe whether the participants carried out the proposed activities during the intervention, it was possible to note that the seven teachers who participated showed interest and became involved with the proposal. Here, it is worth highlighting the difficulty experienced in engaging teachers in these educational initiatives that concern new approaches to teaching and learning.

Thus, one of the reasons pointed out for the lack of teacher involvement is the amount of activities which teachers are involved, which leads to a lack of time to participate in more activities. The important role that the coordination of the course can play in order to promote and stimulate collective discussions about these initiatives is therefore highlighted.

When analysing the *Theory Presentation* category, it is possible note that the teachers were able to relate the theory exposed to practice, since they realized what must do in the course and in the class for the concepts of interdisciplinarity and EfS be implemented in the course. However, there is still much to be done to meet the principles and premises of theory in practice.

About the *Discussion of experience* category, two professors narrated relevant aspects about their perceptions from their participation in the initiative. Both reported the positive impact that participating in the project brought to the progress of their classes, especially the fact that the students were able to perceive the relationship between the different areas of knowledge and the importance of each curricular component within their training. Teacher E6 highlighted the need and importance of establishing a relationship of partnership and dialogue between teachers so that they can align activities in order to enable a coordinated action for integration of knowledge. This coordinated action must presuppose a common methodological perspective, which is the case in this research.

Another teacher calls attention to the fact that the students "demonstrate to be well articulated in this part of interdisciplinarity and are very autonomous" (E7). For her the autonomy is evidenced since the students proposed the idea of work, looked up for information, established dialogue with teachers and managed teamwork. In the same way, teacher E6 relates the autonomy of the students by stating that "something that caught my attention was that after all the stages, if I think what my role was with the seven groups, I practically worked with five groups, it was really orientation, the doubts arose, and they came to me about them".

About the category *Significance*, which seeks to identify the direction of new paths and different contexts, the teachers were encouraged to think of an ideal scenario for the development of the activities of the Interdisciplinary Project, with the objective of proposing an action plan to strengthen the activity at the end of the intervention. Thus, it was established that a space would be created so that, at the end of the first trimester, students could make a presentation of the chosen themes to all teachers of the course. This was thought so that besides the students going after the teachers, the teachers themselves could have an overview of the projects and be able to see in what they can help the groups.

Finally, in the category *Creativity*, which aims to identify the emergence of new elements to those discussed, it was possible notice the emergence of some ideas aimed at integration and interaction between the different courses of the IFRS Campus Canoas. For the teacher E2, this would make the activity more and more practical, allowing students to learn how to work with different areas, knowing how to manage the responsibilities of each one and overcome the obstacles. According to the report, today one of the greatest difficulties faced by the groups is teamwork, and with this integration of the areas the experience would be even more like what they will find in real situations in the job market.

DISCUSSION

From the results presented, with regard to the interventions carried out, it is possible to highlight relevant issues for the insertion of sustainability in management education. The use of the model based on experiential learning integrates important elements for the promotion of EfS in management education and "its value is to propose a consistent and concise view of that empirical experience, a connection between a substantive theory and practice" (Magro, Pozzebon, & Schutel, 2020, p. 15). Despite this, and as reported by the authors (Magro et al., 2020), it is important to stress that the development and implementation of an initiative of this character in a traditional management school is not possible without facing several challenges.

Initially, from the difficulties presented to carry out the proposed activity, it is reaffirmed that to deal with the problems experienced by society, initially the students need to learn how to learn from their experiences (real and imagined), their origins, and how they might develop in the future. Learners must draw on, and learn from theories, concepts, principles, ideas, intuitions, and so on and so forth, to formulate alternatives and actions in response to identified sustainability problems (Bawden, 2016).

Furthermore, the complexity and confusion associated with the concepts of "sustainability" and/or "sustainable development" – already evidenced by several studies (Figueiro & Raufflet, 2015; Lozano, 2010; Miller, Munoz-Erickson, & Redman, 2011; Sekhar, 2020; Steiner & Posch, 2006) – was also reported in the present research, consisting of an important barrier to the practice of EfS, since it limits the ability to perceive and create responses to the problems experienced.

Despite management education gradually including content related to sustainability in recent years (Marathe, Dutta, & Kundu, 2020), it still presents resistance to curriculums and integrative initiatives within formal educational institutions. This was evident from the results presented in which the teachers themselves reported not feeling as comfortable as in more traditional disciplines, evidencing this need to break down barriers and overcome the notorious existing resistance.

Studies such as that of Marathe et al. (2020, p. 385) contribute to the discussion by inferring that current management education with a focus on sustainability creates future executives with greater cognitive empathy, that is, "it's shaping the minds of managers towards sustainability, but not their hearts". Thereby, the authors argue that current management education creates future managers would be more concerned with business sustainability in terms of profit or access to capital, rather than a genuine interest in caring and concern for all stakeholders, society and the environment.

The results obtained with the interventions demonstrated that to advance in an education that moves beyond the traditional methodologies and that aims to break with the *status quo* of maximisation of shareholder value (Marathe et al., 2020), it's necessary to use learning approaches that involve students in their entirety, especially with regard to the development of a more systemic thinking, going beyond the fragmented perception of knowledge. Furthermore, building partnerships enables the empowerment of students to make their own decisions, since it promotes dialogue, negotiation and teamwork, and participation in decision-making, given that the student is placed at the centre of the active and participatory experience with the facilitation of learning by the teacher (Tilbury & Wortaman, 2004).

Finally, as with the results of the study conducted by Haney, Pope, and Arden (2020), it was possible to identify that experiential learning-based initiatives promote knowledge, personal connection and empowerment to act for sustainability. The authors (Haney et al., 2020) highlight in their study that some learning outcomes, especially "personal connection" and "empowerment to act", align strongly with the "softer" side of sustainability competencies needed for sustainability leadership. Similarly, in this research, based on the ELT as a backdrop for the development of the Interdisciplinary Project initiative, it is possible to achieve results desired by the Education for Sustainability, especially with regard to aspects of awakening reflections to change behaviour and knowledge about the theme and the development of some competencies for sustainability.

FINAL CONSIDERATIONS

The present study was developed with the objective of utilizing the ELT, through the construction of interventions, to promote the EfS in the Administration teaching. The scenario for building the interventions was the Technical Course in Administration Integrated to High School of the IFRS in Canoas, given its prominent position the context of federal institutes for developing several initiatives of EfS (Palma et al., 2013).

Thus, based on the ELT, two interventions were elaborated with the students of two Interdisciplinary Project classes and one with the teachers of the course in question. From the application of the interventions and with the primary data collection carried out during the interaction between researchers and research subjects, it was possible to analyse the experiences of students and teachers regarding the EfS initiative that was already being developed.

The data from the empirical application of the interventions built by the authors of this study indicated positive results in terms of the development of awareness and knowledge of students about sustainability. A widening of their worldviews was noticed. Reflections and feedbacks after the interventions showed an increase in the autonomy of students who began to integrate many different kinds of knowledge in the development and implementation of their projects.

As far as application to teachers is concerned, some difficulties have been identified from the teachers who participated in the research in understanding, giving importance to and getting involved with the subject, leaving it up to the teacher alone. In addition, the need to create incentive actions on the part of educational institutions was highlighted, raising the awareness of the teaching staff to the initiative and to the importance of addressing sustainability and its plurality.

In addition, teachers highlighted how much they perceive the development of certain skills in students as autonomy, critical and interdisciplinary thinking when exposed to activities and disciplinary proposals such as those described in this research. After the intervention with the teachers, some strategies and action plans were outlined to be incorporated into the project classes in the following period.

Along the way, some limitations of the research were observed, such as the difficulty of entering an educational institution, with obstacles that prevented a more frequent participation in the unit of analysis. The contribution of this study is noteworthy in drawing attention to the understanding of how constructivist approaches to learning, especially EL, can lead to a new proposal for learning in management, capable of collaborating with the much-desired sustainable development.

Finally, based on the theoretical approach and the results presented, as a suggestion for future research it is indicated to conduct a deeper study with teachers regarding the best ways to include sustainability in both basic and technical education. It would also be interesting to explore the development of competencies for sustainability in all levels of education such as higher and post-graduation. It is also suggested that other existing initiatives be studied in the light of experiential learning, in order to enable the strengthening of TAE in the promotion of EpS from different evidences of reality. Finally, it is suggested to add theoretical lenses of other constructivist strands such as Transformative Learning Theory (Sterling, 1996) and Liberating Learning (Freire, 1974) that can contribute to the discussion of the promotion of EfS.

ACKNOWLEDGMENTS

This research had financial support of the Coordination for the Improvement of Higher Education Personnel – CAPES.

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