EDUCATION FOR SUSTAINABILITY AND LEARNING THEORIES: A BIBLIOMETRIC STUDY FOR THE LAST 10 YEARS

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ABSTRACT

A powerful tool for social change and transformation for sustainable future has been considered Education for Sustainability (EpS). Thus, in order for the expected results and objectives of EpS to be achieved, new pedagogical proposals are necessary, behavioral change and attitudes must be attained from pedagogical approaches that focus on the criticality of students. For this to be possible, EpS finds opportunities in theories of learning of constructivist epistemology, such as: Theory of Experiential Learning, Transforming Learning, Liberating Learning and Social Learning. Therefore, the objective of this study is to identify and analyze the characteristics of scientific publications on the subject of education for sustainability linked to theories of Experiential, Transformative, Liberating and Social learning. The operationalization of the survey took place through a bibliometric study, which has been searched in the Web of Science and Scopus in the last ten years, as well as in the annals of ANPAD events. The results show that these are themes that are evident in recent years, and that the theory of social learning is the one that is most consolidated in the literature when it comes to education for sustainability.

Key-words: Education for sustainability; Theories of learning; Bibliometric research.

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1 INTRODUCTION

The need for changes and transformations in the behaviour of society is imminent so that the current imbalance among social, environmental and economic spheres is overcome, making the concept of sustainable development effective. Much is being discussed about the role of education as an instrument of legitimization in front of the society of effective actions for the positive transformation of reality and the achievement of a sustainable future (JACOBI, 2005, ROWE, 2007, CARS, STERLING, 2011, WEST, 2014). According to UNESCO (1997), although it is not the absolute answer, education is a vital part of efforts to develop new relationships between people and greater respect for the needs of the environment.

In addition, Sterling (2011) highlights the present paradox between the transformative power of education and the lack of correlation between high educational performance and socially and environmentally sustainable behaviour. According to Sterling (2011) this paradox has made educators interested in sustainability and social justice, start to look for possible ways of learning through theories of learning. This corroborates Morin (2000) that education of the future shall integrate knowledge in a multidisciplinary, transversal, multidimensional, transnational, global and planetary way, evidencing the need for a renewal in the current pedagogical models.

According to Jacobi, Raufflet and Arruda (2011), education for sustainability demands new pedagogical proposals which are "centered on the subjects criticality, with a view to changing behaviour and attitudes, to the development of social organization and collective participation "(JACOBI, RAUFFLET and ARRUDA, 2011, 28). In this way, it is understood that the transition from a teacher-based learning model and content to a student-centered approach is necessary.

The core of this process of change lies in the search and integration of different learning theories in pedagogical activity, it is necessary to integrate the constructivist perspective, which sees the student as an agent in the construction of his own knowledge, being able to interpret and represent the world creatively and not just respond to it (MOREIRA, 1999). According to Figueiró (2015), it is necessary to emphasize active, experiential, collaborative and directed learning situations, allowing the solution of local, regional and global problems.

In this sense, approaches such as David Kolb's Experiential Learning Theory, Mezirow's Transforming Learning Theory, Paulo Freire's Theory of Learning, and Theory of Social Learning emerge, with its main representative Albert Bandura as some possibilities of designing and practicing educational forms that favour the creation of conditions that allow sustainable development. It is worth noting that there are other approaches linked to constructivism, such as the theories of Vigotsky, Ausubel, Johnson-Laird, among others (MOREIRA, 1999). However, in this study the focus will be on the four theories previously presented, since when consulting specialists in the area of education for sustainability, they indicated these approaches as the ones that relate more to education for sustainability.

Since the presented panorama, it is interesting to analyze the following research problem: how are the national and international scientific production on sustainability education linked to theories of experiential, transformative, liberating and social learning characterized? Therefore, the objective of this research is to identify and analyze the characteristics of scientific publications on the subject of education for sustainability linked to theories of experiential, transformative, liberating and social learning.

Based on that, it is sought to present evidence, raising information and characteristics to obtain knowledge of the publications related to the topic. When considering the complexity of education for sustainability, which encompasses all areas of knowledge, not only the educational

sciences, the results of this study can help in expanding knowledge about how learning theories can help in achieving the objectives of EfS, considering that not all those interested in EfS have knowledge in education. In addition, insights from this study could benefit a range of institutional processes, from designing and reviewing academic programs (especially new emerging programs), through teaching and learning assessments.

In order to respond to the questioning, the articles published in the last ten years, covering the period from 2007 to 2016, were used as references. The Web of Science and Scopus databases were searched, in addition to the research done in the proceedings of the events of the National Association of Postgraduate Programs in Administration (ANPAD).

2 EDUCATION FOR SUSTAINABILITY AND LEARNING THEORIES

Various agencies and institutions, highlighting the importance of quality education in an integrated and interdisciplinary way (UNESCO, 2012), already disseminate the discussions about education as an essential tool for sustainable development. Thus, education for sustainable development is geared to the reorientation of education on a global scale, as outlined in Chapter 36 of Agenda 21, which 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).

The United Nations has proclaimed the Decade of Education for Sustainable Development (2005-2014), whose overall objective is "to integrate the values inherent in sustainable development into all aspects of learning in order to foster behaviour changes that will create a society sustainable and fairer for all "(DESD, 2005, p.16). The UN seeks to develop society's critical and resolute thinking in order to propose questions about the current context and the possibilities of improving the relationships between the social, environmental and economic aspects of the community in which we are inserted (DESD, 2005).

In this sense, Jacobi, Raufflet and Arruda (2011) affirm that actions of sustainability education should be based on pedagogical approaches aimed at criticality, changing attitudes and behaviours, participation of the entire society and the development of social organizations. In order for these goals to be achieved, it is necessary to think and to do education in a different way from what is done today. Education for sustainability requires new methods and approaches to teaching and learning, we must think both what is taught and how this is and thus, more and more innovative ways of developing students' abilities are to be sought (BRUNDIERS et al, 2010; ROWE, 2007).

Rowe (2007) states that sustainability needs to be the focus of our education efforts. According to Sipos et. al (2008), education for sustainability must be prepared to deconstruct and reconstruct all aspects of teaching and learning. According to the authors, it is possible to change educational standards, which are aimed at unsustainability - social and ecological crises - by directing the pedagogical approach to teaching sustainability - social and ecological justice.

In this context, overreach the reproduction of our social problems, requires transformation to new ways of approaching education and life, demands pedagogical innovations that enable interactive, experimental and transforming real-world learning (SIPOS et al, 2008; BRUNDIERS et al. , 2010; SIVAPALAN et al, 2015). In their study, Brundiers and Wiek (2013) argue that in the recent literature contextual, which are constructivist and collaborative learning approaches on the development of possible solutions to real-world sustainability problems involving stakehold-

ers are best suited for training of students in the field of sustainability.

Given the Monitoring and Evaluation Report on the Decade of Education for Sustainable Development (DESD), Tilbury (2011), analyzing and documenting several studies shows that active and participatory learning processes are aligned with intentions and structures and are perceived as the most appropriate for learning of the education for sustainable development. Active and participatory learning encourages students to: i) ask reflective and critical questions; ii) clarify values; iii) projecting a more positive future; iv) to think systematically; v) respond through the application of learning; vi) explore the dialectic between tradition and innovation, which makes them commonly considered as one of the main processes underlying education for sustainable development (Tilbury, 2011).

Therefore, Sivapalan et. al (2015) argues that pedagogical notions around sustainable development are teaching and learning approaches associated with the theory of constructivism. This is because constructivism sees the student as an agent in the construction of his own knowledge, being able to interpret and represent the world creatively and not only respond to it (MOREIRA, 1999). That is, the emphasis is placed on the involvement and interaction of students, as well as between students and teachers, in a learning community that promotes student centralization, reflexivity and transformation (SIVAPALAN et al., 2015).

From the perspective of constructivism, theories emerge such as David Kolb's Experiential Learning Theory, Mezirow's Transforming Learning Theory, Paulo Freire's Theory of Learning, and Social Learning Theory, with its principal representative Albert Bandura as possibilities of conceive and practice educational forms that enable the creation of conditions that allow sustainable development. Based on Moreira (1999), it is worth noting that in this work the term "learning theory" is used without much rigor, and a learning theory is a human construct to systematically interpret the area of knowledge, representing a point of view of a author/researcher on how to interpret the learning theme, what it is, how it works and why it works (MOREIRA, 1999).

David Kolb's (1984) experiential learning theory stems from the works of Lewin, Dewey and Piaget and consists of an interdisciplinary, holistic, and integrative learning approach that combines experience, perception, cognition, and behaviour (KOLB, KOLB, 2008). Kolb (1984) highlights in his theory the importance of experience, in the sense of experiential experience, for the development of learning and knowledge.

Kolb (1984) defines experiential learning as the process by which knowledge is created through the transformation of experience and summarizes the foundations of theory in six main characteristics: 1) learning is better conceived as a process, not in terms of results; 2) all learning is a relearning; 3) learning requires the resolution of conflicts between dialectically opposing modes of adaptation to the world; 4) learning is a holistic process of adaptation; 5) learning involves synergistic transactions between people and the environment; 6) learning is the process of creating knowledge.

The transformative learning theory emerged from the studies of Mezirow (1978). Transforming learning consists of the process by which change takes place in our frameworks of reference, making them more inclusive, open, emotionally capable of change and reflective (MEZIROW, 1997). Reference frames are structures of assumptions through which we understand our experiences.

According to Mezirow (1997), to transform our frames of reference it requires critical reflection on the assumptions on which our beliefs, interpretations and points of view are based. Sterling (2011) argues that transformative learning refers to a qualitative change in the learner's perception and sense-making in a given learning experience, such that the learner questions or

reformulates his assumptions or thinking habits.

Sterling (2011) also argues that Mezirow's view about the transformative learning has some resonance with Freire's (1972) concept of consciousness that has been very influential in the discourse of critical pedagogy and in circles of emancipatory education. According to Maciel (2011) Paulo Freire was an educator and militant who dedicated his life to the construction of a liberating education, producer of permanent dialogue, which stems from the questioning of the reality of the students for the purpose of intervention in the world.

Still, according to Petroni and Souza (2009), within liberating learning, Freire understands the concept of autonomy as something resulting from the development of the subject, related to the fact that he becomes able to solve questions by himself, to take decisions always consciously and ready to take greater responsibility and bear the consequences of their actions. In addition, according to Freire (1996, 1999, 2005 apud PETRONI; SOUZA, 2009), this model of education provides the acquisition of knowledge respecting individuality, taking into account the previous knowledge of the student.

Finally, the theory of social learning arose in 1970 when Albert Bandura sought to describe how individuals learn and change their behaviour in a social context. According to Bandura (1977), it is possible to explain human behavior through the influences of behavioural, cognitive and environmental structures. That is, the learning of individuals occurs through interaction or observation in their social context (FIGUEIRÓ, 2015).

Social learning has been studied in several areas over the years, including the management of natural resources and the resolution of complex problems, which are characteristic cases of sustainability (HARMONICOP, 2005; GLASSER, 2007; KILVINGTON, 2010). The concept of social learning expands the individualistic meaning of education in which each learning process is influenced by participants' social interactions and the social environment so that mutually agreed solutions are achieved and contextual circumstances are considered (DLOUHÁ et al, 2013). For D'angelo and Brustein (2014) although Bandura's theory (1977) was developed to explain individual behavior, it can also be applied in the investigation of how collective learning occurs.

3 METHOD

With the objective of identifying and analyzing the characteristics of scientific publications on the subject of education for sustainability linked to theories of experiential, transformative, liberating and social learning, the present study was developed from a bibliometric research. Bibliometry, the technique chosen for this study, is dedicated to quantifying, identifying, analyzing and describing a series of standards in the production of scientific knowledge on a specific topic (ARAÚJO, 2006).

With regard to the data analysis approach, the present research is a quantitative nature characterized by data systematics, the use of statistical tools, and the analysis of a specific topic without focusing on issues related to the quality of publications (MEADOWS, 1999; GREGOLIN et al., 2005).

3.1 Data collection

For data collection, the Web of Science (WoS) databases of the Institute for Scientific Information (ISI) and Scopus were used to provide a broader coverage of the subject and to provide useful bibliometric tools for the consolidation of the research. The proceedings of the events of the National Association of Graduate Programs in Administration (ANPAD) were used as well due to its importance in the Brazilian national academic scenario.

It is worth mentioning that the Web of Science is a multidisciplinary database that indexes only periodicals with large numbers of quotations on the web, offering information about the impact and visibility of scientific publications, where scientific production can be analysed with bibliometric indexes and percentage of self-citations, as well as the creation of rankings by numerous parameters (CAPES, 2017).

In summary, the information used in this research was collected through the Web of Science, Scopus system and proceedings of ANPAD events. The accomplishment of the same one was divided into three stages, according to Figure 1.

Figure 1 – Research phas
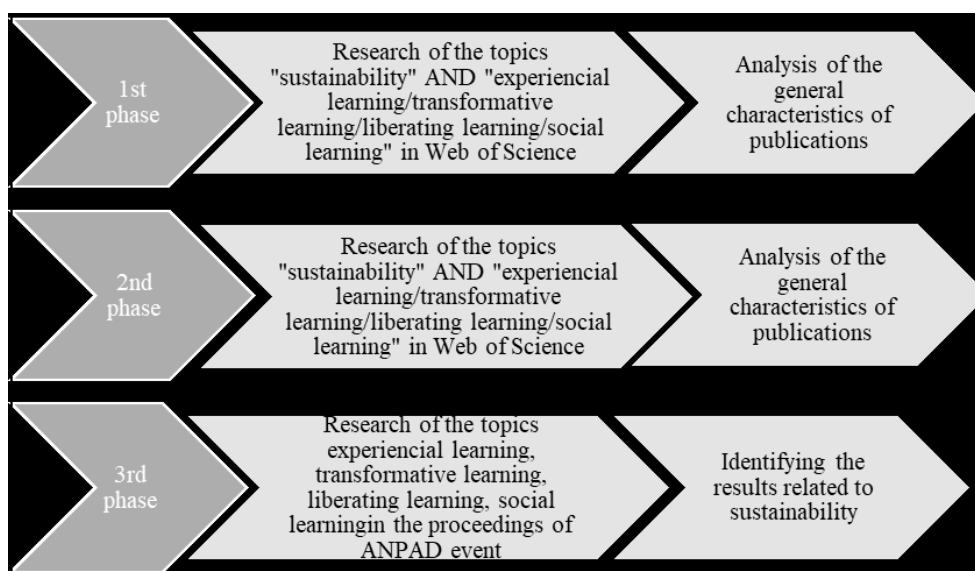
Origin: Elaborated by the authors

Initially, in the first stage through the search engine of the Web of Science, the research was carried out by the topic "sustainability" AND "experiential learning", then "sustainability" AND "transformative learning", later "sustainability" AND "liberating learning / education". Finally, the terms "sustainability" and "social learning" were defined, delimiting all the searches for a period of ten years, from 2007 to 2016, from the Main Web of Science Collection.

It is worth noting that in the search for "sustainability" AND "liberating learning", the research for "sustainability" and "liberating education" was also carried out, aiming at a greater comprehensiveness of search, considering that in the first attempt no answers were obtained. In addition, it is important to emphasize that we chose to use the term sustainability instead of education for sustainability, aiming to find a greater number of works on the theme. Thus, in the second stage of the research, exactly the same procedures were repeated in the Scopus database.

Finally, in the third stage, it was sought data about the national scientific publication regarding education for sustainability linked to learning theories. The operationalization of this stage took place through surveys in the proceedings of ANPAD events. In the search field available in the ANPAD portal, the term "experiential learning" was first inserted in the sequence of transformative learning, after, liberating learning (also sought by liberating education and liberating pedagogy) and, finally, sought social learning. With the results of the search, a selection was made, through the reading of the titles and abstracts available, of the publications that linked the theories in question with sustainability.

3.2 Data analysis

For the data's analysis of the research in the databases of Web of Science and Scopus it was used the resources of analysis of WoS that generate graphs of percentage, based on the conceptual model that seeks to identify the categories arranged in Table 1.

In addition, to analyze the data related to the ANPAD proceedings of the events, characteristics such as title, authors, event and year of publication were used. According to the phases shown in Figure 1, the bibliometric analysis proposed in the present study was performed, the results of which will be presented in the next section.

Framework 01 – Conceptual model for the bibliometric analysis

General characteristics of the publications	
Amount of publications	Source's titles
Tematic areas	Years of publication
Types of documents	Languages
Authors	Countries

Origin: Elaborated by the authors

4 RESULTS

In this section, the results of the research on sustainability and learning theories carried out in the Web of Science and Scopus databases, as well as those of the ANPAD event proceedings, will be presented.

4.1 General characteristics of publications in the Web of Science and Scopus databases

In the first phase of the research, the topics "sustainability" AND "experiential learning", "sustainability" AND "transformative learning", "sustainability" and "liberating education (learning)" are inserted, the terms "sustainability" AND "social learning", initially in the Web of Science database and later in Scopus. The number of records found for each search is shown in Table 1.

Table 1 – Number of publications

Learning theories	WoS		Scopus	
	Records	%	Records	%
Experiential learning theory	78	25%	144	29%
Transformative learning theory	47	15%	78	16%
Liberating education/learning theory	0	0%	0	0%
Social learning theory	189	60%	267	55%
TOTAL	**314**	**100%**	489	100%

Origin: Elaborated by the authors

As shown in Table 1, it is possible to see that most of the publications that link sustainability to learning theories do so with social learning theory, which presented 189 publications as a result of the WoS search and 267 records in Scopus. Already, among the theories researched, the theory of experiential learning is the second one with the largest number of records, 78 in WoS and 144 in Scopus.

Based on the observed results, social learning has been characterized as the main theory of learning linked to sustainability. This may be related to the fact that the locus of this approach is situated in social relations and not only in a cognitive approach. In this way the knowledge and reality are constituted through social interactions, either through the development of practices or joint experiences on the part of the actors involved (BOUWEN AND TAILLIEU, 2004), which is in line with the EfS proposal.

In addition, it is possible to perceive that several studies have argued that experiential learning is one of the most effective ways of promoting positive changes in individuals and organizations (SVOBODA, WHALEN, 2004, BADEN, PARKES, 2013, ALVES, TOMETICH, 2016; UNESCO, 2017, CORSCADDEN, KEVANY, 2017). It is because the theory involves the individual completely in the process: his mental, emotional and somatic intelligence, treating the person as a complex living system, in which "experiential learning may be the type of experience, as well as the experience of real life "(SVOBODA, WHALEN, 2004, p.172).

It is worth noting that no results were found in any of the bases for the search for the terms "sustainability" AND "liberating education", not even "sustainability" AND "liberating learning".

Thus, the general characteristics of publications related to the theme are presented in the following categories: authors, countries, type of documents, languages, year of publications, thematic areas and titles of sources, as previously shown in Table 1.

The main authors who published on the subject researched are presented in Table 2.

Table 2 – Main authors

| Learning theories | Main authors | | | |
| | WoS | | Scopus | |
	Author	Record	Author	Record
Experiential learning theory	WIEK, A.	3	LANDIS, A.E.	5
	SEAGER, T. P.	3	BILEC, M.M.	4
	LANDIS, A.E.	3	ANTAYA, C.L.	3
	ANTAYA, C.L.	3	WIEK, A.	3
Transformative learning theory	SINCLAIR, A.J.	11	SINCLAIR, A.J.	12
	MOYER, J.M.	3	MOYER, J.M.	4
	STERLING, S.	3	STERLING, S.	3
Liberating education/learnin theory	-	-	-	-
	-	-	-	-
	-	-	-	-
Social learning theory	ANGELSTAM, P.	6	ANGELSTAM, P.	6
	AXELSSON, R.	6	AXELSSON, R.	6
	ELBAKIDZE, M.	6	ELBAKIDZE, M.	6

Origin: Elaborated by the authors

It can be observed in Table 2 that the highlighted authors are common in the two databases in which the searches were carried out. In terms of the combination of sustainability and transformative learning theory, the results indicate that the author who published the most on the subject is based on the same number of publications, ANGELSTAM, P., AXELSSON, R. and ELBAKIDZE, M ..

In relation to the countries that concentrate the publications on the subjects, it was chosen to select the three most representative of each, according to data collected in WoS and Scopus. For the search for "sustainability" AND "experiential learning", the main countries that publish on the subject are United States, United Kingdom and Canada. With regard to transformative learning, it is highlighted Australia, Canada and the United States. Finally, when combined with social learning, the United Kingdom, United States and Australia stand out. In addition, it is noteworthy that Brazil is not present among the main countries that publish on the topics, which represents a great opportunity for Brazilian researchers.

Regarding the types of documents found with the search in the Web of Science and Scopus databases, the results can be seen in Tables 3 and 4.

Table 3 – Main types of the documents

Learning theories	WoS					
	Document's types					
	Article	Proceedings Paper	Review	Editorial Material	Book Chapter	Total
Experiential learning theory	56	22	-	-	-	78
Transformative learning theory	38	6	2	1	-	47
Liberating education/ learning theory	-	-	-	-	-	-
Social learning theory	170	10	5	3	1	189
Total	264	38	7	4	1	314

Origin: Elaborated by the authors

Table 4 – Type of document Scopus

Teorias de aprendizagem	Scopus										
	Tipos de documentos										
	Article	Conferen-cePaper	Review	Article Press	Conference-Review	Book Chapter	Book	Editorial	Note	Short Survey	Total
Teoria de aprendizagem experiencial (*experiential-learning*)	95	30	8	2	4	4	1	-	-	-	144
Teoria de aprendizagem transforma-dora (*trans-formativelear-ning*)	55	9	5	3	-	5	1	-	-	-	78
Teoria de aprendizagem libertadora (*liberatin-geducation/ learning*?)	-	-	-	-	-	-	-	-	-	-	-
Teoria de aprendizagem social (*social learning*)	191	16	18	6	1	26	5	2	1	1	267
Total	341	55	31	11	5	35	7	2	1	1	489

Origin: Elaborated by the authors

According to Tables 3 and 4, regarding to document types, it is possible to observe that in the Web of Science and Scopus, the predominance of documents occurred in the format of an article, in all searches performed, independent of the linked learning theory. In addition, another

document format with the highest number of records consists of articles published in events.

It is also worth noting that social learning theory was the only one found in all types of documents surveyed within the Web of Science and Scopus bases, what can highlight the importance and its wide applicability within social contexts (DLOUHÁ et al, 2013).

Next, Table 5 shows the main languages of the publications found in the Web of Science database, for each type of search. It is important to mention that this information was not available for the Scopus database at the time of the research.

Table 5 – Main languages

Learning theories	WoS			
	Main languages			
	English	Espanish	German	Russian
Experiential learning theory	74	2	-	-
Transformative learning theory	46	-	1	-
Liberating education/learning theory	-	-	-	-
Social learning theory	187	-	1	1

Origin: Elaborated by the authors

From the analysis of Table 5 it is possible to notice that, with regard to the main languages of the published publications, there is a great predominance of the English language. The other languages appear less representative and do not have significant differences of representativeness, being: Spanish (experiential learning), German (transformative and social learning) and Russian (social learning).
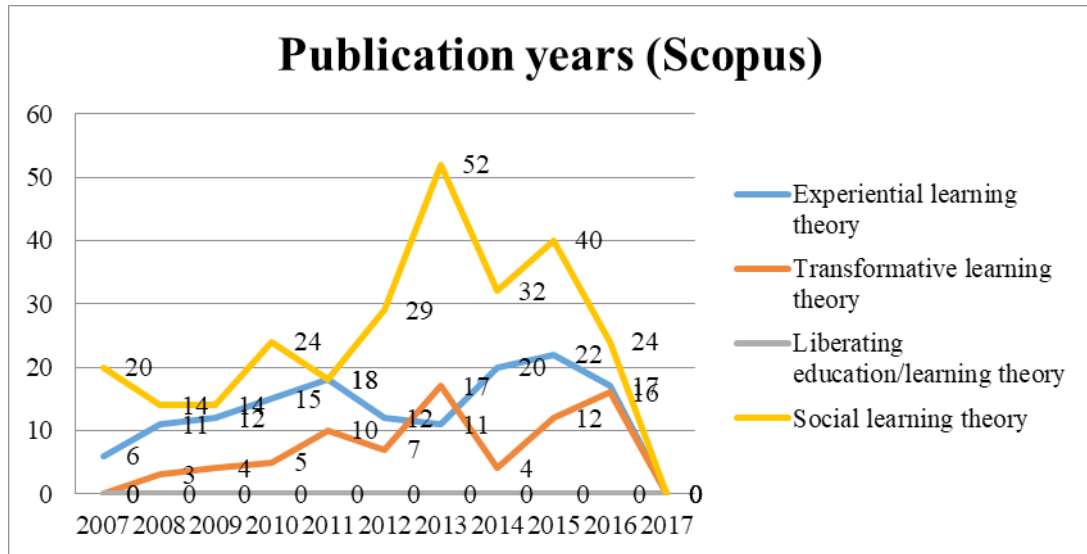
Figures 1 and 2 show the relation of the number of documents to the distribution among the years to which the present research has proposed to research.

Figure 1 – Publication years (WoS)
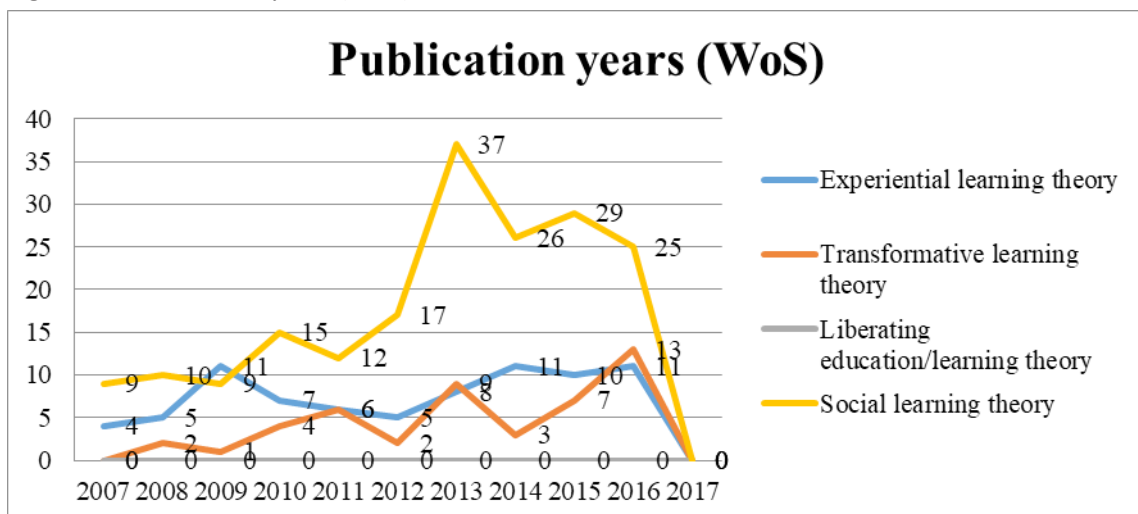
Origin: Elaborated by the authors

Figure 2 – Publication years (Scopus)

Publication years (Scopus)

Origin: Elaborated by the authors

As depicted in the figures 2014, 2015 and 2016 are the years that presented the most documents on sustainability and experiential learning, demonstrating the growing development of studies on the subject in recent years. In relation to the studies on sustainability and transformative learning, it is possible to note that 2013 and 2016 have stood out in publications on the subject, and there is no record of publications on the subject. Lastly, with regard to sustainability and social learning, the year that published the most was on 2013, with a drop in the number of publications in the last two years.

Another categorical aspect investigated consists on the titles of the source, available in the database of Web of Science. The results obtained for the search for sustainability and experiential learning indicate that the two sources with the highest registration number are the International Journal of Sustainability in Higher Education (5 records) and the Asee Annual Conference Exposition (4 records). For sustainability and transformative learning, the sources that stand out are entitled International Journal of Sustainability in Higher Education (4 records) and Environmental Education Research (4 records). Finally, when it comes to sustainability and social learning, Ecology And Society (11 records) and Ecological Economics (9 records) are the most record-bearing source titles.

Finally, the four main research areas, Web of Science and Scopus, respectively, are presented and highlighted in Tables 6 and 7.

Table 6 – Research areas – WoS

Learning theories	WoS				
	Main Research areas				
	Education Educational Research	Environmental Sciences Ecology	Engineering	Science Technology Other Topics	Business Economics
Experiential learning theory	26	21	18	16	7
Transformative learning theory)	23	19	2	11	3
Liberating education/learning theory	-	-	-	-	-
Social learning theory	20	120	18	35	23

Origin: Elaborated by the authors

The Table 6 shows that, according to data from the Web of Science, the areas of Education Educational Research, Environmental Sciences Ecology, Engineering and Science Technology Other Topics stand out in the quest for sustainability and experiential learning, with emphasis on first. When it comes to sustainability and transformative learning, the same thematic areas have stood out, with the exception of Engineering. Following, when analyzing sustainability linked to social learning, the areas of research highlighted are Environmental Sciences Ecology, Science Technology Other Topics, Business Economics and Education Educational Research, being the first most expressive.

Table 7 – Research areas – Scopus

Teorias de aprendizagem	Scopus					
	Main Research areas					
	Social Sciences	Environmental Science	Business, Management and Acco...	Engineering	Energy	Agricultural and Biological Sciences
Experiential learning theory	79	27	26	26	19	5
Transformative learning theory	54	23	13	7	8	6
Liberating education/learning theory	-	-	-	-	-	-
Social learning theory	127	136	42	29	26	38

Origin: Elaborated by the authors

As records showed in Table 7, it is possible to highlight the main areas of research for each search in the Scopus database. Thus, in terms of sustainability and experiential learning, the most prominent areas are Social Sciences, Environmental Science, Business, Management and Accountability, and Engineering. In relation to sustainability and transformative learning, it is highlighted the areas such as Social Sciences, Environmental Science, Business, Management and Accountability and Energy. Finally, with regard to social learning, the focus goes to Environmental Science, followed by Social Sciences, Business, Management and Accountability and Agricultural and Biological Sciences.

As shown in Tables 6 and 7, it is possible to verify the number of publications dealing with social learning within the area of Environmental Sciences, which demonstrates the initial relation of the use of theory with the management of natural resources, as stated in the reference (HARMONICOP, 2005; GLASSER, 2007; KILVINGTON, 2010). In addition, the use of experiential learning in the social sciences may be linked to the fact that several authors classify experiential learning as a key component in the process of integrating sustainability into teaching (Deloemann and Hussing, 2007), being also well mentioned in studies about the teaching-learning process in the courses of management and business (CORSCADDEN and KEVANY, 2017).

4.2 Collecting in the ANPAD proceedings

This section intends to present the national context regarding publications on the subject of sustainability and the selected learning theories. Therefore, surveys were conducted in the proceedings of the events promoted by the National Association of Postgraduate and Research in Administration (ANPAD) in a period of time that comprised the last ten years, due to the relevance of the Association in the national academic scenario of the Administration.

This research phase was accomplished by searching for the terms experiential learning, in the sequence of transformative learning, after liberating learning / liberating education / liberating pedagogy, and, finally, it was sought for social learning in the ANPAD portal search field. The results obtained with the research are set out in Table 8.

Table 8 – ANPAD search results

| Learning theories | ANPAD | |
	Total of records	Relationships with sustainability
Experiential learning theory	5	1
Transformative learning theory	5	2
Liberating education/ learning theory	0	0
Social learning theory	9	5
TOTAL	19	8

Origin: Elaborated by the authors

As observed in Table 8, social learning was the search that obtained more results, as well as the results obtained with the Web of Science and Scopus, where nine publications related to the subject were obtained, and five of them are related to sustainability. With the same representation, in the initial search, experiential and transformative learning presented five publica-

tions each, and the transformative learning presented a publication more linked to the theme of sustainability, totalling two publications on the subject matter of this research.

It is important to point out that, as in the results obtained in the search for liberating learning in the Web of Science and Scopus, it was not possible to obtain results for this theory. In order to broaden the search, the term liberating education and liberatory pedagogy were inserted, in addition to the term liberating learning, which also did not present results. In the sequence, the characteristics of the publications (title, authors, event and year) found that link the learning theories in question with sustainability will be presented. Framework 2 shows the results for experiential learning

Framework 2 – Publications of ANPAD proceedings

Experiential learning			
Title	**Authors**	**Event**	**Year**
Teoria da Aprendizagem Experiencial e Design Thinking para Criação de uma Feira de Sustentabilidade	Nilo Barcelos Alves; Patricia Tometich	EnANPAD	2016
Transforming learning			
Title	**Authors**	**Event**	**Year**
Framework da Aprendizagem Transformadora Sustentável: Integrando os Processos de Ensino-Aprendizagem, Gestão e Mudança para Sustentabilidade	Lisiane Celia Palma; Eugenio Avila Pedrozo	EnANPAD	2015
Reflexão Crítica e Aprendizagem Transformadora: Mensurando a Racionalidade de Valor Compartilhado no Ensino de Estratégia para Sustentabilidade	Janette Brunstein; Marta Fabiano Sambiase; Marcos Bidart Carneiro de Novaes	EnANPAD	2015
Social learning			
Title	**Authors**	**Event**	**Year**
A Emergência da Aprendizagem Social no Ambiente de Gestão das Águas de Rios	Lúcia Rejane da Rosa Gama Madruga; Tania Nunes da Silva; Lucas Veiga Ávila	EnANPAD	2015
Aprendizagem Social para Sustentabilidade: um Estudo em um Curso de Administração de Empresas	Andreza Sampaio de Mello; Arilda Schmidt Godoy	EnANPAD	2015
Aprendizagem Social Organizacional e Sustentabilidade: a Experiência de um Programa Empresarial de Mulheres Empreendedoras	Diego Gama Amaral; Janette Brunstein	EnANPAD	2015
O Processo de Aprendizagem Social nos Comitês ou Conselhos Voltados às Questões de Desenvolvimento Sustentável	Marcia Juliana d'Angelo; Janette Brunstein	EnEO	2014
Aprendizagem Social para a Sustentabilidade: Um Estudo Sobre Negócios Sustentáveis em Contextos de Múltiplos Atores Sociais, Relações e Interesses	Marcia Juliana d'Angelo; Janette Brunstein	EnANPAD	2013

Origin: Elaborated by the authors

As shown in Table 2, eight papers were published in the proceedings of ANPAD events that addressed at least one of the learning and sustainability theories in the last ten years. The EnANPAD event presented the majority (seven) of the papers in its proceedings with the theme in the years of 2013, 2014 and 2016, while the EnEO presented a paper in the year 2014. It is worth mentioning that the target theme of this study has demonstrated an increasing number of publications on the national scene in recent years. The largest number of studies found in social learning theory can exemplify their applicability both with a focus on individual behaviour and on investigating collective learning (D'ANGELO, BRUSTEIN, 2014).

5 CONCLUDING REMARKS

Based on the observance of the importance of education in society and the increasingly urgent need to think and act for sustainability and sustainable development, the objective of this study was to identify and analyze the characteristics of scientific publications on the subject of education for sustainability linked to the theories of experiential, transformative, liberating and social learning. Thus, it was possible to gather information and characteristics to obtain knowledge of publications related to the subject.

What was predominantly observed through the bibliometric study is in agreement with Sterling (2004, p.50) that sustainable development provides "a gateway to a different view of pedagogy", in view of the results found for each of the searches performed. However, it is possible to perceive that these are themes in evidence in the last years, and the theory of social learning is the most consolidated in the literature when it comes to education for sustainability.

With respect to the results obtained in the Web of Science and Scopus databases, the majority of the publications consists of articles, published in great part during 2013 and 2016, with the most prominent publication being the International Journal of Sustainability in Higher Education. As regards the countries of origin, the United States, Canada, the United Kingdom and Australia were the most relevant in terms of publication quantity over the last ten years. Finally, English has stood out as the most used language in the publications about the subjects. In the national scenario, it was also possible to find results for the searches that demonstrate the growth of publications on the subject in recent years.

Moreover, the present study evidenced research opportunities in the field of Education for Sustainability linked to learning theories, in view of the growing focus on different pedagogical approaches to sustainable development. In this way, it is emphasized the need for continuity and deepening in the studies on the subject, and the accomplishment of a qualitative study on these publications would be interesting.

Finally, the limitation of the present study is the lack of methodological rigor regarding the feasibility of the research steps developed in the search method. The way in which the researches were carried out in this study took into account a compilation of several methodological jobs found in several bibliometric studies, resulting in the impossibility of generalization of the results.

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