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Sustainable Fashion: challenges and barriers for advancing the circular economy in Fashion Design Courses teaching

Abstract: The textile sector is considered one of the most polluting sectors of society. In order to generate a transformation in value-added products from the textile production chain, the educational sector plays a strategic role. This paper validates theoretical propositions about teaching good practices in sustainability and circular economy. The theoretical assumptions that supported this study are circular economy and sustainable fashion. The study was carried out in Brazil, and it includes Fashion Design courses at the undergraduate level. Primary data was obtained by the application of a questionnaire with teachers, coordinators and students of 54 courses. The main results show the ab-sence of the term teaching of good sustainability practices within the political pedagogical projects of the analyzed courses. We conclude that, although there is an internalization of sustainability and circular economy practices, it is still necessary to evolve a higher maturity stage in the type of practices disseminated and in the emphasis on practices associated with the core of the circular economy. Practices are capable of generating a new meaning in the fashion sector, circulating materials and retaining value in resources in a strategic way and generating innovative solutions for the sustainable fashion segment.

Keywords: Sustainable fashion, Circular Economy, Fashion design, Sustainable education, Political Pedagogical Projects.

1. Introduction

Sustainable fashion is a concept that is being internalized in the elaboration of collections [1], to align the premises of sustainability [2]. The concept provides the inclusion of sustainability assumptions in the fashion sector [3]. This implies manufacturing products that adopt elements that do not harm the environment in their production system as a basic raw material [4] and also consideration to social issues. In the environmental aspect, an example is organic cotton, which pro-duction process does not includes the use of pesticides [5], neither is the use of transgenic seeds recommended [6]. In the social aspect, sustainable fashion seeks to generate a shopping experience for the customer associated with social and environmental commitment [7]. Thus, it unites the pillars of consumption with awareness and commitment to society [8].

The context in which sustainable fashion is inserted, shows that in 2015, the global textile and clothing industry was responsible for the consumption of 79 billion cubic meters of water, 1,715 million tons of CO2 emissions and 92 million tons of waste, and also, it is estimated that by 2030 these numbers would increase by at least 50% [9]. Furthermore, the fashion sector pollutes the environment during the production, use and post-consumption phases [10]. This scenario is considered alarming and demands an alternative way of thinking to the traditional and linear model. Thus, it is necessary due to the restriction of access to natural resources [11]. Exaggerated consumption makes scarcity pressing [12]. Scarce resources become more expensive and more valuable [13]. And the perspective of sustainable fashion goes in the opposite direction, in which there is the sense of providing access, so that everyone can enjoy it without generating such a significant ecological footprint [14].

Considering that the textile sector is considered one of the most polluting sectors [15], it is understandable that it is a sector in which there is under great pressure by society to generate new alternatives [16]. In addition it is considered a "villain" in water consumption [17]. This is so visible that product planning alternatives [3], life cycle analysis [17], design for sustainability [19], biodegradable fibers [20], smart fabrics are internalized in the fashion production processes [21], to contribute to the generation of eco-friendly products [22]. In this sense, the change in mentality is associated with finite natural resources [23] that requires a new posture from society to allow perpetuity [24]. Also, it is important that people be more aware and willing to make ecologically correct choices [25]. So, costumer associate the idea of sustainable fashion to terms such as eco-friendly, ethical, and recycling [26]. However, within the industry, most labels focus on the environmental aspects predominantly in the upstream life cycle phases of textiles, whereas some relevant impacts and life cycle phases remain neglected [27].

Based on this plot, this study aimed to validate theoretical propositions about teaching good practices in sustainability and circular economy (CE). The practical justification for choosing the theme is associated with the growing sustainable consumption market share [28]. It is also associated with technological options that emerge as solutions

to the problems caused by traditional productive models [29]. The educational process plays an important role in this transition to sustainable fashion [10, 30], as it is an important way to allow the transition to sustainability organizations [31] and, by understanding the systematics and topics taught it is possible to generate insights for improving curriculum matrices. The social relevance of the study is associated with the opportunity to integrate people [32] to an educational model that generates inclusion, preservation of natural resources and economic benefits for communities that engage in sustainable fashion [33]. In the Brazilian case, it is specially important to allow to be replicated, taught and broadcast in the best undergraduate courses in Fashion Design in Brazil. From that, it will contribute to the generation of a higher commitments to sustainable development and to the generation of a more equitable and just society [22]. The effect is indirect, since teaching raises awareness, educates, and allows to build new possibilities. The replication and dis-semination of good sustainability practices in education is the first step towards creating an eco-friendly society [34].

This study is structured in several sections. In addition to this introduction, section 2 presents theoretical aspects alluding to sustainable fashion and circular economy. Section 3 presents the methodological path covered by the research. Section 4 presents and discusses the research results. Section 5 presents the final considerations and is followed by the references.

2. Sustainable Fashion, Circular Economy and Sustainability

Sustainable fashion is a concept associated with rethinking the wild logic of consumption in the fashion segment [34]. It is associated with the slow fashion movement [35], that emerged in the 1960s. Sustainable fashion encourages a shift in thinking from the perspective of productive systems, as it emphasizes local development, the effective use of resources, the inclusion of the workforce of local communities and promotes long-term relationships [10]. Among it priorities are the transparency in all production processes and stages [36] , the internalization of sustainability and ethical conduct values [34], the launch of only two new collections per year, namely, autumn / winter and spring / summer. As a consequence of social issues awareness, it includes aspects such as the development of social standards by the calculation of orders, risk sharing, cost sharing, price premiums, and guaranteed order continuity for social compliance to reduce opportunistic behaviors upstream of the supply chain [37].

The idea of sustainable fashion is specially associated with: 1. People's awareness of the negative environmental impacts of producing fashion collections [38]; 2. Advocation about the need to use organic and ecological materials in the fashion product development processes [39]; 3. Promotion of the internalization through the ability to certify the origin of products through certifications and traceability [34]; 4. Stimulate the confidence in the supply chain, small-scale production, traditional handicraft techniques, use of local materials and trans-seasonal clothing [9]; 5. The adherence to shared economy practices [10]; 6. Other practices internalized in the sustainable fashion production processes are recycling, upcycling, use of renewable raw materials [40]. Still, there is the incorporation of alternative ways of learning to design new products, the generation of social change and the realization of collective production [10]. However, it is also considered a slow and time-consuming process. For companies, it is costly to internalize sustainable fashion practices that, sometimes, can make them less competitive than the traditional model of dissemination adopted by the fashion segment [41].

It is noted that few sectors are as challenged by sustainable initiatives as the fashion segment [51]However, it is possible to observe the persistence of a social and marketing phenomenon that advocates for sustainable fashio [52] In Brazil, it is possible to identify a competitive advantage, generated by sustainability as a differentiating element [51]. Although, there is a lack of involvement of social groups such as government institutions, to act as supervisors and educators promoting sustainable initiatives at all stages of the product life cycle, teaching consumers about conscious consumption [52].

In this sense, the circular economy proves to be a powerful concept to contribute to this transition from the linear to the circular model [10], via design education, as a potential contributing tool for creating an ethical fashion sector, supported by people who adopt an ideology aligned with the premises of sustainability [10]. So, it is important to internalize a set of practices that make the fashion segment more adherent to the premises of sustainability and aligned with the Sustainable Development Goals [42]. This internalization of the circular economy can occur taking into account the assumptions of the retention of value of resources. For instance, it is important to highlight that even though the production of fibers from waste is not a novel concept, the production of fibers from waste protein sources is largely forgotten [43].

In this bias, it is understood that the paradigm is broken and that design aligns with sustainability to revisit the way fashion products are conceived and used [53], recognizing design as strategic, key to innovation, which proposes radical innovations, capable of creating new artifacts, meanings and new contexts of consumption [53].

One alternative to change this reality is by the application of the 10Rs [44]. The 10 R Principles of CE (10R), in order of priority depending on the value retention of resources in the chain, are composed by the R0 as the highest priority level and R9 the lowest priority level. In addition, these principles are divided into three priority groups: 1. Short Cycles - R0 to R3; 2. Medium Cycles - R4 to R6; 3. Long Cycles - R7 to R9 [44]. The first four R principles of CE (R0 - Refusal, R1 - Reduction, R2 - Reuse / Resale and R3 - Repair) are considered preferred in this context; these principles provide shorter cycles and happen close to the consumption of the product. The second group of principles (R4 - Renovation, R5 - Remanufacturing, and R6 - Reuse with a new function) prioritize medium cycles and generally happen through business activities with indirect connections with consumers. The concepts of renovation and remanufacturing are mixed in the literature and are often used interchangeably [44]. Finally, the third group of R principles for CE (R7 - Recycling, R8 - Energy recovery and R9 - Resource extraction) focus on long cycles and refer to traditional waste management activities; despite being considered the least desirable options, CE practices still focus on recycling options [44].

In the fashion segment, reuse can occur by dismantling unused products and transforming them into new pieces adhering to current fashion trends [10]. Some ambitious proposes for the fashion sector in the 2030 horizon, take into account the precepts of the circular economy, emphasizing the internalization of short cycles and safe materials; designing clothes that last longer; review the way clothes are manufactured and sold and rent should be considered an alternative to accessing new clothes [56]. In addition, it consider the internalization of a recycling system aimed at the industry, which allows capturing the value of materials that are lost and the negative impacts caused by disposal, recommends internalizing technological innovations and encouraging the use of recyclable materials and, finally, the effective use of renewable resources and inputs should be the first choice (56]. So, in order to these good practices and trends in favor of sustainability become widely disseminated practices, the educational process plays a strategic role [10].

The first higher education course in design in Brazil was created in 1963, but it was only in 1988 that the first higher education course in fashion was founded. Initially, fashion was not considered a design specialty, the change occurred when the Ministry of Education (MEC) determined, in 2004, that courses focused on fashion should be adjusted to the Curriculum Guidelines for Design [54]. Thus, educational institutions are crucial in the training of designers, teachers must act as facilitators of the sustainable learning process, the creation process based on sustainability must aim to arouse socio-environmental awareness and sensitize fashion students and professionals. and design on the impact of their decisions on the life cycle of products [55].

In Brazil, it is the Ministry of Education, that provides all the guidelines for the formulation of curricular matrices, regulates and supervises educational institutions and their educational practices (58]. Even though the current guidelines advocate the need to teach environment and sustainability as interdisciplinary topics, the current curricular matrices can go a long way towards becoming more appropriate to contribute to the dissemination of sustainability premises through adherence to practices, tools, strategies and principles circular economy and sustainable operations [57].

However, the bibliographic review revealed that there are few publications in Brazil that broadly address the insertion of sustainable fashion and the circular economy in Fashion Design Courses, the studies are directed to the analysis of specific themes, with restricted audiences. However, some studies found linked to the theme of sustainability in fashion in Brazil point out that the pedagogical intervention provided significant changes in relation to sustainability and that showed concern with conscious consumption [59]. On the other hand, based on the analysis of dissertations and articles, it identified the lack of rethinking the role of design and its teaching to deal with environmental and social problems presented in contemporary scenarios. However, there is progress with regard to teaching approaches, with recommendations for sustainability to be treated as a cross-cutting theme and for active teaching-learning methodologies to be adopted, for example, integrative projects or problem-based learning [60].

The clothing sector in Brazil comprises about 25,000 companies nationwide (legally registered), 90% of which are defined as micro and small enterprises that contribute significantly to the generation and distribution of income. The Brazilian clothing sector in 2019 showed a textile and apparel value chain with revenues of $45 billion. Approximately R$ 3.6 billion were invested in the industry, which had an average production of 2.4 billion pieces that included apparel, socks, accessories and home textiles. Average textile production was 9.4 billion of peaces. This is

crucial for the Brazilian economy, as it demands 1.5 million direct employees and creates 8 million indirect jobs. The income effect also stands out because 75% of the workers in the sector are women, which increases average household income in Brazil. The sector is the second largest employer in the manufacturing industry, followed by the food and beverage industry. It represents 16.7% of jobs and 5.7% of turnover in the manufacturing industry. In addition, the Brazilian Fashion Week is among the five best fashion weeks in the world.[13].

Although Brazil has a complete textile supply chain, the amount of imports from Asia reaches 60%. From China, Brazil's share in the import of textile and clothing products is 8.40%, while the share of the export product is only 0.81% [62] The Brazilian textile industry is worth 65 billion dollars and employs millions of people. Brazilians. The most produced are cotton and leather, placing Brazil as the fourth largest cotton exporter in the world [63] However, the Brazilian textile industry is still among the most young people compared to other countries.

Apparels are the final product from the textile industry, and it is consumed worldwide. The fashion industry presents new trends every season to customers generating large amounts of second-hand products. More than 60% of what is collected in developed countries is exported to developing markets. A total of 60% of France's wasted textile and garment (210,000 tons/year) is reused for international second-hand clothing exports [64].

In Brazil, the state of Ceará was the biggest importer of textile waste by bulk, and the state of São Paulo, the biggest importer in commercial value, with volume three times lower compared to the State of Ceará, which suggests the selection of waste with greater value. The major exporting countries by volume are Honduras, Turkey and others, such as Bangladesh countries with tradition in textiles and clothing, however, with industrial production lower than Brazil [64].

In general, the volume discarded of textile solid waste is around 10% of the total volume of used raw material. Thus, when comparing fabric consumption in Brazilian apparel manufacture, IEMI (2015) reported 1,199,893 tons (2014), which is estimated the generation of 120 thousand tons of textile waste or daily disposal of 330 tons by 29,942 clothing companies formally registered [65].

Brazil generates around 175,000 tons of textile fiber per year. Annually, R$ 5 billion of cost per destination and another R$ 127.2 million are expenses for adequate provision of solid waste, characterizing in a high destination value for each Clothing company [66]. Other sectors such as the Brazilian agro-industrial chain generates about 291 million/tons/year of wastes, which, if inadequately destinated, could originate social and environmental risks. [18]The Fish Production in 2019 was estimated at 800,000 tonnes, representing a gross revenue of US$ 1 billion. whereas after the industrialization of seafood only 44% on average of the total raw material is used for human consumption and 59.2% of the unused portion is discarded in landfill.In this context, the Brazilian fish industry generated around 474 thousand tons of waste in 2019 (almost 3x) more than the textile industry [18]. According to the Vale group, the mining activity generated 527.8 and 515.3 million tons of mining and metallurgical waste in 2020 and 2021, respectively [18].

3. Methodological procedures

This study was carried out adopting the Bachelor of Fashion Design Courses in Brazil as the unit of analysis. The research was carried out from September 2019 to January 2020. In the planning of the research data collections from different sources were foreseen, namely, Courses Political Pedagogical Projects (CPPPs), application of questionnaires to teachers, students and teachers of the courses. All the 54 courses in the country were invited by email to participate in the research. Figure 1 illustrates the sources of collection and samples obtained.

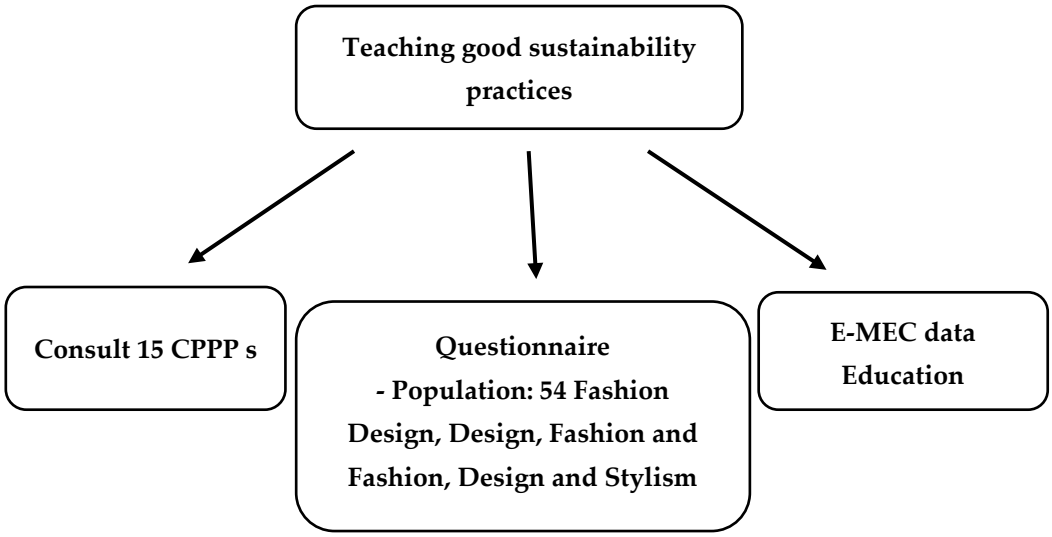

Figure 1: Sources of data analyzed

The data collection process took place by consulting the Ministry of Education website, the E-MEC, to iden-tify all courses in Fashion Design, Design, Fashion and Fashion, Design and Stylism offered at the undergraduate level in Brazil. With this information, e-mails were sent to the current course coordinators to: 1. Invite to participate in the research; 2. Request CPPPs; 3. Request the sending of the questionnaire to all teachers of the courses with a with an approximate response rate of 8%. 370 answered questionnaires were returned, being: 247 questionnaires from students and alumni; 112 professors; 11 coordinators; 54 Fashion Design courses and 15 political-pedagogical courses pro-jects.; 4. Re-quest the sending of the specific questionnaire to students and graduates of the courses. This is an emerg-ing topic and it was not possible to locate similar studies in the Brazilian context. This reinforces its originality and originality.The research protocol is shown in Table 1.

Table 1: Research Protocol

Phases	Description
Objective of the study	Validate theoretical propositions about teaching good practices in sus-tainability and circular economy.
Design: proposi-tions	Proposition 1: Fashion Design Courses teach sustainability practices and circular economy. Proposition 2: Fashion Design courses train people who are aware and adopt sustainable fashion practices. Proposition 3: Fashion Design courses encourage the manufacture of sustainable fashion collections
Analysis object	Brazilian Fashion Design Courses
Analysis Unit	Course Political Pedagogical Project, perception of course coordinators, teachers and students / graduates
Schedule	The survey was applied from October 2019 to January 2020
Evidence Sources	- Questionnaire (teacher, student / alumni and coordinator) - Official website of the institution (CPPP, request via e-mail or telephone of the material)
Data analysis and analysis	- Content analysis - Categorization and qualitative analysis of pattern matching - Data triangulation
Research validity	Use of protocol, use of multiple sources of evidence and data triangulation (Yin, 2010).

Phases	Description
Data source and reliability	The reliability of the data is obtained from the triangulation between the data, comparing the data obtained through the survey carried out with coordinators, teachers and students / alumni, with the information obtained through the analysis of the Pedagogical Political Project.
Key issues	**Student** 1) Linked Course; 2) Course development stage; 3) Phase of the course that is enrolled; 4) Educational institution; 5) Fashion sector perception; 6) Fashion sector expectation; 7) Disciplines that address sustainable practices; 8) Ways of teaching sustainable practices, 9) Age of the public; 10) Gender of the public; 11) Location of the educational institution you attended / attend; 12) Actions taken when purchasing a product; 13) Sustainability practices and Circular Economy 14) Relevant aspects that you would like to socialize about sustainable fashion and ways in which face-to-face Bachelor Fashion Design courses offered at undergraduate level in Brazil are inserting premises of sustainability and circular economy in the training of your student **Teacher** 1) Time in teaching; 2) Concerns about teaching sustainable practices; 3) Emphasis on teaching strategy; 4) Teaching contributions; 5) What is taught about sustainable fashion in the course; 6) Teaching institution location; 7) Relevant aspects that you would like to share about sustainable fashion and ways in which the face-to-face Bachelor's Fashion Design courses offered at undergraduate level in Brazil are inserting premises of sustainability and circular economy in the training of your student. **Course coordinator** 1) Time in the coordination; 2) Perception about the coordinated; 3) Predominance in teaching in the course; 4) Disciplines that emphasize content focused on sustainability; 5) Sustainable fashion impact; 6) What is taught about sustainable fashion in the course; 7) Coordinated educational institution location;

Phases	Description
	8) Relevant aspects that you would like to socialize about sustainable fashion and ways in which the face-to-face Bachelor's Fashion Design courses offered at undergraduate level in Brazil are inserting premises of sustainability and circular economy in the training of your student.
Evidence search	Theoretical proposals, perceptions of respondents to questionnaires, documents, technical reports and website.
Report	Linking the evidence between the questions, the data collected and the conclusions.

Source: Adapted from Troiano (2020, p.82-83) [48]

In terms of data, the analysis consisted on identifying patterns and creating analytical categories based on the premises of sustainable fashion, circular economy and sustainable development objectives. Thus, the study fol-lows the guidelines which suggest that the analytical categorization is suitable for studies that elaborate open ques-tions (Stake, 2011 [46].Table 2 shows the analytical categories that were used in this research.

Table 2: Research analysis categories

Analysis Dimensions Circular Economy (10Rs) [44]	**Analysis Dimension Sustainable Fashion [51, 52]**	**Analysis Dimension Sustainable Development Goals (SDG, 2015) [53]**
Refusal	Customer value	Eradicate poverty
Reduction	Environmental value	End hunger
Reuse / resale	Social value	Healthy life
Repair	Value for other key stakeholders	Quality education
Renovation	Design	Gender equality
Remanufature	Production	Water and sanitation
Reuse with new function or purpose	Distribution	Renewable energy
Recycling	Use	Decent work and economic growth
Energy recovery	End of life	Innovation and infrastructure
Resource extraction		Reduce inequalities
		Sustainable cities and communities
		Sustainable production and consumption
		Combating climate change

		Oceans, seas and marine resources
		Terrestrial ecosystems and biodiversity
		Peace and justice
		Partnerships for development

The generation of analytical categories, based on empirical evidence, was carried out in three stages. The first evolved fluctuating reading of the empirical evidence from different sources. The second stage considered signage in yellow of the representative sections. Only excerpts were coded that mentioned active behaviors related to each of the research constructs; third: collation of data, strengthening the relationship with the categories of analysis from the scientific literature and that support the constructs of this research, namely, sustainable fashion, circular economy and sustainable development. Based on the mapped codes, patterns were extracted by recomposing the data that consolidated the findings of this research [54]. For the purpose of maintaining anonymity, educational institutions were called pseudonyms CPPP A, CPPP B, CPPP C ... CPPP P).

4. Data Presentation and Analysis

From the obtained data, it is noted that the term teaching of good sustainability practices is never mentioned in the political pedagogical projects of the analyzed courses, nor was it mentioned by the course coordinators, teachers and students in the answered questionnaires – as presented in Figure 3. However, when deploying this concept to the constructs circular economy (n = 4) and sustainable fashion (n = 15), there is evidence in the analyzed documents and in the answered questionnaires that these practices happen and are usual in the analyzed courses. These findings are similar to those found by Onur [10], in Turkey, who points out that artisanal practices, collaborative work and sustainability premises are generally ostracized in the higher education system.

Figure 2 shows the main results found in this study.

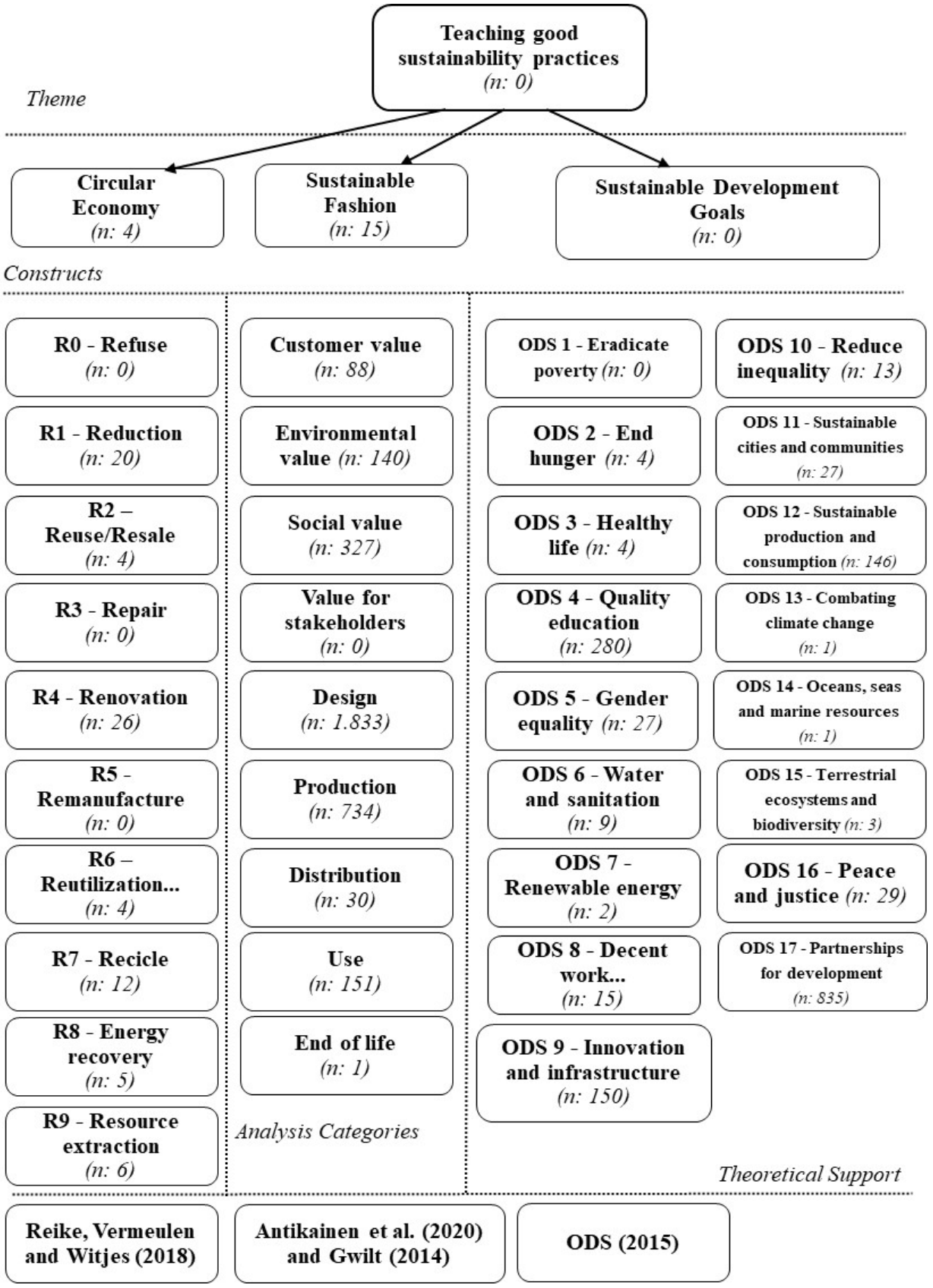

Figure 2: Main search results

Especial regard is made to terms as renovation (n = 26), reduction (n = 20) and recycling (n = 12). Also, highlights are made to the terms design (n = 1833), production (n = 734), end of lifecycle (n = 151), social value (n = 327) and environmental value (n = 140). Considering the assumptions of the circular economy and sustainable fashion, it is understandable that these are sustainable practices that corroborate the achievement of the SDGs. Among the SDGs, partnerships for development (n = 835), innovation and infrastructure (n = 150) and sustainable production and consumption (= 146) were highlighted. These important findings show that the matrices of analyzed courses are aligned with the Sustainable Development Goals, especially with regard to the creation of networks and synergies in favor of promoting a development based on principles of cooperation, partnerships and generation of systemic results.

However, it is important consider the options for retaining the value of the resource prioritized by the fashion design courses surveyed. The 10Rs of the circular economy are presented on a priority scale, thus R0 represents the highest priority level and R9 the lowest priority level [44]. This priority is associated with the contribution of the practice to generate value retention of resources in the chain. Therefore, it is noted that the evaluated courses are adopters of practices that are less contributory to the success of the circular economy. They are relevant, essential, but also they can be considered the most costly and the ones that take the longest to be operationalized, as they are positioned in the category of logo cycles (practices R7 to R9). Besides, the first four R principles of circular economy (R0 - Refusal, R1 - Reduction, R2 - Reuse / Resale and R3 - Repair) are considered more relevant, more useful for the circularity of resources, as they correspond to short cycles and with greater retention of resource value. Practices R4 to R6 are considered average cycles.

Evidence from CPPP s

Another element not measured by the constructs of this research, but which appeared in different occasions is the creative economy, as a potential opportunity for institutionalizing practices that can be considered transformative and innovative for the fashion sector (CPPP A, CPPP B) and the offer of the discipline of sustainability (CPPP C, CPPP E); i) ecodesign (CPPP E, CPPP F), ii) environmental education and sustainability and iii) ethics and human rights CPPP D); product development (CPPP E); digital portfolio production and computer modeling (CPPP F); Textile Materials and Processes (CPPP I); Creative Economy in Fashion (CPPP J): Social Factors Design - Trends and Consumption (CPPP J), Creativity and Innovation (CPPP L),

Furthermore, terms that are consistent with what is expected from good sustainability practices are eco-efficiency (CPPP J), environmental education (CPPP I), environment and sustainability (CPPP L), diversity, citizenship and law (CPPP M), Sustainability and Topics in Fashion Design (CPPP P). Such aspects are named throughout the analyzed CPPP s, which shows the dissemination of good sustainable practices in the analyzed courses.

It is also necessary to highlight that sustainability in the context of Brazilian education is understood as a cross-cutting theme and, as such, it must be worked in an interdisciplinary way. This is reflected in the way in which good sustainability practices are inserted in education. And it has been highlighted in the analyzed CPPP s. As can be noted in seen in this excerpt “When designing the curriculum, the skills of the syllabus are reflected in the didactic-pedagogical routing and intertwining of the course subjects.” (CPPP C). Or, “the curricular matrix contemplates interdisciplinarity during its development in different instances.” (CPPP B). Or even “The legal requirements related to ethnic-racial relations and the teaching of Afro-Brazilian, African and indigenous history and culture, policies for environmental education and human rights are addressed transversely throughout the student's training path, either as specific content some disciplines, or as complementary activities. ” (CPPP D). Finally, “The insertion of knowledge related to Human Rights Education in the curriculum of this course will occur as follows: I. through transversality, through themes related to Human Rights and treated interdisciplinarly through research and extension projects, promoting debate between the academic community and other social segments, especially those in situations of social exclusion and violation of rights, as well as social movements and public management; II. as a specific content of the disciplines Anthropology and Sociology and Human Rights; III. in a mixed way, combining transversality and disciplinarity. ” (CPPP F).

The focus on social aspects is evident in CPPP F which highlights “As established by CNE / CP Resolution No. 01/2012, which institutes the National Guidelines for Education in Human Rights, this Fashion Design course adopts educative concepts and practices based on Human Rights and its processes of promotion, protection, defense and application in the lives of students. With the purpose of promoting education for change and social transformation, this project is based on the principles presented in Art. 3 of the aforementioned resolution: I. human dignity; II. equal rights; III. recognition and appreciation of differences and diversities; IV. secularity of the State; V. democracy in education; SAW. transversality, experience and globality; and VII. socio-environmental sustainability. ”

“The education of ethnic-racial relations aims to promote social values and knowledge focused on the various aspects of history and culture that characterize the formation of the Brazilian population based on these two ethnic groups. The education of ethnic-racial relations is an essential and permanent component and its implementation is related to the principle of pluralism of ideas and interdisciplinary perspectives, made explicit in the pedagogical projects of the course. ” (CPPP I). With regard to the environmental dimension, it can be mentioned “Environmental

education, within the scope of undergraduate courses, aims to promote social values, knowledge, skills, attitudes and competences aimed at preserving the environment. Environmental education is an essential and permanent component and its implementation occurs through the pluralism of ideas and pedagogical concepts, in the perspective of inter, multi and transdisciplinarity, made explicit in the pedagogical course project "(CPPP I).

Besides, it is important to note that other concepts that may be relevant in the context of sustainable fashion and that in no time were mentioned are practices such as upcycling, ecofriendly fashion, conscious consumption, total resource efficiency, design for sustainability, conceiving and designing products facilitating their disassembly, reduction of ecological impacts and the intensity of the use of resources, promotion of socially acceptable well-being, ecological development of products, adhesion to environmentally friendly and intelligent fabrics, use of fabrics from organic cotton, inclusion of tools for the analysis of the cycle of products, the choice of low impact materials, the best use of production techniques, new uses for fabric scraps, efficient product distribution, reduction of environmental impact, optimization of product life, completion of its life cycle with introduction of materials for second use. These are emerging practices that have a relevant role in building collections that meet the specificities of sustainable fashion. This absence of contemporary practices may be associated with the time when the pedagogical political projects of the courses were built. There may be a time lag involved in this absence of more emerging practices.

These concepts are considered relevant, because they represent practices that are elementary for the full fulfillment of the objectives of the courses. Especially when the explicit purposes are precise, namely, "Valuing the ethical and humanistic dimensions, developing in the student attitudes and values oriented towards citizenship and professional practice" (CPPP D). As well as the excerpt that highlights that "… students are invited to submit proposals for the elaboration of products and actions based on the demands of poor communities located in the regions neighboring the university's Campi. For this, they are encouraged to propose ideas that contemplate the programmatic lines of the project, with a focus on socio-environmental responsibility. During the stages, awareness-raising actions are carried out to diagnose the region's social and environmental problems and to elaborate design products. Scholarship students and volunteers, teachers and the community in general are invited to contribute to the manufacture of articles using textile waste materials and / or factory waste from companies in the region, as well as articulating actions that promote the formation of networks so that they provide income generation for the communities served by the project, from the perspective of the solidarity economy. " (CPPP L).

Respect to the transversality in curricula it was mentioned that developing works with some transversal themes are indispensable due to the relevant importance, such as: Globalization, Media, Environment, Advertising, Capitalism, Economy, Social Responsibility, Export, Import, Ethics, Sustainability, among others. Also, it was quoted that "According to Federal Law No. 9795, of April 27, 1999, which provides for" environmental education, instituting the National Environmental Education Policy ", Decree No. 4,281 of June 25, 2002, which regulates said law and Resolution No. 2, of June 15, 2012, which establishes the National Curricular Guidelines for Environmental Education, environmental education (EA) is represented by the processes through which the individual and the community build social values, knowledge, skills, attitudes and skills aimed at the conservation of the environment, essential to the quality of life and its sustainability. Environmental Education involves the understanding of a responsible, critical, participative, citizen education, in which each subject learns with scientific knowledge and with the recognition of traditional knowledge, enabling transformative decision-making, based on the natural or built environment in which people come together. EA moves forward in building responsible citizenship focused on cultures of socio-environmental sustainability. " (CPPP P).

Evidence from the Coordinators

Furthermore, the speech of the course coordinators, signals a commitment to sustainability, namely, "A course that disseminates the best sustainability practices and is friendly to the environment and society." (Coord 2 and Coord. 6). Above all, committed to practices that make a difference, as can be seen in the following statement: "An innovative course in the area of fashion and clothing" (Coord 7). Regarding the emphasis on teaching, the coordinators mentioned that the course teaches predominantly, with emphasis on the lines "A sustainable practices, environmentally friendly and environmentally and socially conscious" (Coord 2). "Emerging and innovative practices" (Coord 4). "However, the environmental part is still the one with the least amount of content" (Coord 5). "There are emerging and innovative practices" (Coord 6 and 7). "Sustainable practices based on the circular economy and inclusive fashion practices" (Coord 11).

When the course coordinators were asked about the percentage of subjects that emphasize content focused on sustainability, the answers obtained were: 100% of the subjects of the course (n = 1); Up to 30% of course subjects (n = 3); Up to 50% of course subjects (n = 1); Up to 70% of course subjects (n = 1); Less than 10% of course subjects (n = 5). This finding highlights the lack of consensus on how transversal the concept of sustainability is in fashion design courses. Another question reported that sustainable fashion had a predominant impact: In the final destination of obsolete pieces (n = 1); in production (n = 5); the reputation of the company that makes sustainable pieces (n = 1); In consumption (n = 3). This signals that the coordinators' perceptions are still intertwined with the traditional concept of fashion in which only production and consumption are predominantly understood as impacted by the value chain.

A perception that once again highlights the emphasis on short cycles of the circular economy, that is, those that generate less value retention for the chain. Or, they may portray an absence of more in-depth knowledge about what circular economy is, since we are talking about an emerging concept. Finally, the coordinators were asked about what is taught about sustainable fashion in their course, it is understandable that: The Course contributes in a very small way in the dissemination of sustainable fashion practices in Brazil (n = 3); The Course contributes reasonably to the dissemination of sustainable fashion practices in Brazil (n = 4); The Course contributes significantly to the dissemination of sustainable fashion practices in Brazil (n = 1); The Course contributes satisfactorily to the dissemination of sustainable fashion practices in Brazil (n = 1). See that the coordinators themselves recognize that there is potential to teach more practices, to create a proactive mentality in synergy with the sustainability precepts. In other words, the course can teach more than it teaches today about sustainable fashion.

Evidence from teachers

In order to better recognize evidence from teachers, they were asked about the concern abouth teaching. The results presented a predominant emphasis on: the possibility of reflecting on theory and practice so that learning does is not related to age (n = 1); the practice of ethics and responsibility as a professional fashion designer (n = 1). Emerging and innovative practices that are sustainable, environmentally and environmentally friendly and socially aware (n = 1); Sustainable, environmentally and environmentally friendly and socially conscious practices (n = 43); Traditional practices in the fashion and clothing sector (n = 7); Critical reflection on the fashion market (n = 1); Approaches with content and themes related to the responsibility of the designer (n = 1); Emerging practices include sustainable ones (n = 1); practices in general, discussing traditional and innovative issues (n = 1); to link traditional activities in the fashion and clothing sector with current technological innovations.

In fact, both emerging and innovative and sustainable practices are important, as long as the former are in line with the following: critical and socio-historical awareness (n = 1); teaching of subjects related to the theory of image and illustration, in my subjects, the approach to sustainability is not carried out or is possible (n = 1); critical training, expansion of repertoire within the context of the humanities and its relationship with the fashion universe. That is, to assert the belonging of fashion in the field of applied human sciences (n = 1); the most innovative education applies, with activities based on projects and problem situations, in addition to partnerships with companies in the area, bringing problems for our academics to develop. Whenever possible, aligned with sustainable practices and environmental concerns (n = 1); Creative, authoring practices with socially conscious proposals (n = 1); reflective and critical and socially conscious practices (n = 1); relating theory and practice in a sustainable perspective (n = 1); Critical theory of design (n = 1).

With regard to teaching strategies, the highlights were: oral presentation of the content (n = 49); participation in specific events in the fashion and design sector (n = 20); use of cases for teaching (n = 22); technical visits to specialized companies in the fashion and design sector (n = 23); use of preparatory readings for participation in the lecture and dialogue (n = 45); use of cases for teaching (n = 11); use of dynamics and exercises to fix the content (n = 79) and making fashion pieces and collections (n = 33). On the question whether the form of education adopted by your institution and whether it contributes to the formation of, was highlighted: people qualified to work in new, innovative markets and differentiated niches (n = 56); people qualified to be predominantly entrepreneurial (n = 17); qualified people for the traditional model of operation in the market (n = 15); bold people, capable of revolutionizing the fashion and clothing sector (n = 14) and finally, qualified people to be predominantly employed (n = 10).

With regard to the respondents' perception of the assertion whether the practices of sustainability, biodegradability and ethical clothing manufacturing, that is, "good clothes", the evidence is stimulated that: there is wide acceptance and adherence to these practices by students who attend the courses in which I teach (n = 33); students are encouraged to adopt these practices in their profession (n = 32) and emphasis is placed on this type of practice in courses (n = 24).

Also, respondents showed to understand that the sustainable fashion sector is the main trend of the future (n = 52); it is promising (n = 26); it is an attractive alternative for beginners in the fashion / clothing sector (n = 16); only serves a niche market (n = 13); It is aimed at elites, because the products are very expensive (n = 4); It is intended for designer brands that are more capable of promoting products (n = 1). Finally, considering what is taught about sustainable fashion in its course, it is understandable that: The Course contributes satisfactorily to the dissemination of sustainable fashion practices in Brazil (n = 33); the Course contributes significantly to the dissemination of sustainable fashion practices in Brazil (n = 30); the Course contributes reasonably to the dissemination of sustainable fashion practices in Brazil (n = 26); the Course makes a very small contribution to the dissemination of sustainable fashion practices in Brazil (n = 14); and the Course contributes fully to the dissemination of sustainable fashion practices in Brazil (n = 9).

Speech by students

Considering what is taught about sustainable fashion in its course, students manifested that: The Courses contribute in a very small way in the dissemination of sustainable fashion practices in Brazil (n = 45); The Courses contributes fully to the dissemination of sustainable fashion practices in Brazil (n = 25); The Course contributes reasonably to the dissemination of sustainable fashion practices in Brazil (n = 80); The Course contributes significantly to the dissemination of sustainable fashion practices in Brazil (n = 43); The Course contributes satisfactorily to the dissemination of sustainable fashion practices in Brazil (n = 49);

About the sustainable fashion sector students believe that: It is the main trend of the future (n = 95); It is promising (n = 90); It only serves a niche market (n = 30); It is aimed at elites, because the products are very expensive (n = 15); It is an attractive alternative for beginners in the fashion / clothing sector (n = 15); and it is intended for designer brands that have a greater capacity to promote products (n = 3). Therefore, the design courses students demonstrate a wide variety of practices that are taught and corroborate for the formation of graduates based on sustainability principles. Especially, able to articulate elements of social innovation to create fashion collections oriented to sustainability.

Teaching the course about how to design products from waste and reuse and to create creative alternatives to create a product that besides being an artifact of fashion, represents a conscious posture of its consumer. In this sense, it is noticeable that there is an effort in the training process to articulate knowledge that can contribute to support the different dimensions of sustainability, namely: a) social dimension: through the possibility of undertaking in different geographical and social contexts, so that there is an income distribution, possibilities of job creation and social inclusion; environmental dimension: adherence to creative ways of using waste and dematerialized parts, which guarantees reuse, optimizing the use of natural resources and minimizing impacts on the ecosystem; c) economic dimension: management of own and public resources in favor of fashion projects, associations, cooperatives, groups and entities that ensure the generation of income, jobs and opportunities for the empowerment of individuals; d) cultural sustainability: valuing the cultural specificities of different peoples and regions, including generating partnerships for development and generating opportunities for valuing local culture to create an identity for the region when offering specific products to tourists and supporters ; e) spatial sustainability: the creation of poles, networks and synergies that are associated with specific territories and local regionality, through the exploration of fair economic activities. Summing up, there is a zeal for the development of different regions and groups.

5. Discussion of results

The practices of sustainability and circular economy are the subject of debate in different organizational contexts. They receive attention from managers, as they represent a new production model, supported by the assumptions of balance, preservation, life cycle extension, inclusion of longevity among other aspects in the production cycles and resulting results. In the fashion segment, they become strategic as the industry internalizes circular economy practices capable of inducing reuse, reassessing existing materials, adhering to upcycling for altering or personalizing products [10]. It depends on a rethinking the logic of consumption within the fashion segment [34]. In this sense, under no circumstances are outdated clothes considered garbage. The recycling, reconditioning and reuse practices contribute to the transformation of linear operations into cyclical ones.

So, it is necessary to align the educational system with the changing dynamics of the fashion sector, because only in this way can education be part of the solution [10]. Also, by the adaptations in the education system it may be possible to generate strategies and changes that allow to unites the pillars of consumption with awareness and commitment to society – as mentioned by Lee et al. [8] – and increase the understanding about the growing restriction of access to natural resources [11] that more expensive and valuable [13] in context that of lack of sustainability.

This movement in favor of a balance in environmental, social and economical issues is very welcome. However, it has not yet found full legitimacy in the Brazilian organizational context, nor the change in cultural issues – as those presented by Sener et al. [36], Henninger et al., [34] and Köksal and Strähle [37]. There is evidence of its relevance, of its role in the survival of different species on the planet, but organizational trade-offs still corroborate that it is complex and challenging to implement sustainability and the circular economy fully. In order to make it happen it is fundamental on a change of awareness [34, 38], mentality [23] and postures [24] that last for a long term, allowing new to generate new perceptions about the fashion sector [26] and its impacts [27]. Advocation may be a way for the change [39], and education is a potent mean for it. As a consequence it may be possible to reach a higher commitments to sustainable development and a more equitable and just society [22].

Many advances have already been made within the Brazilian fashion Desing education sector. There are guidelines, laws, regulations, resolutions, business models, tools, practices, guidelines. However, there is still a room for awareness about the importance of promoting an educational model that connects social, economical and environmental issues into the concept of sustainable fashion [33]. Anyway, a very rich framework of alternatives. But the consumer, the executor, the population in general still lacks further instructions on what needs to be done and how to engage for the success of the circular economy in favor of sustainability. By this, it is important to highlight that even though sustainable fashion is a concept that is being internalized [1], there is still the need for a higher collective effort in order to change behaviors. From that, it will be possible to accomplish with the aim proposed by Fung, Choi, and

Liu [3] of including of sustainability assumptions in the fashion sector. This kind of change is essential to allow the adoption of more sustainable raw material [4, 5, 6, 20] and processes [3, 7, 18, 19, 21, 22, 40]

Circular economy provides a set of elements that are associated with the concern for materials, while people, that is, traditional craftsmen use their technical expertise, generating new pieces from the reduction of waste, reuse and reuse. In this context, design values craftsmanship, personalization, the craftsman's creativity and unique and stylish pieces. Therefore, it generates social and cultural meanings [10], by recognizing the role and importance in this transition into sustainable fashion sector [30, 10] and society. The internalization of sustainable and circular may be costly [41], however they are necessary.

Finally, it must be remembered that the industry has positioned the fashion sector in a way that promotes scale and intensive production. And the circular economy proposes a transition to a new logic of production.

6. Final Remarks

This study aimed to validate theoretical propositions about teaching good practices in sustainability and circular economy within the Brazilian context. The validation took place through empirical evidence and cross analysis of data from different sources.

The studied context allows to conclude that Brazil is at an early stage of maturity in teaching circular economy practices as assumptions in favor of sustainable fashion. There is a long way to go to in order to consolidate this path. It encompasses the widespread dissemination of concepts, the teaching of good practices, the sensitization of people to adhere to and consume products from this productive system and especially the adherence of major players in the sector, who have greater power to convince and engage actors in the supply chains fashion production. Empirical evidence shows that this transition from fashion design courses to the sustainable perspective has been taking place. Although, in order to reach the level recommended by Amritha and Suresh [2] that sustainability, it still requires a collective work, engagement, commitment, cooperation and generation of profitable results. So, it must be the result of collective of a conscientization effort about the need of change in practices, beliefs and behaviors that evolves academia, society, companies and governments.

The main lessons that can be drawn from this study are associated with the dissemination of long cycle circular economy practices, such as recycling, remodeling the piece on a mannequin using folds, drapes, cuts and other elements or deconstructing the parts of the piece and rebuild it in a new way; eco-design, possibilities for reuse and recreation. This expands the space for investment in short cycle circularity practices, associated with product, service and platform design. That is, the perspective of product planning and digital business models, process virtualization, shared platforms, artificial intelligence, among others.

For managerial implications, this study suggests the need to update the curricular matrices of Fashion Design courses in Brazil. This changes can be done by making the perspective of research, design, planning, prototyping, creation, production, making products available on the market and return of post-use products for designers to reuse materials, elements closely aligned with the principles and premises of the circular economy. The popularity of circular practices in the sustainable fashion segment tends to spread more quickly if major players in the sector adhere to them. Although the premises that support this concept emphasize local collaboration, development of communities and regional networks, the awareness of the general population to purchase this type of product tends to occur more effectively when there are actors capable of investing heavily in strategies for communication and awareness.

The limitation of the study is associated with the lack of indicators and quantitative metrics referring to the total of internalized practices, time of internalization and acceptability by consumers. Such limitations can become opportunities for new studies to advance and disseminate the circular economy in the sustainable fashion segment aligned with the premises of sustainable development. Also, it is important to highlight that even though it presents the reality in Brazil, it would be recommendable to conduct the same study in other developing countries in other to better understand how this kind of problem is treat in similar contexts.

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