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Sustainable fashion: an analysis from the perspective of teaching good sustainability practices and circular economy

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Abstract

Good practices in sustainability and circular economy are recurrently addressed in society since there is a transition in consumption behavior of a portion of the population, which aims to purchase eco-friendly products. This study analyzes how face-to-face fashion design undergraduate programs in Brazil are including premises of sustainability and circular economy. The theoretical framework is based on sustainable fashion and circular economy. The work consists of a survey with a qualitative and quantitative approach. Questionnaires were applied to coordinators, professors, and students of fashion design undergraduate programs. The results showed that good sustainability and circular economy practices are taught in fashion design programs. This teaching encourages students to adhere to good practices in sustainability, biodegradability, and ethical clothing manufacturing. There is evidence that the form of teaching adopted by the educational institution contributes to preparingqualified people to work in innovative markets and with different niches. Therefore, the undergraduate programs are aligned with the teaching of practices and provide knowledge so that professionals can disseminate good sustainable fashion practices. This study contributes by subsidizing coordinators of undergraduate programs so they can structure educational plans and include specific disciplines that emphasize contemporary and emerging circular economy and sustainability practices.

Keywords: Sustainability. Circular economy. Fashion design.

Moda sustentável: uma análise sob a perspectiva do ensino de boas práticas de sustentabilidade e economia circular

Resumo

As boas práticas de sustentabilidade e economia circular são assuntos abordados de forma recorrente na sociedade, uma vez que há uma transição de comportamento de consumo de uma parcela da população que almeja adquirir produtos *eco-friendly*. O objetivo deste estudo é analisar a forma pela qual os cursos de bacharelado presencial em *design* de moda ofertados em nível de graduação no Brasil estão inserindo premissas de sustentabilidade e economia circular na formação do aluno. O arcabouço teórico está pautado em moda sustentável e economia circular. O trabalho consiste num levantamento com abordagem qualitativa e quantitativa. Foram aplicados questionários a coordenadores, docentes e discentes dos cursos de *design* de moda. Os resultados evidenciaram que são ensinadas boas práticas de sustentabilidade e economia circular nesses cursos. Tal ensino dá ênfase ao incentivo aos discentes para adesão das boas práticas de sustentabilidade, biodegradabilidade e fabricação de roupas. Há evidências de que a forma de ensino adotada pela instituição contribui para a formação de pessoas qualificadas que atuam em mercados inovadores e com nichos diferenciados. Portanto, os cursos estão alinhados com o ensino de práticas e provisionam conhecimento, a fim de que os profissionais possam disseminar boas práticas da moda sustentável. O estudo contribui para que os coordenadores tenham subsídios na reestruturação dos projetos pedagógicos dos cursos e possam inserir disciplinas específicas que enfatizem práticas de sustentabilidade e economia circular contemporâneas e emergentes.

Palavras-chave: Sustentabilidade. Economia circular. *Design* de moda.

Moda sostenible: un análisis desde la perspectiva de la enseñanza de buenas prácticas de sostenibilidad y economía circular

Resumen

Las buenas prácticas en sostenibilidad y economía circular son temas que se abordan de forma recurrente en la sociedad, ya que hay una transición en el comportamiento de consumo de una parte de la población, que anhela adquirir productos ecológicos. El objetivo de este estudio es analizar la forma en que las licenciaturas presenciales de Diseño de Moda en Brasil están insertando premisas de sostenibilidad y economía circular en la formación del alumno. El marco teórico se basa en la moda sostenible y la economía circular. El trabajo consiste en una encuesta con enfoque cualitativo y cuantitativo. Se administraron cuestionarios a coordinadores, docentes y discentes de los cursos de Diseño de Moda. Los resultados mostraron que, en dichos cursos, se imparten buenas prácticas en sostenibilidad y economía circular. Esta enseñanza hace hincapié en alentar a los estudiantes a adherirse a buenas prácticas en sustentabilidad, biodegradabilidad y fabricación de ropa ética. Existe evidencia de que la forma de enseñanza adoptada por la institución educativa contribuye a la formación de personas calificadas para trabajar en mercados innovadores y con nichos diferenciados. Por tanto, los cursos están alineados con la enseñanza de prácticas y aportan conocimientos para que los profesionales puedan difundir las buenas prácticas de moda sostenible. El estudio contribuye a que los coordinadores de cursos tengan bases para la reestructuración de los proyectos pedagógicos de los cursos y puedan insertar disciplinas específicas que enfaticen prácticas de sostenibilidad y economía circular contemporáneas y emergentes.

Palabras clave: Sostenibilidad. Economía circular. Diseño de moda.

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INTRODUCTION

The industrialization process in Brazil started with the textile industry, when natives abandoned handcrafted techniques to make garments using European methods (Prado, 2019). As of 1990, the fashion industry began to adopt sustainable practices, due to environmental pollution, fabric waste, and high carbon emissions, responsible for 1.2 billion tons of greenhouse gases per year (Ellen MacArthur Foundation [EMF], 2017).

The concept of sustainable fashion is incorporated in the creation of collections (Claxton & Kent, 2020) to align with sustainability assumptions (Amritha & Suresh, 2020), by including them in the fashion sector (Fung, Choi, & Liu, 2020). This suggests manufacturing products that use raw materials with elements that do not harm the environment in their production system (Fifita, Seo, Ko, Conroy, & Hong, 2020) – for example, organic cotton, which does not use pesticides (Galleli, Sutter, & Lennan, 2015). Sustainable fashion seeks to give the customer a shopping experience associated with social and environmental commitment (Ertekin & Atik, 2020), thus joining the pillars of consumption with the awareness and commitment to society (Lee, Choi, Han, Ko, & Kim, 2020).

According to data from UN Environment, the fashion industry is the second most water-consuming sector, producing 20% of wastewater (Pena, 2019) and releasing 500 thousand tons per year of synthetic microfibers into the oceans, and 10% of greenhouse gas emissions (Amaral et al., 2019). In Brazil, the largest textile producers are concentrated in the Southeast and South regions, and the country is the fourth largest producer of knitwear and the fifth among the largest textile industries in the world (Associação Brasileira da Indústria Têxtil e de Confecção [Abit], 2018).

The expression "sustainable fashion" has been investigated by several researchers (Cardoso & Dantas, 2019), becoming an object of interest in social, academic, and scientific spheres (Silva & Alliprandini, 2018). Higher education institutions play an important role in preserving the environment and the community's quality of life (Lima, Silveira, & Beirão, 2018), given the characteristics of their activities (Costa, 2012). The creation of the National Curriculum Guidelines for Environmental Education (Resolução nº 2, de 15 de junho de 2012) and the teaching policy opened spaces for sustainable education, present at different levels of the multidisciplinary educational process (Lei nº 9.795, de 27 de abril de 1999), that is, the content can be distributed over the entire curricular matrix (Podlasek et al., 2018). Fashion designers are responsible for using artifices that reflect on the textile process (Amaral et al., 2019).

Based on this script, our study aimed to analyze how undergraduate courses on fashion design in Brazil are inserting assumptions of sustainability and circular economy into students' education. The theoretical justification relates to the words by Lipovetsky (2015), thanks to the change in consumer behavior. Considering the growth of the textile industry in recent decades, and the analysis of environmental, economic, and social impacts within industry (Koszewska, 2018), this study sought to contribute to science for mapping strategies, paths, and alternatives used by fashion design courses for the insertion of sustainability and circular economy assumptions in students' education.

The social relevance of the study is associated with the opportunity to integrate people in an educational model that motivates communities to engage in sustainable fashion, by bringing practices such as inclusion, preservation of natural resources, and economic improvements (McNeill & Moore, 2015). We understand that the effect is indirect, because teaching sensitizes, raises awareness, and shows possibilities. Therefore, it creates the first step towards an eco-friendly society, by replicating and disseminating good sustainability practices in education (Henninger, Alevizou, & Oates, 2016). Considering the behavior proposed by sustainable fashion, it is possible to contribute to relieve the damage caused by the textile industry to the planet by adopting measures like the choice of natural fabrics, for example, which minimally affect the environment, winning over the consumers.

This study aimed to understand the mechanisms that strengthen the relationship between a contemporary education, according to international guidelines – the Sustainable Development Goals [SDG] defined by the United Nations (D. S. S. Garcia & H. S. Garcia, 2016) –, actions to ensure the planet's continuity (Salcedo, 2014), and the formation of sustainable values, principles, and behaviors (Loureiro, Pereira, & Pacheco, 2016).

We organized this study as follows. In addition to this Introduction, the next section presents theoretical aspects related to the topic of sustainable fashion and circular economy. Next, we present the methodological path, the results, and their discussion. We conclude with the final remarks and the references.

SUSTAINABLE FASHION AND THE CIRCULAR ECONOMY

Fashion industry is expanding its market, and sustainability is an opportunity to expand its businesses (Galleli et al., 2015). Fashion is an ephemeral, temporal, cultural, anthropological (Lipovetsky, 1989), contextual, and conceptual phenomenon (Janaudis, 2011). It is something complex (Treptow, 2003), with several dimensions, and a system that accompanies apparel and is part of the use of daily clothes (Chiaretto, 2013). Research is an important element of sustainability, through the incorporation of material reuse and recycling practices (Leite & Sehnem, 2018).

In 1980, organic cotton and ecological clothing culture emerged (Berlim, 2012), based on environmental care (Galleli et al., 2015) and guided by sustainability, by something less polluting (Fletcher & Grose, 2011). This care is oriented towards the ability to create products with discarded material (Duarte, 2012), exploring opportunities to improve fashion items through the efficient use of resources (Fletcher & Grose, 2011), considering environmental, social, and economic issues (Araújo, Broega, & Ribeiro, 2014).

For sustainable fashion to be in evidence, joint attitudes for product design and its life cycle are necessary (Refosco, Oenning, & Neves, 2011). Sustainable product creations can spread consumer wish (Berlim, 2012), and sustainable management requires considerations on environmental, cultural, social, and economic elements, regarding aspects that can affect the local community (Leite & Sehnem, 2018). Consumers are taking daily actions focused on sustainability (Zhang, 2014); therefore, it is essential that designers pay more attention to all phases of the product life cycle (Berlim, 2012).

The work of cooperatives and workshops for the growth of sustainable fashion is evident (Chiaretto, Martins, & Muylder, 2014), together with the choice of biodegradable fibers, without the use of pesticides (Galleli et al., 2015). Famous brands are abandoning plant fibers grown with chemicals (Chiaretto et al., 2014). The choice of recycled fibers, derived from the residues of the production itself, ensures the product's durability, avoiding early disposal (Nishimura & Gontijo, 2017). In addition, water is a relevant element in practically all stages of production in the textile industry (Fletcher & Grose, 2011). The company Jeanologia reduced water consumption by 71% during the production of Levi's jeans (Moura, 2018). The challenge is to save 85% with the first Lavanderia Zero [Zero Laundry], ensuring no waste and pollution (Jeanologia, 2019).

The circular economy has received attention from prestigious journals (Winans, Kendall, & Deng, 2017). The subject has been quickly spread (Manninen et al., 2018), and the number of publications has grown a lot (Geissdoerfer, Savaget, Bocken, & Hultink, 2017), since it has the assumption of rethinking the way of producing and using natural resources (McDowall et al. 2017). The principle of circular economy emerged in 1848 (Lancaster, 2002). In 1982, the article "The product-life factor" was the first publication that referred to the definition of the economy's closed circuit (Leitão, 2015). Germany pioneered the implementation of the concept, approving the Toxic Substances Management Act and the closed-loop waste management (EMF, 2015).

The circular economy is an economic model that integrates different lines of thought (Confederação Nacional da Indústria [CNI], 2018) and creates opportunities for innovation in industry (EMF, 2015). The challenges for inserting circular economy in organizations are global (Geissdoerfer et al., 2017), but it consists in the transition from current economic models to a more sustainable one (Gomes, González, & Bárcena, 2018). Conceived as a continuous cycle of positive development that preserves the natural capital, circular economy optimizes resource productivity and minimizes systemic risks by managing finite stocks and renewable flows (EMF, 2015). In the circular economic model, waste becomes resources, to be recovered and revalued through recycling or reuse (Pearce & Turner, 1990).

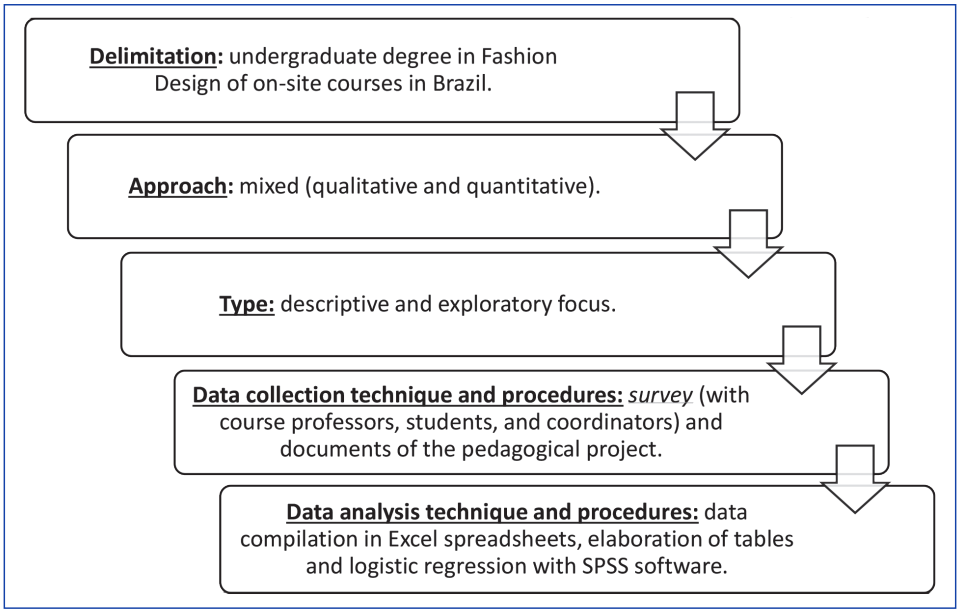
The concern with solid waste from the clothing industry stimulates fashion professionals to create collections using biodegradable raw materials (Amaral et al., 2019). Solving conflicts around environmental and social impacts requires collaborative management, through agreements and consensus (Lopes & Demajorovic, 2020). Innovations oriented to the circular economy in the fashion industry add value to the brand and contribute to systemic changes in the sector, allowing value preservation of products and services (Amaral et al., 2019). Hence, the circular economy becomes a viable business model that turns waste into inputs for new products, solving social and environmental problems, protecting natural resources, and exploiting them ethically (Anice & Rüthschilling, 2013).

Sustainability is one of the directions of circular economy, and its strategic concept is rooted in the pillars of sustainability (Elkington, 2011). Thus, the fashion market is tied to the idea of rethinking the ways of production (Sena, Matos, Mesquita, & Machado, 2017). Slow fashion and sustainable fashion are forms of making consumers aware, embedding values and improving the quality of life (Fletcher, 2007). It is a change from quantity to quality (Lee et al., 2020). Garments are created to last, with timeless models and ecological fabrics, showing a higher quality (D. Pereira & Nogueira, 2013).

METHODOLOGICAL PROCEDURES

To support the study, we present the methodological procedures used. Next, we delimit the research, regarding the type and approach – qualitative and quantitative – as well as the methods for defining the universe and the sample. Figure 1 presents the flowchart of the research stages.

Figure 1
Flowchart of research steps



Source: Elaborated by the authors.

We carried out the research from September 2019 to January 2020, focused on fashion design courses, and the target audience comprised coordinators, professors, and students, in addition to examining each course's pedagogical project (PPC). We used two approaches: qualitative and quantitative. Using the qualitative approach, we analyzed the pedagogical projects of fashion design courses; and we used the quantitative approach for data collection based on a survey with coordinators, professors, and students. This was an exploratory and descriptive research.

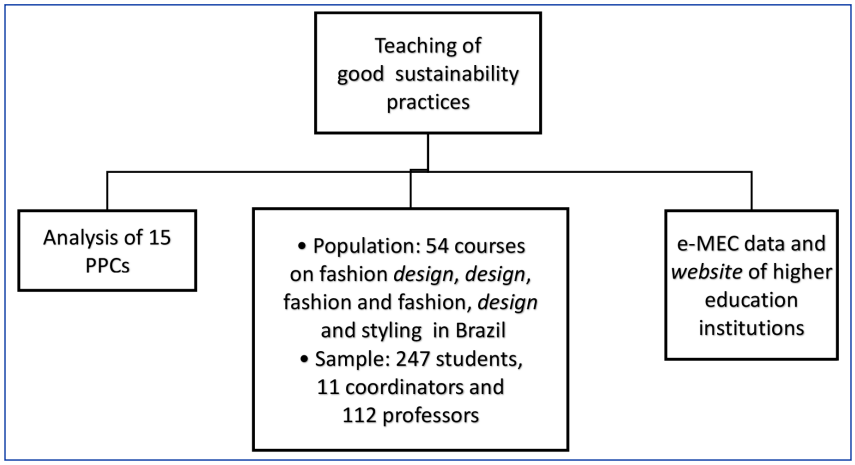
In order to identify the on-site undergraduate courses in fashion design in Brazil, we conducted a documentary research in May 2019, in the e-MEC/Ministry of Education system, a platform created to facilitate the procedures of higher education institutions. We observed the following criteria: detailed OECD area (design and styling), status (in activity), modality (on-site), degree (bachelor), general OECD code-area (2), general OECD area (humanities and arts), specific OECD code-area (21), specific OECD area (arts), detailed OECD code-area (214), and OECD area (fashion course).

Through this initial survey, we found 54 courses – some from the same institution, but in a different city or state –, in addition to different names, but which fit the criteria mentioned in the previous paragraph. After defining the courses, we conducted a search in the official pages of the institutions, in order to get support for applying the questionnaire to professors and students, sending a link with a different questionnaire for each audience.

In cases where we could not access the PPC on the institution page, we contacted the coordinator to request the documents. With those in hand, we read them carefully and drew a table to organize the information. To keep anonymity, we named the institutions by pseudonyms, described as PPC A, B, C, in alphabetical order. Next, we carried out a content analysis, having as axis the categories "sustainability", "triple bottom line/sustainability tripod", "fashion design", "slow fashion", "recycled material", "upcycling", and "eco-friendly".

For the survey applied to coordinators, professors and students, we used an electronic questionnaire, adapted to each audience, registered on Google Docs, based on the studies by Štefko and Steffek (2018) and Zhang (2014). Figure 2 shows data collection sources and the samples obtained.

Figure 2
Sources of the analyzed data



Source: Elaborated by the authors.

In the qualitative approach, used to analyze the topics extracted from PPCs, we adopted the process of content analysis proposed by Bardin (2011): pre-analysis, material exploration, and handling of results, inference and interpretation. After exploring PPCs' analyses, we defined the registration units and the context units (Bardin, 2011). At this stage of categorization, we analyzed the collected data in detail. Finally, we handled the results, made inferences and interpretation, through an analysis based on the theoretical framework.

To analyze the questionnaires applied to coordinators, professors, and students, we compiled data in an Excel spreadsheet and created tables. We analyzed the data from coordinators and professors through the relative frequency of answers. As for the data from the questionnaire applied to students, in addition to the descriptive analysis, we examined sustainability and circular economy practices more related to the students' perception of sustainable fashion. To do that, we used the technique of multiple linear regression, with the assistance of the SPSS statistical software. Box 1 presents the research protocol, to increase the study reliability (Yin, 2010).

Box 1
Research Protocol

Steps	Description
Study objective	To analyze how on-site undergraduate courses on fashion design are inserting assumptions on sustainability and circular economy in students' education.
Design: propositions	Proposition 1 – Fashion design courses teach practices of sustainability and circular economy. Proposition 2 – Fashion design courses form conscientious people that adopt practices of sustainable fashion. Proposition 3 – Fashion design courses stimulate the production of sustainable fashion collections.
Preparation: unit of analysis	Fashion design courses in Brazil.
Analysis environment	PPC and perception of course coordinators, professors and students.
Schedule	Survey was applied from October 2019 to January 2020.
Collection: sources of evidence	• Questionnaire (professors, students, and coordinators). • Institution's official page (PPC, invitation by e-mail or telephone).
Analysis	• Content analysis. • Definition of analysis categories. • Data triangulation.
Research validity	According to Yin (2010), we followed the procedures for protocol use, multiple sources of evidence, and data triangulation.
Data sources and reliability	Data reliability was achieved from triangulation, comparing those obtained through the survey with coordinators, professors, and students/graduated with data from PPCs analysis.
Key questions	**Student**
	1. Linked course. 2. Course's stage of development. 3. Perception of the fashion sector. 4. Expectations regarding the fashion sector 5. Disciplines that address sustainable practices. 6. Forms of teaching of sustainable practices. 7. Audience age. 8. Audience gender. 9. Location of the education institution that you attended/attend. 10. Actions adopted in buying a product. 11. Practices of sustainability and circular economy. 12. Relevant aspects that you would like to share on sustainable fashion, and the ways fashion design courses are incorporating assumptions of sustainability and circular economy in students' education.
	Professor
	1. Time of experience in teaching. 2. Concerns about teaching sustainable practices. 3. Emphasis on teaching strategy. 4. Contributions on forms of teaching. 5. What is taught about sustainable fashion in the course? 6. Institution's location. 7. Relevant aspects that you would like to share on sustainable fashion, and the ways fashion design courses are incorporating assumptions of sustainability and circular economy in students' education.

Continuation

	Coordinator
Key questions	1) Time of experience in coordination. 2) Perception on the course you coordinate. 3) Prevalence of teaching in the course. 4) Disciplines that emphasize contents oriented to sustainability. 5) Impact of sustainable fashion 6) What is taught about sustainable fashion in the course. 7) Institution's location. 8) Relevant aspects that you would like to share on sustainable fashion, and the ways fashion design courses are incorporating assumptions of sustainability and circular economy in students' education.
Search for evidence	Based on theoretical proposition.
Report	We linked the evidence between questions, collected data, and conclusions.

Source: Adapted from Štefko and Steffek (2018), Troiani (2020), and Zhang (2014).

With data in hand, the analysis consisted of identifying patterns and creating analytical categories based on the assumptions of sustainable fashion and circular economy.

DATA PRESENTATION AND ANALYSIS

In all, we collected 370 questionnaires and 15 PPCs. The presentation of research data begins with answers from students, professors, and coordinators, and ends with the PPCs.

Profile of the students surveyed

There were 247 respondents, 15.7% male and 84.2% female. A percentage of 38.46% are between 18 and 23 years old; 33.2%, between 24 and 28; and 28.3%, between 29 and 48 years old. Regarding the Brazilian region where they attend the course, 43.3% are in the South; 41.7%, in the Southeast; 8.9%, in the Northeast; 4%in the Midwest; and 2% in the North region. As for the names established for the research on the Ministry of Education website, 72% are linked to a design course; 13% to fashion design; 7% to fashion, design and styling; and 7% to fashion.

When asking students how many subjects in the course address sustainable practices, 34.4% mentioned up to 3 disciplines; 23.9%, up to 5; 13.7%, one; 10.5%, up to 7; 4.4%, none; and 12.8%, up to 13 subjects. The guiding axis in the development of professionals in fashion design should be a constant process of interaction between the academic environment and the labor market, and the course's disciplines balance academic education to understand reality.

Regarding sustainability actions taught to students, 17.4% answered sustainable, eco-friendly, and socially conscious practices; 16.6%, emerging and innovative practices; 2.9%, traditional practices in the fashion and apparel sector; and 63.1% mentioned other practices, without specifying them. When asking students how professors teach, addressing sustainable practices in the fashion sector, 36.4% said it was only in the classroom, orally; 22.2%, through events to disseminate examples of sustainable fashion; 21.4% with biodegradable, organic, recycled and eco-friendly materials; 4.8%, by visiting establishments that manufacture and sell sustainable fashion; and 15% said 'other forms', without specifying them.

On the question about students' expectations regarding the fashion sector, 38.4% said it is the main future trend; 36% considered it a promising sector; 18.1% said that it serves only a niche market, focused on the elite, since products are expensive; and 7.2% think it is an interesting option for beginners in the fashion/clothing sector, oriented to designer brands that have greater capacity to announce their products.

Regarding the course contributions for the dissemination of sustainable fashion practices in Brazil, 34% of the students said that the course contributes reasonably; 19.8%, satisfactorily; 18.6%, minimally; 17.4%, relevantly; and 10.1%, fully. Table 1 shows the actions taken by students when they buy something for their use/consumption. We analyzed the answers based on a scale from 0 to 10, where 0 means 'does not do/does not attend', and 10,' full attendance'.

Table 1
Actions adopted in buying a product

Actions adopted in purchases for your use/ consumption	0	1	2	3	4	5	6	7	8	9	10	Total
Product durability	2.8%	0.4%	0%	0.4%	0.8%	5.2%	4%	9.7%	21.9%	13.3%	41.5%	100%
Long-term fashion	6%	0.8%	0.4%	2.8%	0.4%	5.6%	4.9%	9.8%	14.9	12.9%	41.5%	100%
Repair capacity	7.3%	1.2%	1.6%	4.8%	2%	9.3%	6.9%	11.7%	18.1%	10.9%	26.2%	100%
Environmental impact of product manufacturing	6%	1.2%	3.2%	5.2%	2.4%	13.3%	9.3%	13.3%	14.5%	7%	24.6%	100%
If the product is made from recycled material	9.7%	2.8%	2.8%	6%	5.6%	20.2%	10.1%	10.1%	11%	4%	17.7%	100%
If the product is made from ecological materials, that is, recycled, organic, and renewable	9.7%	2%	2.8%	3.6%	6.9%	11.7%	9.7%	16.5%	10.9%	7.7%	18.5%	100%
If the product is manufactured ethically (for the workers that make it)	5.2%	0.8%	1.2%	0.8%	3.2%	6%	5.7%	8.5%	14.5%	12.1%	42%	100%
Resources used to send and distribute the product	16.1%	2.8%	2.8%	4.4%	6%	14.1%	9.7%	8.9%	11%	8.5%	15.7%	100%
Use of ecologically correct production processes	8.5%	2.4%	4%	3.2%	4.8%	12.5%	8.5%	13.7%	14.1%	8.9%	19.4%	100%
Item recycling	8.5%	3.6%	4.4%	2.4%	2.8%	13.3%	9%	14.1%	13.3%	5.2%	23.4%	100%
Potential points of sale of items that extend product's life	11.7%	4%	3.6%	2.4%	4.8%	10.9%	9.3%	9.3%	13.7%	9.7%	20.6%	100%
Retailer or producer's commitment to the environment	6.9%	2.4%	2.4%	1.6%	4.7%	9.7%	6.5%	11.7%	19%	7.7%	27.4%	100%

Source: Elaborated by the authors.

Considering Table 1, 41.5% attributed a score of 10 to the items 'product durability' and 'long-term fashion', while 42% gave a score of 10 to the item 'if the product is manufactured ethically'. Regarding the item 'resources used to send and distribute the product', 16.1% of respondents gave 0.

Profile of the professors surveyed

Regarding professors, there were 112 respondents, of which 70.5% have been in the area for more than 5 years; 8.9%, from 4 to 5; 12.2%, from 2 to 3; and 6.25% for less than one year. As for the region, 44.6% are from the South; 32.1%, from the Southeast; 16.9%, from the Northeast; 3.5% from the North; and 2.6% from the Midwest.

When asked about their teaching strategy, 28.2% of the professors mentioned teaching dynamics and exercises to retain content; 17.5%, the oral presentation of the content; 23.1%, the production of fashion pieces and collections, and the use of teaching cases; 15.7% referred to previous readings for participation in the expositive and dialogued class; and 15.3% cited technical visits to specialized companies and participation in specific events in the fashion and design sector.

With regard to the perception of encouraging practices of sustainability, biodegradability, and clothing production, 33.9% answered that students are encouraged to adopt these practices in their profession; 29.4% mentioned that there is wide acceptance and adherence to these practices by students; 21.4% observed that they emphasize sustainable practices; and 15.1%, that they say little about sustainable practices.

As to the form of teaching adopted by the institution, professors answered according to these percentages: 50% believe that they contribute to prepare qualified people for working in new and innovative markets and different niches; 15.1% train people to be mainly entrepreneurs; 13.3% qualify people for the traditional way of acting in the market; 12.5% prepare bold people, capable of revolutionizing the fashion and clothing sector; and 8.9% educate people to become mostly employees.

In relation to professors' perception about the sustainable fashion sector, 46.4% considered it the main future trend; 23.2%, a promising sector; 14.2%, an attractive alternative for beginners in the fashion/clothing sector; 11.6% that it only serves a niche market; 4.5%, that is oriented to elites and designer brands with greater ability to promote their products.

When asking professors about sustainable fashion practices in the course, 29.4% answered that the course contributes satisfactorily; 26.7%, in a relevant way; 23.2%, reasonably; 12%, minimally; and 8%, fully.

Profile of the coordinators surveyed

Of the 11 coordinators who answered the survey, 36.3% have been in the coordination function for less than 1 year; 36.3%, from 2 to 3 years; and 27.1%, for more than 4 years. As for the region, 27.2% of respondents are from the South, Midwest, and Southeast, while 18.1% are from the Northeast. There were no respondents from the North region.

As for the percentage of disciplines that emphasize contents focused on sustainability, 45.4% indicated less than 10%; 27.2%, up to 30%; 18.2%, up to 50%; and 9.1%, up to 70%. Asked about the perception regarding the prevalence of teaching in the course, 36.3% said that emerging and innovative practices prevail; 27.2%, those traditional in the fashion and apparel sector; 10%, sustainable, eco-friendly, and socially conscious practices; and 27.2%, other practices.

With regard to the perception of the impact of sustainable fashion, 45.5% mentioned the impact on production; 27.2% on consumption; 18.2%, on the final disposal of obsolete items and on the image of the company that makes sustainable items; and 9.1%, other unspecified options. Asked about the perception of the course in the fashion and clothing area, 45.4% said that the course is differentiated; 27.2%, traditional; 18.1%, disseminator of the best sustainability practices, eco-friendly, and committed to society; and 10% innovative.

Coordinators answered about the contribution of the course to disseminating sustainable fashion practices, with 36.3% mentioning that it contributes in a reasonable manner; 27.2%, minimally; 27.2%, satisfactorily; and 9.1%, significantly.

Relationship between sustainability practices, circular economy, and sustainable fashion

To analyze sustainability and circular economy practices that influence students' perception on sustainable fashion, we conducted a multiple linear regression, using the sustainability actions as independent variables, and the perception on sustainable fashion as the dependent variable. We also used the stepwise method to list sustainability practices, from higher to lower importance, which are linked to the perception of sustainable fashion. Table 2 shows the regression results.

Table 2
Relationship between sustainability practices and sustainable fashion

Models		Non-standardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics		R2
		B	Erro Padrão	Beta			Tolerance	VIF	
1	(Constant)	5.434	.232		23.457	.000			0.173
	PRACTICE15	.273	.038	.416	7.107	.000	1.000	1.000	
2	(Constant)	4.666	.322		14.510	.000			0.211
	PRACTICE15	.182	.046	.277	3.916	.000	.658	1.520	
	PRACTICE05	.168	.050	.238	3.370	.001	.658	1.520	
3	(Constant)	4.618	.319		14.459	.000			0.228
	PRACTICE15	.145	.049	.220	2.970	.003	.587	1.704	
	PRACTICE05	.125	.053	.177	2.367	.019	.577	1.735	
	PRACTICE20	.107	.046	.168	2.321	.021	.613	1.631	

According to Table 2, the regression generated three models of analysis. The first addresses the practice of sustainability and circular economy that is more related to the student's perception on sustainable fashion. Models 2 and 3 incorporate the second and third practices, respectively, which also have a greater relationship with sustainable fashion. Therefore, of the 23 practices, only three have a positive and significant relationship with the perception of sustainable fashion.

In model 1, we see that practice 15 is the one that most relates to the perception of sustainable fashion. We can also say that this practice, alone, can explain fashion's perception in 17.3% of the cases. Practice 15 refers to students' understanding that, in the course taken, they learned that sustainable fashion is more profitable for the entrepreneur. Thus, students seem to be concerned with sustainable fashion, since it can bring more results to entrepreneurs.

The best results stem from the reduction in manufacturing costs, as firms make efforts to eliminate waste during the production process, reduce and reuse water, in addition to using recyclable materials. As a result, expenses with the purchase of raw materials or exploration of natural resources are minimized. Thus, there may be a beneficial association between environmental preservation through sustainable fashion and keeping organizational profits.

The second most relevant practice for the perception of sustainable fashion is practice 5, which increases the explanatory power of the dependent variable by 3.8%, reaching 21.1%. This practice is related to thinking consciously on the planned and designed pieces for creating a garment collection. Thinking consciously is about choosing the raw materials, taking into account those that can be reused, and the production methods that reduce a negative impact on the environment. The combination of the type of raw material and the form of production must also ensure and preserve the quality and design of the created pieces.

The third most relevant practice for fashion perception is practice 20, which adds a 1.7% explanatory power to the dependent variable, raising it to 22.8%. It relates to learning that haute couture tends to become sustainable. What will be relevant in the future can influence the perception of students about sustainable fashion, since traditional practices, not linked to sustainability and circular economy, will become obsolete.

The other practices did not show a significant relationship with students' perception of sustainable fashion.

DISCUSSION OF RESULTS

Given the complexity of the textile chain, the designer has an essential role in searching for more sustainable techniques. We noticed that the public has knowledge on sustainability and its dimensions, but sometimes, in professional practice, this understanding is not fully exercised, due to the interference of some factors in designers' creative process. Although the fashion industry promotes scale and intense production, the circular economy proposes a transition to a new production logic, based on the mapped evidence. In this study, we could validate some propositions that we describe below.

Proposition 1: Fashion design courses teach practices of sustainability and circular economy

In search for keywords, we found good sustainability practices and circular economy in PPCs, which are not expressed directly, but indirectly, through their concepts. In this perspective, CNE/CES Resolution No. 5/2004 (Resolução nº 5, de 08 de março de 2004), highlights the responsibility of educational institutions when addressing environmental issues in design courses, but it does not have a direct interference, leaving it to the discretion of the institution. Podlasek et al. (2018) argue that the institution can distribute the topic along the course, with no minimum percentage to achieve.

For 64.3% of the professors, teaching sustainable fashion in the course contributes, in a full and satisfactory way, to disseminate sustainable fashion practices in Brazil. This is in line with Resolution CNE/CES No. 5/2004 (Resolução nº 5, de 08 de março de 2004), in art. 4 – VIII and art. 5 – I, which has explicit guidelines regarding design with environmental issues. For 45.5% of coordinators, the course is different in the area of fashion and clothing, while 36.4% highlight that the course mostly teaches emerging and innovative practices. Rech (2002) observes that the fashion designer is a professional with the ability to innovate, responsible for adapting forms and techniques. For Treptow (2003), this professional is always aware of trends, in addition to creating and recreating pieces.

According to CNE/CES Resolution No. 5/2004 (Resolução nº 5, de 08 de março de 2004), the responsibility for addressing some environmental issues in design courses rests with the institutions. Hence, 50% of the professors indicated that the form of teaching adopted by the institution contributes to form qualified people to work in new and innovative markets, and differentiated niches, confirming Lopes and Tenório (2011), for whom the professor mediates knowledge and practical actions. For Brunstein, Fischer, and Godoy (2013), educational institutions aim to train skilled professionals for the challenges of sustainability.

Act No. 6,938/1981 (Lei nº 6.938, de 31 de agosto de 1981), on the National Environmental Policy, requires environmental education at all levels of education. According to the students, the course taught that one should think consciously about the pieces when creating a garment collection, and haute couture tends to become sustainable (Nishimura & Gontijo, 2017).

Proposition 2: Fashion design courses form conscious people that adopt sustainable practices

Professors' perceptions contribute to validate this proposition. Almost 40% (33.9% of them) observed that practices of sustainability, biodegradability, and the manufacturing of ethical clothes are conveyed to the students, encouraging them to adopt these practices in the profession, which is in line with Borges (2004); for him, the design area is growing and the market needs professionals who are receptive to the new trends exposed by society. Companies should establish correct actions for society, regarding market ethics (Araújo et al., 2014).

The study showed that fashion professionals are those who are ahead of the production cycle of numerous items. If they are not fully aware of the importance of sustainability actions and practices, despite all existing legislation, they will take decisions that may harm the environment, especially professionals linked to textile and apparel production, segments recognized as huge consumers of natural resources.

The results contribute to the success of sustainability in the fashion context, based on joint attitudes between the pre-production stage, production and selection of techniques that reduce the environmental impact. Several actors interact with fashion design courses, and designers must reflect on this whole process, when choosing the material for creating a piece.

Proposition 3: Fashion design courses stimulate the production of sustainable collections

Coordinators validate this proposition, since 45.5% of them indicated production as an essential part. At this stage, the work of designers starts. Through their work, they can contribute to the transition to sustainable lifestyles, making changes in product redesign. This finding is similar to Borges's (2004) conclusions, by showing that the fashion designer uses his/her ability to adapt the product to his/her methods. Bürdek (2006) observes that these professionals are responsible for a piece's production method.

We observe the concept of 'slow fashion' in the actions taken by students when buying a product. A percentage of 41.5% values the long-term fashion and product durability, confirming Lee et al. (2020) that slow fashion is a shift from quantity to quality. In the concept of slow fashion, and according to Fletcher and Grose (2011), the development processes of the pieces and the origin of raw material are essential, with 42% of the students saying that they evaluate the form of production when purchasing. In line with Refosco et al. (2011), slow fashion seeks to increase products' life and quality. Thus, 26.6% of the students said that they assessed the product's repair capacity at the time of purchase, and 18.5% observe if the product is made of ecological materials.

Regarding the expectations for disseminating good sustainability practices and circular economy in fashion design courses, 46.4% of the professors understand that sustainable fashion is the main trend of the future, a situation shown by Berlim (2012), for whom fashion is concerned with social and environmental actions in society. A percentage of 36.6% of the professors showed concern for the students, emphasizing sustainable, eco-friendly, and socially conscious practices. Confirming this trend, Chiaretto et al. (2014) point to the growth of sustainability in fashion, through the work of studios, cooperatives, and workshops.

FINAL REMARKS

The objective of this study was to analyze the way on-site undergraduate courses in fashion design in Brazil are inserting sustainability and circular economy assumptions in students' education. We concluded that there are good practices of sustainability and circular economy in the courses, as pointed out by professors, coordinators, and students in the questionnaire answers. PCCs strengthen these topics, by presenting them directly and indirectly.

The managerial implications of this study suggest the need to update the curriculum matrix of fashion design courses in Brazil. Above all, to adopt the perspective of research, design, planning, prototyping, creation, production, availability of products in the market, and product return after use. These guidelines serve for designers to reuse materials, elements aligned with the principles and assumptions of the circular economy. The popularity of circular practices in the sustainable fashion segment tends to spread rapidly, if major players in the sector join them. Although the assumptions that support this concept emphasize local cooperation, the development of communities, and regional networks, the population's consciousness for purchasing this kind of product tends to happen effectively if there are actors capable of investing heavily in strategies of communication and awareness.

The study contributes to awaken, in students' minds, possibilities and alternatives for planning and designing conscious products, respecting the process cycle. In general, it shows a diagnosis of the current education panorama in Brazil with regard to sustainability and the circular economy, in addition to innovating in the areas of design, in order to project with consciousness, focusing on good practices of sustainability and circular economy, to motivate designers to be actors of the necessary change in products.

The limitations of the research were due to the lack of direct access to the e-mails of students and professors, thus depending on course coordinators for sending the questionnaire, and the unavailability of PCCs in some institutions. Suggestions for future studies involve extending the debate on the topic, aggregating all actors involved in the process, and increasing the dissemination of the circular economy in the sustainable fashion segment.

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