Case Report

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UNDERSTANDING USER EXPERIENCE OF AN OPEN DESIGN-CLOTHING PRODUCT.

Compreendendo a experiência do usuário com vestuário open design.

ABSTRACT

Few studies related open design to the clothing sector, but none explored how users would experience it. The study reported here aimed to investigate how people with some or without prior sewing knowledge - advanced and amateur users – experience an open design-clothing product. Following four fashion design heuristics, a garment was created and distributed as DIY kits among advanced and amateur users. Data were collected in two stages: assembly and personalization. The results indicate that although skills play a significant role during assembly, other factors, like cross-generational differences and personal taste, influence how users experience an open design product. Furthermore, the study shows that given the necessary support, the open design can be used by a heterogeneous public, amplifying the participation of users with little or without prior sewing skills in clothing co-creation.

KEYWORDS

Co-creation; Do-It-Yourself (DIY); Fashion Design; Sewing.

RESUMO

Poucos estudos relacionam o design aberto ao setor de vestuário, mas nenhum explora como a experiência dos usuários. O estudo aqui relatado teve como objetivo investigar como pessoas com ou sem conhecimento prévio de costura – usuários avançados e amadores – vivenciam um produto de vestuário de design aberto. Seguindo quatro heurísticas de design de moda, uma peça de vestuário foi criada e distribuída como kits de "faça você mesmo" entre usuários avançados e amadores. Os dados foram coletados seguindo duas etapas: montagem e personalização. Os resultados indicam que, embora as habilidades tenham um grande papel durante a montagem, existem outros fatores, como diferenças entre gerações e gosto pessoal, que influenciam a forma como os usuários experimentam um produto de design aberto. O estudo mostra que, com o suporte necessário, o design aberto pode ser explorado por um público heterogêneo, ampliando a participação de usuários com pouca ou nenhuma habilidade prévia em costura na cocriação de vestuário.

PALAVRAS-CHAVE

Cocriação; Costura; Design de Moda; Faça Você Mesmo.

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1. INTRODUCTION

The clothing sector constantly seeks innovations in styles and materials, but rarely in its processes. Open design can innovate in this aspect. It can use technology for distribution processes while using digital manufacturing to innovate the production processes. However, although open design has been widespread in rapid prototyping over the past few decades (Smith *et al.,* 2017) [1], open design in clothing design is new. Open design can be defined as a project in which the creators allow free distribution, modification, and derivation (Abel *et al.,* 2011) [2]. Thus, people can develop projects globally through the internet, sharing and improving ideas and digital files, while the production of the artifacts takes place locally. Although professional designers often create, the open design main actors are the users, with a diversity of skills (Mustonen, 2013) [3]. User participation in the open design can happen by contributing to a collaborative design process or open access to project files and outputs (Open Design Working Group, 2016) [4]. The latter interrelates with the "Do It Yourself" (DIY) culture, in which any person, without the participation of a specialized professional, can manufacture, improve, or correct an artifact. DIY culture has evolved and encompassed innovations such as communication technologies and digital manufacturing, allowing people to produce a clothing product with their abilities through, *e.g*, kits containing materials and instructions (Martindale & McKinney, 2020) [5].

While DIY is an old practice in the clothing sector, only recently open design has started to get some attention. Some brands exploited the open design approach, like The Post-Couture Collective, which used to sell its creations as digital files and DIY kits. However, this brand is no longer active. Furthermore, only a few studies related open design to the clothing sector (Hirscher & Fuad-Luke, 2013 [6]; Mustonen, 2013 [3]) or mentioned it as a possibility (Hirscher, 2013 [7]; Rissanen & McQuillan, 2016 [8]), but none of them explored the users' experience. Hence, this article reports a study that investigated the users' experiences with an open design-clothing product though a DIY kit, looking at two user profiles: people who had little (advanced users) or did not have (amateur users) prior sewing or pattern making knowledge and skills. The aim was to understand to what extent they could benefit from DIY in an open design-clothing concept, exploring their challenges, opinions, and feelings.

2. LITERATURE REVIEW

The core of the open design proposal is to open the design development and manufacturing processes to different user profiles, with the possibility of participation at various levels, through sharing files and creating opportunities to include individuals with less knowledge and skills in design and production (Instituto Faber-Ludens, 2012) [9]. Furthermore, open design allows users to contribute to artifact production and customization, stimulating the DIY culture (Richardson, 2015) [10]. The DIY culture in post-industrial times takes advantage of the internet and digital manufacturing to distribute, produce and customize products (Fox & Alptekin, 2018) [11]. Through DIY, people can explore the benefits of creative and craft works: joy, pride, personal fulfillment, and high-quality aesthetics (Camburn & Wood, 2018 [12]; Hahn *et al.,* 2013 [13]). Nevertheless, suppose the user has a bad experience during the assembly process. If there are failures, or if the process is too complicated, the user could not finish it or not use the product after all (Hirscher, 2013 [6]).

Since open design can target users with different skills and knowledge, design heuristics can help identify and propose design 'alerts' when using open design in clothing creation. Daly *et al.* (2012, p. 606) [14] define heuristics as ideation strategies used by designers and engineers to solve problems; they are "cognitive alerts that point designers to an exploration of design variations." In User Interaction (UI), heuristics are well-known evaluation methods that apply usability principles (based on practice and recurrent problems noticed by experts) to evaluate designed products or services (Perez, 2018)[15]. Perez (2018) [15] proposed heuristics to guide the development of open design clothing: 1) user orientation, 2) system and connections, 3) customization, and 4) modularity. Another approach is to consider the open design process

through DIY kits from these users' perspectives. For example, users with different abilities can produce and customize a garment using a DIY kit containing materials and instructions, facilitating the process (Hirscher, 2013 [7]; Hirscher *et al.*, 2018 [16]; Martindale & McKinney, 2020 [5]).

3. MATERIALS AND METHODS

The study related here had exploratory and experimental characteristics, with a cross-sectional approach, which evaluates the experiences of two user profiles (advanced and amateur users) with open design facilitated by a DIY clothing kit. These user profiles are based on Mustonen (2013) [3]: advanced users are creative students or professionals in areas related to design, with sewing or digital manufacturing skills, while not working in these areas; and amateur users are unaware of design, sewing, or digital production, but are interested in DIY. The sampling followed the criteria of these two user profiles' skills and diverse age ranges and backgrounds. The recruitment was based on snowball sampling, starting with the researchers' network and expanding as participants indicated friends. Three advanced users and four amateur users from diverse backgrounds and age ranges (24-63 years). The sample of seven participants reflects the qualitative study, and, based on Begley and Dong (2020) [17], it was adequate for this research's purposive sampling. In terms of ethical compliance, this study complied Resolution no. 510/2016, of April 7, 2016, of the Brazilian National Health Council's. Therefore, the researchers applied the Informed Consent Form to all participants and kept their identities anonymous.

The study used a product developed to explore the user experience, including the four design heuristics mentioned before: a vest in neoprene fabric laser cutting that incorporates a creative identity and guidelines on its surface to assemble without a sewing machine. The researchers prepared a DIY kit whit this product (Fig. 1) consisting of clothing patterns that form the body, sleeves, pouch, pockets, and belt, and trims such as embroidery threads, buttons, and a needle. In addition, an instruction manual with assembly and personalization information was available digitally to the participants, with hyperlinks that led to instructional videos of hand sewing.

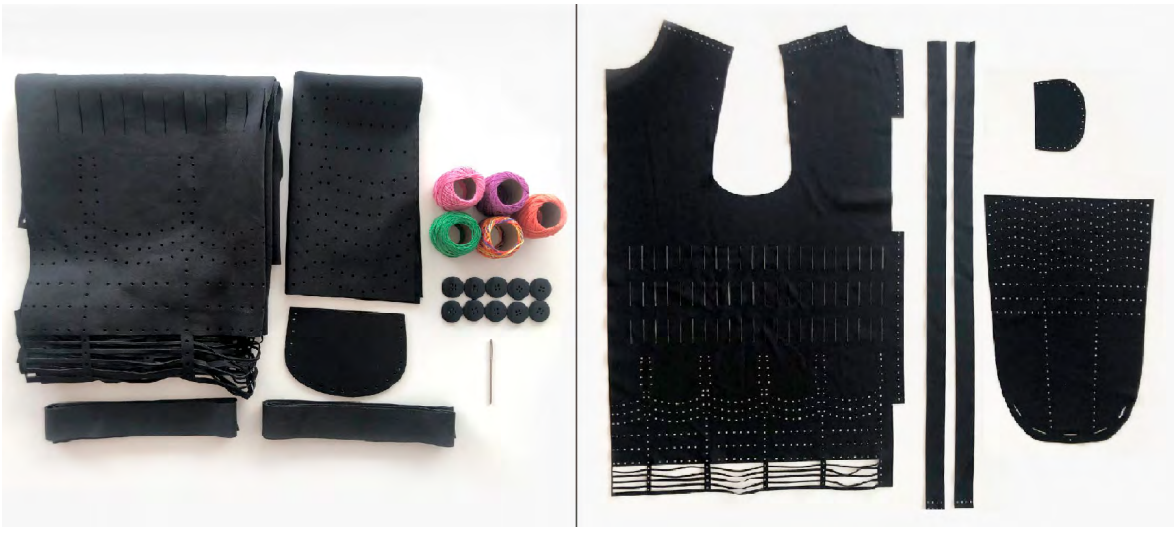

Fig.1
DIY kit prepared to engage users with an open design-clothing product
Source: The authors

Two user experience (UX) methods were chosen to investigate how different users interact with the object of study: contextual inquiry and diary reports. Contextual inquiry combines users' observation and self-reported data holistically as it is conducted in the context of use - the user's natural environment (Hartson & Pyla, 2012 [18]; Getto, 2020 [19]). The diary report is also applied in the user's context; however, the result is from daily notes produced by the users without the researcher's input (Martin & Hanington, 2018 [20]). Data collection took place at the participant's residences to simulate the experience when assembling the DIY kit in its context of use.

The user experience test was divided into two phases: *Assembly* - the participants received the DIY kit in their residences and had the instruction manual (digital medium) available. The assembly was experienced freely, without the researchers' intervention.

The researchers documented this phase by video recording, voice recording, photos, and recording the time of the activity. In the end, the researchers interviewed the participants using a structured script to understand the experience of the product assembling. *Personalization* - the first activity of the second phase was customizing the garment using the laser-cut holes in its surface to create new patterns. The participants had up to three days to customize the vest without the researcher's presence and fulfill the diary report, informing: customization date; time spent; personalized module; carrying out other activities concurrently with the task; feelings during task performance and afterward; the difficulty found across the tasks; and, how involved they were with the product. At the end of the third day, the researchers returned to the participants' residences to collect the diary and apply the second activity of this phase, based on the contextual inquiry method. The users should explore the garment modularity, creating at least three different outfits, using pieces and accessories from their wardrobe, with the condition of presenting the product with and without sleeves, and using the pouch at least in one of the outfits. The researchers documented this activity through photos and voice recordings. In the end, structured interviews aimed to identify the whole experience through emotional perceptions about the three activities processes and results: assembling, customization, and modularity exploration. This analysis followed the recommendation of Gibbs (2008) to create code hierarchies lists and data crossing, applied based on the design heuristics used to develop the product (Table 1).

Table 1
The list of codes and their relationship with the heuristics
Source: The authors

Root Codes	Sub Codes	HEURISTICS
Assembly	Pattern understanding	User orientation; modularity; Systems & connections
	Hand sewing process	User orientation; systems and connections
	Use of the instruction manual	User orientation
	Assembly time	N/A
	Emotional aspects of the participant	
Personalization	Product customization degree	Customization
	Process adversities	
	Aesthetic question	Customization; Modularity

4. RESULTS

In general, all the advanced users had different perceptions about pattern understanding. Some could easily visualize the parts of the waistcoat, but others could not even assemble it correctly. Amateur users had more difficulty than advanced uses with pattern and features (sleeve, pouch, vest) understanding; and found the hand sewing process difficult. Some were unsure about their results, whose quality was lower than advanced users' results (Fig. 2).

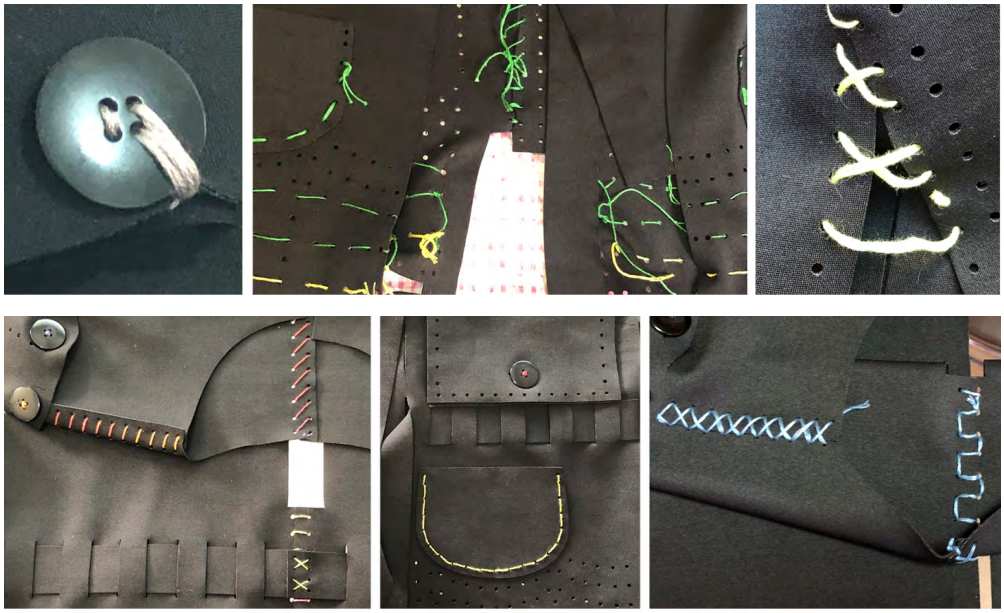

Fig. 2.
Examples of assembly results among amateurs (top) and advanced (bottom) users
Source: The authors

All participants (advancers and amateur users) heeded to consult the instruction manual and reported having confidence in their information. However, only one of the participants accessed the hyperlinks that led to the instructional sewing videos. Regarding the time spent assembling, the average timing of the advanced users was 1 hour and 48 minutes. It was 2 hours and 37 minutes for the amateur users, totaling a considerable difference between their skills. The researchers observed frustration in almost all participants while assembling the vest. Some advanced users reported that the task was slow but challenging. All amateur users stated that they were surprised when they saw the vest completed. The personalization (Fig. 3) is the modification of vest parts surface or combination, like the laser-cut area in which the participants did embroidery (i.e., customization) and wearing the vest with or without the sleeves and the pouch (i.e., modularity). Concerning the results, there was an expressive variability (emphasizing the graphic elements created through the sewing points) among the results of advanced and amateur users. Nevertheless, all participants managed to compose three different outfits with the products regarding modularity. Still, most of them declared that they would not explore all possibilities aesthetics.

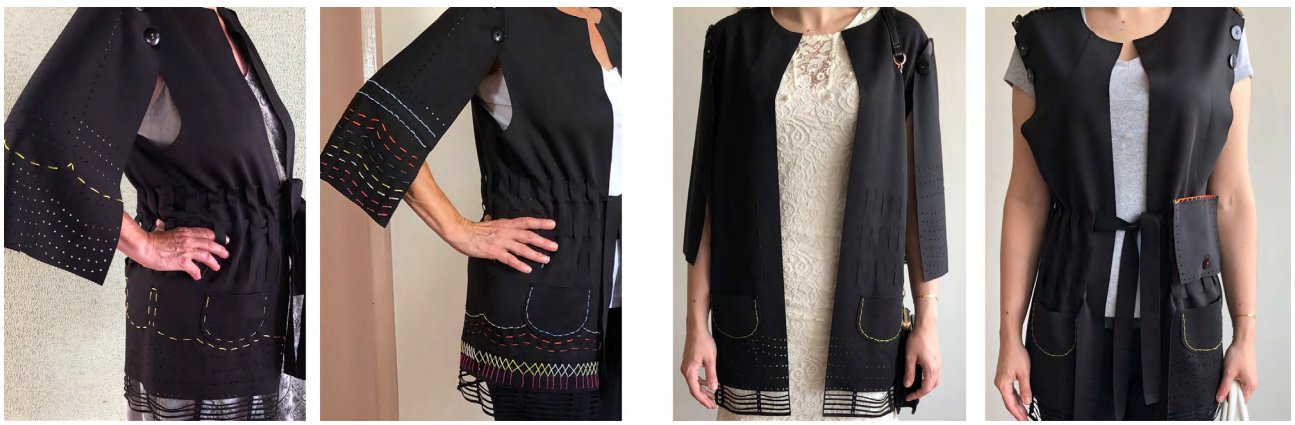

Fig. 3,
Examples of customization (left) and modularity exploration (right) results.
Source: The authors

The differences among personal tastes were evident in the interest in customization, probably linked to generational differences. The two oldest users of the sample explored more customization possibilities than the other participants, while the two youngest ones declared they would prefer not to customize it. After customization, the user's perceptions of the vest were more favorable among the older adults.

5. DISCUSSION

The focus of the study reported here was to understand users' participation as they can access the product (*e.g.*, files, blueprints, DIY kits) and create from there. Following the strategy proposed by Martindale and McKinney (2020) [5] and Hirscher *et al.* (2018) [7], the DIY Kit was adopted in this study to facilitate the integration of two users profiles - advanced (with little sewing skills) and amateur (without sewing skills) – investigating their experiences with an open design-clothing product. All amateur users had great difficulty assembling the vest, as they did not have sewing skills and could not understand the clothing pattern to know how the parts of the vest should be joined. Although advanced users also faced difficulties while assembling it, the task was easier for them, who were faster and had a better seam finish. This result indicates some differences in performance and needs between both profiles and the users' age. We observed that, among advanced users, the older ones (57 and 59 years old) had more difficulty in the assembly phase than the younger users. It might indicate that problems can also be related to age since open design-clothing products can present patterns and assembly differently than common ones. Moreover, the personalization phase results suggest that some open design users would not be interested in customization for purely aesthetic purposes, which can be related to the users' age.

Even though the researchers observed frustration in most participants during the assembly phase, most users reported a sense of joy and personal fulfillment after the assembly and customization processes. This result confirms the joy, pride, and personal satisfaction described by Hahn *et al.* (2013) [13] because of the creative manufacturing of artifacts. Even so, the difficulties related to the processes (especially the assembly) and the quality of the results, besides the reliance on the instruction manual, indicate that an open design product must be carefully developed when targeting amateurs and advanced users, who must quickly understand how to assemble and personalize it.

Although the heuristics were not the focus principal of the study, they were fundamental to guide the analysis and identify possible improvements in the open design in clothing creation. For instance, the researchers observed that the product could better apply the heuristic user orientation (Rissanen & McQuillan, 2016) [8] since some users reported difficulty understanding how to assemble the clothing. Other heuristics were satisfactorily used, such as modularity (Instituto Faber-Ludens, 2012) [9] and customization (Rissanen & McQuillan, 2016) [8]. Due to technical, time, and funding reasons, it was impossible to adopt an iterative approach to modify the artifact by incorporating adjustments and then testing it again. Future research could improve the heuristics applied in the study reported here or even propose and test other ones. Moreover, future studies could incorporate interactive touchscreen interface features to allow amateur and advanced users to participate in thought open contribution during the design process.

6. CONCLUSION

The study reported here investigated the users' experiences with an open design-clothing product, looking at f people who have some sewing knowledge - advanced users – and those who do not have prior sewing knowledge - amateur users. Following open design principles of open access to project materials to assembly and personalization, a DIY kit was distributed among the two users' profiles to explore usability, acceptability, and satisfaction with the open design concept in the clothing sector. The results indicate that skills play a significant role during the assembly process. Advanced users benefited more from the open

design kit since they were more familiar with sewing. In contrast, amateur users presented more difficulties and needed to use the manual instructions to complete the task. Besides skills, the study suggested that there are cross-generational differences. Both oldest amateur and advanced users faced more difficulties during assembly. Still, they explored more customization possibilities than the younger ones, enjoying more its results than the youngest users. So there is space in open design clothing to explore differences such as taste and preferences among users. Both users' profiles were interested in open design and experienced joy and fulfillment after the assembly and personalization tests. Anyway, open design heuristics and strategies for clothing creation need to be improved, providing the necessary guidance to make open design clothing more accessible to both users' profiles.

An open design-clothing product that can be easily assembled and personalized potentially would attract a heterogeneous public, amplifying their participation in clothing creation independently of their previous sewing skills. In this manner, open design in clothing creation for amateur and advanced users can enable a new area of expertise in the clothing sector, for whom this study may provide important ground in terms of design suggestions and recommendations for future research.

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CONFLICTS OF INTEREST

The authors state that there was no eventual conflict of interest that might interfere with the result of the research.

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