ESTUDOS EM DESIGN
DESIGN ARTICLES

Hybrid ceramic crafts: users' perception of traditional and digital technologies for production

O artesanato híbrido cerâmico: a percepção dos usuários frente às tecnologias tradicionais e digitais de produção

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Abstract
This article presents the construction of meaning based on users' perceptions of traditional handmade ceramics and hybrid ceramics produced using traditional techniques and the digital technology of 3D clay printing. Previous studies on the perception of users in relation to materials were mapped, which was the basis for the tests involving 118 participants, virtually, and 15 in person. Through comparative data, similarities and distinctions between the objects were identified. The results were not limited to hybrid utilities, as they also provided information on traditional ceramics. This article inserts designers as mediators between craft tradition and technological innovation, fostering a dialog about new forms of contemporary production.

Keywords: Design, Ceramics, Craftsmanship, Perception, Digital Technology.

Resumo
Este artigo apresenta a construção de significado a partir da percepção de usuários frente a utilitários cerâmicos artesanais e aqueles híbridos, produzidos via técnicas tradicionais e tecnologia digital da impressão 3D da argila. Foram mapeados estudos anteriores sobre a percepção de usuários em relação a materiais, isto fundamentou os testes que envolveram 118 participantes, de maneira virtual, e 15 presencial. Por meio de dados comparativos, foram traçadas similaridades e distinções entre os objetos. O resultado não se limita aos utilitários híbridos, pois trouxe também informações referentes à cerâmica tradicional. Este artigo insere designers como mediadores entre a tradição artesanal e a inovação tecnológica, fomentando um diálogo sobre novas formas de produção contemporâneas.

Palavras-Chave: *Design, Cerâmica, Artesanato, Percepção, Tecnologia Digital.*

Introduction

Understanding user perception enhances the knowledge of products beyond functional aspects. The perspective presented in this article is related to the production process of ceramic objects, particularly to the hybrid process — one that combines digital clay modeling tools with traditional techniques — and the characteristics that different manufacturing methods imprint on objects, whether objective or subjective.

Ashby and Johnson (2014) define the perception of materials and products as the result of interpreting what is observed, which varies for each user. Pagnan (2018) states that experiences provided by products, services, or environments have been increasingly valued, changing how they are conceived, designed, or consumed. Desmet and Hekkert (2007) mention that, since the 1960s, various disciplines involved in product design and consumption have focused on perception analysis, including Engineering, Marketing, and Economics. Following this logic, designers and manufacturers have come to understand their products beyond functionality.

Contextualization of the Relationship Between Craftsmanship and Individualized Digital Manufacturing

We are currently witnessing a revolution that directly impacts production methods, not only in the industrial sector but also among small-scale producers. The popularization of the internet and personal computers has broken virtual barriers and driven new productive practices through rapid prototyping technologies. Thus, the Maker Movement emerged, characterized not only by the possibility of individualized digital manufacturing but also by the sharing of information within networks as a manifestation of people from various fields seeking experimentation and the re-appropriation of production (Anderson, 2012).

This context immediately connects with the craft sphere, as it also refers to the creator's productive autonomy and the appropriation of small-scale productive means, distinct from the prevailing industry. This is because the traditional artisan centralizes the entire production process, being the owner of the means of production and responsible for the design, execution, and commercialization of their pieces, not merely an executor. Their product stands out as an instrument of cultural identity, local representation, and productive differentiation - qualities valued at a time when industrial means are being reevaluated due to the intense massification of the 20th century (Dias, 2014; Freitas 2025).

This post-industrial scenario of changing production cycles establishes new design and manufacturing dynamics that benefit makers and artisans by providing aesthetic innovations and new market opportunities. Gonçalves (2016) emphasizes that the major change brought about by the Maker Movement is not the nature of objects but rather who produces them. The author claims that the maker is a new type of artisan connected to the digital world.

The production of ceramic artifacts, more specifically, has traditionally employed analog methods. It represents a complex repertoire of artisanal knowledge and techniques that have remained largely unchanged over time (Frigola, 2002). However, craftsmanship is guided by the availability of technologies and resources within a cultural discourse that is redefined over time and cannot be regarded as a fixed practice. According to Borges (2011), it results from a set of crafts, knowledge, and symbols passed down from generation to generation, continuously

reinterpreted through social changes. Cuéllar reinforces this idea: “Craftsmanship, based on the legacy of past traditions that are renewed with each generation, constitutes a true living heritage” (1997, p. 255). This suggests that ceramic craftsmanship can benefit from the interdisciplinary approach of Design and contemporary digital experimentation.

Hybrid Ceramic Production

There are several methods of 3D printing, and each one works distinctly and with specific materials; however, all classes start from a pre-conceived 3D computational model in a Computer-Aided Design (CAD) system that functions as geometric modelers. Another way to obtain a 3D model is through a scanner, a machine capable of copying the geometry of a physical body. Once it is ready, the model is exported as a STereoLithography (STL) file, which is configured for the 3D printer based on the desired parameters. Slices are generated, and the layers to be printed (deposited or hardened) are defined based on thickness. Choosing the correct parameters compatible with the type of printer, material, and function of the product is essential for quality printing (Volpato, 2007; Gorni, 2001).

As this study focuses on the artisanal scope, only the extrusion printing category is addressed, as it is simpler and more accessible, thus more present in studios and workshops (Gürsoy, 2018). In this category, the most well-known class is Fused Deposition Modeling (FDM), commonly applied to polymers, but when referring to ceramic materials, the method used is Paste Deposition Modeling (PDM), from the same category. It is a process similar to FDM; however, the clay is extruded and deposited at room temperature, rather than heated, and solidifies through the evaporation of water in its composition. The following steps are traditional; that is, after being printed, the piece goes through drying, the first firing, glazing, and a second high-temperature firing that can reach up to 1250ºC.

When this 3D printing tool began to gain popularity, it was noticed that clay presented itself as a suitable material for experimentation, as it allows, while still wet, a series of interventions (during and after printing) that make the final object not merely a reproduction of the digital model; furthermore, the natural characteristics of clay used (texture, grain size, color) and the specificities of the tool (extrusion nozzle, resolution and speed of printing, material flow), along with the inventiveness of the glazing process and firing conditions, attribute aspects to the final pieces that are not digitally designed and compose variables to be explored throughout the artisan's creation (Gürsoy, 2018).

Starting from the appreciation and shared similarities among the described production strands, the convergence between craftsmanship and digital technologies would be inevitable.

The perceptual dimensions in relation to materials and products

For Dias (2009), both material and experience play essential roles in product development. Materials define functions, durability, costs, while user experience, determined by perceptual processes, also influences this moment of conception. The author states that such processes stem from individuals' mental functions: cognition, affection, and volition or conation.

Cognitive Dimension

The cognitive dimension interprets and understands the relationship between material and product in the mind. It can be divided into levels of experience: aesthetic impression, semantic interpretation, and symbolic association. It is a complex phenomenon that involves manifestations such as subjective feelings, behavioral, physiological, and expressive reactions (Dias, 2009; Desmet; Hekkert, 2007).

- Aesthetic impression - Refers to "the whole set of effects caused by the interaction between user and product, including the degree to which our senses are activated" (Hekkert, 2006, p. 160);
- Semantic interpretation - Refers to a cognitive process that implies associations such as interpretations, attribute connections, memories that trigger meanings and expressive characteristics to products and their use (Dias, 2009);
- Symbolic association - deals with emotional experience. In other interpretations, this last level is defined by social satisfaction, communication of user identity through their products (Dias, 2009).

Affective Dimension

This dimension refers to the positive or negative emotions triggered by the use of products, i.e. emotional and mood reactions. Norman (2006) shows that emotions guide our decision-making process; they are inseparable from cognition and modify the way we think and behave.

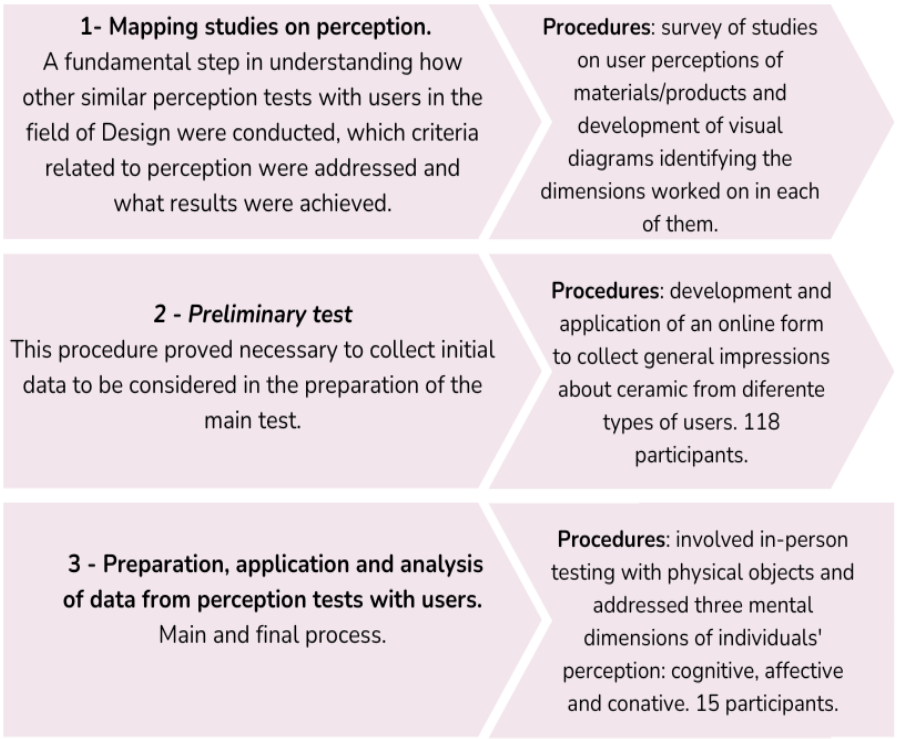
Conative Dimension

Related to volition, it concerns the decision-making and attitudes of users when faced with the stimuli of a material/product. Therefore, it refers to the motivation for purchase, use and choices. Conative evaluation is used to try to clarify users' motivations and preferences regarding the materials and products evaluated (Dias, 2009).

Development of the research instrument

To investigate users' perception of printed ceramic objects, it was also necessary to gather the subjective cognitive profile regarding traditional ceramics, which are already deeply embedded in the daily practices of social life. Thus, by comparison, it was possible to determine whether the interference of digital technology implies a change in users' perception and consequent differentiation in cultural valuation. The research consists of the following summarized steps. (Figure 1).

Figure 1: Research summarized steps.



Source: authors, 2025.

Step 1 - Mapping of Previous Studies on Perception

To develop the perception tests, it was necessary to establish the specific procedures to be carried out. Thus, it was pertinent to address similar studies that fulfilled the task of analyzing users' perceptions regarding products and materials. The following studies were analyzed:

- Permatus Evaluation Model (Dias, 2009).
- Material Driven Design - MDD - (Karana *et al.*, 2015).
- Persus Model (Santos, 2012).
- User Perception of Products Manufactured via 3D Printing in Colored PLA with Annatto Masterbatch - Bixa Orellana L. - (Pagnan, 2018).
- Method and Measurement Scale Applied to the Furniture Sector (Almeida, 2013).

It was found that all these studies analyzed the three perceptual dimensions described above. This aspect was incorporated into the tests of this research, as well as the division of user profiles that result in distinct perceptions.

It is important to emphasize that, unlike the cited studies, this research investigates perception in relation to production processes, rather than just materials. Although these factors are inseparably present in the product, this differentiation was important in the design of the subsequent tests. From this stage, it was possible to outline the following paths.

Step 2 - Preliminary Test

The main objective of this phase was to collect a general impression from users to structure the other planned activities, such as verifying the difference in perception between a handcrafted object and an industrialized one, or the level of understanding among users with different profiles

regarding ceramics. Thus, an online form was applied with questions regarding the level of knowledge about ceramics, the frequency of purchasing these objects, and semantic interpretation questions based on images of three cups representing printed ceramics, manually obtained ceramics, and standardized ceramics produced on a large scale by mechanized processes. The cup was chosen as the utility item because it is quite common in the daily life of anyone and is frequently produced in many workshops.

A total of 118 responses were obtained over the course of three weeks, reaching people from all five Brazilian regions and even residents outside the country.

Although this preliminary stage generated a broad set of data, this article focuses on the most relevant results for the development of the main tests. It involves the survey of characteristics attributed to a conventional handcrafted ceramic utility item. Participants were asked to freely mention at least two characteristics associated with it. A word cloud was created (Figure 2) based on the responses and the number of times each word was mentioned.

Figure 2: Word cloud generated in the preliminary test based on participants' responses regarding the characteristics they attribute to handmade ceramics.

Source: authors, 2025.

It was noted that no negative characteristics were attributed by the respondents, even though people with different levels of knowledge regarding ceramic production processes were reached. Some of the attributes mentioned most frequently were included in the stage related to the cognitive sphere of the in-person test.

Step 3 - Application and Analysis of Main Test Data with Users

Selected Objects

The cups selected for this stage were different from those presented in the preliminary test and were acquired to allow physical interaction with the participants. For this selection, some decisions were made based on practical issues such as ease of acquisition and communication with the producers and the value of the pieces. A perceived need was the selection of pieces with simple shapes so that they would not strongly interfere with the respondents' perception (Figure 3).

Figure 3: Pieces selected for in-person user testing.

CUP 1	
	**Production process: pottery wheel**
	Local: Nova Lima - MG; R$95,00
	Capuccino Clay - satin glaze all over the piece; 102 x 45mm - 120ml;
	Fired at high temperature - 1220ºC.
CUP 2	
	**Production process: manual**
	Local: Belo Horizonte - MG; R$35,00
	Local clay - white glaze all over the piece; 128x49mm - 125ml;
	Fired at high temperature - 1220ºC.
CUP 3	
	**Production process: slip casting in a plaster mold from a printed matrix**
	Local: São Paulo - SP; R$56,00
	Terracota clay-Vitrified on the inside with shiny white glaze.; 82x48mm - 88ml;
	Fired at high temperature - 1220ºC.
CUP 4	
	**Production process: 3D printing**
	Local: Estados Unidos - EUA; $30
	Local clay-Vitrified on the inside with shiny clear glaze; 80 x47mm - 80ml;
	Fired at high temperature - 1220ºC.

Source: authors, 2025.

Formation of Respondent Profiles

A crucial issue for understanding the tests is the specification of the user profiles studied. Dias (2009) points out that the personal characteristics of users (age, gender, type of education), as well as their experiences and prior knowledge about the product, influence their preferences, resulting in distinct perceptions of the same product. Thus, the invited participants were divided into three profile categories:

- Laypeople - users who are unfamiliar with 3D printing (ceramic or not) and traditional ceramic processes. It is important to emphasize that even without this knowledge, these participants were expected to have an interest in the topic so that they could reflect on each presented object and thus provide more complete responses;
- Makers - users who are familiar with 3D printing processes, even if they have not had contact with the printing of ceramic materials. They may or may not recognize traditional ceramic production processes;
- Ceramists - users who are knowledgeable about artisanal processes. They may or may not recognize the 3D printing process. Professional ceramists and ceramics students were invited, as preliminary tests indicated that they did not demonstrate distinct perceptions.

Following these requirements, 15 users (five from each profile) were invited to participate in this stage conducted in person.

Application of In-Person Tests

The tests were conducted individually, in person, on different dates and locations. To expedite data collection, the researcher went to the participants at predefined times. It was agreed in advance with each one that a quiet, well-lit environment with a spacious table was necessary, so that the ceramic objects, computer, and audio recorder (cell phone) could be organized.

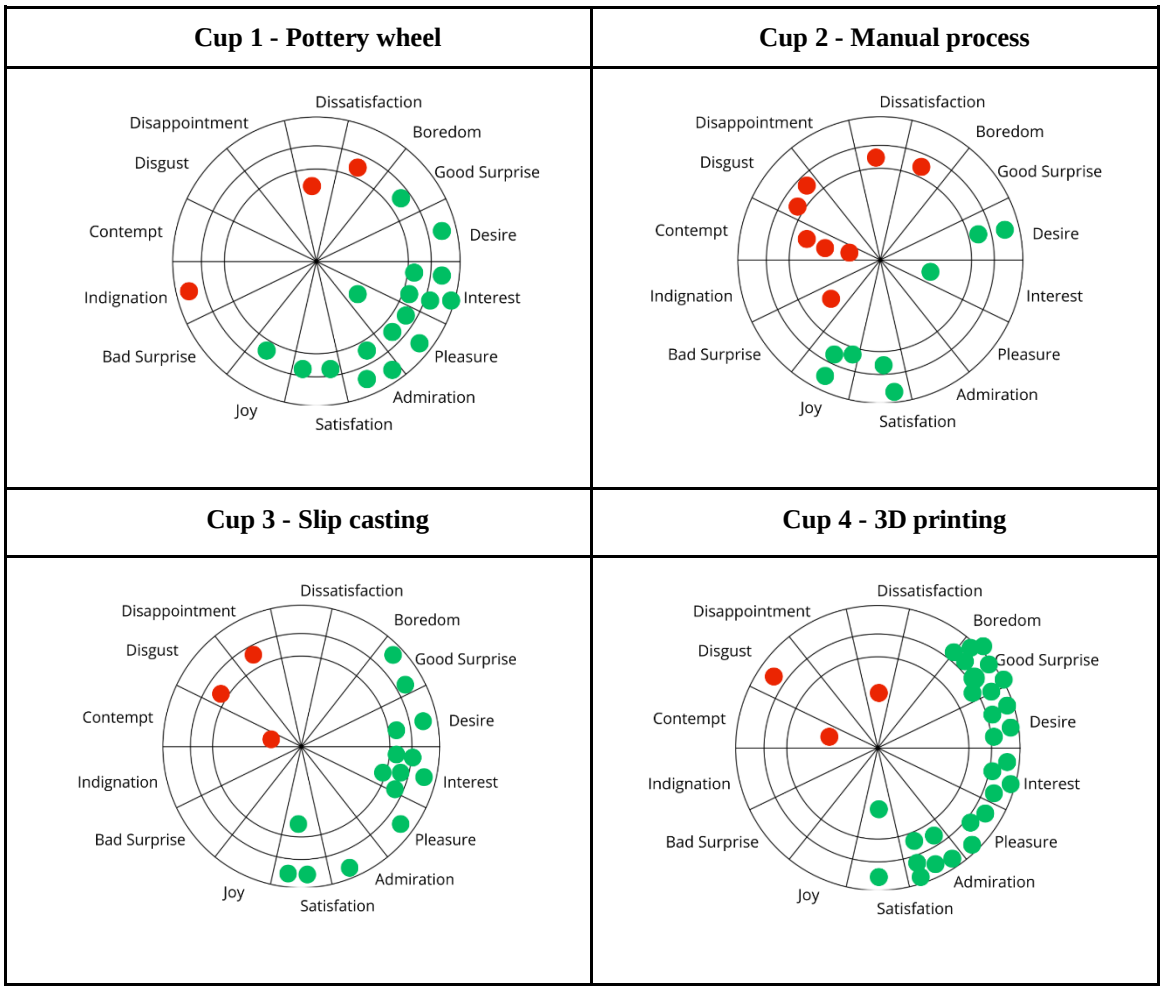
For the objectivity of this paper, a large part of the following analysis focuses primarily on the printed cup, which is the core of this study. A more detailed perception of the other pieces is present in the original dissertation.

Analysis of Results Regarding the Affective Dimension of Perception

After a brief interaction with the cups, participants were asked to identify, in a self-assessment, the emotions evoked by each of them, if any existed. These were presented based on Desmet's Circle of Emotions (2004) in a simplified adaptation of PrEMO - Emotion Measurement, an instrument developed by Desmet to measure users' self-assessment of reactions to products. This circle consists of seven positive emotions and seven negative emotions across three scales of intensity.

In this way, all four cups were analyzed, totaling 85 self-assessments of emotions identified by the 15 users. Of these, 80% were positive emotions and 20% negative (Figure 4).

Figure 4: Graphs of the self-assessment results of emotions for the four cups.



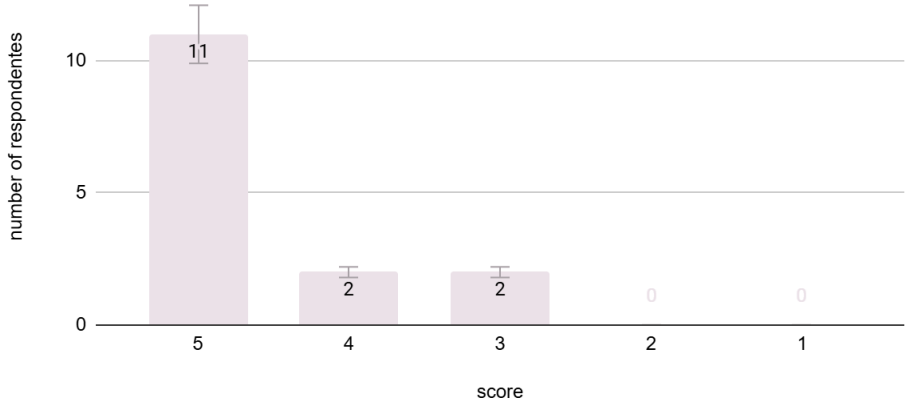
Source: authors, 2025.

Cup 4, modeled using 3D printing with ceramic material, provoked the most emotions, totaling 31. It also received the highest number of positive emotions in both relative and absolute values, with 89% of these being rated as strong intensity. The 'good surprise' was the most mentioned by respondents due to the unusual shape of the cup, which sparks curiosity about the still little-known production process.

Analysis of Results Regarding the Cognitive Dimension of Perception

Introducing the tests regarding cognitive function, a question rated on a scale was posed: From 1 to 5, with 1 being little and 5 being a lot, what value do you attribute to a piece made by a manual process? Justify. The objective was to assess the degree of importance attributed by participants to the manual production process in general; at this point, there was no evaluation of the cups (Figure 5).

Figure 5: Graph of score vs. number of participants for the question on manual craftsmanship appreciation.



Source: authors, 2025.

About 73% of respondents gave the maximum rating, and the average score given was 4.6, indicating a high appreciation for manual craftsmanship among the sample of participants. Separating by group, the average remained exactly the same among laypeople and ceramists and slightly lower among makers (Figure 6).

Figure 6: Average rating of manual appreciation by profile group.

Overall average	Average among laypeople	Average among makers	Average among ceramists
4,6	4,6	4,4	4,6

Source: authors, 2025.

In analyzing the justifications, it was possible to observe the repetition of words and meanings to express the appreciation of the manual process, such as: more conscious consumption, closer human connections, the creator's identity, and a longer production time. Among ceramists, expressions like 'body and soul,' 'energy,' 'emotional state,' and 'intimate production relationship' were used to emphasize the personal connection between the piece and the artisan.

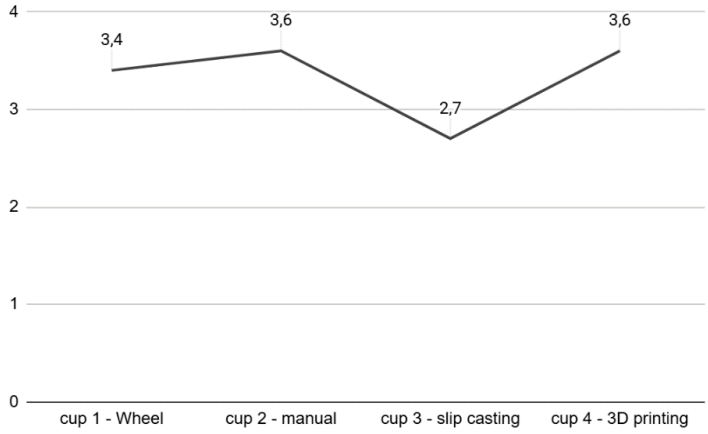
Among the four respondents who did not rate it a 5, it was mentioned that craftsmanship should not be the only aspect considered. After all, attributes such as harmonious form, good ergonomics, and practicality are also important and are not always present in handmade pieces. Interestingly, two makers pointed to attributes of industrial processes as positive; they consider them synonymous with quality when found in handmade pieces, such as a smooth surface and precision in finishing.

In the second stage of cognitive analysis, the following attributes—most frequently cited in the preliminary online test—were evaluated for each cup: unique, traditional, rustic, expensive, cozy, imperfect, regional, and handmade.

How unique do you consider this piece? How difficult is it to reproduce? (1 = little, 5 = very much)

Piece 3 was considered the easiest to reproduce (Figure 7), not only due to the plaster mold process, recognized by some respondents, but also because of its highly geometric aesthetic. "More geometric shapes give me a clear sense of measurement because they are straight. I feel I can follow the reproduction process more easily." – maker 1

Figure 7: Average score of respondents per piece related to reproduction difficulty.



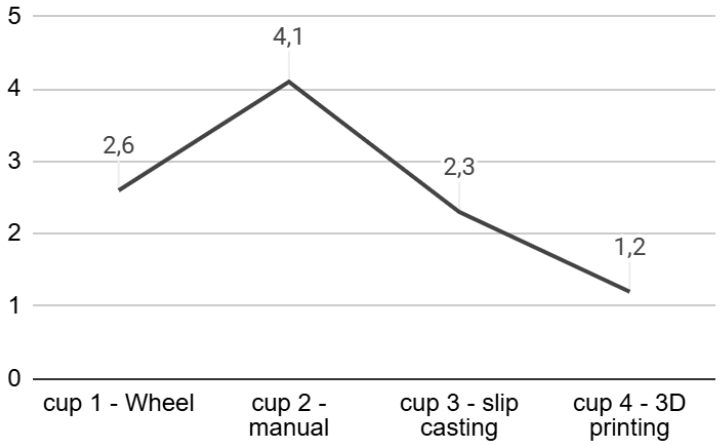
Source: authors, 2025.

When comparing participant groups, the makers considered piece 4 the most difficult to achieve. They were able to identify the 3D printing method and point out its manufacturing challenges. Difficulties mentioned included obtaining the printer, maintaining it, setting the parameters for a successful first print, and the need for deep material knowledge for the process.

How traditional do you consider this piece? (1 = little, 5 = very much)

Cup 1 lost points in terms of tradition due to its innovatively designed handle. On the other hand, the wide rim of this cup was recognized as part of the coffee tradition in Minas Gerais. In another interpretation, the potter's wheel was seen as a traditional process in Brazil. Piece 2 was considered the most traditional (Figure 8), as it also has a wide rim, and craftsmanship is strongly associated with tradition.

Figure 8: Average score of respondents per piece related to tradition.



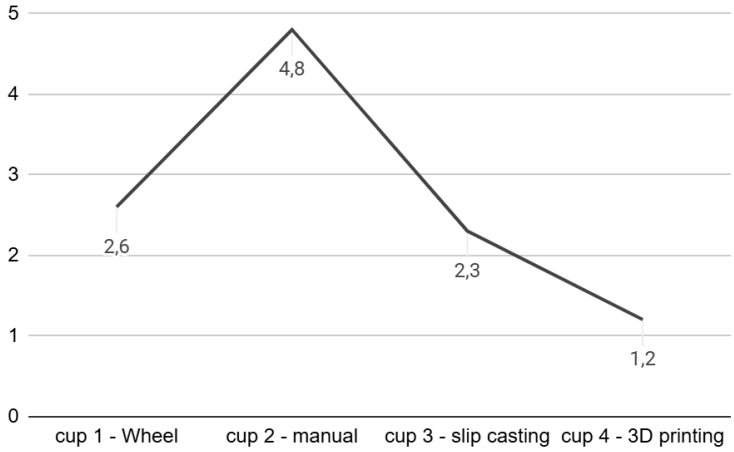
Source: authors, 2025.

Pieces 3 and 4 were generally considered less traditional. The slightly higher score of piece 3, compared to piece 4, is due to its use of terracotta ceramics, a material regarded as very traditional and closely linked to Brazilian folk crafts.

How rustic do you consider this piece? (1 = little, 5 = very much)

Rusticity was strongly associated with piece 2 (Figure 9) due to its handmade production process, which results in irregularities, asymmetrical, and 'crooked' forms. In this case, these characteristics are intentionally emphasized by the ceramist, reinforcing this process, highly valued today.

Figure 9: Average score of respondents per piece related to rusticity.



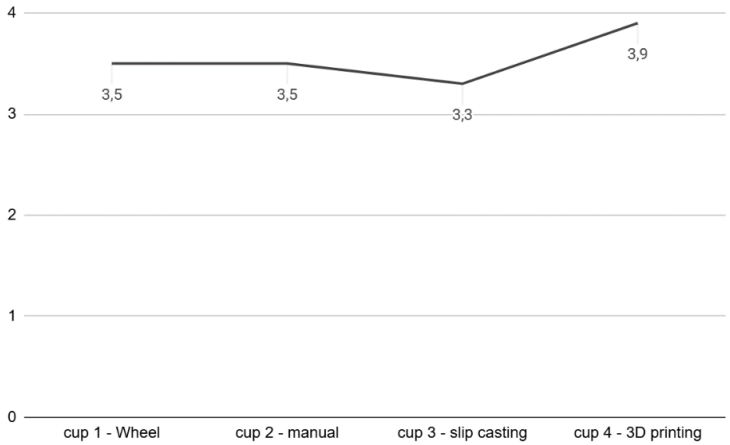
Source: authors, 2025.

The rougher texture of piece 3, created by the extrusion layers from the polymer matrix 3D printing and replicated in the plaster mold, contributed to a sense of rusticity, along with the use of terracotta ceramics. Although piece 4 also features the layered texture typical of the 3D extrusion printing process, users did not perceive it as rough or rustic because it is extremely symmetrical, precise, and flawless.

How expensive do you consider this piece? (1 = little, 5 = very much)

Monetary value stood out as a curious criterion, as it was the only attribute in which piece 4 achieved the highest average score (Figure 10). It was also the attribute with the smallest difference between average scores.

Figure 10: Average score of respondents per piece related to valuation.



Source: authors, 2025.

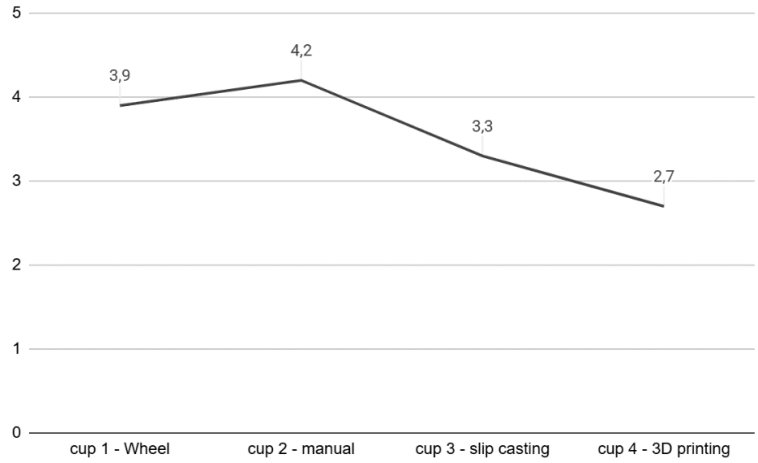
The design perceived as innovative was the most frequently mentioned factor in justifying why piece 4 was considered more expensive. Even though most respondents were unable to identify ceramic 3D printing as the modeling process, the presence of a designer behind the piece was easily recognized, giving it higher value.

Pieces 1 and 2 prompted comments about monetary appreciation due to their handmade production. However, ceramists had opposing views on this valuation, particularly concerning piece 2, which is entirely handmade: “I think it’s cheaper, unfortunately. That’s why I gave it a lower score - 3. Handmade work is not valued as it should be, right?” – ceramist 1. “This type of piece has become overvalued, and that makes me angry. Handmade doesn’t have to mean crooked and poorly made.” – ceramist 5. The first statement refers to craftsmanship in general, while the second is a critique of the intentionally irregular and asymmetrical aesthetic of piece 2.

How much does this piece give you a sense of coziness? (1 = little, 5 = very much)

Pieces 1 and 2 were considered the most ‘cozy’ by users (Figure 11).

Figure11: Average score of respondents per piece related to sense of coziness.



Source: authors, 2025.

A common reason was that the cups were larger, with a greater beverage capacity, and therefore, it takes more time to savor the drink in these pieces. “Larger cups give me a greater sense of coziness; there is more to drink, and you spend more time drinking. That feeling is stronger for me. Larger curves, larger rims... coziness doesn’t go with speed.” – layperson 1.

Ceramists associated the satin glaze, with little shine, found in piece 1 as an element of coziness, in contrast to the glossy glaze of piece 2. “The matte glaze gives me a more natural feeling and, therefore, more coziness. Additionally, the grip is good, and knowing that it’s handmade adds to that.” – ceramist 4 on piece 1. “A lot of coziness due to the grip and the satin glaze. It’s not shiny and has a smooth, pleasant surface.” – ceramist 5 on piece 1. “The shine doesn’t give me as much of a sense of coziness.” – ceramist 4 on piece 2. “This piece bothers me because the glazing reminds me of plastic.” – ceramist 3 on piece 2.

This preference for a natural feel has already been identified by Overvliet, Karana, and Soto-Faraco (2016) and Karana & Nijkamp (2014). According to them, people believe that things perceived as natural are healthier, more sustainable, and stimulate the senses more.

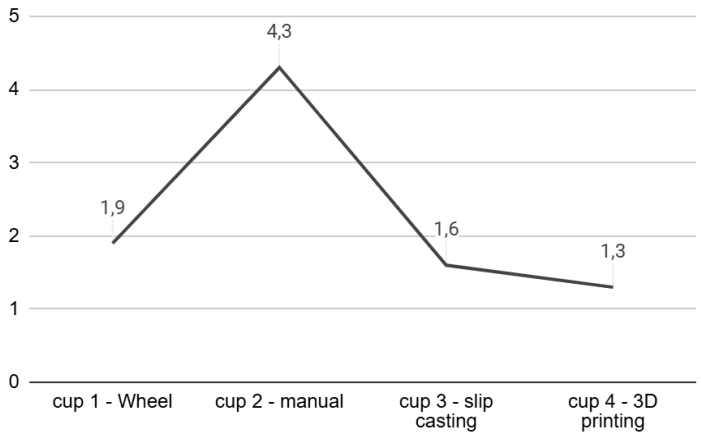
Another aspect strongly associated with coziness was the ergonomics of the handle. “The large handle wraps around me, embraces me, and that gives me satisfaction.” – ceramist 1 on piece 2. “I don’t like the grip; I associate it with a lack of coziness.” – maker 5 on piece 2. “I like the grip and the texture; they give me a feeling of comfort and coziness.” – maker 5 on piece 4.

Comments regarding piece 3 stand out for highlighting terracotta ceramics as an element that evokes coziness. The warm color and reference to traditional rural craftsmanship may have triggered this association. “It reminds me of a clay water filter, grandma’s house, and it gives me coziness. It’s emotional memory.” – maker 4. “It definitely gives a sense of coziness because of the terracotta.” – ceramist 4. “Despite the more straight-lined design, the warm color gives me a bit more of a cozy feel.” – ceramist 2.

How imperfect do you consider this piece? (1 = little, 5 = very much)

Imperfection, a craft characteristic strongly associated with handmade production, connects to aesthetic uniqueness, organic irregularities, and charm. In this context, imperfection does not carry a negative connotation. Piece 2 was considered by users to be the most imperfect among them (Figure 12). “Piece 2 is full of imperfections—that’s its charm. It’s the least industrial.” – maker 3. “It’s imperfect, but that’s why I like it.” – ceramist 1. “It has a handcrafted and irregular feel, where imperfections are welcome.” – maker 1.

Figure 12: Average score of respondents per piece related to imperfection.



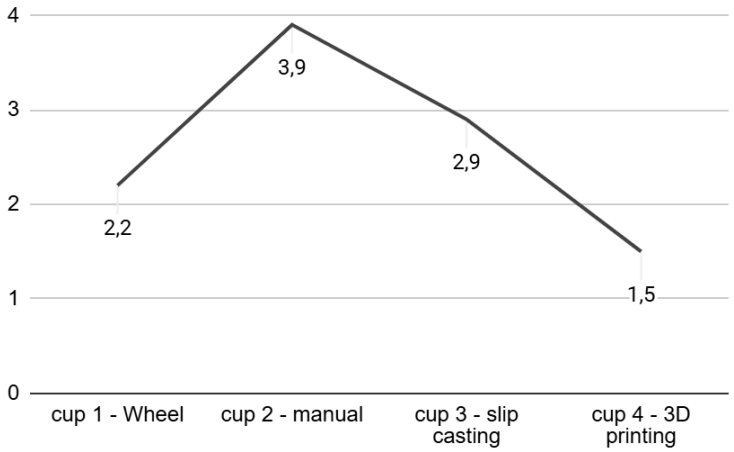
Source: authors, 2025.

Among respondents, the concept of perfection is attributed to industrial pieces and refers to aesthetic attributes such as symmetry, smooth surfaces, and uniformity. “It has an industrial finish; it must have been made by a machine that makes everything very precise.” – layperson 5 on piece 3.

How much do you consider this piece to represent a regional culture? (1 = little, 5 = very much)

Piece 2, which received the highest average rating for regional culture (Figure 13), was not rated based on its shape, color, or glazing, but rather for being handmade. “Handmade finishes remind me of regionalism.” – maker 5. This is also reflected in other users’ responses: “It is regional because it was made locally by someone, but it doesn’t identify a specific regional characteristic. It could be made in various places.” – layperson 4.

Figure 13: Average score of respondents per piece related to regional culture.



Source: authors, 2025.

Piece 3 received the second-highest average score for regionalism among users. This is due to the use of terracotta ceramics as a raw material and the white internal glaze. “The texture and color remind me of handicrafts from the Jequitinhonha Valley. This glaze reminds me of the small clay cups from the countryside. There have always been pieces like this there. It reminds me of home, and I’m away from home.” – maker 2. “Because it’s made of terracotta, it makes me think it has regionalist influences.” – ceramist 5. “The color and shape remind me of the countryside and regional culture, despite the innovation in the grip.” – maker 4. “Piece 3 looks like something from the countryside, more rustic, from older generations, cups from grandma’s house.” – layperson 1.

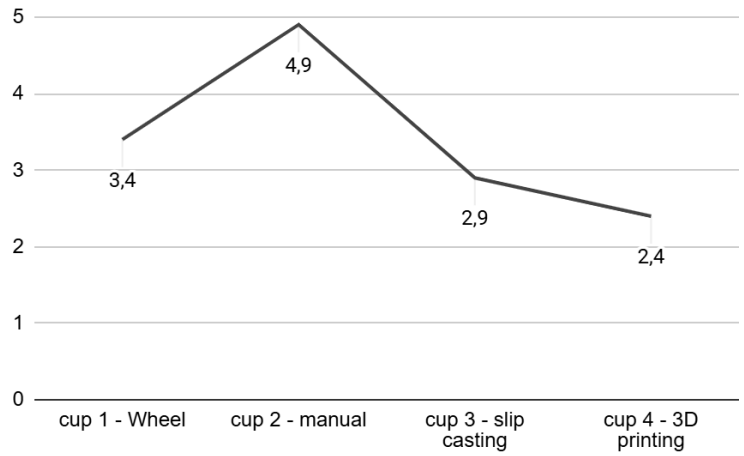
A mention about color is relevant here, even though it is not a configurative element derived from the production process like texture. According to Donis (1997), each color has numerous associative and symbolic meanings. This visual element was linked to traditional Minas Gerais craftsmanship based on users’ cultural repertoire, thus bringing piece 3 closer to the concept of regionalism.

Pieces 1 and 4 received the lowest scores. “They seem more modern to me, less regional and artisanal; They relate more to design and modernity.” – layperson 1. “Piece 1 is more cosmopolitan and contemporary.” – ceramist 4.

How much do you consider this piece to be handmade? (1 = little, 5 = very much)

Piece 2 is the one that most explicitly presents signs of craftsmanship, although all the tested pieces underwent some form of manual process in their production (Figure 14).

Figure 14: Average score of respondents per piece related to manual process.



Source: authors, 2025.

The production process of piece 4 often raised doubts among users. “It has a handmade feel, but it could be 3D printed. I’m not sure.”– ceramist 2. “I have doubts about the production method.”– layperson 3. “These stripes seem impossible to make by hand, I think.”– layperson 1.

General Analysis of the Previous Attributes

When comparing all the average scores for the evaluated attributes, it is evident that piece 4 (3D printed) has the lowest overall average (Figure 15). Quantitatively, it can be stated that it was the least recognized by users as a handcrafted object, based on the evaluation of typically artisanal attributes. However, the attribute in which it received a higher score than the others was monetary value. This suggests that, although not widely recognized as handcrafted, the 3D printed piece is perceived by users as having some kind of value.

Figure 15: Overall average for the attributes of the four pieces.

	Cup 1- Wheel	**Cup 2- Manual**	**Cup 3 -Slip Casting**	**Cup 4 - 3D Printing**
Overall average	2,9	4,1	2,6	2,2

Source: authors, 2025.

Analysis of the Results Regarding the Conative Dimension of Perception

The final stage of the test involved a direct evaluation question about preference. Participants were asked: If you could choose only one, which of these pieces would you buy? (Considering all of them at the same price.)

The 3D printed piece was the preferred choice for 46.7% of the respondents. Even though it received the lowest average score in the evaluation of typical craftsmanship attributes, it was the favorite among the majority. This highlights its appreciation for other aspects, such as technological and aesthetic innovation.

Discussion of Results

The results discussed represent the most relevant findings for this article, although additional data were collected and may be explored in future studies.

Piece 4, the one produced using 3D printing with ceramic material, stood out from the others in tests involving affective and conative functions: it elicited the highest number of positive emotions and was the preferred piece for 46.7% of the respondents, the highest preference rate. However, concerning the metric parameters obtained from evaluations related to the cognitive function associated with traditional craftsmanship, it scored the lowest overall. This indicates a distancing from its recognition as a handcrafted object, even though its production process undeniably includes artisanal elements such as individualized and small-scale production, the use of local raw materials, the requirement for extensive material knowledge by the producer, and traditional manual manufacturing steps such as glazing, finishing, printer and kiln assembly, and firing.

This quantitative distinction supports Dias' (2009) assertion that users perceive materials and products based on values beyond practical or objective aspects. Aesthetic, symbolic, and cultural factors play a significant role in people's perceptions, influencing their preferences and choices.

It is suggested that piece 4 be valued within a sphere related to ceramic craftsmanship, yet distinct — that of contemporary design objects. Although it carries all the traditional characteristics of the material, the piece was recognized for its technological and aesthetic innovation, featuring a minimalist form and a distinctive texture. This positively influenced the perception of the respondents during testing, although it remains distant from the cultural guidelines of traditional craftsmanship.

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