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Designer Identity: Reflection with Verbal and Visual Representation Systems

Işıl Özçam, Assistant Professor Dr.
Mimar Sinan Fine Arts University, Interior Design Department
isil.ozcam@msgsu.edu.tr

ABSTRACT
While the increasing product diversity, developing presentation, production and communication opportunities bring forward individualism in design, forming a unique and consistent view needs thinking about individual identity and clarifying designer definitions. In contrast to its contemporary importance, the subject of identity is not given a sufficient place in design education programs and literature. Realized with the undergraduate students of interior architecture, this study required identity definitions that reflected them through verbal and visual representations and asked them to design furniture based on these. At the end of the study, a questionnaire related to representation methods and design processes was held, followed by the analyses of effects of related usage of different modalities and presentation of the outcomes. The results show that students usually prefer visual techniques while reflecting themselves. In addition, verbal representations which significantly contribute to design processes can widely be used under guidance. Besides, studying with different representation systems help students think conceptually and ask new questions. Aimed at researchers studying on education and students, the goal of this study is to discover the positive role of coordinated use of different modalities on thought-development processes and present a developmentable method in reflecting designer identity.

Keywords External Representation, Identity Development, Modalities, Reflective Practice, Design Education.

INTRODUCTION
Today, within the system which has gradually become globalized through industrialism and technological developments, being different has become a commercial and psychological priority. While designers focus on creating the new in every sector, users seek for the unique; thus, design is transformed to an identity-defining activity for both designers and users. This triggers designers to think about their individual identity and develop unique design definitions. It is therefore important for design students to develop creative designer identities for themselves and start thinking about "who they are and who they will be in the future" through their knowledge and interests. The subject of identity in design may not pose a problem for experienced designers; indeed, they can decide on their design by using the accumulation they formed with previous design samples (Tracey & Hutchinson, 2013). Yet, it is challenging for the students new in their professions to express themselves and their view of design. This brings about such questions in the minds of educators: What kind of approaches can be used in the identity development? In what ways do the students express themselves better? Which level is the most challenging in the self-definition process?

In this study which was carried out with interior architecture students, it was focused on the associated use and functions of verbal and visual representations in order to reach individual definitions. The students who formed a conceptual basis by expressing themselves with different modalities made furniture designs that reflected their designer identities based on the concepts they had revealed. Afterwards, they interpreted their

furniture designs by using different materials and functions, thus clarifying their definitions while capturing alternative perspectives. They evaluated their experiences at the end of the process through a questionnaire.

The distinctive feature of the study can be shown as "creating rich expressive environments with the use of different representation systems while guiding students for expressing themselves to find their own design approaches". The aim of this study for researchers and students working on education is to explore the role that different modalities and representation systems play in students' thinking and expressing themselves in the dimension of identity, to draw attention to the importance of verbal representations that are relatively in the background today and to offer an improvable method that can be used by educators.

IDENTITY AND DESIGN EDUCATION

Identity in design is the line reflected to design in parallel with the knowledge, experience and awareness acquired throughout life, influencing individual thoughts and decisions. This understanding which is also called 'style' or 'line' distinguishes it from its counterparts in the market as a personalized expression of the technique, color, shaping and expressive characteristics of the designer (Özçam, 2018). An individual expresses itself by his/her dressing, speaking, attitude and behavior. While this situation exhibits the identity of the person, the identity of a design is defined by features like its values, mass, volume, form, color, texture, material, etc.; The identity of a designer is determined by his/her approach to design problems; the way s/he perceives the world; and the design method s/he uses. The synthesis of the experience and awareness acquired in line with the interests and abilities of the person affects the formation of identity; consequently, this affects the design understanding of the person. According to Eastman (2001), the designer has several sources of information to develop this understanding; observation of natural and artificial objects on earth, information coded by different methods (words, images, sensual and aural data), and reminiscences of previous experiences and knowledge set the foundation of this synthesis. The designer earns a rich accumulation with the help of these resources and develops a design approach in parallel. Whether the design process develops in a planned or experimental manner; features in usage of form, material, and texture; whether the designer has an artistic or functional approach; the meanings of the concept of design for the individual; messages targeted via design; whether there is a statement or not; whether it is nourished by the agenda, technology, or any field of art gain importance in terms of reflection of designer identity.

As the issue of identity gradually gains more importance, when the source text is analyzed, it is seen that studies related to self-knowing and self-definition of students are insufficient. On the subject, although studies of Tracey et al. (2014), and Tracey and Hutchinson (2013, 2016, 2018) which focus on the role of uncertainty and reflection in the development of designer identity and studies of Kunrah et al. (2018; 2020a, 2020b) that examine the role of personal characteristics and cognitive processes in the formation of designer identity provide useful information, it is obvious that more research is needed that includes comprehensive data on such an important subject. It is important for students studying in design programs to start thinking about the direction of their individual identity definitions, and be aware of how they approach problems as well as producing solutions to problems. To accomplish this, it is necessary to give them the opportunity to evaluate what it means to be a designer in the education process and reflect the experiences, beliefs and interactions that will impact their identity (Dall'Alba, 2009). The ability to express internal processes gives the designer the power to understand and manage them. As Tracey and Hutchinson (2018) state, 'students need support in order to explore and gain insight into idea generation processes; this issue may require studying even for experienced designers' (p.283).

In order to develop a design definition, the person may need to analyze himself, recall his/her affective-cognitive knowledge, emotions, previous experiences, beliefs, interests and thoughts about design from his/her long-term memory. At this point, Schon's reflection practice has been considered as a suitable approach for the study to be done since it offers useful method suggestions in terms of providing awareness on issues such as past experiences and personal interests and reflecting these (Schön, 1983). Reflection theory, which is based on Dewey's (1910, 1916) researches, is based on the constructivist point of view of human perception; Today, according to the opinion that cognitive scientists also agree, the designer builds his world view based on his/her beliefs, knowledge and previous experiences and reflects it to his/her works (Chan et al., 2015; Goldschmidt & Sever, 2011). Reflection can be aimed at different chronological points: reflection-in-action focuses on what happens at that moment; reflection-on-action looks at what happened in the past; and reflection-for-action is headed towards what will happen in the future. The second approach is beneficial for design students in terms of thinking about what they perceive about design and who they are (Tracey et al., 2014; Tracey & Hutchinson, 2016) This process consists of self-communicative cycles based on individual experiences (Weisberg, 1999) and is very important for cognitive learning (Oxman, 1999). By including reflection practices in design education, students not only gain ideas and sensory awareness about themselves, but also develop predictions about how to produce solutions to design problems (Cross, 2013; Nelson & Stolterman, 2012).
The issue of identity has been the subject of various studies together with the technique of reflection. Using the reflective writing technique, Tracey and Hutchinson (2013, 2018) asked students to keep a reflection diary, write down their beliefs, experiences and uncertainties, and they aimed to reach answers about what it means to be a designer. Giampa (2012) developed a method called "sinking maps" in order to reach identity definitions in a visual representational study with fine arts students. Özçam (2018) asked students to reflect their individual design definitions through metaphors and make a visual representation study. It has been demonstrated by various researchers that the practice of reflection, which is used as a pedagogical technique in terms of creating awareness about themselves and when used in integration with representation systems, provides benefits to students, especially in the early stages of design (Casakin, 2012; Schön, 1983). In this direction, reflection in education stands out as a process that enables students to develop their ideas through representation systems.

VERBAL AND VISUAL REPRESENTATION SYSTEMS

Design is representative and there is no non-representative design (Eastman, 2001). For this reason, it is important for design students to be competent in different types of symbolic representations. Different techniques are used for representations, which are also referred to as "external representations" (Baaki & Luo, 2017) or "design representations" (Huybrechts et al., 2012) in literature. These representations which are prepared with writing, drawing and production techniques or at different levels of abstraction in computer environment mainly cover not only visual techniques such as draft and technical drawing, model and prototype making, concept mapping, video, photography, collage and computer modeling but also verbal techniques such as free writing and mind mapping.

With representation systems, images are encoded by signs, transforming them into expressions containing information and concretizing them. In this way, it is possible to convey ideas. Ferdinand de Saussure (2011) defined graphic and linguistic systems as a way of expressing and forming an idea in the mind. Another important feature of representations is that they are a reflective tool to communicate with oneself and enable questioning of content and form in both the early and later stages of the design process (Schön, 1983). These internal dialogues both enable clarifying ideas and discovering deficiencies in addition to thinking about situations, conditions, and solutions (Medway, 1994). According to Goldschmidt (1991, 1992, 1994), forms cannot find a place in the

mind without externalization on paper. While Fish and Scrivener (1990) state that thinking with external representations increases the capacity of the mind, Stables (2008) states that the mind deals with images through external representations. The fact that representations are in the nature of a conversation with oneself is a frequently mentioned function in cognitive design theories and has been the subject of many studies to increase creativity (Goncalves et al., 2014; Huybrechts et al., 2012; McVey, 2008; Wang, 2012; Welch et al., 2000). Schoffelen et al. (2013) argued that design representations (sketches, documents, prototypes, etc.) trigger the reflective design process and provide inspiration for ideas. Herring et al. (2009) emphasized the positive role of verbal representation and sketch in providing inspiration, and emphasized the influence of representational systems on idea development. Based on these points of views, it can be said that representation systems play an important role in the design processes in terms of generating and developing ideas, establishing connections and providing inspiration for ideas, communicating with oneself through reflection and transferring thoughts to the environment.

Although there are several representation systems that play a significant role in cognitive operations according to memory models, the most outstanding ones are verbal and visual representations. Nevertheless it has been put forward with many studies that students usually prefer visual representations in expressing their ideas (Hanington, 2003; Henderson, 1999; Muller, 1989) and that images are the most effective solution for designers (H Casakin & Goldschmidt, 1999; Goldschmidt & Smolkov, 2006; Sarkar & Chakrabarti, 2008). Moreover, they can lead to a particular mind-set where previously seen ideas are incorporated into new design solutions with poor creative results (Goncalves et al., 2014) or design fixation (Jansson & Smith, 1991). Referring to the role of thought during representation, P. Buckett observed that in schools, students are mainly taught visual expression, but students often sketch aimlessly instead of drawing through the act of questioning (Dong et al., 2013). The correct establishment of conceptual infrastructure gains importance at this point; the ideas and decisions developed in the early stages of design play a major role in the final products (Lawson Bryan, 1994; Özorhon, 2016).

According to Paivio, who states that the mind thinks with verbal and visual image codes, representations in one system can activate those in the other system; for example, pictures can be named and images can be associated with words (Malaga, 2000). It is thought that verbal representations and especially reflective writing studies provide a good basis for visual representations in this sense. According to Goldschmidt and Sever (2011), words and sentences support original thinking by leaving a wide field of manipulation to visual imagery in the translation process. In the preliminary stages of the design, the verbal act of thinking undertakes tasks such as finding cause-effect relationships, selecting important information within the thought or subject, monitoring its development by seeing the relationships between thoughts and events, extracting concepts, and adding keywords that explain the subject. All of these strengthen the processes of defining, framing and reflection (Atakan, 2014).

Coordinated use of verbal and visual representations has been the subject of some previously conducted research (Linsey et al., 2008). As Gombrich (2004) points out, there are many more relationships than might be expected between language and visual representation. Cikiş and Ek mentioned that the combination of visual and written representations makes the design experience effective in establishing the conceptual infrastructure and providing active communication while increasing the power of expression. Delage and Marda argued that verbal and visual representation are concrete expressions in interaction, transforming concepts (Cikis & Ek, 2010). According to Koestler (1964) establishing new connections or relationships in the process of generating ideas in design is possible by first analyzing the information, then combining it

with new connections (abstraction) and reimagining. Within the scope of the study, while the information externalized in the verbal representation process is re-internalized in the visual representation phase, it can be transformed into new information with different associations by passing through the perception process and interpretation. In this context, it can illustrate Koestler's "connection-building thinking" activity. Based on all of these, a study was conducted thinking that using different representations in coordination would support multi-directional thinking; strengthen the conceptual infrastructure and individual expression; and ultimately provide satisfactory design outputs in a reflective study of students' identities.

METHOD, GOALS AND PHASES OF THE STUDY

Schön's reflection theory was used in formulating a theoretical perspective for a study in which students' levels of expressing their designer identities with different representations were investigated. With the research which was planned with a quantitative scanning design after a qualitative analysis of two projects, it was aimed to understand the design processes of students who reflect themselves and define their identity using different representations and also the relationships they establish between representations, seeking for answers to the questions below:

-With which representation systems did the students work more comfortably while thinking about themselves and their past experiences?
-What were the effects of the use of different representation systems on the design process?
-Which methods did the students choose while generating ideas verbally and visually?
- At which stage did students have the most difficulty in reaching their identity definitions?

The research was carried out in the Identity in Furniture course in the third year program of Interior Architecture at Mimar Sinan Fine Arts University, which is one of the leading universities in the field of architecture in Istanbul, within the undergraduate academic calendar for the spring semester of the 2018-2019 academic year. At the beginning of the study conducted with 26 (56.5%) women and 20 (43.5%) men, 100% of whom were between the ages of 20-25, the students were theoretically informed about the concept of designer identity and representation systems. The first three weeks of the individual work process were devoted to reflection and representation in order to create the conceptual infrastructure, and the last three weeks were allocated to the design.

In the beginning of the study, students who were informed about the reflective thinking practice, representation systems and what was expected from them within the scope of the project were asked to reach their internal stimuli through verbal representations; think about what design means to them considering their past experiences, beliefs, hobbies, sources of inspiration; and describe their point of views verbally with the written method they chose. Free writing, individual brainstorming, mind mapping and checklist techniques were methods used by the students in this process. Based on the narratives put forward, the visual reflection process started. In the visual work that lasted for two weeks, some students progressed through the verbal definitions they developed in the first stage; some developed the verbal representations they started and moved them to different points; and some of them visualized their ideas with two or three-dimensional expressions by establishing new concepts. No restrictions were imposed on students in terms of dimension, components or media related to idea generation and presentation processes. Schemes, hand sketches, collages with the photographs taken by students or with the images found online, mock-up, video and computer modeling were the preferred techniques in the visual transfer process (The verbal and visual representations the students preferred in the study can be accessed in Appendix A and B). In this mental expression process carried out with different representation systems, it is aimed for the student to think about him/herself through semantic and image codes; discover internal

and external stimuli that stimulate the imagination; use external representations s/he chooses to concretize these data, establishing relationships between different modalities; produce symbols and present them. The dimension of the experience for generating ideas is important in terms of determining the main idea that will be the basis of designs and setting the following steps correctly. At this stage, what is required from the students is that the representations should represent the concept itself and do not have any inferences regarding the design. With this orientation, students were able to directly focus on conceptual definitions, and representations.

The verbal and visual definitions that emerged as a result of the reflection studies formed the basis for identity approaches and students were asked to design a chair in this framework. It was the students who decided on the practical, symbolic and aesthetic function levels of the furniture. While some of them prioritized the practical function in their projects, others turned towards symbolic designs with artistic priority for display. At the last stage, students were asked to design furniture with different functions using different materials with the same logic. At this stage, they were expected to reinforce their concept practice by preventing them from repeating forms and materials. Since the process of transferring abstract content to form is a relatively more complex process, the design phase covered the period between the third and sixth weeks. The students did not receive individual table criticism at any stage of the process. Rather, criticisms and ideas were discussed in the classroom through interactive dialogues with the lecturer; in addition, the qualifications of the presentations as graphic and communicative design products were emphasized. In the final presentation made in the last week, visual features such as form, texture, material, color, practical function, structure details and production considerations were also discussed. At the end of the task which was completed in a period of six lessons in total, a questionnaire was distributed to the students and they were asked to evaluate the process they went through.

DATA COLLECTION AND ANALYSIS

In the questionnaire made at the end of the project, the students were asked what methods they used as verbal and visual representations. They were also asked to evaluate the stages in terms of their contribution in clarifying their identity definitions. The questions were applied to the participant group using a cross-sectional method and all were collected at once. This method was chosen because the questionnaire is a useful tool for participants to reveal their views as a quick data collection tool (Creswell & Creswell, 2017). In evaluating the answers given to the questions whose base was prepared by the author, the evaluation range of arithmetic means according to the 5-point Likert scale was used. The intervals were assumed to be equal and the score interval for arithmetic means was calculated as 0.80 (Score Range = (Highest Value - Lowest Value) / 5 = (5 - 4) / 5 = 4/5 = 0.80). Questions were assessed according to a scale ranging from 1 (strongly disagree) to 5 (fully agree). All the information analyzed in the study was obtained from the survey data. While evaluating the findings obtained from the questionnaire, NCSS (Number Cruncher Statistical System) 2007 Statistical Software (NCSS LLC, Kaysville, Utah, USA) program was used for statistical analysis. Spearman correlation analysis was used to compare quantitative data in addition to descriptive statistical methods (mean, standard deviation, median, frequency, and ratio) while evaluating the study data; in addition, significance was evaluated at $p < 0.05$.

TWO STUDENT WORKS ILLUSTRATING THE DESIGN STEPS

In this section, it is aimed to provide a better understanding of the design steps and results by emphasizing two student projects. The selection of the projects was made by considering the performance of the students in the stages of the process. In parallel with this, the first project whose idea development and final designs can be seen in Figure 1a, b and c discussed the concepts of color, light, and permeability. By working with the mind mapping method in the verbal reflection process, the student reached the

prominent themes in the design concept that she thought were related to each other. The subjects of color and light were determined at this point and were associated with the themes such as layering, intersection, and permeability. Then, the student made a two-dimensional visualization study in the format of collage by handling these concepts with aesthetic integrity and a dynamic composition. The conceptual infrastructure is reflected in furniture designs with the effect of overlapping layers of different colors and transparencies. In the chair design named 'Intersection', layers of different colors bearing the font are lined up one after another in an asymmetrical order. The backmost surface is white like a blank canvas, allowing the colors in its front to be seen. The sculptural chair which gives the impression of standing in the air with the use of transparent acrylic material is considered as a statement furniture that summarizes the philosophy of the designer and has a symbolic rather than a practical function. In the buffet design named 'Flare', the student used the same layer logic aesthetically and functionally while evaluating the color effects caused by opening and closing the lids. On the other hand, in the design of the coffee table named 'Concave', the structures made of metal and glass complement each other. They are designed in such a way that they can be used separately when necessary; and when combined, they look harmonious. At the last stage, the student made the dimensioning and technical drawings of the furnitures and detailed the dies.

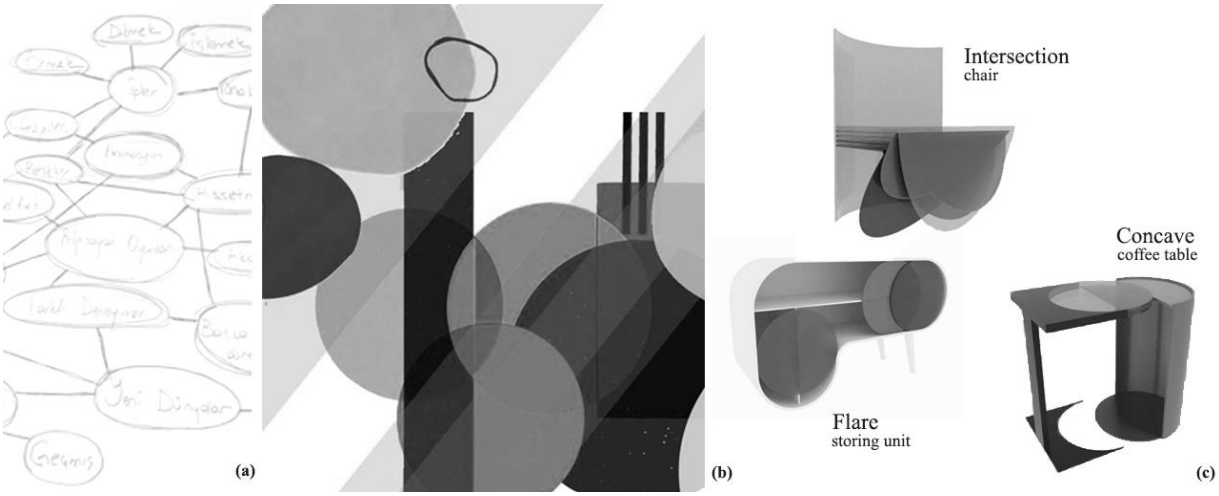


Figure 1. Evolution of the first concept: (a) verbal reflection (b) visual reflection (c) furniture design phases.

In the second project, the organic texture and natural formation concept stand out (Figure 2a, b and c). In the verbal study, the student wrote poetry in the process of defining herself and preferred expressions with analogical similarities. Contrast concepts such as fun / serious, complex / flat, free / captive, and emotional definitions came to the fore at this point, and 'togetherness of diversities' was determined as a method. In the visual reflection work, the student focused on organic lines and textures that reflect her feelings; developed her visual work in the format of a collage with the aesthetic balance created by different patterns/images found from internet; and used a color scheme that emphasizes nature. The organic texture and flowing forms on the visual study have been reflected in the chair design at the point of creating the linear and dynamic formed structure. Stating that her work is based on feelings and thoughts in the subconscious, the student named the chair she designed with polyurethane material as 'the Surreal'. Based on the flowing forms in the coffee table module named 'the Sole', using polyethylene material, she designed topographical compartments and defined an area where magazines / books can be placed on the monoblock mass. In the shelf system fixed to the wall, the student transformed natural textures into usable surfaces by

giving volume, in a sense, establishing a relationship between two and three dimensions, this time using laser cut MDF wood material painted in white. In the final delivery, the student included explanations about technical drawings, naming and material proposals regarding all of the projects.

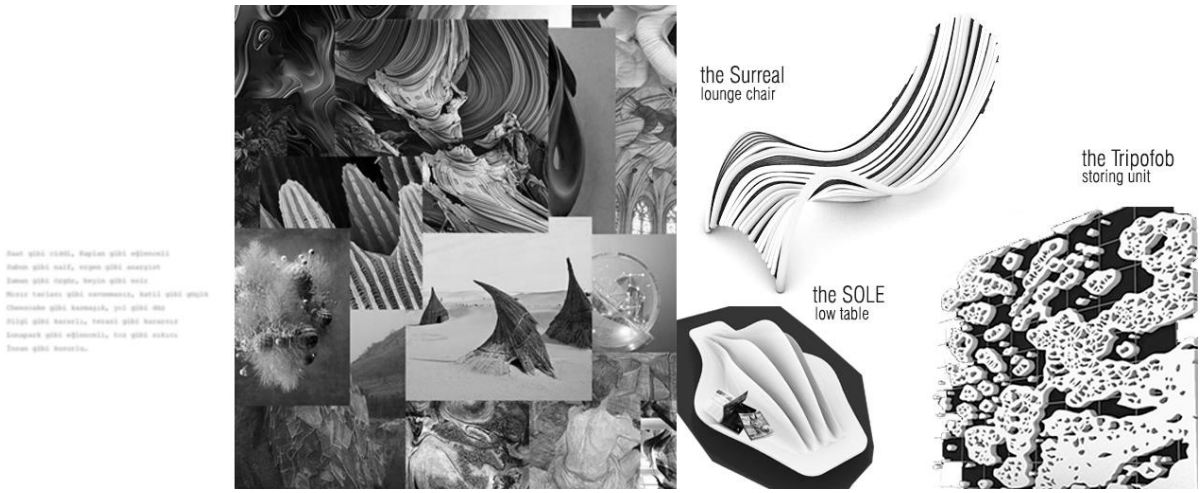


Figure 2. Evolution of the second concept: (a) verbal reflection (b) visual reflection (c) furniture design phases.

RESULTS

This section presents the results of data analysis. First, the level of participation in the techniques used as verbal and visual representation tools was included; and later, the relationships between the stages of the project and the processes of clarifying the identity definitions were revealed with Spearman correlation analysis and frequency values. As seen in Table 1, the students preferred the free writing technique at the highest level by 43.5%, followed by the brainstorming and mind mapping technique; and the checklist was used at the lowest level. Based on the usage rates of verbal representation tools in the answers, when scoring is calculated over 100, it was determined that the students preferred the verbal representation tools at an average rate of 54.89 ± 19.83 (standard deviation). Among the visual representation tools, while hand sketches and computer modeling were used at the highest rate, this is followed by collages made with images found from the internet (Table 2). Mock-up and video visualization were almost never used. Among the participation rates in the use of visual representation tools, when scoring is calculated over 100 according to the answers given in the same way, it was found that students could use the visual representation tools at an average rate of 31.58 ± 11.68%. It is seen that the factors that reduce the score here are the almost-never-used mock-up and video. When these two means are released, the same rate is 43.47 ± 16.08% on average.

Table 1: Distribution of levels of participation in techniques used as verbal representation tools

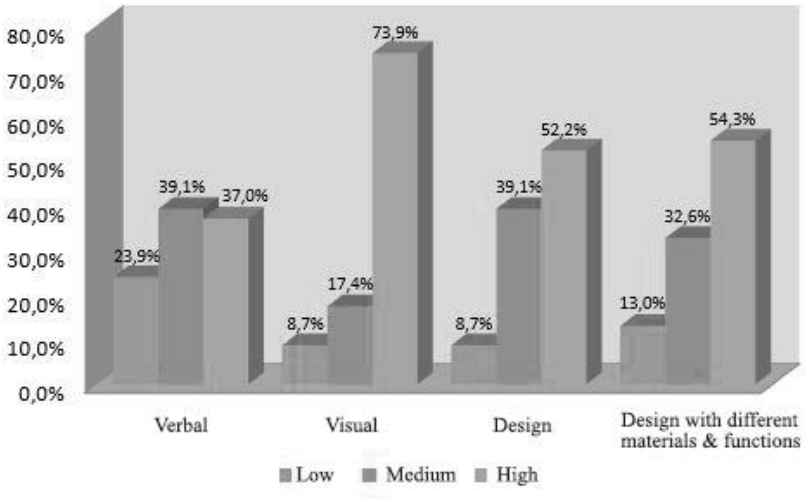
	None	Low	Medium	Medium-high	High	Mean±SD
	n (%)	n (%)	n (%)	n (%)	n (%)	
Free writing	5 (10,9)	4 (8,7)	10 (21,7)	7 (15,2)	20 (43,5)	3,71±1,39
Individual brainstorming	5 (10,9)	7 (15,2)	7 (15,2)	14 (30,4)	13 (28,3)	3,50±1,35
Cognitive map	12 (26,1)	4 (8,7)	10 (21,7)	10 (21,7)	10 (21,7)	3,04±1,50
Control List	15 (32,6)	8 (17,4)	11 (23,9)	8 (17,4)	4 (8,7)	2,52±1,34

Table 2: Distribution of levels of participation in techniques used as visual representation tools

	None	Low	Medium	Medium-high	High	Mean±SD
	n (%)	n (%)	n (%)	n (%)	n (%)	
Diagram	26 (56,5)	8 (17,4)	9 (19,6)	1 (2,2)	2 (4,3)	1,80±1,11
Hand sketch	8 (17,4)	5 (10,9)	8 (17,4)	5 (10,9)	20 (43,5)	3,52±1,55
Collage with photographs	28 (60,9)	5 (10,9)	6 (13)	3 (6,5)	4 (8,7)	1,91±1,34
Collage with found images from internet	8 (17,4)	10 (21,7)	3 (6,5)	11 (23,9)	14 (30,4)	3,28±1,53
Mock-up	43 (93,5)	3 (6,5)	0	0	0	1,06±0,24
Video	43 (93,5)	2 (4,3)	1 (2,2)	0	0	1,08±0,35
3d modeling	17 (37)	3 (6,5)	2 (4,3)	3 (6,5)	21 (45,7)	3,17±1,86

When the different representation tools and design processes used in the project were evaluated according to the percentages of students' ideas and their ability to convey themselves, it is observed that those who were able to express themselves visually were determined to be the highest in number. They are followed by those who mention that they felt most productive at the third stage, the process of transferring verbal and visual definitions to the design, followed by those who could successfully interpret the design with different functions and materials. Those who say that they are successful in verbal transmission come last (Table 3).

Table 3: Reflection degrees in transmission according to project stages



It was stated that the most important contribution in clarifying the designer identity and design definitions was the visual representation stage, followed by verbal representation studies. Those who said that their identity definitions became clear during the design phase showed an almost equal distribution. Among the students who said that they could successfully reflect their approaches to their designs, 32.6% of them labeled ‘medium’ level; 34.8% of them selected ‘medium-high’ level; and 26.1% of them selected ‘very well’.

When the participants were asked to evaluate the questions about the design process completed with different representation systems, the highest rates were respectively "helped me ask new questions", “provided conceptuality”, “progressed efficiently” and “offered flexible thinking” (Table 4).

Table 4: Levels of participation in statements related to the design process

	None	Low	Medium	Medium-high	High	Mean±SD
	n (%)	n (%)	n (%)	n (%)	n (%)	
Fluently progressed	3 (6,5)	1 (2,2)	16 (34,8)	17 (37)	9 (19,6)	3,60±1,04
Efficiently progressed	1 (2,2)	1 (2,2)	21 (45,7)	12 (26,1)	11 (23,9)	3,67±0,94
Provided flexible thinking	1 (2,2)	5 (10,9)	9 (19,6)	22 (47,8)	9 (19,6)	3,71±0,98
Provided conceptuality	0	3 (6,5)	9 (19,6)	17 (37)	17 (37)	4,04±0,91
Helped me ask new questions	1 (2,2)	3 (6,5)	6 (13)	14 (30,4)	22 (47,8)	4,15±1,03
Provided me with unexpected results	2 (4,3)	12 (26,1)	15 (32,6)	9 (19,6)	8 (17,4)	3,19±1,15

When the relationships between verbal and visual transfer levels, design steps and evaluation questions regarding the design process are evaluated, a positive relationship was detected between the ability to express oneself verbally and the fluent progress of the design process (r:0.401; p<0.01) and conceptual thinking (r:0.351; p<0.05). A positively significant relationship was found between the ability to reflect oneself visually and the efficient progress of the design process (r:0.305; p<0.05). There is also positive relationship between the ability to transfer ideas to design through the conceptual infrastructure that it has created with representation systems and the efficient progress and flexibility of the design process (r:0.332; p<0.05). In addition, a positive correlation was found between interpretation of design definitions through different functions and materials and productivity (r:0.362; p<0.05), flexible thinking (r:0.377; p<0.05) and feature of conceptual thinking (r:0.304; p <0.05). When the participants' self-reflection levels and evaluation questions regarding the project design stages are evaluated with Spearman Correlation analysis, a significant positive correlation was found between the efficient progress of the project process (r:0.292; p<0.05) and the opportunity to think flexibly (r:0.346; p<0,05) and conceptualization (r:0.293; p<0.05). When the level of reflection of the designer through his/her designs and the project design stages were evaluated with Spearman Correlation analysis, a positive significant relationship was found between the ability to transfer the conceptual infrastructure to the design and the level of self-reflection (r:0.293; p<0.05).

DISCUSSION

This quantitative study, which aims to propose a method for defining students' designer identities, reveals interesting results regarding the effects of the use of different representation systems and design phases. First of all, considering the entire process of representation and design, the most difficult stage for students is the verbal representation stage. When the different representation tools and design processes used in the project process were evaluated according to the percentages of students' ideas and their ability to convey themselves, the percentage of being able to express themselves visually was found to be the highest. Students claiming that they can best reflect themselves through visual representations coincide with the general acceptance that designers are prone to visual representations (Hanington, 2003; Henderson, 1999; Muller, 1989). However, when scoring over 100 according to the answers given based on the usage rates of verbal representation tools, it was observed that the students surprisingly used verbal representations with wider possibilities than visual representations. These datas show that students try to use verbal representations with wide possibilities when they are directed; moreover, they demonstrate that language is a method that needs to be improved in design education. The most important contribution in clarifying the designer identity and design definitions was the verbal representation phase after the visual representation. The results support the use of reflective writing as

an effective tool for exploring identity-related issues in graduate design education (Tracey & Hutchinson, 2016). The positive relationship between the ability to express oneself verbally, the fluent progress of the design process and conceptual thinking confirms the positive role of verbal representation in the design process.

The fact that students did not want to reflect themselves by making mock-ups at the visual representation stage suggests that studies for three-dimensional representation should be supported. It is striking that computer modeling is in the third place in the evaluation as a visual representation system. This situation suggests that computer technologies have begun to be used effectively in students' expressing themselves and developing ideas, and perhaps even in replacing manual mock-ups.

When the participants were asked about the effects of working with different representations on the process, it was seen that the answer with the highest rate was "it helped me to ask new questions". This shows that interpreting different representations helps students gain different perspectives. This result was followed by conceptuality, efficiency and flexible thinking. The results coincide with the work of Cikis and Ek (2010), who refer to the positive role of working with different modalities in the design process. Considering the research of Casakin and Krietler (2005), who established the relation of flexibility with creativity, it can be said that working with different modalities increases creativity. The dimension of the experience for generating ideas is important in terms of determining the main idea that will be the basis of the designs and setting the next steps correctly. The conceptual infrastructure created with representation systems enabled efficient and flexible thinking while transferring ideas to design. Within the scope of the project, it is among the results that the last step of the process, 'designing with different functions and materials', has boosted the efficiency of the design process, flexible thinking and conceptual thinking. It is seen that designing furniture with different functions by using different materials with the determined method and logic gives the students the opportunity to re-examine the concept, reinterpret the same principles and thus contribute to grasping the new and unique. When this whole process approach is evaluated together with the students' ability to reflect themselves, those who can reflect themselves were observed to gain efficiency, think flexibly, and question relationships between concepts. Confirming this, there is a positive relationship between the ability to transfer the constructed conceptual infrastructure to the design and self-reflection.

In studies which are based on process-oriented design pedagogy, not only results but also inter-process relations are ‘indications’; each attempt is tested in the circular stages of the previous thought, experience or reflection and is actively experienced. There is production in each step and each production can open new windows (Yorgancıoğlu & Seyman Güray, 2018). For this reason, instead of a one-dimensional interpretation about outputs of the method applied in the study, it is significant that the design process itself should be presenting a learning process. As Donald Schön (1983) maintains, students adopt the approach of ‘reflective communication with the material put forward by a certain condition’ rather than finding a solution for an existing problem. Ways of self observation trigger conceptual and relative thinking, which as a consequence supports development of conditional design methods. Based on “reflection-in-action”, design can be defined as a repetitive, creative, critical and transformative process where the student is actively engaged. When analyzed with these dimensions, the phases, contents and acquisitions of the study can be summarized in Table 5.

Table 5: Phases in the project process, contents and acquisitions

	Contents	Acquisitions
Reflection phase	• Reflecting oneself and design with different representation systems, reaching metaphors and symbols. • Thinking on the design method. • Making definitions. • Creating a conceptual background. • Making connections among different representations.	• Being able to execute conceptual and relational thinking. • Expressing and presenting the concept in the most effective way. • Reflecting oneself verbally and visually. • Deciding among ideas. • Asking new questions. • Thinking flexibly and fluently.
Design phase	• Chair design within the framework of representation definitions. • Establishing definition-form relationships. • Performing visualization studies regarding the design.	• To be able to reflect the concepts to the design. • To be able to think flexibly. • To think two and three dimensionally. • To present the design effectively. • Reflecting oneself.
Design phase with different functions and materials	• Designing furniture with different functions using different materials. • Reconstructing and reinforcing the relationship between definition and form.	• Conceptual and relational thinking. • Flexible thinking. • Presenting the design effectively.

CONCLUSION

With this study which was carried out to develop individual identity concepts with design students, it was aimed to shed light on students' self-definition and representation processes and to develop a proposal that can be used in education. Since identity is a multifaceted phenomenon that can change in every period of life, it would be appropriate to consider the project steps and final outputs as an ongoing process that can result differently when repeated at certain time intervals and a part of lifelong learning rather than perceiving them as final products. As Dall'Alba (2009) states, 'The process of becoming professionals is always open-ended and incomplete' (pp.43). It entails developing and refining an embodied understanding of professional practice that integrates knowing, acting, and being in the world. This embodied understanding is not limited to individual cognition, then, but is embedded and enacted within the dynamic, intersubjective flow of activity that is professional practice' (Adams et al., 2011). In addition, the ability of designers to adapt to rapid changes and increasing problems in the society is very important today. Schön drew attention to the importance of adaptation and change, stating 'The future needs a transformative, adaptable and learning society. Designers can contribute to the society as much as they can transform and adapt themselves' (Schön, 1983). Being aware of the changes in oneself and environment, creating meaning and transferring them to design gains importance at this point.

Reflection which is a preferred method in identity studies has been a factor that activates

students' communication with themselves and strengthens their internal dialogue. Reflecting oneself with different representations and forming a conceptual background in the project flow, students worked on designs in line with the concepts they developed and practiced to establish the relationship between definition and form. Research findings showed that design students mostly prefer to be limited to visual representation in the order they are accustomed to, and cannot express themselves easily with verbal representations. The guidance made within the scope of the study was beneficial in this sense; in fact, it was observed that thinking with verbal representations contributed to a fluent design process and conceptual thinking. This situation reveals that it would be beneficial to increase cognitive applications for verbal expression in design education.

Representation of ideas in design and how definitions are made beforehand are important. Having knowledge about how modalities and, accordingly, how stimuli are selected, used and transformed can open new research directions and contribute to the related discourses. Measuring how students use design methods and the relationships they establish with representation systems can help to build environments that support creativity and to construct transformative design practices in educational programs; Awareness of the differences between modalities and design behavior can support the development of training concepts, strategies and tools. It can contribute to designers in finding ways to reach their sources of inspiration, establishing abstract relationships and representing their ideas.

This study, which investigates the effect of verbal and visual representations on reflecting the designer identity, serves as an initial contribution to the emerging discourse on identity construction in design education. However, more information is needed on how the concept of identity in design is perceived, developed and maintained. In addition, more comprehensive studies can be conducted on the effects of different representation systems such as auditory and tactility. This study was carried out individually; however, identity is also a multifaceted and social phenomenon. Research on identity in interactive environments where students interact with each other will present different perspectives to the literature. It is thought that long-term studies with more students will provide detailed information on the subject.

Another issue that needs to be considered is the effects of developing technologies on representation systems. Today, various technology applications have started to being used for encouraging students to produce external representations, for assisting in representation processes and for making learning visible. Online concept preparation, mind mapping and diagram applications, drawing and modeling tools are some of them. Multimedia representations that enable cross-linking between representations and interactions with sketches, drawings or models created in digital media may be the subject of future research. It is predicted that new forms of representation that develop every day will lead the designer to different results and support creativity, developing new aesthetic understandings and cognitive abilities. Practices that increase imagination, thinking and help to discover new and alternative directions in learning environments that break the rigidity of formal education will pave the way for students' creativity, productivity and contribute to their forward-looking vision.

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APPENDIX A
Verbal representations preferred by the students in the study

Free writing: In the free writing technique, it is aimed to put the thoughts on paper freely and put them into sentences, regardless of the facts such as grammar, spelling rule, and logic. It is aimed to perform the writing action without interruption during the specified period as a flow with full concentration.

Individual brainstorming: As an alternative to group brainstorming, in the individual brainstorming method which emerges with the idea that people are more productive in generating ideas when they are alone, people note the thoughts that come to their mind randomly. It is aimed to generate a large number of ideas without being attached to an idea, being related or unrelated, true or false, acceptable or unjustifiable. By this way, people can access a large number of keywords which are the basis of concepts that can later be associated with one another.

Mind map: This method enables visualization by associating a topic with any idea or concept that may be related to it. The map progresses with the establishment of the main title-subtitle hierarchy and provides a better perception of the subject by creating a structure.

Checklists: It consists of a list of questions prepared to systematically develop a specific design problem or concept. It gives the designer the chance to think within a plan, to easily see the completed or missing items and to include them in the design program.

APPENDIX B
Visual representations preferred by the students in the study

Diagrams: A diagram is a graphical representation of data schematically. For example, the motion of an object or the life cycle of a living thing can be diagrammed and dynamic relationships between different situations can be mapped. Diagrams that can contain measurable values, graphic abstractions, schemas, sketches, pictograms, signs or symbols that describe information can be used in both thinking and representation processes.

Sketches: Considered the most important tool of thinking and representation in design, sketching is done with free hand movements, usually without any auxiliary drawing tools other than pencil and eraser. It gives the designer the chance to concretize thoughts and interact with them, generate improvised ideas, and express himself/herself freely. The interactive, dynamic and flexible role it plays in the design process enables the sketch to be used on a wide scale from abstract images to realistic perspective drawings.

Collages: In collage technique, it is aimed to reflect a concept, thought or feeling by combining visual data collected from different sources with a certain logic. The main purpose here is to give an impressive visual expression of the content. Typography, color palettes, photographs taken by the designer or found images from the internet can be used for collage making. In addition to conveying the ideas of designers to others, it helps to question the form and concept, especially in the beginning of the design process.

Mock-ups: The mock-up which enables to represent a concept in three dimensions allows including the properties of the material such as color and texture besides the formal features brought by the form. This representation tool which can be at different levels of abstraction such as conceptual thinking, draft work, and final prototype includes not only seeing but also tactile experience**.**

Video: With the development of computer technologies, representation tools such as video and modeling have entered the representation literature. With video editing programs that facilitate the making of digital edits, students can prepare presentations that appeal to multiple senses, and create rich expressions with the use of different images and effects.

3d modeling: Another representation tool that stands out with the development of computer technologies is three dimensional computer modeling. In addition to detailed perspectives on technical drawing and presentation, modeling programs which give the designer the opportunity to think, experiment with form, material and texture, are increasing in parallel with the wide usage possibilities offered by the effective use in representation and design processes.