

Framing students' reflective interactions based on photos

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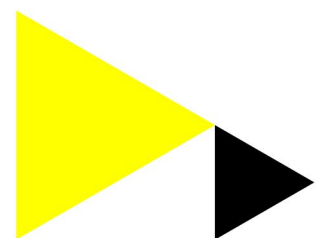
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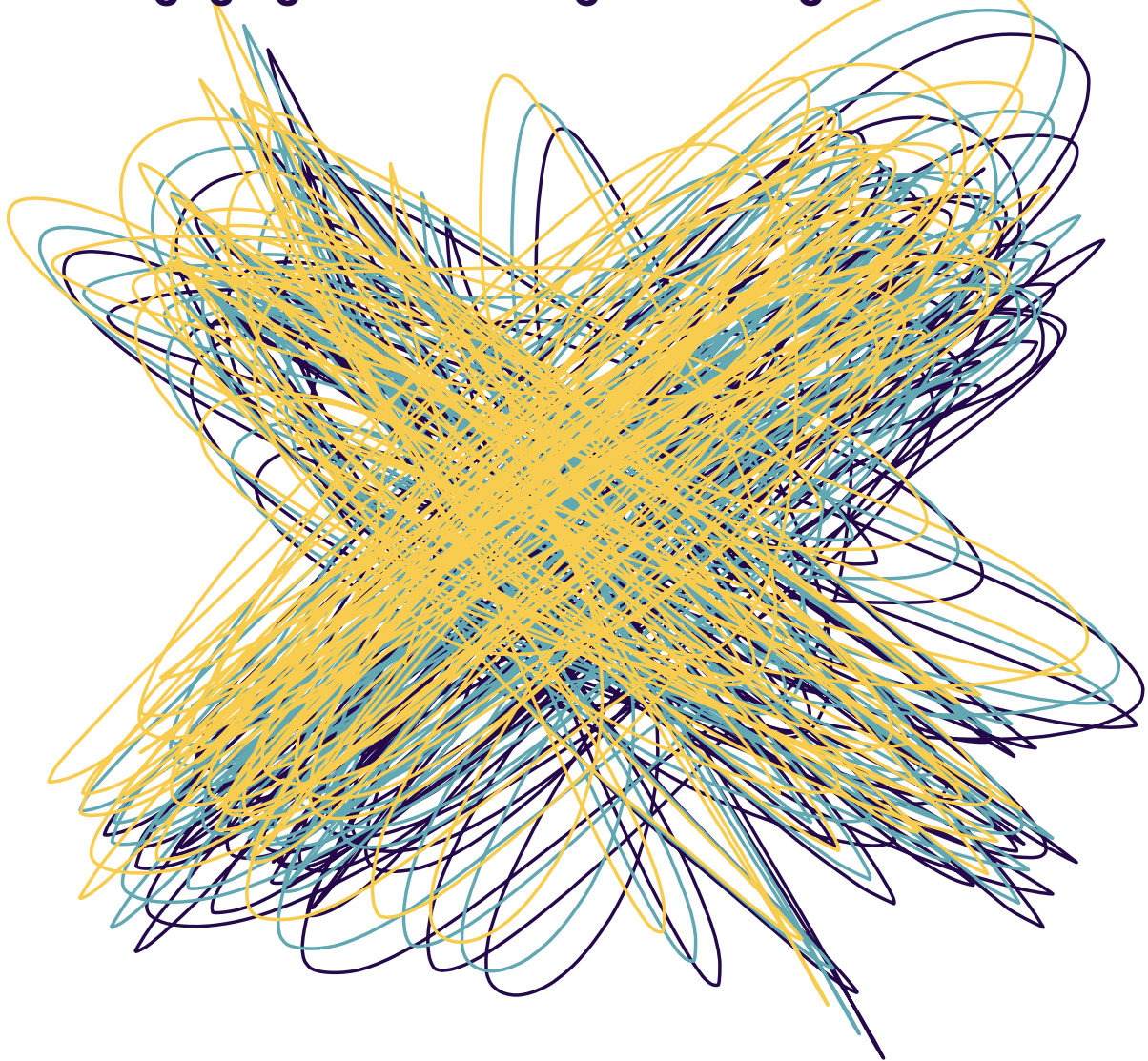
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Engaging with Challenges in Design Education



**6th International Conference
for Design Education Researchers**

24–26 September 2021
Jinan | China

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10th Anniversary of the International Conference for Design Education Researchers
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Framing students' reflective interactions based on photos

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Critical reflection, addressing students' attitude, beliefs and values related to pressing topics in the world, plays a crucial role in developing ethical sensitiveness and critical design literacy in design education. Critical reflection is provoked by discussing self-made photos, as is demonstrated in the research method *Photovoice*. This paper considers Photovoice in design education for its ability to foster learning through *self-guided critical reflective interactions* with peers based on self-made photos. Research on how to support this is lacking. This paper addresses this gap by studying students engaging in self-guided Photovoice assignments. Results consist of adapted steps for Photovoice in education and illustrate potential as well as boundaries of self-guided Photovoice through students' quotes and *photomaps*. Also, five *frames of interpretation*, suggested by students engaged in self-guided Photovoice, contribute to previous knowledge and may inspire the design education community to start experimenting with Photovoice in course work. The final aim is to support students in critical reflection, a crucial skill for responsible design professionals.

Keywords: Photo sharing, Photovoice, Critical reflection, Interpretation, Learning

Introduction

In design education, the ability to reflect is crucial for students to become responsible design professionals and creative thinkers (Dewey, 1933; Kolb, 1984; Norman, 1993; Schön, 1983). More than *reflection* – which focuses on the improvements of actions in an established field of practice –, *critical reflection* – which addresses students' attitude, beliefs and values related to pressing topics in the world – is considered crucial in transforming knowledge and practice and in developing ethical sensitiveness and *critical* design literacy (Mezirow, 1997; Orr, 1991). At the same time, it can be hard for educators to turn reflection from an individual cognitive process inside student's head into a social, tangible and preferably self-guided process in class (Chio & Fandt, 2007; Fleck & Fitzpatrick, 2010). There is a need for methodologies and exercises supporting self-guided critical reflection in design education.

Research shows that taking photos and discussing them with others provokes reflection (Harper, 2002; Hurworth, 2003; Latz, 2017; Mendelson, 2007; Sontag, 1977; Tinkler, 2013). Photos have the visceral power to communicate not only what is shown in the photo: *the signifier*, but also what idea or meaning it refers to: *the signified* (Saussure, 1961). When transitioning from *describing the signifier* towards *interpreting the signified*, a process of reflection occurs, characterised by 'reviewing experiences' (Baumer et al., 2014) and 'coordinating one's beliefs, values and internal loyalties' (Baxter Magolda & King, 2012), supportive for ethical and cultural sensitiveness and critical design literacy (see Fig. 1).

The research method of *Photovoice* (Wang, 1999; Wang & Burris, 1994, 1997) builds on this power of photos. Historically, Photovoice has been used to highlight the perspectives or *voices* of often marginalised groups in society. Through dialogue about self-made photos, participants reflect on topics important to their daily lives and are empowered to make themselves heard. This paper focuses on the use of Photovoice in design education and considers its ability to foster *critical reflective interactions*. With this term the social, active and personal character of reflection built on interaction about and with self-made photos is emphasised.



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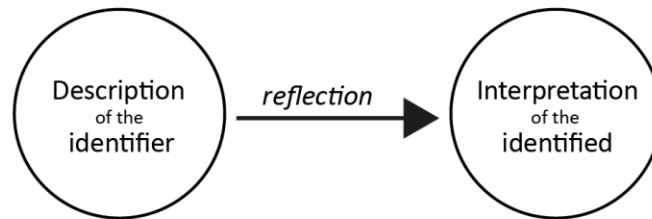


Figure 1: Reflection occurs when transitioning from describing the identifier towards interpreting the identified (based on semiotic theory of F. de Saussure (1961).

To support reflection in Photovoice, literature suggests the use of questions, caption writing and storytelling in a process controlled by the researcher (Wang, 1999; Wang & Burris, 1994, 1997). In the context of learning, better results are to be expected when students guide their own learning process (Mezirow, 1997). However, there seems to be a lack of knowledge and practical applications on how to achieve this in Photovoice. This paper aims to address this gap to be able to support students in self-guided, critical reflective interactions with peers based on self-made photos. However, first we need to better understand what happens when students engage in such a process.

An explorative user study with bachelor design students engaging in Photovoice assignments was performed. The results consist of 1) an adaptation of the steps of conventional Photovoice into steps suitable for use in education, 2) quotes and students' deliverables illustrating the potential and boundaries of Photovoice in education and 3) five *frames of interpretation* of self-made photos by students. With these results we aim to strengthen the design education community in its attempt to support self-guided critical reflective processes and help students to become responsible design professionals and creative thinkers.

Theory and related work

In this section we will introduce founding theories and related work.

Photovoice

Photovoice is a form of participatory action research (Lewin, 1946). It is closely associated with research of Wang and Burris, who coined the term 'Photovoice' in the 1990s (Wang & Burris, 1994). Traditionally, the method focuses on marginalised groups in society and proved to be a powerful means to (a) encourage documentation of their lives, (b) raise critical reflection through dialogue about their photos and (c) reach policy makers to catalyse change (Latz, 2017). As opposed to *Photo-elicitation* (Harper, 2002), Photovoice is participant driven, meaning that photos created by the participants themselves are in the heart of the process. Research describes typical steps to take in a Photovoice process (Latz, 2017; Tinkler, 2013; Wang, 1999):

- Step 1: Identification. The researcher identifies the concept(s) to be explored.
- Step 2: Invitation. The researcher invites the participants.
- Step 3: Education. The researcher informs the participants about the concepts and procedure.
- Step 4: Documentation. Participants take photos.
- Step 5: Narration. Participants, guided by the researcher, discuss and reflect on their self-made photos. A set of questions, raised by the researcher, may be used to support this step (Wang, 1999).
- Step 6: Ideation. The photos are analysed as a set. Connections between photos of participants are labelled – often by the researcher. Literature on Photovoice recognizes the importance of involving participants in this step for the learning and reflection that takes place (Sutton-Brown, 2014), however suggests that this is not always feasible. Literature on supporting this step is limited. General references are made to 'caption writing' and 'storytelling'.
- Step 7: Presentation. Participants and researcher co-create an exhibit for a wider audience.
- Step 8: Confirmation. The perception of those who visited the presentation, including policy makers.

Arguments against the use of Photovoice often refer to the potential risk of upsetting vulnerable participants when exploring sensitive concepts (Booth & Booth, 2003; Latz, 2017; Wang & Burris, 1997). When using Photovoice as a means to facilitate students' learning these arguments are less troublesome. Although some concepts might be sensitive to some students, it is never the aim to address specific problematic issues in the

lives of the students as a group – as is the goal of conventional Photovoice projects. The risk of upsetting students may therefore be small. A second argument against the use of Photovoice refers to potential difficulties to analyse the photos, due to their subjective nature. This will be discussed later.

Photovoice for critical, reflective learning

Paolo Freire's education for *critical consciousness* is one of the theoretical foundations of Photovoice. Freire's central premise is that education is not neutral and takes place in the context of students' lives (Freire & Ramos, 1970). Drawings made by Freire were used to stimulate collective reflection and discussion among students. A similar approach is used in Photovoice. Freire's drawings represent realities of daily life, the photos created with Photovoice do that as well. However, Photovoice takes the concept one step further by focusing on artefacts (photos) created by the students themselves.

As stated, conventional Photovoice is directed towards reaching policy makers. When Photovoice is used in education, the process is directed towards student reflection. Research on Photovoice in education has emphasised critical reflection on issues such as cultural diversity and gender inequality (Ali-Khan & Siry, 2014; Chio & Fandt, 2007; Kaplan & Howes, 2004), racism and sexism (Sensoy, 2011) or health (Cooper, Sorensen & Yarbrough, 2017). However, suggestions on how to support *self-guided* critical reflection are lacking.

Reflective learning assignments

We selected theories on Self-Authorship (Baxter Magolda & King, 2012) and Basic Human Values (Schwartz, 2012) to define concepts for the Photovoice-assignments. Self-Authorship is characterised by internally generating and coordinating one's beliefs, values and loyalties, rather than depending on external values (e.g., from parents), external beliefs and interpersonal loyalties. By definition, it is strongly related to critical reflection. The theory states that all learning outcomes require a certain level of Self-Authorship and move away from binary assessment of knowledge such as right or wrong. Knowledge assessment and critical reflection require more sophisticated treatments that involve ambiguity and often generate more questions than answers. Students should be supported in a self-guided process to 'actively work on developing internal perspectives and self-definition' and to become 'the Author of One's Own Life'.

To have students actively work on developing internal perspectives and self-definition, the Theory of Basic Human Values (Schwartz, 2012) served as inspiration for the definition of the concepts to explore with photos. It is stated that individuals and groups differ substantially in the importance they attribute to basic values such as 'self-transcendence' and 'conservation'. Researching these different priorities or hierarchies involves researching internal perspectives and self-definition, supporting Self-Authorship and critical reflection.

Analysing photos

Due to their subjective nature, photos are considered hard to analyse. However, when Photovoice is used in design education the analysing or interpretation of the photos is not done by the researcher but by the students as part of the reflection process. In this research, we aim to better understand this process and to *analyse the analysis of the students*, to be able to support it. Since a photo can be considered a sign, theories from semiotics, the study of signs, were consulted. Swiss linguist, semiotician and philosopher Saussure conceptualised a sign as a *referent* (Saussure, 1961). The referent refers to what is depicted in the photo: *the signifier*, as well as to the meaning of the thing in the photo: *the signified*. A sign consists of both: a totally meaningless signifier or a completely formless signified does not exist. However, the same signifier could refer to different signifieds. For example: a photo of a sleeping cat is both referring to 'a sleeping cat' (the signifier) and to 'my cat I love so much', 'relaxedness', 'flea infestation' etc (the signified). As such, the signified can include the thing in the photo but also refer to an abstract idea or concept.

Theories of the American logician, mathematician and philosopher Peirce also informed our analysis. Peirce defined three modes of relationships between signs and their referents: *the iconic*, *the indexical* and *the symbolic* (Peirce, 1960). Employed within a broadly Saussurean framework, the iconic relationship tends to emphasise the signifier, while indexical and symbolic relationships tend to emphasise the signified. In the iconic mode the signifier is perceived as resembling the signified, being similar in possessing some of its qualities. In the case of photos, there is always an iconic relationship, since photos are in a certain respect exactly like the object they represent. In the indexical mode the signifier is directly connected to the signified in a physical, observable way or in a causal, inferential way. The relationship is not arbitrary. For example: a photo of smoke refers to fire. In the symbolic mode the signifier does not resemble the signified but relates to it in a fundamentally arbitrary or conventional way. The relationship must be learnt, for example: a photo of a

white dove might refer to peace.

Research has been done on the practical use of icon, index and symbol in assigning meaning to and querying of photos (Nack, Scherp & Neuhaus, 2014). Findings suggest that this established division does not correspond with the actual reasoning and reflecting process of the participants. Specifically, the distinction between the indexical and symbolic meaning of photos could not be reproduced. It is suggested that a dyadic division between iconic and indexical/symbolic, resembling the identifier and the identified in Saussurean terms, should suffice. In this research this dyadic approach is the primary guiding principle for the analysis. See Fig. 1.

The study

To better understand the process of critical reflective interactions based on self-made photos we performed a user study with two cohorts of 3rd-year bachelor students participating in a minor program on design research at a University of Applied Sciences in the Netherlands. 31 students participated: 14 in 2019 and 17 in 2020 (see table 1). The main author of this paper took the role of educator in the program.

The assignments

A learning goal of the course was to develop a professional attitude as a design professional. In order to encourage students to 'actively work on developing internal perspectives and self-definition' (Baxter Magolda & King, 2012) as a means to fulfil this learning goal, we carefully defined three concepts inspired by the Theory of Basic Human Values (Schwartz, 2012):

- **Social city** – We envisioned this concept to contribute to the exploring of internal perspectives on what constitutes a social society. Inspired by the human value 'self-transcendence' (Schwartz, 2012).
- **Traditional city** – We envisioned this concept to contribute to the exploring of internal perspectives on what constitutes 'tradition'. Inspired by the human value 'conservation' (Schwartz, 2012).
- **I love my city** – We envisioned this concept to nudge students towards expressions of self-definition in terms of preferences and opinions.

We aimed to explore the same concepts with the 2020-cohort, however due to Covid-19 restrictions we could not ask students to go out to explore. We therefore adjusted the concepts to guide a process of creating photos closer to home: (a) **Social home**, (b) **Traditional home** and (c) **I love my home**. Since the conceptual core of the concepts is unchanged, we expected these concepts to be interpreted in a similar way as the year before.

To complete the assignment both student cohorts were asked to document and illustrate the answers to two questions: (1) 'What did the group find out about the concepts?' resulting in a group document and (2) 'How would you describe your own perspective on the concepts?' in an individual document. To answer these questions, students discussed the photos and created *photomaps*: labelled configurations of photos to illustrate their interpretations (see Fig. 2).

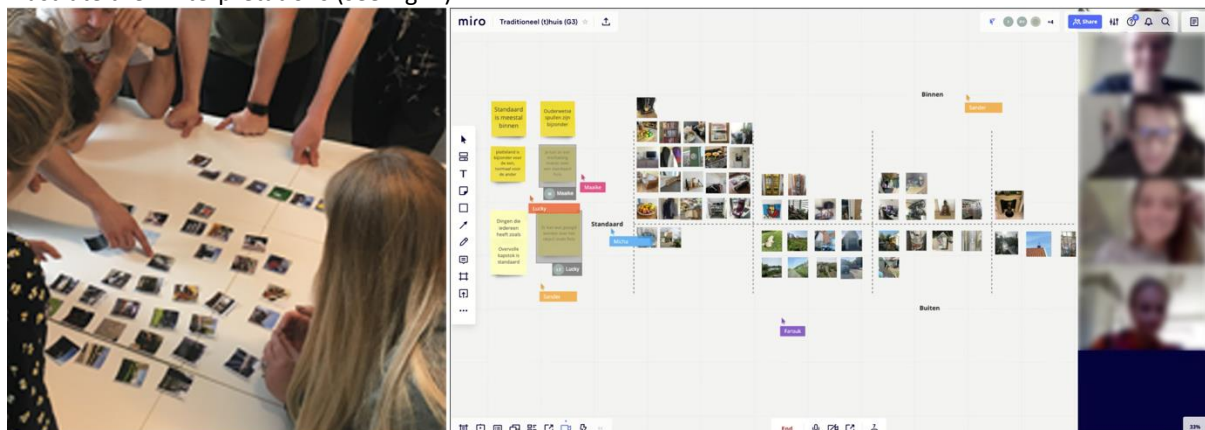


Figure 2: Students created photomaps through reflective interactions based on their self-made photos in class in 2019 (left) and in the online tool Miro (Miro, n.d.) in 2020 (right).

Data collection

The students were asked to create a minimum of nine photos per concept with their mobile phones. They

were given three days for this. In 2019, the photos were printed on paper by the educator shortly before discussing the photos in class. The students were divided into two subgroups. Each group was positioned at a table and provided with their photos as well as post-its and markers to support the reflective interactions. The students were informed that their activities would be recorded and asked for their consent.

Due to Covid-19 restrictions, the 2020-cohort could not meet up in class. Instead, they were asked to use an assigned board in the online white boarding tool Miro (Miro, n.d.) and engage in the video-chat (see Fig. 2). The Miro environment provides for digital post-its and markers. The group was divided into three subgroups. The students were informed that their activities on the board would be recorded and asked for their consent. Screen recordings including video and audio were made with video messaging tool Loom (Loom, n.d.). The students spent between 25 and 35 minutes per concept. They received little guidance on how to start their reflective interactions but were informed about what questions to answer to complete the assignment. In 2019, two educators were present during the discussing in class, however not interfering. In 2020, two educators were switching between the different allocated boards in the online environment and not interfering. The students were asked to deliver the documentation two days after the discussion session, as a pdf file.

Table 1: Set up of the study and overview of the collected data.

	2019	2020
Setting	Offline in class Printed photos	Online in Miro (Miro, n.d.) Digital photos
Support	Post-its Markers	Digital post-its Digital markers
Concepts to explore	Social city Traditional city I love my city	Social home Traditional home I love my home
Student population	14 (7 male, 7 female)	17 (10 male, 7 female)
Subgroups	Group 1: 7 students Group 2: 7 students	Group 1: 6 students Group 2: 5 students Group 3: 6 students
Data (discussions)	Video and audio recordings of 2 groups x 3 concepts = 6 recordings. Transcribed	Screen recordings (audio + video) of 3 groups x 3 concepts = 9 recordings. Transcribed
Data (documentation)	2 group documents 14 individual documents	3 group documents 17 individual documents

Data analysis

Unique codes were assigned to each student: P1-G1-19 means Participant 1 from subgroup 1 in 2019. The data were analysed using Thematic Analysis (Braun & Clarke, 2006). We took an inductive, data driven and bottom-up analytical approach (Boeije & Bleijenbergh, 2019; Langley, 1999; Miles & Huberman, 1994). This means that we did not try to fit a pre-existing coding schema but created one ourselves. However, knowledge on the division between *identifier* and *identified* (Saussure, 1961) was used as *sensitising concept* (Boeije & Bleijenbergh, 2019; Bowen, 2006) to recognize interpretations and distinguish them from descriptions.

We operated within a constructionist paradigm, meaning that we acknowledged that codes and themes were constructed by us and did not just speak for themselves (Boeije & Bleijenbergh, 2019; Braun & Clarke, 2006).

We were actively looking for pieces of narrative evidence which we selected, edited and applied to strengthen our arguments. As is good practice in a constructionist approach, excessive data reduction was avoided and the different viewpoints on the studied process were presented as completely as possible (Langley, 1999).

After the first period of familiarising ourselves with the data an iterative process was followed of open coding, constructing initial themes, reviewing them and defining final themes. Open coding means that as many codes as needed were assigned to pieces of text (Boeije & Bleijenbergh, 2019; Langley, 1999; Miles & Huberman, 1994), using the sensitising concepts as a lens. Spread sheet software was used to document the codes alongside the data extracts and photo (Figure 5). To determine if a code could constitute or be part of a theme, we again took a qualitative approach. The number of occurrences in the data was not the decisive measure, instead we looked for variety in codes. Since students might experience reflecting and interpreting as challenging (Fleck & Fitzpatrick, 2010), we took into account that successful efforts might occur only once, yet still be valuable for our analysis. After, but also during the process of open coding, mind-mapping techniques were used to merge, rename, split and finally cluster open codes and construct themes (Figure 6). The 15-point

checklist of criteria for good Thematic Analysis (Braun & Clarke, 2006) was consulted.

Results

Three types of results were gained: 1) an adaptation of the steps of conventional Photovoice into steps suitable for use of Photovoice in design education, 2) insights illustrating the potential and the boundaries of Photovoice in design education and 3) five *frames* of interpretation of self-made photos by students.

Adapted steps for Photovoice in design education

We propose adjustments in the process-steps of a conventional Photovoice-project to better facilitate critical reflection in an educational context. Figure 3 illustrates the shift in responsibilities for the actors involved.

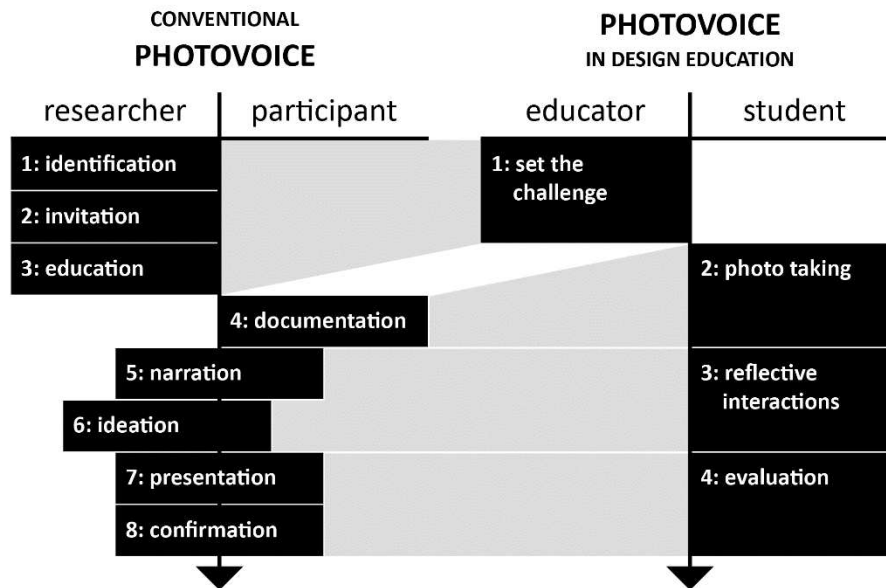


Figure 3: Adaptation of the steps in conventional Photovoice compared to Photovoice used in education.

- **Step 1: Set the challenge** – In this step the educator takes the leading role. It includes former steps 1: Identification, 2: Invitation and 3: Education. The concepts to explore should fit the learning goal of the course. They can be provided by the educator – as in this research –, by the students or co-created by both. Inviting students and informing them about the assignment is embedded in the course.
- **Step 2: Photo taking** – Students have the leading role in this step. It includes former step 4: Documentation. Students take photos with their mobile phones to explore a given concept.
- **Step 3: Reflective interactions** – Students take the leading role in this step, in which critical reflection and learning takes place through discussing of photos and the creation of photomaps. This step includes former steps 5: Narration and 6: Ideation. The educator may perform a facilitating role in the background.
- **Step 4: Evaluation** – Students take the leading role in this step. It includes former steps 7: Presentation and 8: Confirmation. Although the results from using Photovoice in design education might be of interest to others (for example other, not participating students), the aim of the process is critical reflection for the participating students themselves. Presenting the results to a wider audience of policy makers is not in focus. We therefore restrict this step to evaluation of the Photovoice results by the students, a reflective activity that may deepen the insights gained during the reflective interactions. The evaluation is often captured in a document, as in this research. However, other means of evaluation could be suggested, such as a presentation or an exhibition. The evaluation may be graded.

This research focused on step 3: Reflective interactions. Previous research suggests that a) reflection can be challenging (Fleck & Fitzpatrick, 2010) and b) sharing and discussing photos support reflection (Harper, 2002; Hurworth, 2003; Latz, 2017; Tinkler, 2013). In this research evidence supporting both claims was found. First of all, we observed that reflection can be challenging: transforming from describing the identifier towards interpreting the identified was not always easy or self-evident. Regardless of which concept was discussed first, all five groups in 2019 and 2020 started out describing the identifier or 'thing' in their photos and created categories of 'similar things'. It was not until the second or third concept that references to other interpretations were discussed and more complex connections between photos were recognized. Student P1-G1-20 stated: "I thought it was a shame that we as a group got stuck on just categorising photos for 'I love my home', because it had actually interested me enormously what kind of stories came with the photos." At the same time, students indicated that ultimately, sharing and discussing photos helped them to reflect: "If you just start talking about a particular topic, you will never get conversations or discussions as deep as you get with photos" (P5-G2-19) or "Behind all these photos is a story and if you bring them together you can form an image of the person behind them" (P2-G3-20). An example of students experiencing photos as means to develop internal perspectives and cultural sensitiveness that might not have surfaced without the use of photos is given by P5-G2-20: "Often I don't mention my background because I don't think it is necessary to talk about it, but with these photos it comes out in an interesting way". Moreover, some students mentioned specifically that photos may support self-definition or self-reflection. P5-G2-19 wrote: "This is not about pushing through your own opinion, but rather being open to other opinions". P4-G1-19: "I was forced to look beyond my own personal interpretations [...] and had no problem deepening my perspective". An example of a photomap of the concept 'Social city' illustrates how reflection took place (Fig. 4). After forming categories, students increased complexity by creating an axis in which the contraposition of 'antisocial' was introduced. Some photos, such as a photo of cigarette butts on the sidewalk, were perceived as ambiguous: was the photo referring to the leftovers of a social gathering or to littering and indifference? This triggered a more fundamental discussion about internal perspectives and attitude towards what constitutes 'social' and resulted in discussing the opposite as 'antisocial'. Also, the group concluded that "Social behaviour does not always have to be self-evident, so instructions or reminders in the city are needed", referring to the photos labelled with 'Affordance'. It suggests that 'beliefs, values and internal loyalties are being generated and coordinated', which could have a positive impact on students' development toward Self-Authorship and critical reflection (Baxter Magolda & King, 2012).

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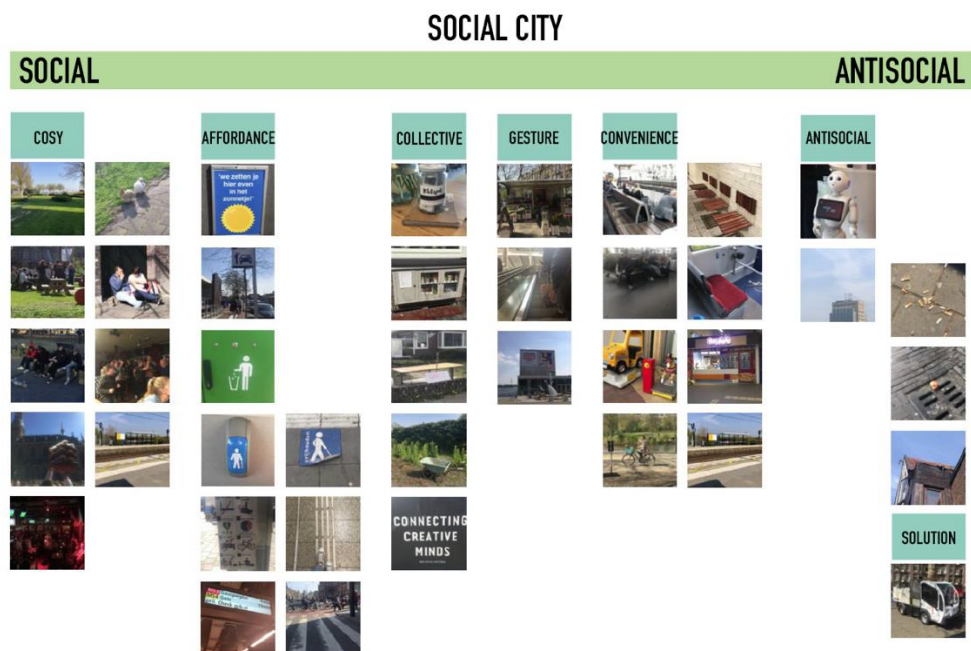


Figure 4: Photomap on the concept 'Social city' by G2-19. It is a digital reproduction, made by the students, of the photomap laid out on the table in class. The labels were translated from Dutch into English in the digital file, by the author.

Despite the potential of Photovoice for critical reflection in design education, we also witnessed students struggling with it. Frequently, they were stuck at the level of defining how the concept is interpreted according to the majority of the group without further explanation or deeper reflection. For example: G1-19 wrote on the concept 'I love my city': "Travelling is an important theme, as well as clean", without further explanation or critical reflection on what these themes may induce. P1-G3-20 wrote: "When I look at my photos of 'Social home' I see many objects that have to do with physical social activities instead of digital social activities", also without deeper reflection. P2-G1-19 judged the process of interpretation as complicated all together: "Can't we go back to categories, that is a lot easier."

We conclude that critical reflection can be challenging, although students recognize the potential of photos as triggers for critical reflection and achieved it occasionally. Students are able to express interpretations, however support is needed to explicate how these interpretations relate to 'beliefs, values and internal loyalties' or how they can be 'put together to create some sort of insight' (Baumer et al., 2014). The final result, discussed next, aims to contribute theory and practice for such support.

Photo	Data extract	Open code	Photo	Data extract	Open code
	My cupboards, and I have, you know, all my pens organised on Sharpies, Stabilos, black pens, blue pens... I just love that very much, that it is all organised. (P3-G2-20)	identity, personality trait, values, appearance		I don't like too much rubbish laying around. In my opinion, an organised set of boxes or bottles also illustrates a certain kind of affection and love for your home. (P5-G1-20)	identity, personality trait, opinion, values
	There are a lot of people in my neighbourhood with a kind of bookcase next to their house, from which you can take books or leave books behind. Is about to sharing things, doing things together. (P1-G2-19)	interaction, human, behaviour, sharing		I think I am good at logical thinking. The interpretation of the assignment shows that I have thought logically and literally about the word 'traditional' and based my photos on that. (P3-G1-20)	identity, personality trait
	This is very bright sky so that means prosperity... (P2-G1-19, photo by P6-G1-19)	symbol		I've made my house my home. I like the colours blue and green combined with wood. That is reflected in the photos. (P5-G3-20)	identity, preferences style
	In Scheveningen... we are known to be a bit dirty... of course a joke... that you have Tokkie* sauce. (P1-G1-19)	local symbol		I think the fact that we have to make room for each other and think about each other is social. You don't have to see each other physically to be social. (P6-G1-20)	the other, interaction, human, behaviour
	* Term to describe socially weak citizens I am of Pakistani descent, so I made photos of religious prayers and from the Quran. And also the dough we use to make food. (P5-G1-20)	culture, religion, roots		So we found out that social behavior does not always have to be self-evident and that incentives are therefore needed in the city. (G2-19)	interaction, behaviour, human, respect
	Sending birthday cards... that in itself is of course also a tradition, which almost everyone does. (P3-G1-20, photo by P1-G1-20)	culture, rituals, human, behaviour		The items in the photos refer to the past and what was the norm then and now no longer. (P6-G1-20, photo by P1-G1-20)	temporality, past, old reality, tradition

Figure 5: Assigning open codes to data from students' discussions (left) and documentation (right).

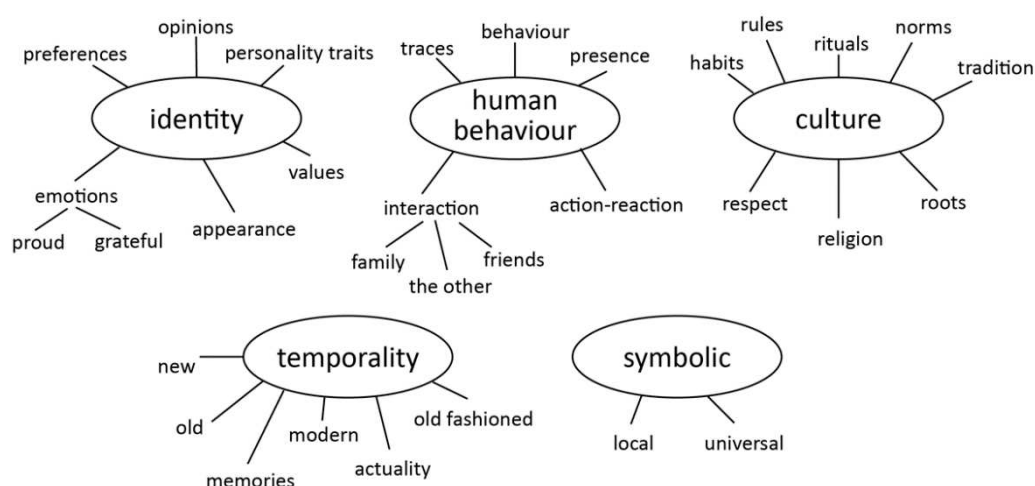


Figure 6: From the open codes, themes or frames were constructed.

The interpretation framework

Using Thematic Analysis (Braun & Clarke, 2006) the data were analysed for clues marking the transition from describing the content of a photo towards interpreting its meaning (Fig. 1). After an iterative process of open

coding (Fig. 5) and mind-mapping techniques, final themes were constructed (Fig. 6). These final themes represent *frames*, or *hypotheses about the connections among (parts of) photos* (Klein, Moon & Hoffman, 2006):

1. **Identity** – referring to the self
2. **Human behaviour** – referring to (interaction with) the other
3. **Culture** – referring to a wider context of influence
4. **Temporality** – related to (the passing of) time
5. **Symbolic** – referring to symbolic meaning

We took time to construct five ‘coherent, consistent and distinctive’ frames: point 6 of the 15-point checklist of criteria for good Thematic Analysis (Braun & Clarke, 2006). Three frames focus on *the human* but differ in their context of influence: *identity* (intrapersonal, smallest context of influence), *human behaviour* (interpersonal) and *culture* (widest context of influence based on established behaviour in larger groups). These three frames are essentially different from the fourth frame *temporality*, related to (the passing of) time and the fifth, referring to *symbolic* meaning.

Although the five frames are recognizable and distinct, we acknowledged that one single interpretation might be scaffolded by more than one frame. For example: the data of P3-G1-20 (fig. 6, left, final line) refer to *culture* as well as to *human behaviour*. Also, references to ‘memories’, positioned in the frame *temporality*, relate to and may overlap with ‘emotions’: part of the frame *identity*. This is in line with semiotic theories indicating that the same signifier could refer to different signifieds. Ultimately, depending on student and context, the focus is specified. In figure 7 the process of moving from describing towards interpreting a photo, illustrated in figure 1, is extended with the five frames into a framework. The boundaries between the frames are permeable to express flexible and combined use.

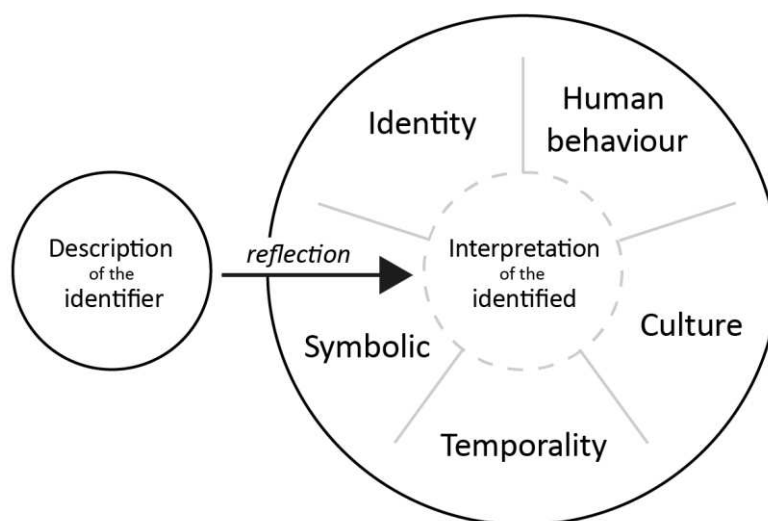


Figure 7: The interpretation framework consists of five frames suggested by students transitioning from describing towards interpreting their self-made photos.

The frame ‘symbolic’

Rarely, students refer to a symbol the way semioticians understand it: as a convention-based sign referring to an abstract concept. The occurrences in the data are illustrated in figure 5: a bright sky as symbol for prosperity and a bottle of ‘Tökkie sauce’ as symbol for a locally understood nickname of ‘somewhat messy’ people. However, often the word ‘symbol’ was used in a way that differs from the conventional, semiotic way. Instead, what is depicted in the photo is seen as a *symbol* for a personal, unique interpretation and is *symbolising* a related memory, habit, activity or preference. The relationship is direct and not based on conventions, thus indexical. An example is made by G1-20, stating that frames with family pictures and mottos presented in the home are ‘memories of relationships between people in a symbolic way’ (Figure 8). We conclude that the conceptual distinction between a photo as index or as symbol is rarely made by students.

This confirms earlier research (Nack et al., 2014).

Regardless the often alternative use of the term ‘symbol’, we incorporated the frame symbolic in our results. Doing so, the references made by the students are justified. Also, bringing students attention to this frame may help to discuss conventional (semiotic) symbolic qualities of their self-made photos, reveal more complex connections and support students in critical reflection.

Photo	Data extract	Open code	Theme
	These are memories of relationships of people in a symbolic way. The texts and the image represent something. [...] Often there is a reason why they are created or bought. (Documentation of G1-20. The students created a category ‘Symbolic’, containing these three photos.)	symbol, memory, past	Symbolic

Figure 8: Example of an alternative use of the word ‘symbolic’: referring to personal memory, habit, activity or preference.

Discussion

With this research an understanding of the process of critical reflective interactions based on self-made photos in design education was achieved. The results confirm the potential of Photovoice for critical reflection among students as stated in previous research and contribute detailed knowledge for practical and theoretical use. The first result builds on knowledge of conventional Photovoice (Latz, 2017; Tinkler, 2013; Wang, 1999) and contributes with adapted steps for Photovoice in education. A crucial difference with the conventional steps is that responsibilities shift from the educator to the students, potentially beneficial to self-guided learning (Mezirow, 1997). The adapted steps could contribute to theoretical knowledge on Photovoice in education and may encourage the design education community to start experimenting with Photovoice in course work. Other results underpin and illustrate the potential of Photovoice in design education through quotes and photomaps of students. However, it is also indicated where reflection stagnated and learning results were lagging. These findings may contribute to theoretical knowledge on Photovoice in education and strengthen the design education community to focus their attention on Photovoice to support critical reflection. The final result: the interpretation framework with five frames of interpreting self-made photos, may have theoretical as well as practical implications. We envision the frames to contribute to semiotic theories on signs (photos) as a means for critical reflection. The frames add a subdivision to the broader concept of *the identified* by Saussure (1961). To our knowledge, this has not been done before. Future research could investigate the applicability of the frames in other learning contexts, for example outside the design domain or with students of different age groups or cultural background, and enrich the frames. Also, the framework may provide a feasible schema for research purposes to code reflective interactions based on photos, taking into account that the frames could overlap.

On a practical level, the framework aims to inspire the design education community to start experimenting with self-guided Photovoice in course work. The frames could be translated into a set of *frame cards* to be used by students as reflective triggers in Photovoice assignments. The proposition would be that the frame cards nudge students – offline and online – towards diverse and deep interpretations. Future research could experiment with strategies and designs of the frame cards in course work, resulting in improvements of the framework. Another practical approach may involve video or audio, as a means to start critical reflection, resulting in expanding of the framework. We invite design educators and researchers to pick up this challenge.

Limitations

The data analysis has been performed by the first author of this paper only. This might be limiting the validity of the results, since a second coder may assign different codes leading to different frames. However, the open codes and frames were discussed in depth with other researchers and educators. We argue that this tempers the limiting effect of the one-coder approach.

Also, a fundamental characteristic of Thematic Analysis may have influenced the results, and that is the constructed character of the results. If we acknowledge the idea of the ‘researcher as an instrument’ (Wa-Mbaleka, 2020), we have to embrace subjectivity and “identify and monitor [our biases ...], to make clear how they may be shaping the collection and interpretation of data” (Merriam & Tisdell, 2015). In our case, it might have influenced the value of the results in terms of positioning. Since the aim was to inform designs and strategies to be used in design education, a designer-bias or educator-bias may have occurred (Graebner, Martin & Roundy, 2012). This could mean for example a purposeful aim for three until seven frames, not less and not more, because this fits the practical context of (designing for) the educational context.

Finally, in the analysis we did not account for the different settings in which the student cohorts operated: off-line in 2019 and online in 2020. However, we argue that our results are little affected by this. Crucial for valid conclusions was to create a comparable challenge for the two cohorts in terms of content and deliverables. We aimed to do so by placing the research in the same course with the same learning goals, by exploring the same concepts (naming differences between 2019 and 2020 did not affect the essence of the concepts) and by asking for the same deliverables. Other parameters, such as the amount of time given to take photos, to discuss them and to deliver the documentation are kept the same, however we might argue that varying these parameters would neither affect our findings. Our focus was to understand and find patterns in the interpretations of self-made photos by students and not (yet) to discover what conditions work best.

Conclusion

With this research we gained theoretical and practical knowledge on self-guided Photovoice in an educational context. Through a study with two student cohorts, we were able to suggest a) an adaptation of the steps in a conventional Photovoice setting into steps suitable for educational context, b) quotes and photomaps of students underpinning and illustrating the potential as well as the boundaries of Photovoice in education and c) an interpretation framework with five *frames* used by students to ‘hypothesise about the connections among data’ (Klein et al., 2006) in their shared self-made photos. With these results we aim to strengthen the design education community to start experimenting with self-guided Photovoice in course work. Observing the world, taking photos and discussing them with peers helps students to coordinate their beliefs, values and loyalties and supports ethical sensitiveness and critical design literacy. Ultimately, such critical reflective processes are crucial for students to grow and to develop into responsible, creative design professionals.

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