

## THE DARK SIDE OF METHODS – AN EXPLORATION OF THE NEGATIVE EFFECTS OF METHOD USE AND METHOD REFLECTION IN DESIGN

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### ABSTRACT

The proper use of methods is increasingly important as design challenges are more complex and involve more stakeholders. Such work also demands high reflective ability from designers. Reflective thought processes do not necessarily produce positive outcomes for the process and the individual involved. Positive reflection is goal oriented while negative reflection is typically self-oriented. In design education, reflection by students is often treated as rather trivial or only rudimentary support is offered. Research in cognitive science shows that poor reflection can hurt students' well-being, abilities and confidence over time. Thus, there is a need to better understand method use and reflection in design education more specifically when done poorly. We take a theory-building approach and interviewed 12 design students and recent graduates and investigated instances of method use where these led to negative experiences and effects. In doing so, we show different types of negative experiences that students have when using methods, the effects that these experiences have and how they relate to problematic use of methods and poor reflection practices. We end with implications for design education and design research.

**Keywords:** Design methods, Design education, Reflective practice, Reflective ability, Case study

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# 1 INTRODUCTION

Methods in design are often portrayed as enhancing the ability of designers and engineers to do their work and to tackle ill-defined and complex problems or challenges (Dorst, 2008; Daalhuizen et al., 2019; Meyer and Norman, 2020). They also form an important part of design education, where they are used as a means to both teach about design in general and teach specific design practices. Much of the design methodology literature emphasises the importance of teaching systematic design (see e.g. (Cross and Roy, 1989; Pahl and Beitz, 2013)), where methods are perceived to largely dictate how designers work (Gericke et al., 2020). As such, design methods are a central element of how we teach students how to design. Despite this central role of methods in design education, little is known about how methods are used in this context (Daalhuizen, 2014), let alone what the positive and negative effects are of both proper and improper use of methods. Further, major questions remain with regards to how students and educators alike handle reflection – a key didactic mechanism in design education (Schön, 1983; Adams, Turns and Atman, 2003) – when teaching design methods, and how poor reflection practices can influence or conflate negative experiences and affect well-being and professional development. In short, the phenomenon of method use – how methods function and affect students' experiences, well-being and professional development – is poorly understood. This is reflected in sustained, critical debate on the value and impact of methods both in practice and education (Andreasen, 2011; Daalhuizen, 2014). As a result, the conception of methods in the literature has been shifting slowly in recent years (see e.g. Dorst, 2008; Daalhuizen et al., 2019).

For many years, the often implicit conception of methods in design was that of 'recipes to follow, leading to good outcomes' (Jensen and Andreasen, 2010, p. 1) with the assumption that methods have a direct effect on the outcomes of design work (Birkhofer, Jänsch and Klobardanz, 2005). However, empirical research on how this relationship functions, let alone attempts to build theory in this domain (Cash, 2018), remains sparse (Dorst, 2008; Daalhuizen, 2014). At the same time, many design educators will probably have experienced instances in which method teaching is challenging, and where the way in which students use methods and reflect on these situations is problematic. Often, they experience that rather than contributing to their development, methods seem to have detrimental effects on the students' well-being and professional development. This is something that was also highlighted by Dorst (2008). Some scholars have addressed important issues related to this. For example, Crismond and Adams (2012) have proposed the 'Informed Teaching and Learning Matrix' with the aim to offer example learning trajectories and teaching strategies to support educators in identifying and developing students along desired paths of design cognition. However, there is a need to understand the specific role that methods (can) play in the development of students. More specifically, there is a need for a more in-depth understanding of the use of methods in an educational context and particularly of those cases where method use and reflection practices break-down. We lack understanding of how design students experience these, and how reflection ties into instances of method use.

An important first step is to explore the problematic instances of use, negative experiences and poor reflection practices of students, and gain insight into what we call 'the dark side of methods'. Shedding a light on the 'dark side of methods' is important for two main reasons. First, in doing so, we gain a more complete understanding of how methods actually function, which will contribute to theory building on this important topic in design. Second, we will be better able to inform good teaching practices and contribute to the development of the future designers we teach.

In this paper, we present an initial exploration of situations where methods did not function properly or had negative consequences in educational contexts. Furthermore, we explore the negative experiences that emerge from these situations and how poor reflection practices sometimes affect students' well-being and professional development. In doing so, we aim to answer the following research questions:

- *What factors influence problematic method use by students?*
- *What negative experiences do students have as a result of the problematic use of methods?*
- *How do reflection practices affect student's experiences?*
- *What effect do these negative experiences have on the student's well-being and professional development?*

## 2 THEORETICAL BACKGROUND

### 2.1 Method use in design

Design methods have been central to design research and have received considerable attention in the literature over time. Their roles have been described from multiple perspectives: (1) as means for facilitating the social process of design work (Bucciarelli and Bucciarelli, 1994), (2) for communicating and justifying design outcomes (Araujo, 2001), and (3) guiding and/or teaching design (Roozenburg and Eekels, 1995; Andreasen, 2011). In the latter context, the interaction between design student and method and how this relationship is moderated through reflection is central to the impact methods have (Andreasen et al., 2015a; Daalhuizen, 2014a). From this perspective, methods are defined as ‘a formalised representation of a design activity, which functions as a mental tool to support designers in achieving a goal, in relation to the circumstances and resources available’ (Daalhuizen, et al., 2019). Methods are much more than systematisations of the design process to be followed in an algorithmic fashion by designers (Daalhuizen et al., 2014; Jensen & Andreasen, 2010; Jones, 1977). Methods are part of a symbiotic relationship between the method and user – one where designers are often both producers and consumers of methodological knowledge – and with methods as a means to help achieve design goals. Moreover, the use of a method – particularly in an educational context – is not a straightforward process, but rather a process that requires processing and interpreting information that the method contains, relating this to the context, task and goal at hand as well as the non-trivial effort to change one’s mindset and behaviour accordingly (Daalhuizen, 2014).

This is particularly important in the context of education, where much of this relationship is formed and where many designers are first exposed to design methods. Thus, a method itself consists of information about a way of working (procedural knowledge) that can help design students to understand how to go about achieving certain design goals. Outcomes are considered to be directly affected by the way in which a method is ‘staged’ i.e. how methods are chosen and used in relation to the emerging situation at a given moment in a design project (Andreasen, Hansen and Cash, 2015). Given the rather complex interaction of factors that influence method use and the outcomes of their use, it is no surprise that the impact of methods is not just a matter of systematic application of a formal protocol (Roozenburg and Eekels, 1995). Methods are flexible, goal-oriented means to help designers reach their goals and to help teach students how to go about designing. Their use requires reflexivity (Fricke, 1999) and reflection (Schön, 1983; Adams, Turns and Atman, 2003). Thus, method use is generally affected by four key factors: the method itself, the method user, the intended goal, and the use context (Dorst, 2008; Daalhuizen, 2014) and productive use requires reflection on these factors both during instances of design work and afterwards. Methods have been conceptualised as ‘mental tools’ that interact with a design students beliefs, knowledge, and cognitive processes (Daalhuizen, 2014). Thus, the effective use of a method depends on how students interact with a method.

### 2.2 Reflection in design

Reflection is an essential part of learning and contributes to defining and developing both one’s personal and professional self (Pavlovich, 2007). However, design students and their ways of reflecting is a quite under-investigated field (Adams, Turns and Atman, 2003). In addition, reflection is often misused and overused in education, often without a comprehensive understanding of what constitutes productive reflection (Hébert, 2015). Productive reflection is particularly important for design education, as it has been argued that design is learnable, yet not directly teachable from a didactic point of view. That is, it can be learned through the practical operations of doing design, experimentation, application of e.g. methods and reflection on the experiences that emerge to inform improvement and development (Schön, 1983). In the design literature and within many traditions of design education reflective practice (Schön, 1983) it is an important mechanism in developing effective designers (Adams, Turns and Atman, 2003). Reflective practice emphasises the existence and importance of practitioners’ ‘knowing’ which is embodied in action and is crucial to effective action (Schön, 1983). Schön characterised reflective practice as an interactive process of framing the problem, naming those issues that the frame brings into focus and acting in ways that bring a solution closer through ‘moves’. Reflection is a core mechanism in directing this iterative process and this has been described by Schön as having a “*reflective conversation with the situation*” (1983, chap. 3). He

distinguished between two types of reflection: reflection-in-action and reflection-on-action (1983). Later, a third type of reflection was proposed by Currano et al. (2011): reflection-out-of-action. Particularly in an educational setting, design methods tie into such situations where students engage in design work and use methods to help inform them on how to go about certain design activities or to serve as a reference when they reflect for example on surprising situations (reflection-in-action), or retrospectively on past action (reflection-on-action). Thus, methods often play a role in such processes and when methods are used as part of an educational setting, reflective practices thus also mediate the aforementioned symbiotic relationship between a method and a designer.

However, there is a need to understand how design methods function in such situations and particularly when such situations become problematic, involve poor reflection practices, evoke negative experiences and have negative effects on students' well-being and professional development. The role of poor or unproductive reflection practices is of particular relevance because although a poor use of methods or students' negative experiences are not necessarily detrimental to students' development - perhaps even to the contrary - productive reflection can help to transform these into teachable moments or learning experiences (Adams, Turns and Atman, 2003). Unproductive reflection is also called rumination. Rumination is defined as continued repetitive negative thinking and is even linked to depression (Papageorgiou and Wells, 2004). Many people are not aware that rumination is a non-productive process, and it is rather believed to be a productive reflection on the individuals themselves or their problems (Lyubomirsky and Nolen-Hoeksema, 1993). Rumination is related but distinct from general worrying (Fresco et al., 2002). Trowler et al identify rumination in students as when they are aware of a problem "*but they feel stuck, not empowered to make the changes they recognise as necessary*" (2020, p. 10). They classify types of reflections on two dimensions: reflection being primarily self-focused versus being problem-solving-focused, and reflection being primarily reflective versus being primarily descriptive.

### 3 METHOD

#### 3.1 Sampling

Participants were recruited via various network channels, with the criteria for participation being a minimum of three years of design engineering education or similar relevant education and current enrolment or recent graduate from the Design & Innovation Master's program, at the Technical University of Denmark. Of the twelve participants, nine were still enrolled in the program and eight had taken the preceding bachelor's degree. Three of the participants had taken a bachelor in another country and nine of the participants had a relevant student job besides their studies. The participants were between 23 and 32 years old, eight were male and four female.

#### 3.2 Procedure

Participants were invited for a one-hour semi-structured interview over MS Teams (due to COVID19 restrictions). The interviews were conducted by two researchers. Both were present at the first interview to align the procedure. No incentive was offered for participation. The key topics covered in the interview guide were the participants' understanding of methods and reflection, their negative experiences and the effects of these experiences. The interviews were recorded and later transcribed with the use of a transcription program.

#### 3.3 Data analysis

All data was coded in Atlas.ti. A blended approach was adopted to coding, with a small set of pre-defined codes based on existing literature, analysis of students' reflection reports and expert input, and bottom-up, thematic coding (Joffe, 2012). The coded data was thereafter analysed, and the themes presented in the results were defined. Table 1 provides an overview of the identified codes with a description and key example quotes from the interviews.

Table 1. Coding scheme.

Codes	Description	Example quote
Method understanding	The participant's understanding of what a method is.	P8 " <i>a method is a structured approach, or a way of combining a set of tools to get you to the achieved or desired aim or purpose</i> "

Method mindset fit	The (lack of) fit between the method mindset and the participant	P1 <i>"I really like to use a centred user design"</i>
Negative experience with methods	Reported negative experiences with methods.	P10 <i>"the most negative experience that I've had, is that by the end of the course I don't feel like I've mastered it"</i>
Adapting methods	How the participant adapts methods for a given context.	P6 <i>"I don't think you should change it too much ... but I think you should be able to, to twist it or to apply it to different applications."</i>
Method role	The role which a method(s) has for the participant's design work.	P7 <i>"I use methods that try to make me think differently"</i>
Method choosing	How the participant chooses between methods to use.	P4 <i>"I usually select them based on experience. So it's actually really rare that I apply a new method that I haven't used before."</i>
Reflection understanding	The participant's understanding of reflection and how it should be used.	P8 <i>"trying to put together a broader understanding of why things have occurred as they have"</i>
Positive outcome of reflection	Reported positive outcomes of reflection.	P8 <i>"sometimes not all of them [courses] have my full blown interest. But then I look to what can this course provide me with? ... So what can I take from this course that I have to have as competences"</i>
How students reflect	How the participant describes and is observed to reflect.	P12 <i>"I think that I look at the method and I think of how I can benefit from it, what could potentially go wrong? Or you know, the data, how can they be affected somehow?"</i>
Team reflection	How does reflecting with others influence the participant's reflections.	P7 <i>"you're probably more forced to reflect when you're working with other people, also, because they're going to question your proposals"</i>
Reflection development	How the participant's reflective practice has developed.	P8 <i>"At some point, I did not understand the reason, why to reflect, that [dates] back to high school. But then again, through practice and experiences the tool and the methods effect, like sort of came with this output."</i>
Amount of reflection	How much and how often participants reflect.	P9 <i>"I feel like, I feel like all reflection is good. Basically, there is of course, you need to limit the amount of time you use on it in, at least in most cases, you are on a deadline..."</i>
Negative experience with reflection	Reported negative experiences with reflection.	P6 <i>"But I find it sometimes like funny that .., you should reflect on one page or something. I think that's either limiting or maybe giving too much space for reflection."</i>
Professional and personal development	Reported participant's past or current development.	P7 <i>"Okay, because I have reflected upon it before and that's why my aim of doing classes is typically something else. I would like to have some certain competences when I leave the class."</i>
Professional identity	The reported reflections on participant's professional identify	P10 <i>"the thing is like, because like, it took the longest time for me to perceive myself as a designer, and I'm not really sure I still do. Like, I don't know what I am."</i>
Confidence	Reported confidence of the participants, focused on methods.	P5 <i>"So, the confidence in me, and the confidence in my education has only been highlighted by getting a job."</i>



## 4 RESULTS

### 4.1 Students' perception and understanding of methods

The participants disagreed to a considerable extent on what constitutes a method and what does not. That is, what participants referred to as methods varied considerably. For example, some referred to the rather simple and straightforward Pareto principle (80/20) as a method, while others referred to extensive frameworks such as Waterfall model as a method. These are quite different in both nature and content. Thus, the boundaries between what is perceived as a method, tool, principle, or reference model are often blurred. When asked to describe the purpose of methods in design, participants gave similar accounts, usually referring to their goal-directedness, their usefulness in providing structure to the way one thinks about design and how one goes about doing design. For example, participants describe methods as: *“pathway of the actions you are going to apply”* (P1), as *“a method is like a structure to achieve a goal”* (P4), or *“systemise your thoughts in your designs”* (P7). Overall, we identified three distinct perspectives on methods: (1) methods as instructions for how to go about a certain design practice, (2), methods as goal-oriented structure that prescribe the core principles and/or mechanisms of a design practice, and (3), methods as ‘thinking tools’ that help to organise ones’ thoughts about specific design work. Participants also reported different views on the extent to which methods can and should be adapted when used. Some were not comfortable adapting methods. For example, P4 stated: *“I think it’s rare that I use the methods differently, because I’m more comfortable in using them the way that I learned”*, showing resistance to adapt methods even when this might be needed. In contrast, P3 stated that: *“it’s more like a guide or something to be able to build on. I never took any method that seriously ... So like I don’t follow methods how you would do in a recipe book”*. This indicates that others are more comfortable with adapting methods and do so almost as a rule. Finally, participants also pointed out the importance of reflection as a mechanism to do this well: *“And I think it also applies very well to the methods that I use, that they’re also constantly changing and adapting ... and I think that only happens by reflecting on what went well, and what could have gone better”* (P5).

These findings showed distinctly different ways in which methods are being perceived. Such differences are likely to affect their use and how students experience, use, and reflect on these experiences.

### 4.2 Negative experiences with using methods

Participants reported a variety of negative experiences with using methods. It is important to note here that in some cases, a negative experience with a method was not perceived as negative in terms of the general learning experience, as these instances sometimes served as ‘teachable moments’ and facilitated learning. However, in general, methods were often characterised as overly complicating matters and as restrictive to the students in their design work: *“it takes away my power as well in some ways.”* (P3).

When going into detail with the way methods ought to be used, participants reported to experience problems in understanding how to use methods correctly in the context of the courses in which they are being offered. Although methods are a part of most design courses, to establish and understand good ways of using specific methods often remains unclear to students, as is illustrated by the following statement: *“you never had a clear answer that what is the right way of doing it? What is the wrong way? And I think the biggest problem with methods actually is how we use them, that no one really knows how to use them and nobody really knows how serious they have to stick to methods if we are doing a course”* (P3). Thus, participants reported that they sometimes do not understand how to use specific methods in a productive way, even after having completed courses in which these methods were being taught. A reflection by P10 offers a potential explanation, highlighting that methods are often only taught once in a single course and thus students lack the repeated experience with specific methods to build up proper understanding and competence to use these methods with confidence. In contrast, some participants expected methods to be understandable and usable from the first instance of use: *“I think when you are working with a method, and you have to discuss whether it’s the right or wrong way to use the method. I think the method probably has some flaws, because then I don’t know, it should be simple to apply and understand”* (P7). At the same time, participants also reported a lack of necessary information in the content of methods, leading to problems in using

them: “if a method isn’t properly informing how you should use it, then it’s just like completely pointless” (P2).

These findings point to how students have different expectations regarding how a method ought to function and how this can shape how students experience their use and reflect upon such experiences. We identified two distinct expectation patterns: (1) methods are expected to function as instructions that should be clear on first use and should result in expected results from the first time of use, and (2), methods are expected to have a learning curve and require multiple instances of use.

### 4.3 The role of reflection

#### 4.3.1 Student’s perception and use of reflection

Participants often met the request to reflect as part of their education and were familiar with reflection practices as part of their course work. Reflection was generally reported as an important mechanism for learning. For example, P5 states: “if you’re taught something and you just start applying it without reflecting and thinking about what, what works and what doesn’t, ... I mean, it’s just repetition of something that you don’t really create anything valuable if you don’t apply it to the next setting”. Furthermore, in pointing out the importance of reflection in improving themselves over time, P11 states “when you realise that you did something wrong or something could have been done better. That’s the lesson.” Reflection was often perceived to be a way to question oneself and try to meet the goal of project activities. This process is described to be an activity that permeated their work every day, rather than happening only at particular moments. Interestingly, most participants did not mention any frameworks for reflection. Rather, their reflection was driven by relatively straightforward questions like: “How can I benefit from it?” (P12), “What could potentially go wrong?” (P12), “Is there a way we can do this better?” (P4), “Do I stand for this?” (P2) or “What could I have done differently?” (P9). The participants did however highlight the importance of more systematically structured reflection. For example, P3 highlights the importance of time-boxing the activity and P8 talked about the benefits of scheduled continuous team reflection. Further, reflection was often mentioned to be a group activity, in which group members reflect on the work they have done: “but it’s easier to be more than one to reflect together, I think” (P9). P5 specifically highlights that you can achieve a deeper understanding by reflecting with peers “because often it’s just when you have two different frames of references, then you will not get the same answer. But if you discuss those frames ... you will get maybe even deeper understanding of your own”. The participants also explain that the act of verbalising your thoughts helps you reflect. Participants reported that their ability to reflect and the focus on reflection had increased throughout the education much like with other skills. It was also reported that the emphasis on reflection was much higher at the graduate level than at the undergraduate. Participants reported that as they progressed towards the graduate level, their mindset shifted from ‘just doing what you are told’ towards ‘thinking critically about what is being taught’. These findings show that students perceive reflection as an important mechanism while lacking the right tools and proper instruction for how to reflect productively.

#### 4.3.2 Negative experiences with reflection

A common observation among the participants was that time spent on reflection rarely seemed to result in visible improvements or contributions to the final design. This makes investment in reflection hard to justify when comparing it to more practical design tasks: “Sometimes for us it’s not really valuable to do these, like I’m spending time that I could be using actually developing something or improving whatever I’m doing. And, at least for me, it really took me a while to see the value on it.” (P1).

The participants also reported negative experiences with how reflection is incorporated into their education. Some reported a lack of reflection in courses that resulted in a low level of perceived learning. Others even reported teachers that de-emphasised reflection in favour of working on design tasks. Participants were for example told: “you should do this because that’s how it is” and discouraged to experiment with a given theory or method. The participants also reported how the task to reflect is often introduced late in a course and at times that did not align with the actual experiences they needed to reflect on. In addition, it was reported that it can be hard to reflect during classes, when you are asked to do so, but not instructed in how and why, as illustrated by P6 “but I think it’s so much undefined the word reflection and what should you be doing when you reflect?... I think it was unclear

to me in the beginning, why I should reflect on something". The participant highlight that the attitude towards reflection tasks and the reporting of reflections were often non-serious, insincere and done at the very last minute. At the same time, reflecting too much was reported to sometimes be unconstructive and lead to negative experiences. This was particularly the case when the focus of the reflection drifted from 'problem-solving' to 'self-focused': "I feel like one of the psychologically most hard-hitting things can be over reflecting, you're in the moment given a task and then you are getting stuck with a task... And then you starting to question like, hmm, did I choose the right education? Do I know what I'm doing? Like you're looking at your paper like, Oh, can I, can I make this happen or this is garbage and it's just like, you're pulling yourself down." (P2). Such cycles of reflection were reported to result in periods during a project where students experienced very low self-esteem and high self-doubt. Similarly, as mentioned above, participants reported that individually reflecting has its drawback as it is easy to "miss something" and for it to not be constructive. P9 suggested that it is often helpful to reflect in a group setting providing "more angles you can look at whatever you're reflecting on" or that using certain methods can help with the process. In contrast, misalignment in a group as to when and how frequent to reflect can also cause problems. P10 reported sometimes becoming hesitant and quiet during group work, as he doesn't "burst out with my opinions" and doesn't follow the fast pace of the group work but gets left behind reflecting while the group is moving on. This is detrimental for both the group and the student himself. These findings indicate that a lack of tools for reflection and the late focus on it in projects limit the benefits to the 'current' project. The findings further show that there are instances where reflection shifts towards self-focused rumination.

#### 4.4 Perceived effect of negative experiences and reflection practices

As noted earlier, negative experiences do not necessarily lead to negative effects. The results do however show that this is the case for some of the negative experiences reported in this study. These effects have an impact on both the professional and personal development of the students, both of which are highly related and are influenced by design and educational activities. The participants emphasise that the development of a designer's identity is often neglected in the education in favour of occupational and technical information. P8 suggests that this should change: "Like you should have a course on how to reflect in your profile. How would you stand as a designer when you leave [the program]?" This tendency can be related to a lack of reflection in the education. Confusion regarding one's identity was found in those participants who also reported lower confidence in themselves, sometimes despite being acknowledged for good work and receiving good grades. The reported confidence in their ability as designers did vary considerably: "I feel like I received so much constraints, methods and practices that you have to use as a designer that is so overwhelming that you don't even know where to start" (P3). Some participants reported that their confidence sometimes stemmed from their use of methods: "And even though I don't know where we're ending up. Uhm, I have some confidence that through the methods that we're going to use, we will have a broader understanding at the end." Alternatively some participants indicated high confidence, but rather despite the tools they have learned: "I think I'm confident in myself, but not necessarily confident in the tools. I'm confident that wherever I go, I will. I can make it work." (P10). In contrast, others were empowered by it: "meeting all these methods and tools and expanding my tool set. I think some of the good things that happened was that I, I got more and more secure in myself and in the work and then the purpose that that we can create or have as a as a designer" (P10). In contrast, P12 experienced that a large amount of self-focused reflection resulted in "not a really comfortable period". Reflecting in a more focused way on what her goal with the education was helped her overcome this period and refocus her education. Reflection proves to be a powerful tool within the development of identity, with both the possibility of being of aid and harm to the students' development and well-being.

## 5 DISCUSSION

This paper presents an initial exploration of the instances of method use that were experienced as negative or had negative consequences as well as related reflective practices, which we refer to as the 'dark side of methods'. Furthermore, we explored how such instances can affect students' well-being in certain situations, mediated by their reflection practices. The results of this study represent a first, explorative step in this area. Even though methods are common in design education and are an



important means to help teach design, it is an understudied area in design research. Our contribution is twofold: First, we identify a number of distinct instances of the dark side of methods across method use, student experience, student reflection and effect on well-being. First, we provide insight into the ways in which methods are perceived, used, experienced and reflected upon. Students have distinctly different perceptions of methods and how they ought to work, and thus lack a coherent idea of how and why methods function, emphasizing the importance of earlier work by e.g. [Gericke et al. \(2020\)](#) and [Andreasen et al. \(2015\)](#) on clarifying the concept of methods in design. These differences seem to shape how students experience their use. This confirms earlier work by [Daalhuizen et al. \(2014\)](#) that showed that students experience design processes differently even when the method and other relevant conditions are similar. Different perceptions of methods also seem to influence how they reflect on negative experiences of use and subsequently affect their professional development, pointing to a new area for future research. Second, we found that students often perceive reflection as important, yet lack a clear understanding of how to productively reflect. When students reflect in unproductive ways (e.g. when they ruminate), this might even result in a negative effect on their professional development and professional identity, linking to important work on designer's professional identity ([Kunrath et al. 2019](#)). These results form a starting point for a better understanding of method use in design education, and the way in which unproductive method use and reflection practices negatively contribute to student's learning experiences and development. Specifically, we identified that these instances relate to how methods and reflective practice are taught and communicated to the students. This highlights that there is a need for further investigation. Second, with this paper, we hope to start a debate in the design research community regarding the potential dark sides of methods and spark more research into and development of improved teaching practices.

### 5.1 Limitations and further work

This study has several limitations. First, the study presents a first, explorative step in investigating the darker side of method use and reflection in design education. The sample is relatively small, and all participants were trained in the same design program at the same university. Thus, although the insights are valid, they are likely not fully representative of the larger student population locally and across design programs. Further, the student sample only represents one perspective that is relevant to the phenomenon, and thus relevant aspects might not have emerged due to this. For example, it would be highly relevant to study the educators' perspectives as well. Third, there is a potential for interviewer bias, as the interviews were conducted by students (acting as research assistants) who were familiar with some of the participating students. However, as the interviews were conducted on this basis, it may also have served as a contributing factor to creating rapport and the honesty of the replies. Therefore, it is also important to stress that this study is the first step of a larger effort to build theory for this important phenomenon in design and design education. Future work should focus on further theory building, where further analysis of the data is still needed, and other relevant perspectives should be included (e.g. the educators perspective) as a first step. This should result in the definition of variables, limitations of the domain as well as relationship building between the variables before prediction, testing and validation ([Cash, 2018](#)).

## 6 CONCLUSION

This study explores the 'dark side of methods' through an explorative study of the use of methods in design education, their negative consequences and the role of reflection. It represents a first, modest step towards theory building ([Cash, 2018](#)) of the method phenomenon in design. As such, it presents initial insights into what students experience in instances of method use, their reflection practices and the negative effects that sometimes result from these. The results indicate that how students reflect on experiences in their education plays a large role in what kind of effects the experiences will have on the students, where an unproductive way or lack of reflection leads to various negative effects on student's professional identity and confidence. The results imply that more focus should be placed on these aspects within design education as both methods and reflection play an important role in design work and education.

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