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Creativity by design? An empirical study

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Creativity by design?

An empirical study

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Abstract

Design thinking has become a popular method of innovation in the business world today, among others. Design thinking is a 5-step iterative process in which the end user is in focus. This human-centered approach has grown out of the Hasso Plattner Institute of Design (d.school) at Stanford University. One of the founders of the institute, David Kelley, and his brother Tom Kelley wrote the book *Creative Confidence*. In the book, they compare creative confidence to self-efficacy, and they name design thinking as a vessel to use to gain creative confidence. Self-efficacy is a construct presented by the famous American psychologist Albert Bandura. Due to the lack of scientific literature on creative confidence, this empirical study looks instead at creative self-efficacy. Creative self-efficacy is a more widely used construct within the literature. Self-efficacy theory is then interpreted and discussed from a behavior analytic point of view as rule-governed behavior. Kelley and Kelley's hypothesis is investigated in this thesis: Is a Design thinking workshop an effective way to increase the participant's creative self-efficacy? The design thinking workshop was conducted with 6 participants and the pretest-posttest 1&2-design were conducted. The results showed an increase in creative self-efficacy in all participants in the first posttest, and similar results were found weeks later, except for one participant whose score decreased. The findings are discussed from two theoretical perspectives: self-efficacy theory and behavior analysis.

Keywords: design thinking, creative confidence, self-efficacy, creative self-efficacy, verbal behavior, rule-governed behavior.

Sammendrag

Design thinking, eller designtenkning på norsk, har blitt en populær metode for innovasjon blant annet i næringslivet. Designtenkning er en 5-stegs iterativ prosess, med fokus på sluttbrukeren. Denne menneskesentrerte tilnærmingen har sitt utspring i Hasso Plattner Institute of Design (d.school) ved Stanford University. En av grunnleggerne av instituttet, David Kelley, har sammen med broren Tom Kelley skrevet boken *Creative Confidence*. I boken sammenligner de kreativ selvtillit med mestringstro (self-efficacy), og de nevner designtenkning som et verktøy for å oppnå kreativ selvtillit. Mestringstro er et begrep som ble presentert av den berømte amerikanske psykologen Albert Bandura. Da kreativ selvtillit ikke er et begrep med noe vitenskapelig empirisk støtte, vil denne studien heller se på konstruktet kreativ mestringstro. Kreativ mestringstro er et mer utbredt begrep i litteraturen. Teorien om mestringstro tolkes og diskuteres ut fra et atferdsanalytisk perspektiv som regelstyrt atferd. Kelley og Kelleys hypotese undersøkes i denne avhandlingen: *Er en workshop i designtenkning en effektiv måte å øke deltakernes kreative mestringstro på?* Workshopen om designtenkning ble gjennomført med 6 deltakere, og et pretest-posttest 1&2-design ble brukt. Resultatene viste en økning i kreativ mestringstro hos alle deltakerne i den første posttesten, og lignende resultater ble funnet flere uker senere, med unntak av én deltaker som fikk en lavere score. Funnene diskuteres ut fra to teoretiske perspektiver: mestringstro og atferdsanalyse.

Nøkkelord: designtenkning, kreativ selvtillit, mestringstro, kreativ mestringstro, verbal atferd, regelstyrt atferd

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Creativity by design? An empirical study

As far as one can dare to say this about any scientific field or topic; creativity has been studied *ad nauseam*. Research on creativity is plentiful, and its definitions are different yet similar. Herbert Simon (2001) defined it like this: "We judge thought to be creative when it produces something that is both novel and interesting or valuable" (p. 208). Amabile (1996) has a similar definition: "Creativity is the production of novel and useful ideas in any domain" (p. 1).

What constitutes creative individuals, as well as their skills, varies. For instance, Amabile's (1996) componential theory of creativity lists 3 components that contribute to creativity: expertise, creativity skills, and task motivation.

Csikszentmihalyi (1999) has another theory which he calls a systems theory of creativity. In it, he steps out of focusing only on the individual and proposes that creativity is a process with three interrelated and integral components (Csikszentmihalyi, 1999). The first component is a culture with symbolic rules – this is the domain. Firstly, the culture imposes rules and practices on the person. The second is the person who brings novel ideas based on the rules and practices of the culture. The third component, the field or society, are the gatekeepers of the domain. These people evaluate and selects the ideas/innovations. In his theory, he acknowledges that famous people from history, like da Vinci, Copernicus, and Einstein would not be the central figures they are today, in isolation (Csikszentmihalyi, 1999). The environment is also crucial.

The topic has been examined from almost all possible angles. This is, however, not without reason. According to the *Future of Jobs Report 2023* (World Economic Forum, 2023) stated that creative thinking was the second most important skill for workers, beaten only by analytical thinking (WEF, 2023). Innovation is important to many companies to help them adapt and survive rapidly changing business environments. Companies might therefore focus

on this as a selection criterion for new recruits. They can also try to increase the creative thinking of the employees they already have. This begs the question then: how can we increase people's creativity?

That is the question this thesis will address. The thesis will commence by presenting an introduction to the fundamental concepts and theoretical frameworks. Specifically, it will delve into design thinking, the pivotal process employed in the conducted workshop experiment. Subsequently, an exposition of self-efficacy theory will be provided, focusing on the sub-construct of creative self-efficacy. Moreover, prior to presenting the utilized methodology, a comprehensive behavioral interpretation of self-efficacy theory will be presented.

Design thinking

A brief design thinking story

Doug Dietz had just designed a magnetic resonance imaging (MRI) scanner and was visiting a hospital where the scanner was installed (Kelley & Kelley, 2013). The scanner had just been submitted to «the Oscars of Design», the International Design Excellence Awards (IDEA). During this visit, the proud designer would learn that to make nervous, or even terrified, patients able to lie still enough for the machine to work, the hospitals would regularly sedate their patients. As many as 80 percent would get sedated by an anesthesiologist. Dietz witnessed a young girl getting escorted by her dad, tearing up and visibly scared of going into the excellently designed, IDEA-submitted, and terrifying machine.

This experience made a big impression on Dietz. He wanted to redesign the machine to make it less frightening to patients like the young girl he met at the hospital. He ended up taking a course at the Hasso Plattner Institute of Design at Stanford. Instead of focusing on the

visual design of the products like he was used to, he learned about another approach, having the user at the center of the design process.

The result of this learning experience was a new design for his MRI machine, the «Adventure Series» scanner. The «Adventure Series» scanner transformed the experience into an adventure story for the children using it. Two examples were the spaceships and the pirate ships. This made the previously terrifying experience much more fun for the users. The need for anesthesiologists was significantly reduced and patient satisfaction scores increased. The moment when Dietz saw that young girl, he *empathized* with her. Empathy is a crucial part of *design thinking*, which is a human-centered approach to the design of products, services, or solutions to problems.

What is design?

What most of us think about when we think about the word 'design' is usually related to the intentional esthetical shape of something. «Apple has been focusing a lot on the design of their products» means simply that they look nice. Design furniture is thought of as expensive and nice-looking versions of «regular» furniture. The functionality of design furniture might even be severely lacking. The fact of the matter is that everything new we make is designed, whether we want it or not. As Nigel Cross (2011) points out, every time we «plan for something new to happen», we design. And we do this *a lot* (Cross, 2011).

What is design thinking?

This brings us to one of the main themes of this thesis: *design thinking*. What is design thinking? And why is it relevant outside of the world of 'designers'? Is it about thinking like a designer who is making furniture that is beautiful aesthetically, but functions poorly? Or is it thinking like a graphic designer, making logos for up-and-coming start-ups?

As Ebbinghaus has said about psychology, design thinking has a short history, but a long past (Cross, 2011). Whenever we make new solutions that are used, we are in some way or

another thinking like a designer. Design thinking is to think like a designer, which is not to say that is only is about making old solutions more beautiful (and less functional, in many cases). It is about creating solutions to our problems. It is a problem-solving methodology with a human-centered approach (Brown, 2019; Cross, 2011; Kimbell, 2011; Kolko, 2014; Liedtka & Ogilvie, 2011).

Design thinking has been proposed as a method of design, and innovation, for solving wicked problems and problems in general (Kimbell, 2011). In terms of innovation, as Leifer & Steinert (2011) from Stanford write:

> Coming from Stanford and Silicon Valley, people expect us, and we attempt to deliver radical or transformative new solutions and designs that obsolete exiting [*sic*] barriers and problems (while possibly creating new ones). We are not usually engaged in incremental innovation or improvements (p. 153).

Their goals and aspirations are, in other words, very ambitious.

Theoretical foundations

The theoretical foundations of design thinking come from different sources. One is from design theory. Another is from Herbert Simon's work on «Sciences of the Artificial» (Kimbell, 2011; Visser, 2010). Simon contrasts design, which concerns «what ought to be», with science, which concerns «what is» (Kimbell, 2011). Donald Schön's work on Reflective Practice is also viewed as one of the precursors to what we today call design thinking (Visser, 2010). Horst Ritter, the design theorist who coined and popularized the term *wicked problems* (Dunne, 2018; Visser, 2010), is also mentioned as one of the field's theoretical forebearers.

Two main proponents and popularizers of design thinking are the consultant company IDEO and the Hasso Plattner Institute of Design at Stanford, also known as d.school (Brown, 2019) Kelley & Kelley, 2014, Kimbell, 2011). David Kelley was one of the founders of the first IDEO in 1991 and he was later a part of creating the d.school at Stanford in 2005 (Kelley

& Kelley, 2014). He has also been credited for starting to use the term design thinking (Brown, 2019). Together with his brother Tom Kelley, he wrote the book *Creative Confidence*, which is one of the most popular books about design thinking (Kelley & Kelley, 2013). It is also the book that inspired the research question for this thesis. Tim Brown, who is now the chairman of IDEO, wrote the book *Change by Design* about how they use design thinking in IDEO. Both of these books are today considered seminal works (and oft-mentioned as introductions) of the DT canon. Neither of these books is academic in nature, although Kimbell (2011, p. 293) claims that the field initially stems from academic research.

Main features of design thinking

The steps of the design thinking process are described and visualized in different, but similar ways. IDEO regards the design thinking process as a five-step iterative process (Dam & Siang, 2018). It begins with *Empathize*, then moves on to *Define*, *Ideate,* and *Prototype*, before it ends with *Test* (Dam & Siang, 2018). See figure 1 for illustration.

Dunne (2018, p.16) has identified three features common to most design thinking processes: experimentation, deep understanding, and creative reframing. Kimbell (2011) states that Design Thinking has a «fragmented core», which is evident in the plethora of definitions and different descriptions of the goals, uses, and processes of design thinking. She has identified three main ways to regard design thinking: design thinking as a cognitive style, design thinking as a general theory of design, and design thinking as an organizational resource (Kimbell, 2011, p. 297). The design thinking process presented in this thesis emphasizes the third.

Brown (2019) describes the design thinking process as a «dance among four mental states» (p. 72). These «mental states» are made of two «pairs»: convergent and divergent thinking and analysis and synthesis. In a design thinking process, you begin the process with divergent thinking. That is when you increase your options. You then go on to make choices

among these options. That is when you use convergent thinking. «Westerners are taught to take a series of inputs, analyze them, and then converge upon a single answer" (Brown, 2019, p. 72). This is a good way to make choices about the options that are available. It is not a good way to find new options. In the process of divergent thinking, many possible solutions to the problem at hand are gathered. It is pointed out that judging these ideas is not a part of the divergent-phase, and thus the amount of information can be quite large. This leads to the need to synthesize the information. The second pair of mental states is analysis and synthesis. «Synthesis,» is, as Brown (2019) writes: «the act of extracting meaningful patterns from masses of raw information» (p. 76). These changes between divergent thinking and convergent thinking is visualized through the «double diamond».

User centered approach

The «traditional» model of innovation in businesses has been described as an analytical process, where the business or corporation analyzes the market, its competition, current products, etc. (Kolko, 2014; Liedtka & Ogilvie, 2011). From there, one can create products and services that *should* work. However, the market is in a wicked domain - what innovations will become bestsellers is unpredictable. Analysis is not the ideal method to create innovation, according to design thinkers (Brown, 2019; Kolko, 2014). Despite this, analytical thinking is acknowledged as essential to running a business (Brown, 2019, p. 75).

Kolko (2014, p. 16) identifies design thinking as one of three different philosophical approaches to product management. The first, and the traditional one is, as mentioned above, using an outward focus - «What is the competition doing?» (Kolko, 2014, p. 16). Marketing is the tactic to «substantiate» this philosophy (Kolko, 2014, p. 16). That is considered as a *market centered approach*. The next one is *technology centered.* Instead of focusing on marketing, this approach focuses more on creating the superior product. Engineering is more important than marketing — to write good code, optimization, algorithms, etc. (Kolko, 2014).

The third approach is focusing on design. The emphasis is on the *user*. It focuses more than just aesthetics. It is a «designerly» way of solving problems that satisfies the needs of the human, the user (Kolko, 2014). This is not to say that it completely neglects marketing or engineering, but is not the main priority when developing a new product.

Creative Confidence

Kelley and Kelley think that we all have the capacity to be creative, – it's an inborn skill that we have from childhood and that has been «unlearned», or lost. They write «Creativity is something you practice, not just a talent you are born with» (Kelley & Kelley, 2014, p. 144). We need to regain this confidence in our own creative abilities. They compare their approach to increasing people's creative confidence to Albert Bandura's approach to combating phobias among phobics, a process he calls «guided mastery» (Kelley & Kelley, 2014, p.39). This will be described in further detail later, but in essence, the subjects of the guided mastery experience go through incremental steps through which their object of phobia comes closer each time. For instance, if a subject is afraid of snakes, they will first talk about snakes, or look at pictures of snakes. This step-by-step process will, if performed correctly, decrease the phobia through mastery of one step at a time; if the subject is afraid of even talking about snakes, they will talk about snakes until that step is mastered and the subject is ready for the next step. This, in turn, increases the subject's perceived self-efficacy. Perceived self-efficacy is simply the subject's belief in his or her abilities to perform a task. It is important to note that this not only entails phobic behaviors but also behaviors in other domains, such as organizational and even general behaviors (Bandura, 1994, 1997, 2009).

At the d.school, where Kelley has worked, they focus on increasing the creative confidence of their students through this guided mastery method. By starting with small manageable steps «with the guidance of someone knowledgeable in the field» (Kelley & Kelley, 2014, p. 43), they would gradually increase the challenge. If the challenge is too big,

too soon, anxiety and fear of failure take hold. Kelley & Kelley (2014) argue that fear of failure will block the individual's best ideas.

Social cognitive theory

Bandura (2001) developed a social cognitive theory of learning. This is a theory that proposes that human learning is largely based upon learning from other peoples' experiences, rather than direct experiences. Bandura (2001) calls the theory an «agentic perspective», where the role of agency in humans is emphasized, rather than them being organisms that are victims of their environment. «…People are not just onlooking hosts of internal mechanisms orchestrated by environmental events. They are agents of experiences rather than simply undergoers of experiences» (p. 4). He contrasts this with what he considered the dominant view in psychology in the 70s and 80s, namely behaviorism, which was on the verge of being replaced by a new metaphor, the computer (Bandura, 2001). These behavioristic principles, as he calls them, made humans a part of a linear input-output model of behavior, where humans were strictly the results of the environmental stimuli and without agency and influence on their own behavior (Bandura, 2001, p. 2).

The new conceptual model, that of the computer, changed this into a new view (Bandura, 2001). In this view, in between input (environmental stimuli) and output (behavior), cognition was added as a more complex factor in determining behavior. Instead of learning being a simple relationship between environmental factors and behavior, there also needed to be a cognitive factor. In his social cognitive model, Bandura (2001) calls this added factor the «personal factor». It is in this factor that thoughts and mental computation and human choice come into play. As he mentions: «It is not just exposure to stimulation, but agentic action in exploring, manipulating, and influencing the environment that counts» (Bandura, 2001, p. 4).

As the name of the theory suggests, it focuses on two divergent routes: the cognitive and the social (Bandura, 2001). The cognitive route focuses on microanalysis of human cognition,

and how these inner workings of the mind impact human goal setting, problem solving, and motivation, among other things. The second route is the macroanalytic, where the focus is on social life and the environment. Humans cannot be socially independent, but are, rather, socially interdependent and «richly contextualized» (Bandura, 2001, p. 5). A comprehensive social cognitive theory «must merge the analytic dualism by integrating personal and social foci of causation within a unified causal structure» (Bandura, 2001, p. 5).

As mentioned earlier, Bandura (2001) considers social cognitive theory as an «agentic perspective». He also believes that the single most important factor in personal agency is what he calls self-efficacy (Bandura, 2001).

Self-efficacy theory

Perceived self-efficacy is defined as a person's belief in «their own capabilities to produce designated levels of performance that exercise influence over events that affect their lives» (Bandura, 1994, p. 71). For people to undertake a new behavior or activity, it is important for us to believe we have the proper skills and capabilities to actually perform this new activity. People with higher self-efficacy choose more difficult goals, persist longer in pursuing their goals, and are less affected by failure (Bandura, 1994). People with lower self-efficacy see difficult goals as something to be avoided, persist less, and take failure as a sign to give up this pursuit (Bandura, 1994). Bandura claims that perceived self-efficacy is a direct cause of behavior, but it also impacts other determinants of behavior (Bandura, 2006, p. 309), such as «goals and aspirations, outcome expectations, affective proclivities, and perception of impediments and opportunities in the social environment." (Bandura, 2006, p. 309).

Sources of self-efficacy

Self-efficacy is built through four main channels: personal mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1994).

When the individual experiences mastery, this is the most effective way to increase self-efficacy. In the early phase of learning, the individual needs to experience enough mastery to become efficacious, but it is also important to not become used to only successes - if one is too efficacious too early, failure might discourage subsequent effort.

If we cannot go through the experiences ourselves, vicarious experiences are important to increase self-efficacy. This happens by learning through social models. The more similar the social role models are, the greater the impact on self-efficacy. If we see someone similar to us succeed through hard work, we believe that we can too.

The third source of increased self-efficacy is through verbal (or social) persuasion. Other people's verbal persuasion that we have the capabilities needed to succeed in a task can help to build self-efficacy. It is, however, hard to build self-efficacy with verbal persuasion alone - it is usually needed to combine it with direct experience or vicarious learning. Verbal persuasion can not only help to increase self-efficacy, though; it can also undermine it.

Physiological arousal can also be a source of self-efficacy. If your heart rate increases before a public speaking event, your self-efficacy can be either increased or decreased in two ways. The first is to decrease the heart rate somehow. The second is based on the interpretation of the physiological arousal. A person that associates the increase in heart rate as a bad sign, as anxiety or otherwise, can decrease self-efficacy. If, on the other hand, you associate the increase in heart rate as a way for the body to focus before an important event, that person is more likely to have a higher self-efficacy.

Processes influenced by self-efficacy

Bandura (1994, 1997) has discovered four main psychological processes that are influenced by our sense of self-efficacy: cognitive processes, motivational processes, affective processes, and selective processes.

Cognitive processes are how people think, perceive, and process information. These processes are influenced in the way we set our goals, how optimistic we are about achieving them, and how we think when we are meeting obstacles.

Motivational processes are impacted by the way we set challenging goals or not, and by the intensity and persistence of effort with which we pursue them. The higher the efficacy, the more challenging the goals.

Affective processes are the processes that regulate emotional states. In challenging situations, highly efficacious people will not be flooded with anxiety, whereas the ones with lower efficacy will experience higher anxiety arousal.

Which activities we decide to partake in are also affected by self-efficacy – selective processes. This does not only mean what kind of choices we make day to day; it also includes career choices and other life choices. A person that does not believe in his or her ability to be a parent, might choose not to become one.

Measuring self-efficacy

Perceived self-efficacy is usually measured from a questionnaire. A construct, such as perceived self-efficacy, where the effects are claimed to be very influential in people's lives, needs to be measured somehow. Since it is a construct of perceived capability and not the intention, Bandura points out that the phrasing of the items when measuring self-efficacy should be *can do*, not *will do* (Bandura, 2006, p. 308). The questions are usually rated on a scale, from 0 to 100, or on a Likert scale, from 1 to 5-10. The sensitivity of a 0-100-measure is said to be higher, and the predictive value is also said to be stronger compared to a 5-interval scale (Bandura, 2006; Pajares et al., 2001).

If you've ever watched a football match with anyone else, it's not uncommon to claim something like «My grandmother would've done that better! », or «Even I would have scored that penalty! ». It is, in other words, easy to claim that would have done something better than

anyone else, and overconfidence is a well-researched domain in psychology. To actually do it, though, is another matter. A natural question to ask is whether self-efficacy scores have any predictive value. It's easy to claim that you can perform highly at something, but that does not necessarily mean that you have the capabilities you feel you have.

Predictive validity

Self-efficacy has been shown to predict future performance (Bandura, 1982, 1994, 2009; Gist & Mitchell, 1992; Heggestad & Kanfer, 2005; Stajkovic & Luthans, 1998). This includes, but is not exclusive to, future performance in relation to work-related behavior (Sadri & Robertson, 1993; Stajkovic & Luthans, 1998), academic performance (Multon et al., 1991), and adaptability to new technology (Gist & Mitchell, 1992; Hill et al., 1987). Some have, however, objected that self-efficacy is nothing more than a measure of past performance, and hence characterize self-efficacy as a "consequence rather than a cause of performance in training" (Heggestad & Kanfer, 2005, p. 84).

Creative Self-efficacy

While self-efficacy is a general term, that does not mean that it can be generalized to all facets of an individual's life. A person with high efficacy in one domain may have low efficacy in another. In 2002, the sub-construct creative self-efficacy was introduced by Tierney and Farmer (2002). However, Ford (1996) cited self-efficacy as a key component in individual creative action (Tierney & Farmer, 2002). Tierney and Farmer (2002) define creative self-efficacy as «the belief one has the ability to produce creative outcomes» (p. 1138). Creativity has been defined by Choi (2004) like this: «I define creativity as the generation of novel or original ideas that are useful or relevant» (p. 188), which is similar to others in the same field (Amabile, 1988; Mathisen & Bronnick, 2009; Tierney & Farmer, 2002).

Previous research

Creative self-efficacy seems to show some predictive validity for creative performance. Creative performance has been defined as: “the behavioral manifestation of creativity potential (e.g., presenting novel ideas, reframing a given problem)” (Choi, 2004, p. 188). Choi (2004) found a significant correlation between Creative self-efficacy and creative performance (β= .34, p = .001), more so than creative intention and creative performance (β= .24, p = .001). According to a meta-analysis done by Puente Díaz (2016), 15 studies have found a positive correlation between creative self-efficacy and creative performance, as rated (subjectively) by the supervisors (Gong et al., 2009; Hon & Chan, 2013; Lim & Choi, 2009; Richter et al., 2012; Shin et al., 2012; Shin & Zhou, 2007; Tierney & Farmer, 2002; Tierney & Farmer, 2004, 2011; Wang et al., 2014; Zhang & Zhou, 2014; Zhou et al., 2012).

Measuring Creative Self-Efficacy

Puente-Díaz (2016) identified three major approaches of measuring creative self-efficacy: 1) use an existing scale, 2) use the same scale that is used in general self-efficacy and adapt to creative self-efficacy, and 3) create a new scale. The least problematic is, according to Puente-Díaz (2016), the first one, as it is using already made, and already have “acceptable psychometric properties (Puente-Díaz, 2016, p. 179)”. The second is the one used in this experiment, as it was the easiest to do, and it was hard to get a hold of an existing one.

Behavior analysis

According to Skinner (1974, 1981), behavior is selected by its consequences. This includes verbal behavior. Verbal behavior constitutes not only words that are spoken out loud, covert behavior but also thinking, which is overt behavior. The implication of this is that we humans, among other things, can change behavior without being in direct contact with the contingencies of reinforcement (Biglan, 1987; Zettle, 1990; Zettle & Hayes, 2015). This is called ruled-governed behavior and is defined by Skinner (1969; 1974) as “contingency-specifying stimuli”. Some people criticize this definition as too narrow and present a more

precise definition (see Zettle & Hayes, 2015) but due to the scope of the thesis, this is not discussed further here. Although all behavior is ultimately contingency shaped, this distinction is helpful to understand "cognitive phenomena" from a behavior-analytic point of view (Hayes & Brownstein, 1986; Skinner, 1974; Zettle, 1990).

We are surrounded by rules. Laws, instructions, and advice are examples of rules that we follow. Instead of everyone being dependent on trying out to see if the consequences of the rules are what they are "specified" to be – a fine or prison sentence in some instances, or death in others, we *learn* to follow rules. Rule-following can be considered its own behavioral class (Hayes et al., 1989). If I have a learning history of following the rules and being in contact with reinforcing stimuli by doing so or aversive stimuli for not following, chances are that I'll follow rules in the future as well (Hayes et al., 1989; Malott, 1989). Rules are not only dependent on other people. Self-rules are when the speaker and the listener of the rule are the same person (Hayes & Brownstein, 1986; Hayes et al., 1989; Zettle, 1990; Zettle & Hayes, 2015).

In 1987 Biglan wrote a behavior-analytic critique of self-efficacy theory. In this critique, he has a few points I will include here. His main argument is Bandura's insistence on self-efficacy as a determinant factor (or cause) of behavior (Biglan, 1987). From a behavior analytic point of view, a mentalistic (or cognitive) construct like self-efficacy can never be the cause of the behavior. That would be considered a behavior-behavior relation (Biglan, 1987; Dougher, 1995; Hayes & Brownstein, 1986). From a behavior-analytic perspective, thoughts about one's self-efficacy are characterized as covert, verbal behavior, cannot cause behavior, and thus does not *explain* said behavior. The causes of behavior will always be found in environmental contingencies and the organisms learning history.

When discussing self-efficacy and any other cognitivist psychological constructs, a central question is: what are the causes of said construct and how does it affect behavior? In

Bandura's social cognitive theory on self-efficacy, he is using a mechanistic worldview to interpret the results. As Hayes & Brownstein (1986) pointed out earlier, their view of what constitutes evidence (mechanism) and causation in science can be challenged by another view, namely contextualism.

Whereas correct description and prediction are the goals in a mechanistic view, correspondence (correlation) between variables can be a sufficient explanation for causation (Dougher, 1995; Hayes & Brownstein, 1986). Again, this is different from a contextual worldview. Instead, both prediction and control are necessary. The emphasis on control is important. When we only see a correlation between variables, we cannot be certain of the causal relation unless we control (manipulate) one of the independent variables and see a change in the dependent variable, we have a stronger claim on the causal link between the two. When we change the variable and see a change in response, that is a stronger claim for causation.

Biglan (1987) points out that our statements, thoughts or self-efficacy scores can predict our behavior as a result of "saying and doing" being its own response class. If I say that I will show up to my mother's birthday, and do not show up, that will probably get aversive social (or non-social) consequences (Biglan, 1987). Statements about yourself that are shown to be accurate can also get reinforced by "being right" (Biglan, 1987). This is what Biglan (1987) claims self-efficacy statements to be – verbal behavior that is a result of the learning history and environmental contingencies.

Design thinking is considered a good way to increase people's creative confidence. Instead of using the non-academic term creative confidence, this thesis will rather use the sub-construct of self-efficacy, creative self-efficacy, and measure that. The results will be interpreted from the point of view of a cognitive, mechanistic view of self-efficacy theory, as well as a behavioral, contextualistic point of view.

Research question

Based on the introduction above, I will try to answer the following research question: *Is a design thinking workshop an effective way to increase the participants' creative self-efficacy?*

Method

Selection procedure/recruitment procedure

This project has been reported to and approved by Sikt, reference number 835424.
To recruit participants, information about the workshop was circulated in many different forums: my personal social media, on OsloMet's Learning Management System, on posters distributed to different places on OsloMet's campus, and in messages sent to people that could be interested or who might know someone who would be interested. By the deadline, 6 participants had signed up for and showed up to the workshop. Since they were recruited through my social network, some were known to me before the workshop.

Participants and Setting

There were 6 participants, between 20 and 30 years old: four women and two men. All were students, from 4 different study programs, and all had at least 3 years of higher education. The study programs were behavioral science, innovation and leadership, preschool teacher, and administration and leadership. Three were students at OsloMet and the other three were students at two different colleges in Oslo.

The workshop was conducted in a classroom at OsloMet from 09:00 to 15:00. It was facilitated by me, as my first experience as a workshop facilitator. The workshop was held in Norwegian. The room was a classroom, where the desks were moved away, and the chairs made a circle with nothing at the center. Coffee, water, different fruit, and cookies were available for the participants. The room was equipped with a whiteboard chart, speakers, and a projector and screen for computers. The screen was used to show a PowerPoint presentation.

The speakers were used for background music and the chart was used to write on and as a place to stick post-it notes relevant to the different exercises used.

Since the classroom was set at OsloMet's campus, the participants had the opportunity to walk around and meet other students to perform interviews as a part of the workshop.

Research design

The research design of this study is a quasi-experimental within-participants pretest-posttest 1&2- design. Right before the workshop, the participants were asked to complete a 7-question internet-based questionnaire. The exact same questionnaire was used right after the workshop and sent out 4 weeks after the workshop. The experiment did not include a control group, since the participants served as their own control, where the pretest measurement acted as the baseline. All the participants went through the same workshop.

Questionnaire

The questionnaire had 7 questions, and the participants were to rate the questions on a Likert scale from 1 to 10. The questions were adapted based on the General Self-Efficacy Scale to fit the more specific construct, Creative Self-Efficacy. The questions are as follows:

1. I am confident in my ability to come up with new and original ideas.
2. I believe that I can generate ideas that are useful and valuable to others.
3. I am capable of overcoming obstacles to implement my creative ideas.
4. I am able to think outside of the box and come up with creative solutions to problems.
5. I am able to generate creative ideas even under pressure or tight deadlines.
6. I can think creatively when faced with challenges or problems.
7. I am able to see opportunities where others see only problems.
8. I can think creatively in spite of being criticized or rejected.
9. I can generate multiple alternative solutions to a problem.
10. I can develop new and unique products or services.

The questions were translated into Norwegian (Appendix A).

Procedure

The workshop began with completing the pre-test questionnaire. Following that was a quick introduction by me, the facilitator, and an overarching agenda for the day. Information about what the data was used for, and what the personal information was used for was provided. The questionnaire included names and e-mail addresses, to enable matching respondents' answers over pre-test, post-test, and follow-up. Participants were informed that although this information is collected, it will be deleted when all the data has been collected.

The workshop

The notes and schedule of the workshop are added in Appendix B. The workshop began with two icebreaker exercises. The function of these exercises was to create connection and safety between the participants and to make collaboration between them possible. After that, the facilitator introduced the steps of design thinking. These steps were presented one by one, with examples and justifications for why they are important and what sets the process apart from other methods and processes.

The workshop began with an exercise called Embodied Prototyping (Greenberg, 2021). In this exercise participants go through the design thinking steps in under an hour, making this a miniature version of the course. The group was divided into two.

After this exercise, they were, as one group, to decide on a design challenge. Through this challenge, they went through all the stages of the design thinking process, one by one. The design challenge they had was: *You are going to design an app, event, etc. to help students to connect with other students.*

Participants began with the 'Empathy' phase, each interviewing 2-3 people on campus, with questions related to the design challenge. They were told not to begin thinking about

solutions yet. They collected all the information and began to formulate a statement of the problem they were trying to solve. This is a part of the ‘Define’ phase.

They went on to the ‘Ideation’ phase. We discussed how we often self-censor when we are ideating. This is because we want to come up with good ideas, and bad ideas can be frowned upon in a group. The ideation stage thus began with a quick exercise where the participants were writing down as many *bad* ideas as they could come up with. The ideation began individually, with one idea for one post-it note. The ideas were discussed, and the participants were asked to see if they could flip any of the bad ideas and make them into good ideas. The purpose of this was to show them that 1) ideas are cheap, 2) that someone’s bad idea could be the seed for someone else’s good idea, and 3) that the evaluation of ideas is easier in groups. Following this, the participants began with a regular brainstorming session, again individually, before all the ideas were stuck to a whiteboard. Participants categorized the data and chose the best ones.

The next step in the process was the «Prototyping» phase. Here they took the ideas they chose and made a prototype of the app they wanted to design. They were asked to discuss the following points: Logistics, practicalities, resources, who would need to be involved, what the timeline would be, what constraints, challenges, or difficulties might there be, what was exciting about the idea, and what opportunities the idea presented.

The ‘Test’ phase is hard to do in a workshop setting, so this was done by presenting the idea to the facilitator. It was pointed out that this is a really important step, and that the results in the test would inform the next steps. In a real-life situation, this could mean that they went back to any of the other steps. Maybe they needed a new idea? Back to the ideation stage. Maybe they needed to think more about the needs of the end user? Back to the emphasize stage. And so on.

We concluded the workshop and discussed and reflected upon the experience. What they learned, what they liked etc. They ended with completing the post-test questionnaire.

Results

In general, all the participants creative-self efficacy increased from the pretest to the first and second questionnaires (Figure 3 and Appendix C, D & E). When adding together the score of the questionnaire of each person, where the maximum would be 100 (10 points times 10 questions), the total score of the six participants was 352 on the pretest and 467 on the first posttest, and 434 on the second posttest. Each person's average was 58 points on the pretest and 77.8 on the first posttest and 72.3 on the second posttest. This is an increase of 115 for all participants or 19 on average for each participant on the first posttest, and from there a decrease of 33, to 434 points.

The biggest average increase from pretest to posttest 1 came from participant 1, where the score increased from 60 to 96 (see Appendix E). The most notable difference came from question 10 (*Jeg kan utvikle nye og unike produkter eller tjenester*.) where it was scored 3 on the pretest and 10 on the posttest. Another notable difference was 5 points increase in question 3, but all the other questions had increased. These numbers decreased in the second posttest, to 77 points in total, where all questions decreased with 1, 2, or 3 points.

Participant 2 also showed a general increase in all the questions, except question 4, where the score changed from 8 to 7 from the pretest to posttest 1. The second posttest had an overall increase of 1. Other than that, questions 1,5,6, and 7 increased by 1, and questions 2 (5 p.) and 9 (6) increased by two points each. Questions 3 (2 p.), 8 (3 p.), and 9 (3 p) increased by 4 points each.

The total increase from pretest to posttest 1 for participant 3 was 21 points, from 55 to 76. Posttest 2 showed an increase in 1 point from the first posttest. Most notable was the

increase in question 10 from 3 points to 8, but all the other questions had an increase. A notable change from posttest 1 to posttest 2 was a 3-point decrease on question 9.

Participant 4 scored lowest in total on all tests. The pretest score was 46, posttest 1 scored 55 and posttest 2 scored 56. Question 2 decreased from 6 to 5, and questions 1 and 3 stayed at 6 and 5 points from pretest to posttest.

Participant 5 increased the total score from pretest 53 to 74 points on posttest 1, a 21-point increase. The second posttest showed a 2-point decrease overall, to 72, compared on the first posttest. Question 7 showed a 1-point decrease, from 7 to 6, but all the other scores increased from pretest to posttest 1. The most notable increase was question 8, where the score increased from 3 to 7. This did, however, decrease back to 4 on the second posttest.

The lowest increase from pretest to posttest came from participant 6, where the pretest began at 85 and ended at 92. 5 of the questions stayed at the same score, while the other 5 increased. In the second posttest, this participant ended up scoring less than the initial pretest. The second posttest had a score of 77, an 8-point decrease from the pretest and a 15-point decrease from the first posttest.

Discussion

The results of the study show an increase in creative self-efficacy in all participants, except one. Based on self-efficacy theory, self-efficacy has four sources: personal mastery, vicarious experiences, verbal persuasion, and physiological factors (Bandura, 1994). In this study, all the factors could be involved in the participant's increased creative self-efficacy. In cognitive psychology, mechanism is the main worldview, with correspondence as the main truth criterion (Hayes & Brownstein, 1986). In a mechanistic view, the concept of mental representation is commonly used. As Ree (2012) and Hayes et al. (1988) have pointed out, this is a copy of the world existing inside the individual. Creative self-efficacy is such a construct, and also what's measured in this study. The workshop gave the participants

different experiences, but most ended up with an increase in their creative self-efficacy. From the point of view of self-efficacy theory, this is a viable explanation of behavior. If we increase our self-efficacy, this increase will also change our behavior.

From a behavior analytical perspective, we can explain the findings as a result of the contingencies of reinforcement (Skinner, 1974). First, though, it's important to discuss what the study measures. From a behavior analytic point of view, we cannot make a causal claim based on a construct, such as creative self-efficacy. What was measured in this study was not the actual mental construct, but it was behavior – more specifically verbal behavior. It was the verbal behavior of the subject that changed in this study. From a contextualistic point of view, this is considered a behavior-behavior relation and is thus not a viable explanation of behavior. Thoughts, or private behavior as it is considered, is also behavior. Private, or covert behavior, is different from overt behavior due to its accessibility. Behavior cannot be the "ultimate cause" of another behavior (Hayes & Brownstein, 1986; Ree, 2012; Zettle, 1990). The "ultimate cause" of behavior will be found in the environment, which in this case is the workshop environment, and in the participants' learning history (Hayes & Brownstein, 1986; Zettle & Hayes, 2015).

In a nutshell, here is how the findings can be explained from the two perspectives mentioned above. We begin with the explanation from the self-efficacy theory point of view. In this context, the workshop gave the participants experiences which, in 5 out of 6 participants, increased their creative self-efficacy. By going through the different exercises, the participants have either felt one or more of the four sources of self-efficacy. A behavior analyst would explain the findings in the following way: The participants in the study came in with individual learning histories. In the workshop and the different exercises, and maybe especially the ideation phase, the participants have been in contact with the contingencies of reinforcement that strengthen/change their verbal behavior, or more specifically the self-rules

in relation to their creative self-efficacy. The experience added to their learning histories from earlier in the day, and when they came out of it, some of their behavior changed, due to environmental factors, and some did not.

All the participants showed an increase in their scores from the pretest to the first posttest. This result extended to the second posttest, except for participant 6. People might not be used to reflecting on the questions they were asked in the questionnaire. Therefore, it could be hard to rate accurately, since they might not have a lot of "evidence" for their own rating. The initial pretest could act as a pre-calibration score, and the intervention could give them either proof or falsification of their initial score. This could not be explained by the decrease for participant 6, though, since the first posttest score was the second highest. The decrease is hard to explain with the workshop alone, and factors in the person's environment have possibly changed the verbal behavior in those 4 weeks.

When looking at the average scores of all the different questions, it's interesting to see the deviation between the scores. In the pretest, the biggest deviation was 2.4 from the lowest average question score to the highest average question score. In the first posttest, the deviation was 1.9 (8,7 and 6.8) and in the second posttest, it was 1.4 (7.7 and 6.3). This is also shown in the individual total scores. In the first posttest, the largest deviation between the lowest and highest total participant score was 39. In the second posttest that same deviation was 21 – five of the participants ended up in the range between 77 and 72. This means that the participant' scores deviated less and the differences in scores were smaller than the pretest.

It is also obvious that the results were higher on the first posttest after the workshop. It makes sense that the fresh experience would have a higher impact on the score, compared to 4 weeks after the workshop.

Question 1, *Jeg er sikker på min evne til å komme opp med nye og originale ideer,* saw an increase in 4 participants (1, 2, 3 & 5), a stalemate in one (4), and a 2-point decrease in

participant 6. Notable changes were participant 1, which increased from a 5 to 9 (post1) and 8 (post 2), and participant 5, who began with a 6 and went from there to an 8 and continued to increase to a 10 in posttest 2.

The second question increased in score on all but one participant, which was participant 6. The average increase was 1.34.

Question 3, *Jeg er i stand til å håndtere utfordringer for å implementere mine kreative ideer*, also saw an increased score in all participants but one, who stayed on the same score. This is the score with the second-highest total increase, with a 2-point mean increase. This is interesting since the workshop had no specific focus on what the question entails – handling challenges.

Question 4 (*Jeg er i stand til å tenke utenfor boksen og komme opp med kreative løsninger på problemer*) and question 9 (*Jeg kan komme opp med alternative løsninger på et problem*) had the least increase from pretest to posttest 2 with a 0.34 increase.

Question 5, *Jeg har evnen til å komme på kreative ideer selv under press eller strenge frister*, increased 1.5 on average from pretest to posttest 2. Most of the brainstorming exercises in the workshop had relatively short deadlines and that might have contributed to this result.

With an average increase of 1, question 6, *Jeg kan tenke kreativt når jeg står overfor utfordringer eller problemer*, participant 3 had a 3 point increase. That's the only 'anomaly' on that question. Question 7 had an equal 1-point increase on average.

Jeg kan tenke kreativt til tross for å bli kritisert eller avvist (question 8) had the second lowest average score (4.7) on the pretest and ended up with the lowest average score on the second posttest (6.3). That might be out of obvious reasons – criticism of ideas can be aversive.

Question 10 had, by far, the largest increase. In the pretest it had the lowest score (4.3) and ended up with the highest (7.7), tied with question 1, 5 and 7. The reason why this question, *Jeg kan utvikle nye og unike produkter eller tjenester*, had the largest increase was probably due to the fact that the participant actually made a plan for a specific product. In the debrief of the workshop they agreed that it was cool to "design" a product that felt very possible to make, and that had the potential to be used by students.

Methodological discussion

Due to the nature of the method, with a workshop as the main intervention, there are some obvious methodological points/issues that need to be addressed. A workshop-setting will always be a dynamic situation. The facilitator comes in with his/her plan, but, as is said in boxing; everyone has a plan until they get punched in the face. The plan will not always get executed – some breaks will be longer, some will be shorter, some exercises will need more or less time than scheduled, etc. This makes it hard to replicate the experiment.

Connected to this, is the facilitator's skill. A workshop will not run itself, and the facilitator is an important part of the workshop. In this case the facilitator, me, had never facilitated a workshop before, and it is natural to point out that the results could have been better (or at least different) with a more skilled and experienced facilitator.

Due to the nature of the workshop, it was hard to recruit participants. This made it necessary to recruit participants from my own social network. Related to this is the fact that all of the participants were students. Another point is the low number of participants. Due to all these factors, one can question the generalizability of the experiment, as students might not be a good representation of the general public.

Implications, future research and concluding thoughts.

Due to the small sample size of this study, it would be interesting to try to replicate the study on a larger scale. Any method that could earn consistent results in this

regard, could help individuals and organizations to become more adaptive in an ever-changing world.

A question that is important to ask, is whether an increase in creative self-efficacy will also increase creative behavior. If not, one can question the usefulness of the construct. As has been mentioned earlier, from Puente-Diaz's (2016) meta-analysis, there are multiple studies that have shown this. This has also been shown in the more general self-efficacy term – (creative) self-efficacy is a good predictor of future behavior. One can also question the *causal* and determinant status of the construct. As Heggestad and Kanfer (2005) have shown, self-efficacy is probably more a consequence of previous behavior rather than a cause of future behavior, but that does not take away the predictive validity.

Based on the results of this study, one can conclude that a design thinking workshop is a good way to increase most of the participants' creative self-efficacy. Or rather, that this design thinking workshop had an impact on the participants' verbal behavior. The interpretation depends on the point of view. From the point of view of self-efficacy theory, creative self-efficacy increased after a personal mastery experience. From the behavioral view, the workshop has impacted the participants' learning history, and, because of the environmental factors the verbal behavior of the participants has changed. As Dougher (1995) mentioned, this discussion will not be solved by empirical data, and this is the case here as well. It all depends on the scientific framework one "subscribes" to. The observational data is the same, but the interpretations are different.

As Csikszentmihalyi (1999) has proposed in his systemic model of creativity, innovation and creativity are not only dependent on the right people to create the innovations but also on getting acknowledged by the right people in the field and favorable cultural adoption (domain). This means that only increasing people's creative behavior is not necessarily enough to create better innovation. Creative behavior does not "succeed" in a

vacuum, and thus, innovative/creative behavior will always be dependent on favorable cultural and societal factors.

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Figure 1

The five stages of design thinking

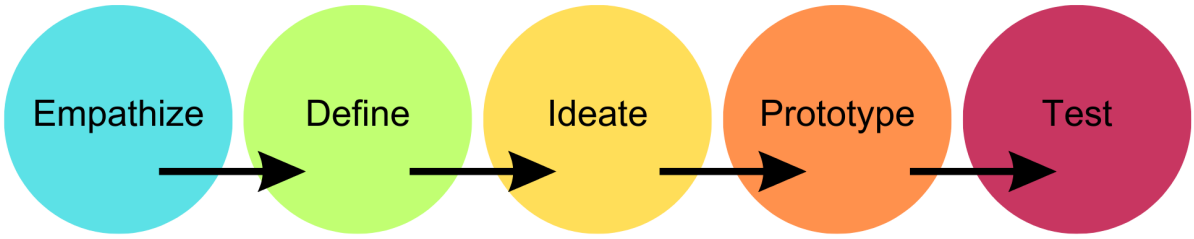


Figure 2

A visual representation of sources of, and processes affected by, self-efficacy

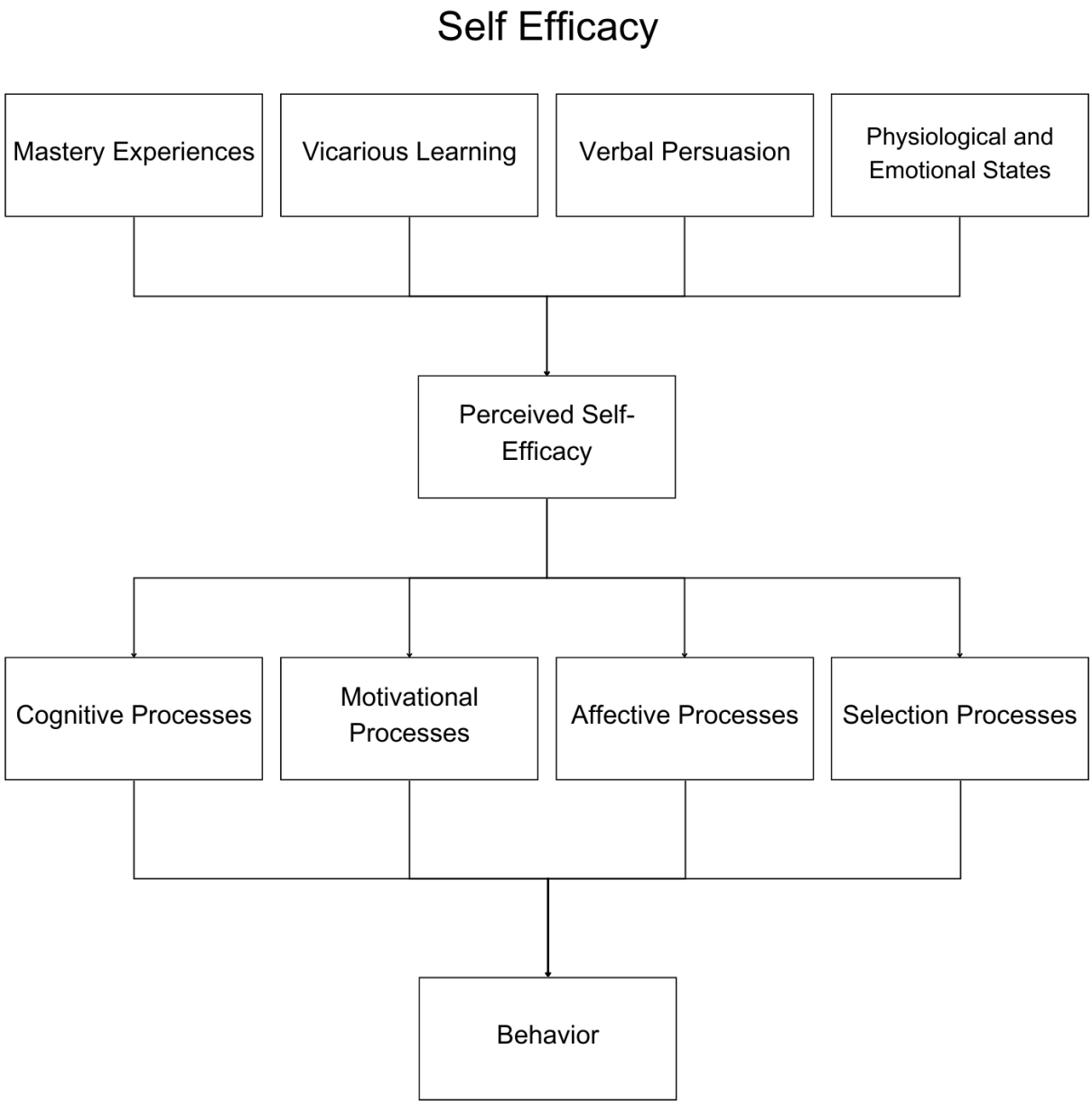
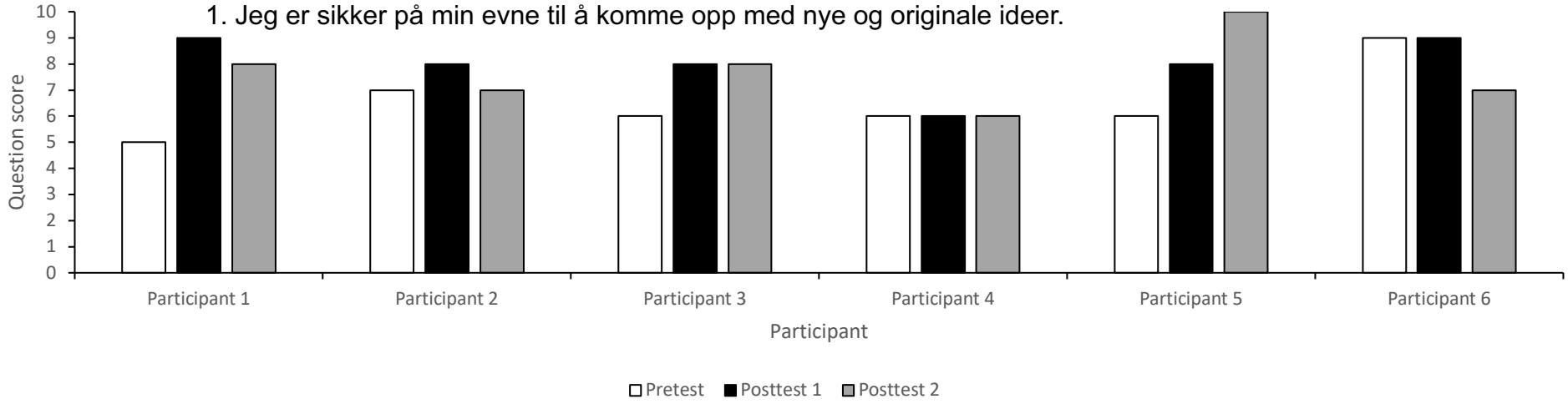
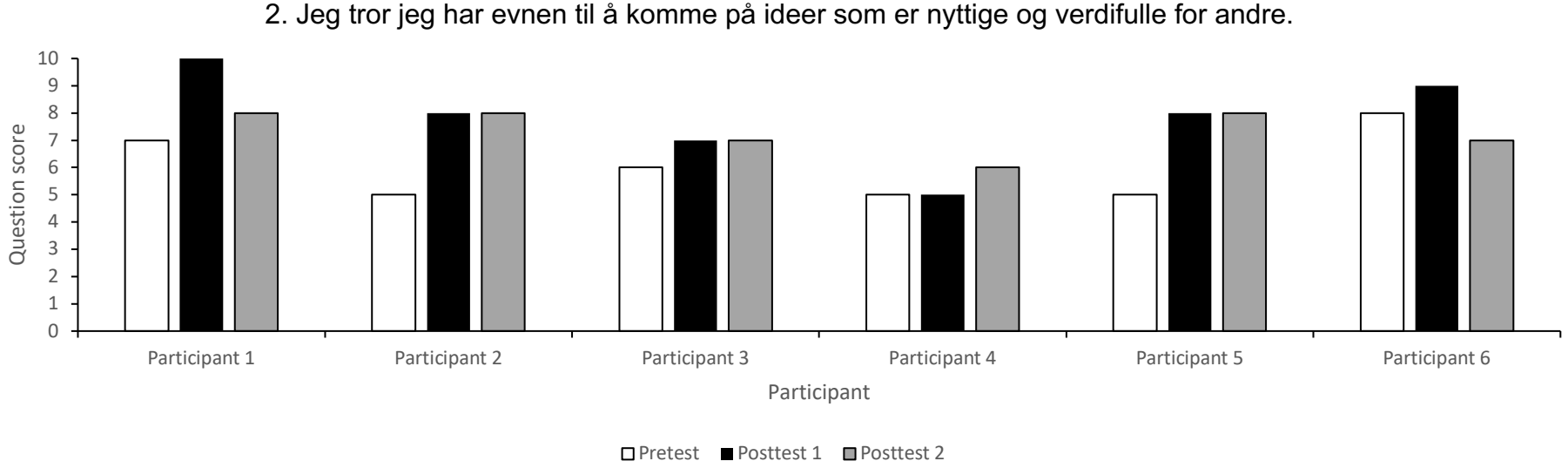


Figure 3

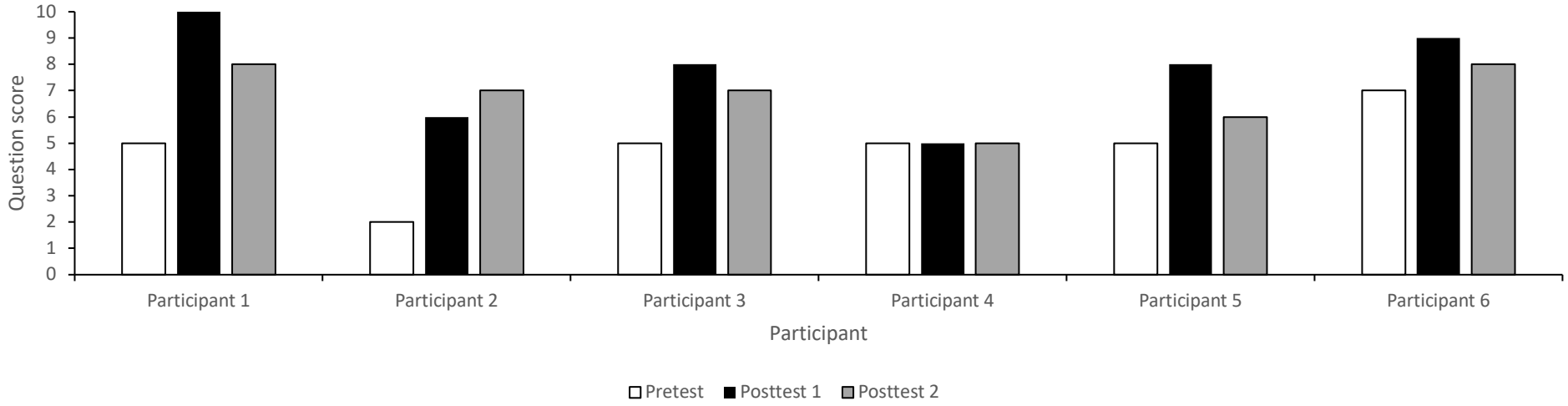
Participants' questionnaire scores



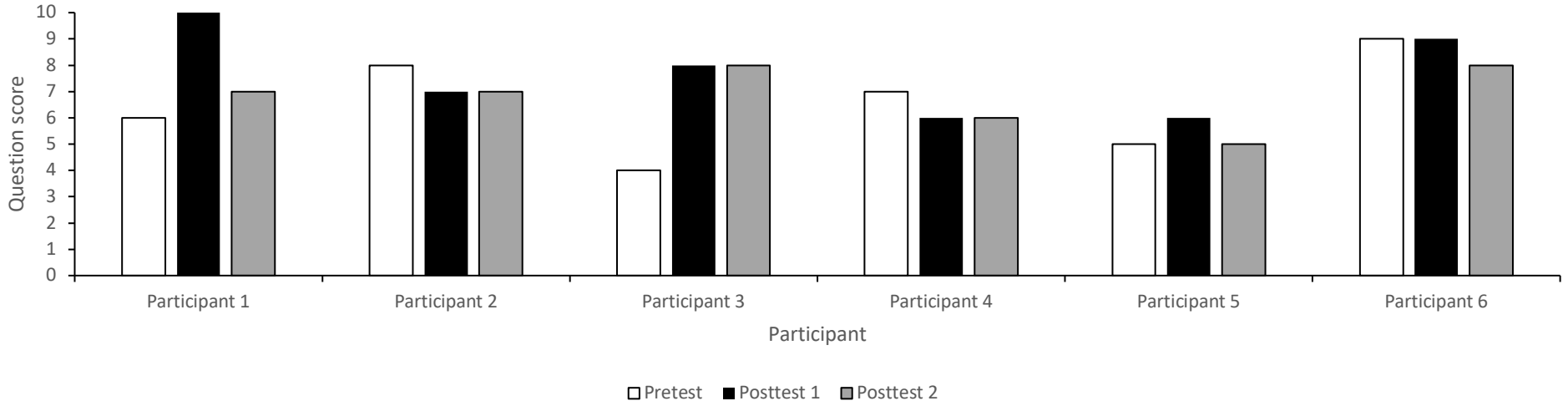


Question score

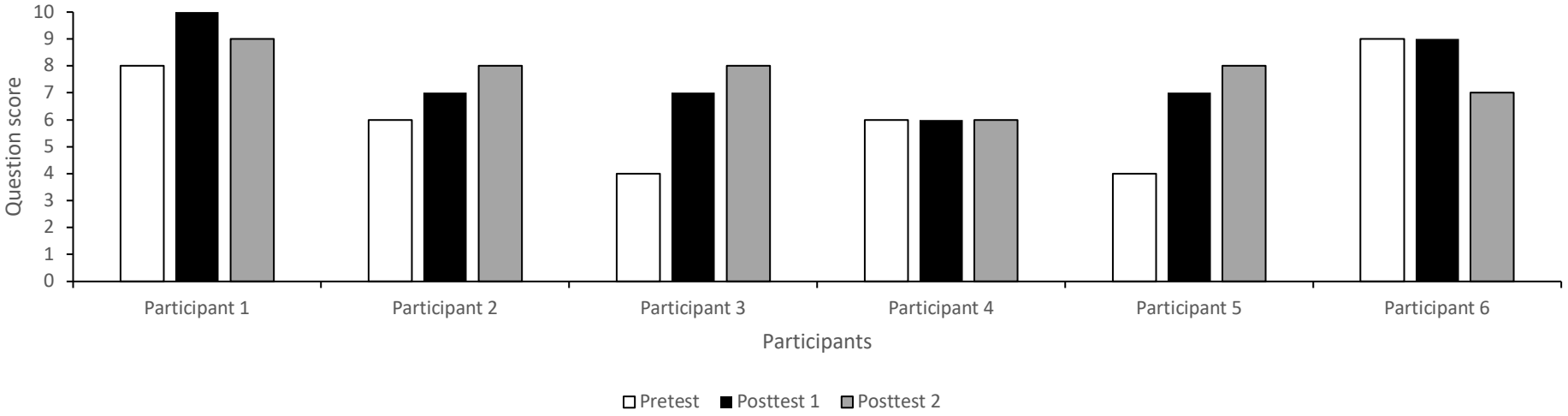
3. Jeg er i stand til å håndtere utfordringer for å implementere mine kreative ideer.



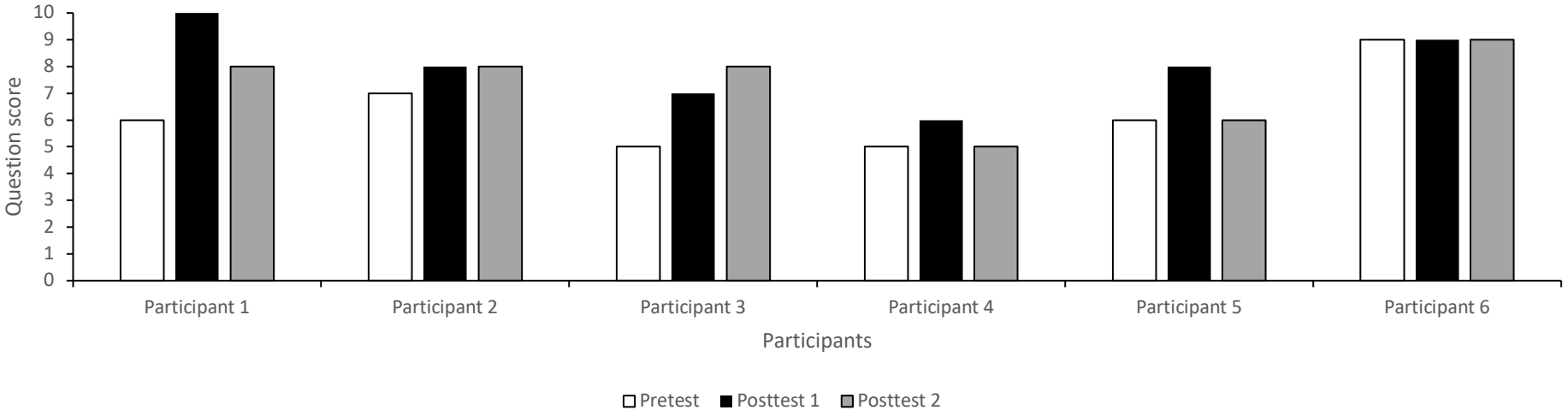
4. Jeg er i stand til å tenke utenfor boksen og komme opp med kreative løsninger på problemer.



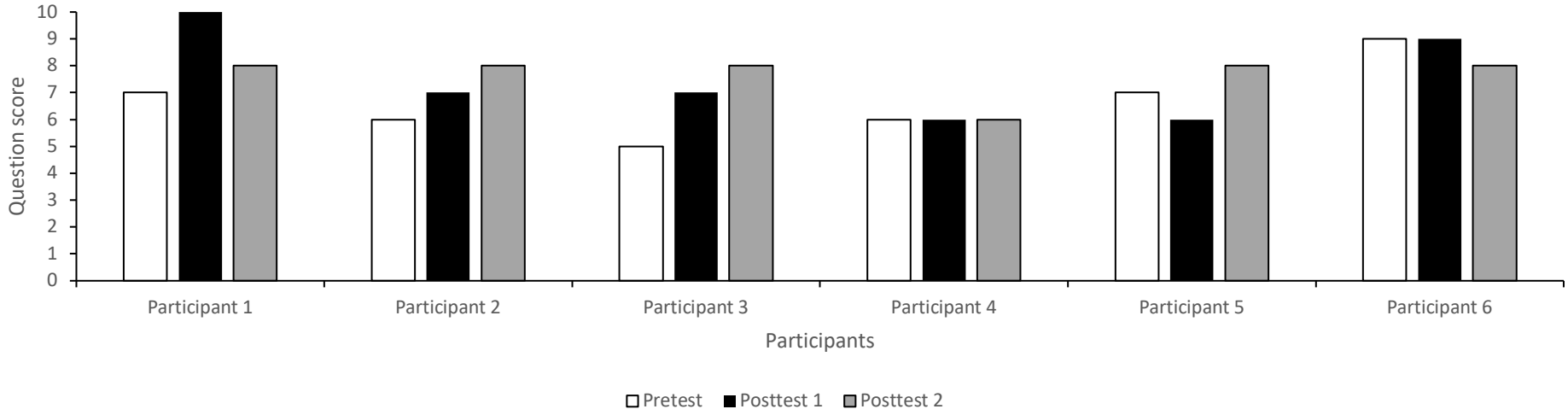
5. Jeg har evnen til å komme på kreative ideer selv under press eller strenge frister.



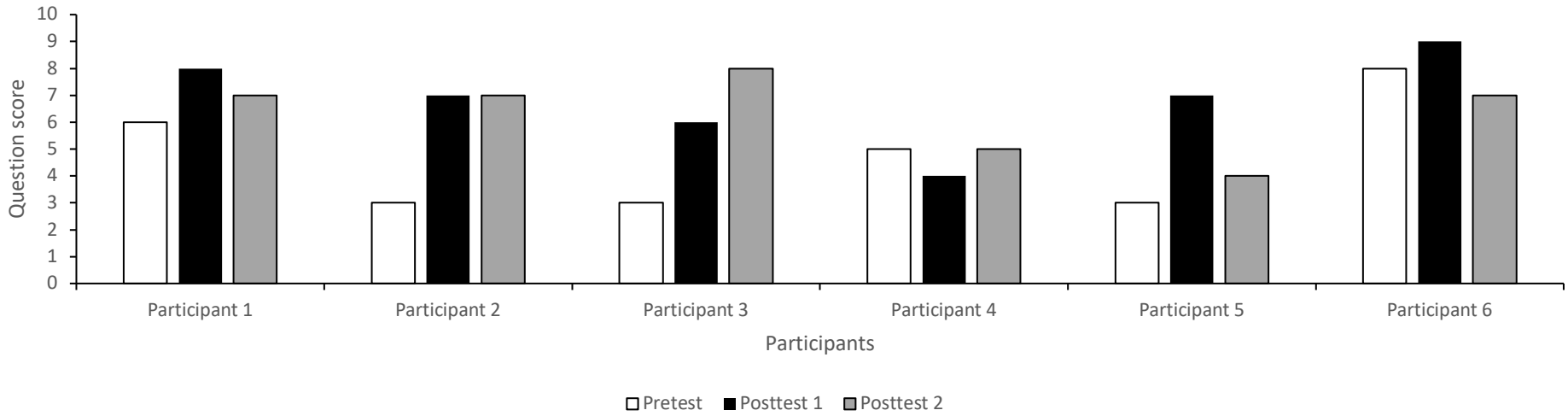
6. Jeg kan tenke kreativt når jeg står overfor utfordringer eller problemer.



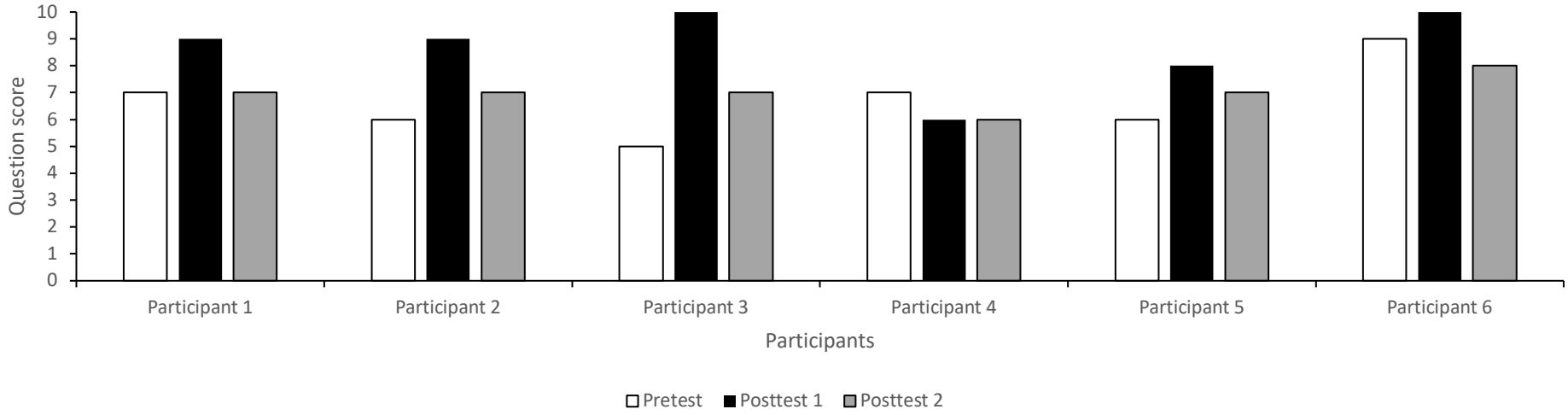
7. Jeg er i stand til å se muligheter der andre ser bare problemer.



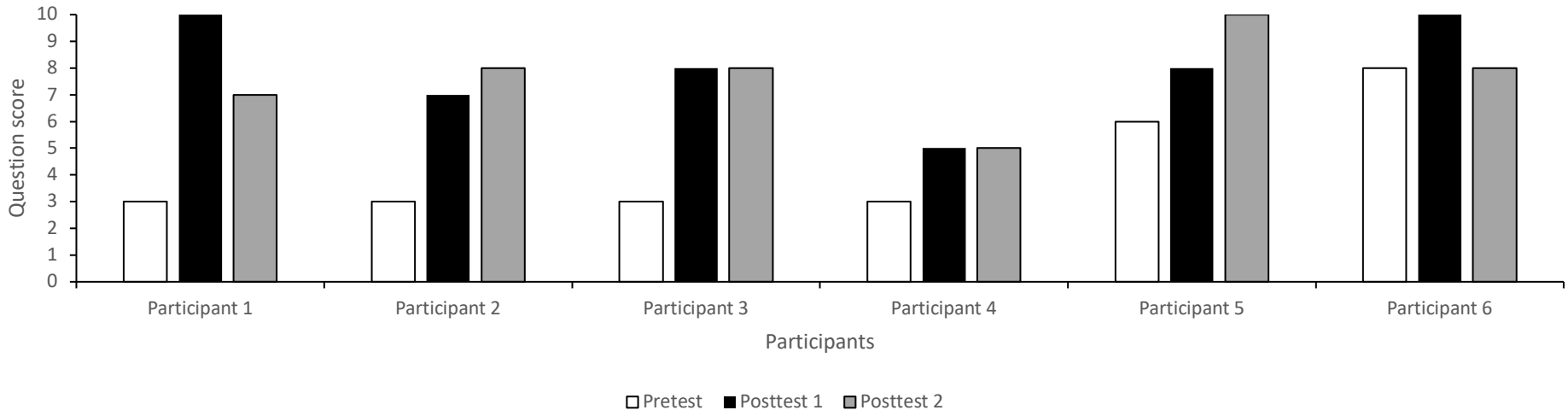
8. Jeg kan tenke kreativt til tross for å bli kritisert eller avvist.



9. Jeg kan komme opp med flere alternative løsninger på et problem.



10. Jeg kan utvikle nye og unike produkter eller tjenester.



Appendix A

Questionnaire questions in Norwegian

1. Jeg er sikker på min evne til å komme opp med nye og originale ideer.
2. Jeg tror jeg har evnen til å komme på ideer som er nyttige og verdifulle for andre.
3. Jeg er i stand til å håndtere utfordringer for å implementere mine kreative ideer.
4. Jeg er i stand til å tenke utenfor boksen og komme opp med kreative løsninger på problemer.
5. Jeg har evnen til å komme på kreative ideer selv under press eller strenge frister.
6. Jeg kan tenke kreativt når jeg står overfor utfordringer eller problemer.
7. Jeg er i stand til å se muligheter der andre ser bare problemer.
8. Jeg kan tenke kreativt til tross for å bli kritisert eller avvist.
9. Jeg kan komme opp med flere alternative løsninger på et problem.
10. Jeg kan utvikle nye og unike produkter eller tjenester.

Appendix B

Workshop notes

Design Thinking Workshop

SessionLab

Theory | Energizer/Icebreaker | Break | Exercise | Discussion/Debriefing

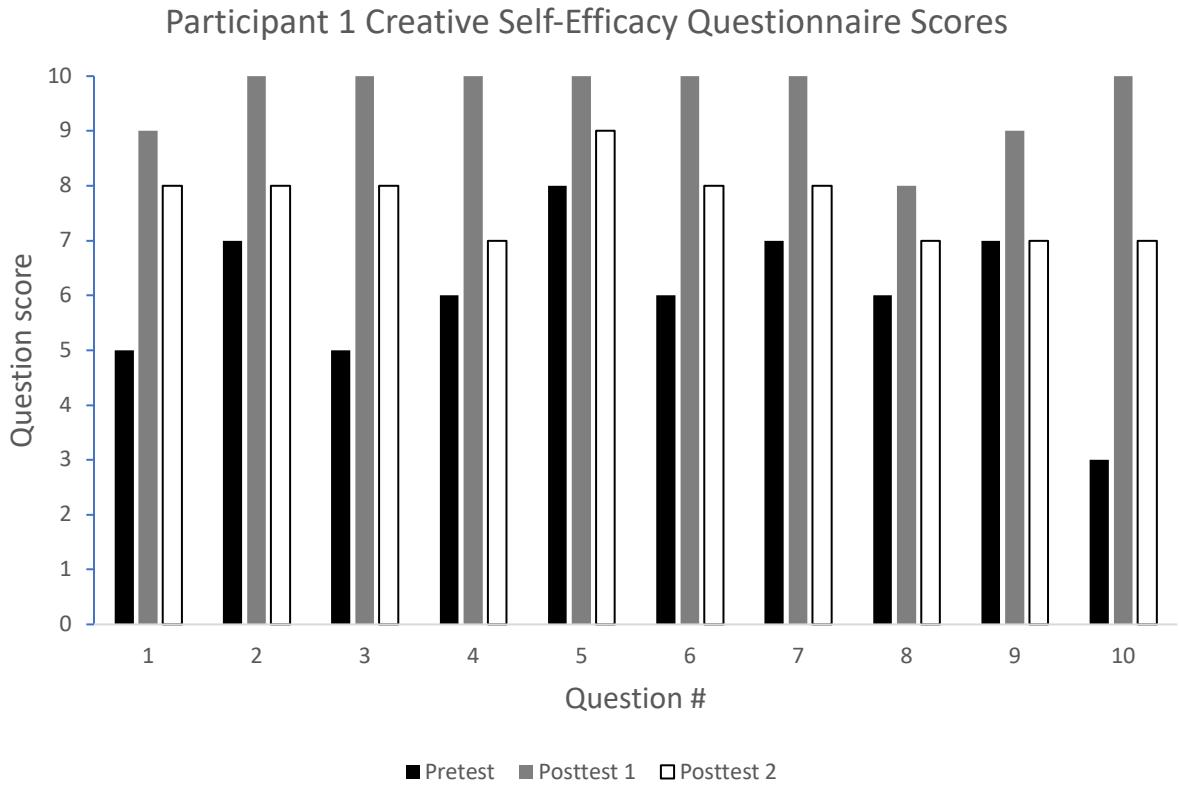
TIME	NAME	DESCRIPTION	ADDITIONAL INFO
09:10 15m	**Introduction**	• Introduksjon til design thinking • Informasjon om dagen - gi en rask agenda • Nettskjema	Utstyr: • PC • Nettbrett • 7 penner
09:25 10m	**Tegning av hverandre uten å se på arket**	• Blind Contour Bookend. • 20-30 sek per pers (7 stk - til sammen 3,5 minutt)	Utstyr: • 7 Ett A4-ark per person • 7 Sharpie 1 per person (MED NOE HARDT BAK)
09:35 10m	**Icebreaker 2**	• Dere får 10 minutter på dere til å finne TO til tre ting som alle har til felles	
09:45 10m	**Rask intro til design thinking**	• Snakke om de 5 fasene • Snakke om at det egentlig ikke er design, og heller ikke så mye tenking men heller at det er mye "doing" - veldig praktisk •	Empatiser - Du må finne ut hvem som er brukeren. Når du
09:55 5m	**Pause**		
10:00 35m	**Embodied Prototyping**	• Lag en opplevelse til den andre gruppen der de skal velge en følelse de skal få frem. • Del opp i grupper - par • De skal få velge ut en følelse av noen fra flashkort (Nostalgi, frykt, Tilhørighet, Sårbarhet, Lykke, Samhold, Usikkerhet, Makt (Power). • Sitt i hestesko og be dem om å tenke på noe som har skapt den følelsen • Intervju hverandre • Lag ideer • Prototyp • Test	• Husk å lag kortene med flash cards
10:35 16m	**Skap følelsen**	• Alle får ca 5 minutter hver (3 grupper med 6 personer)	
10:51 10m	**Presenter design utfordi**	• De kan velge mellom to stykker: • Du skal lage en event til nye utvekslingselever ved OsloMet, for å få dem til å føle seg velkommen. Den skal foregå etter en uke etter semesterstart • Du skal utvikle en ny og innovativ tjeneste som hjelper studenter med å planlegge og organisere studiene sine bedre. Tjenesten bør være brukervennlig og tilgjengelig på ulike enheter, og bør tilpasses ulike typer studenter og studieløp. • Du skal lage en tjeneste/app/event som skal hjelpe studenter å komme i kontakt med nye venner/studenter	
11:01 10m	**Pause**		
11:11 40m	**Empati - Intervju**	• Finn personer som kan være aktuelle og still noen spørsmål. Samle inn informasjonen på ark/skrivebok • Utarbeid spørsmål (gjerne 3-5 spørsmål - husk at det er problemet dere er ute etter nå og ikke en løsning • Kom dere ut eller kontakt noen dere kjenner på telefon eller lignende for å skaffe data • Skriv ned på papir	• Ark og penn til deltagerne
11:51 45m	**Lunsj**		
12:36 35m	**5/7 why's - How might we?**	• Se på informasjonen dere har skaffet fra intervjuene og se om det finnes noen mønster. Lage grupper av dem • Skriv ned 1-3 hovedfunn • Lag en problemstilling: • Hvordan kan vi hjelpe **[målgruppe/brukere]** med **[behov/adferd/innsikt]** slik at **[mål/verdi]**?	• Why?-arkene - husk å skrive ut
13:11 10m	**Pause**		
13:21 15m	**Idefasen - worst / best**	• Begynn alene og lag så mange dårlige ideer som mulig på 2 minutter • Gå sammen og se på alle ideene. Omgjør de dårlige ideene til gode ideer. Er de gode? Legg de ved!	

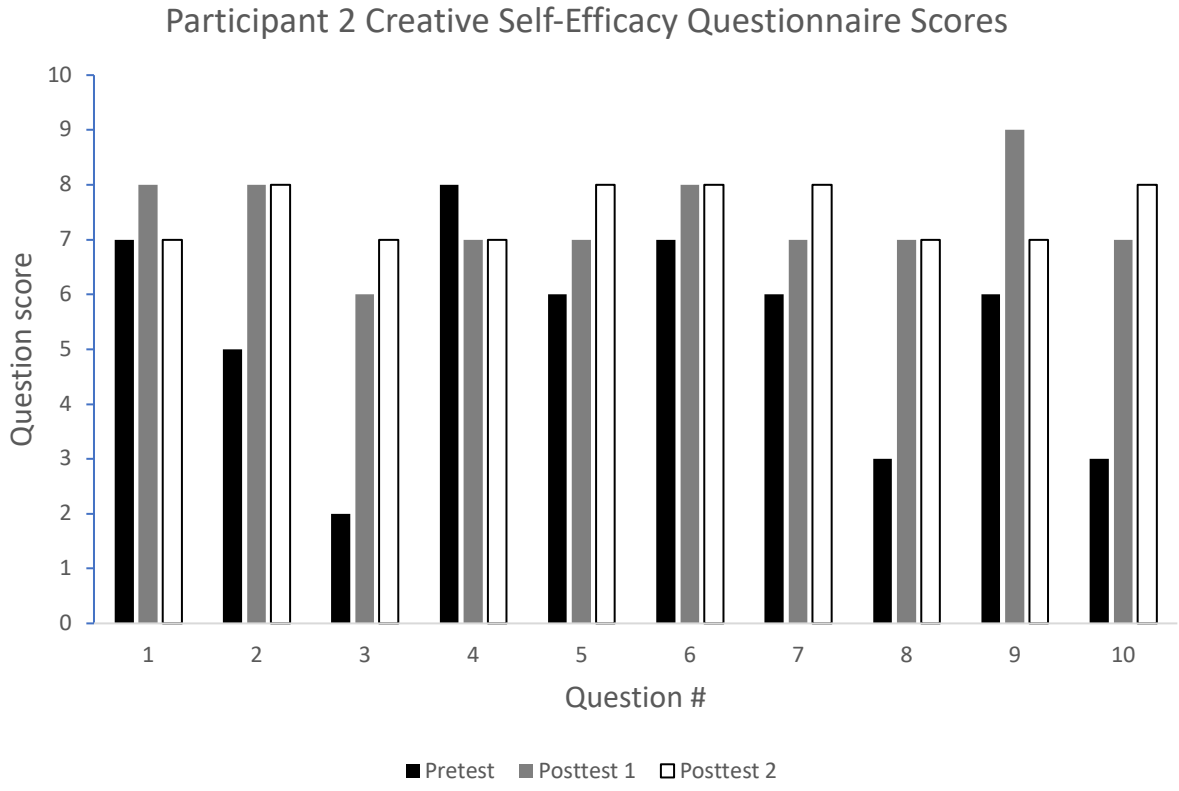
TIME	NAME	DESCRIPTION	ADDITIONAL INFO
13:36 10m	**Idefasen**	• Begynn med brainstorming (2 minutt, lag så mange ideer som mulig. Fokus på kvantitet	•
13:46 10m	**Ideation - REMIX**	• Rearrange(bytt om deler av ideen), Extend (lag større/mindre, strekk), Merge (sett sammen forskjellige), Innovate (ta bort deler av ideer og sett inn noe nytt), Ekstra (kan du legge til noe til ideen?)	
13:56 10m	**Pause**		
14:06 40m	**Prototype - sketching**	• Velg ut 2 ideer - dotmocracy? For hver ide, bruk 15 minutter til å tenke på: • Logistikk • Hvem burde bli involvert? • Lag en tidslinje • Hva slags begrensinger, utfordringer og vanskeligheter er involvert i løsningen? • Hva er spennende med ideen • Hvilke muligheter kommer ut av ideen?	• Logistics, practicalities, resources • Who would need to be involved • What the timeline would be • What constraints, challenges, or difficulties might there be. • What is exciting about the idea. • What opportunities the idea presents.
14:46 10m	**Test, presenter den beste løsningen**		
14:56 10m	**Avslutning og nettskjema**		
15:06			

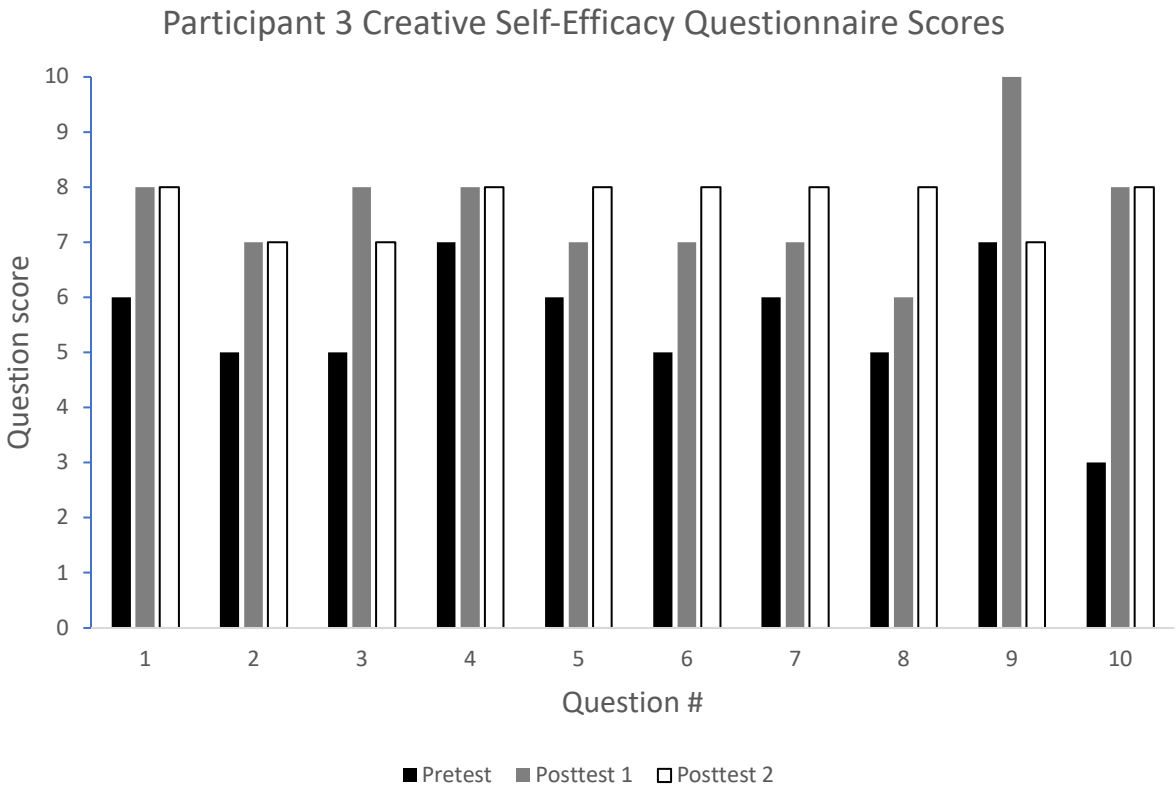
TOTAL LENGTH: **5h 56m**

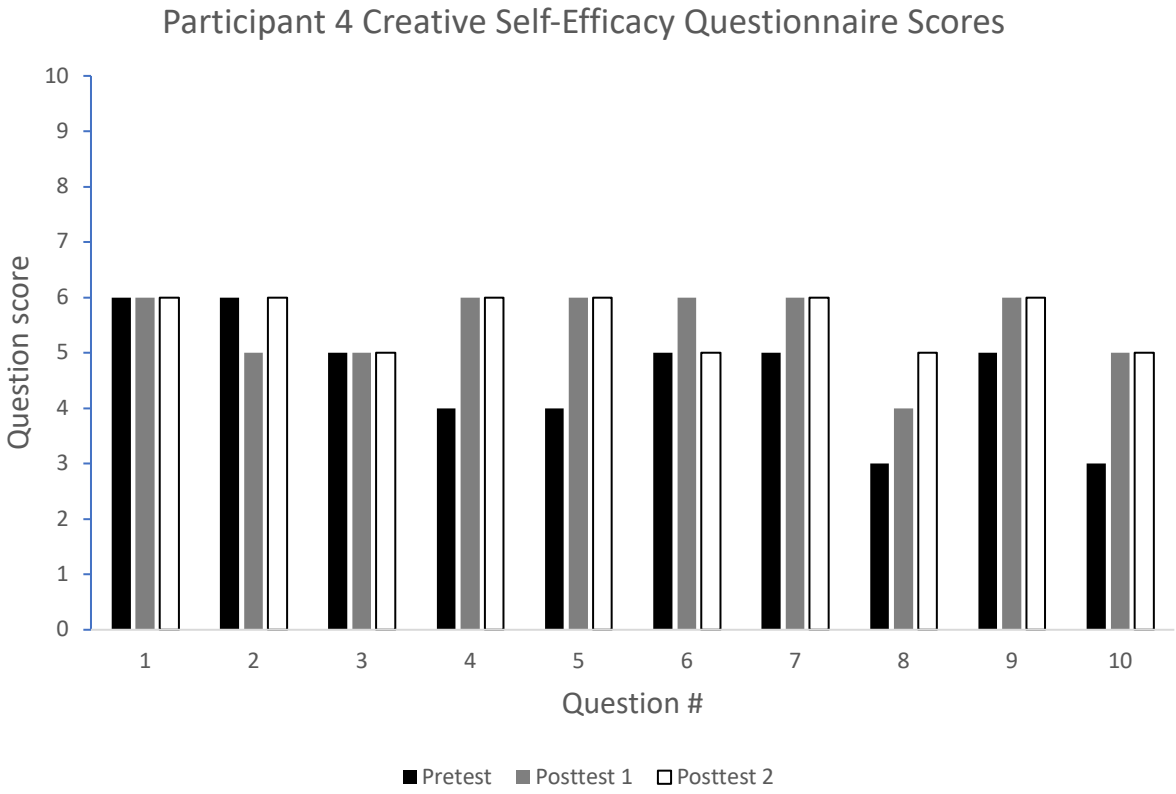
Appendix C

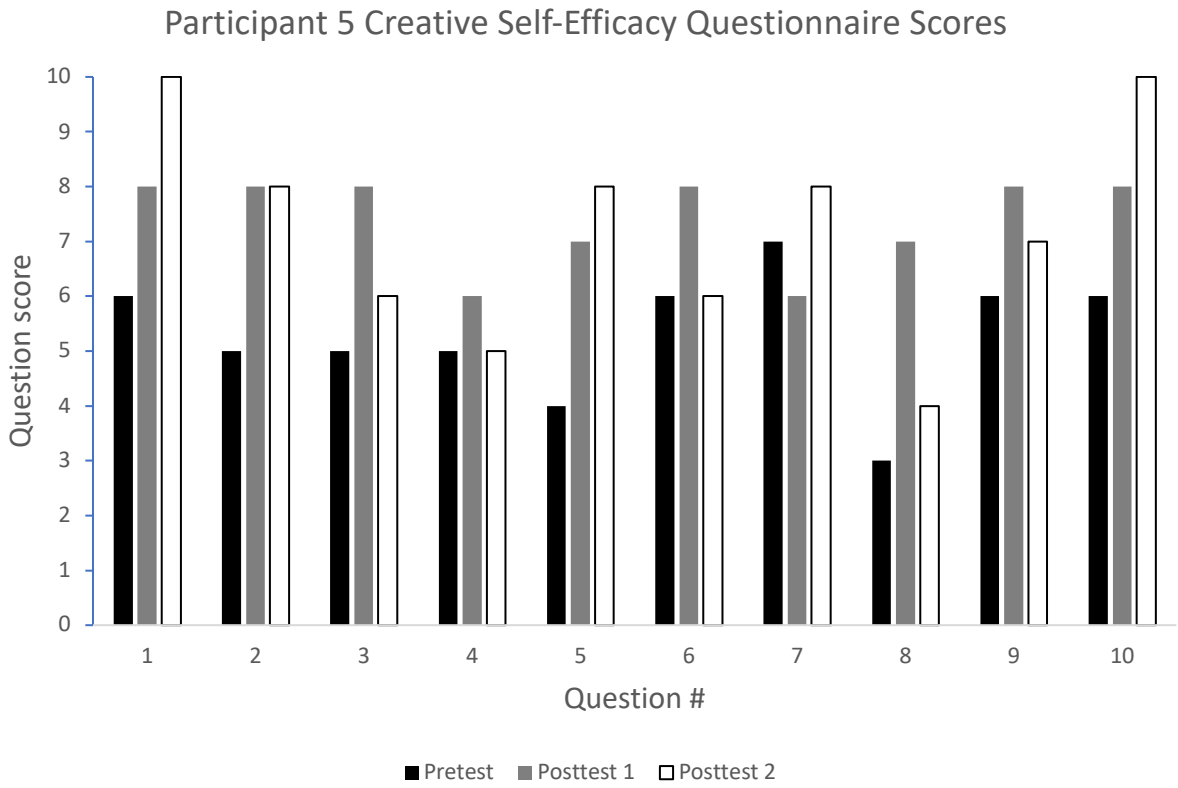
Questionnaire scores for each participant

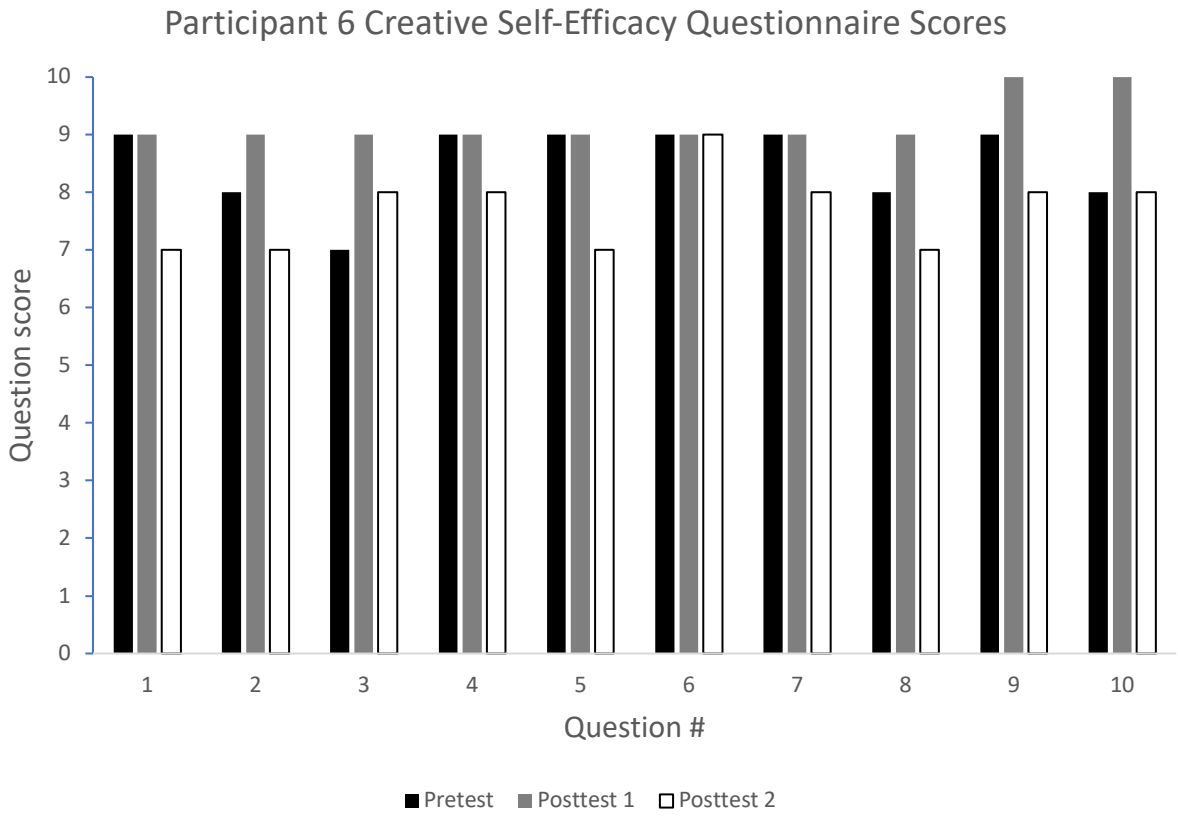





Participant 3 Creative Self-Efficacy Questionnaire Scores
Question score
0
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
Question #
Pretest
Posttest 1
Posttest 2


Participant 4 Creative Self-Efficacy Questionnaire Scores
Question score
0
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
Question #
Pretest
Posttest 1
Posttest 2


Participant 5 Creative Self-Efficacy Questionnaire Scores
Question score
0
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
Question #
Pretest
Posttest 1
Posttest 2


Participant 6 Creative Self-Efficacy Questionnaire Scores
Question score
0
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
Question #
Pretest
Posttest 1
Posttest 2

Appendix D

Table of the questionnaire scores

Questions	Participant 1			Participant 2			Participant 3		
	Pre	P1	P2	Pre	P1	P2	Pre	P1	P2
1. Jeg er sikker på min evne til å komme opp med nye og originale ideer.	5	9	8	7	8	7	6	8	8
2. Jeg tror jeg har evnen til å komme på ideer som er nyttige og verdifulle for andre.	7	10	8	5	8	8	6	7	7
3. Jeg er i stand til å håndtere utfordringer for å implementere mine kreative ideer.	5	10	8	2	6	7	5	8	7
4. Jeg er i stand til å tenke utenfor boksen og komme opp med kreative løsninger på problemer.	6	10	7	8	7	7	4	8	8
5. Jeg har evnen til å komme på kreative ideer selv under press eller strenge frister.	8	10	9	6	7	8	4	7	8
6. Jeg kan tenke kreativt når jeg står overfor utfordringer eller problemer.	6	10	8	7	8	8	5	7	8
7. Jeg er i stand til å se muligheter der andre ser bare problemer.	7	10	8	6	7	8	5	7	8
8. Jeg kan tenke kreativt til tross for å bli kritisert eller avvist.	6	8	7	3	7	7	3	6	8
9. Jeg kan komme opp med flere alternative løsninger på et problem.	7	9	7	6	9	7	5	10	7
10. Jeg kan utvikle nye og unike produkter eller tjenester.	3	10	7	3	7	8	3	8	8
	Participant 4			Participant 5			Participant 6		
	Pre	P1	P2	Pre	P1	P2	Pre	P1	P2
1. Jeg er sikker på min evne til å komme opp med nye og originale ideer.	6	6	6	6	8	10	9	9	7
2. Jeg tror jeg har evnen til å komme på ideer som er nyttige og verdifulle for andre.	5	5	6	5	8	8	8	9	7
3. Jeg er i stand til å håndtere utfordringer for å implementere mine kreative ideer.	5	5	5	5	8	6	7	9	8
4. Jeg er i stand til å tenke utenfor boksen og komme opp med kreative løsninger på problemer.	7	6	6	5	6	5	9	9	8
5. Jeg har evnen til å komme på kreative ideer selv under press eller strenge frister.	6	6	6	4	7	8	9	9	7
6. Jeg kan tenke kreativt når jeg står overfor utfordringer eller problemer.	5	6	5	6	8	6	9	9	9
7. Jeg er i stand til å se muligheter der andre ser bare problemer.	6	6	6	7	6	8	9	9	8
8. Jeg kan tenke kreativt til tross for å bli kritisert eller avvist.	5	4	5	3	7	4	8	9	7
9. Jeg kan komme opp med flere alternative løsninger på et problem.	7	6	6	6	8	7	9	10	8
10. Jeg kan utvikle nye og unike produkter eller tjenester.	3	5	5	6	8	10	8	10	8

Note. Pre=pretest, P1= Posttest 1, P2= posttest 2

Appendix E

Total questionnaire scores of the participants

Participant 1			Participant 2			Participant 3		
Pre	P1	P2	Pre	P1	P2	Pre	P1	P2
60	96	77	53	74	75	55	76	77

Participant 4			Participant 5			Participant 6		
Pre	P1	P2	Pre	P1	P2	Pre	P1	P2
46	55	56	53	74	72	85	92	77

Note. Pre = pretest, p1 = posttest 1, p2 = posttest 2

Appendix F

Ethical considerations

This project has been reported to and approved by Sikt, reference number 835424.

There are no immediate and specific ethical concerns in this thesis. The participants came to the workshop voluntarily. They could leave at any time if they wished to. There was no use of coercive behavior, and the participants were not coming from a vulnerable group. Both the experiment and subsequent data collection, analysis and processing of data went ahead without any issues. The participants' contact information (name and e-mail address) was collected. This was to match the names of the participants in the three questionnaires to ensure the results were connected to the correct scores. This data was deleted when all participants had answered the second posttest and the results are 100% anonymized. Due to the difficulty of recruiting participants, I had to recruit from my own social network. This meant that I knew some of the participants, and one could argue the possibility of them providing me with "good" scores to help my project in some way. In total, I have concluded that this study does not break any basic ethical rules.