

Thinking Inside and Outside the Box: Exploring the Role of Problem-Solving Style in Developing Creative Self-Efficacy Through Applied Training in Creative Problem Solving

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Studies investigating the impact of creativity training on the actual belief in these capabilities have shown contradictory findings and fall short on explaining the underlying mechanisms how people gain or lose confidence in their creative abilities. Following a mixed-methods approach, this study explores how problem-solving style influences the impact of creativity training on creative self-efficacy based on a creativity course at a German university. Style preferences were associated with different experiences of creative mastery and other sources of creative self-efficacy. We discuss the implications of these findings for the design of creativity training courses and developing creative talent in organizations.

Keywords: creative self-efficacy, creativity training, problem-solving style

INTRODUCTION

A recent LinkedIn Learning survey rated creativity as the most requested job skill in 2020 (LinkedIn Learning, 2020). Other surveys have consistently ranked creativity among the most important skills that employees must have to deal effectively with the challenges for the 21st century (e.g. Business Higher Education Forum, 2018; Davies, Fidler, & Gorbis, 2011; Puccio, 2017). There is ample empirical evidence in the academic literature that creativity can be deliberately developed and should not be treated as an immutable ability or trait (Ma, 2006; Rose & Linn, 1984; Scott, Leritz, & Mumford, 2004a&b; Torrance, 1972; Valgeirsdottir & Onarheim, 2017). There is also no shortage of methods and training approaches concerning the deliberate management of creative processes such as design thinking (e.g. Plattner, Meinel, & Weinberg, 2009), creative problem solving (e.g. Isaksen & Treffinger, 2004; Puccio, Murdock, & Mance, 2007) or various other process frameworks. Although the general effectiveness of creativity training is not in question, people also need to belief in their creative abilities to actually apply them. As Bandura (1997, p. 35) argues “*a capability is only as good as its execution. The self-assurance with which people approach*

and manage difficult tasks determines whether they make good or poor use of their capabilities. Insidious self-doubts can easily overrule the best of skills.”

This illustrates the importance of creative self-efficacy defined as “*the belief one has the ability to produce creative outcomes*” (Tierney & Farmer, 2002, p. 1138), which is also referred to as creative confidence (e.g. Phelan & Young, 2003). Although this construct received a lot of attention in recent research (e.g. Haase, Hoff, Hanel, & Innes-Ker, 2018), little is still known about its development over time and social influences on this process (Farmer & Tierney, 2017; Tierney & Farmer, 2011). Previous studies are ambiguous about whether or not creativity training interventions are beneficial (e.g. Azmi, Surat, Marzuki, Yusoff, & Rahman, 2018; Byrge & Tang, 2015; Gist, 1989; Mathisen & Bronnick, 2009; Tang & Werner, 2017; Vally, Salloum, Alqedra, Shazly, Albloshi, Alsheraifi, & Alkaabi, 2019) or unrelated (e.g. Meinel, Wagner, v. Baccarella, & Voigt, 2018; Ohly, Plückthun, & Kissel, 2017) to inducing confidence in people’s creative abilities. Furthermore, these studies fall short in explaining the underlying mechanisms how creativity training actually influences these self-beliefs.

We argue that considering people’s preferences for different approaches to solving problems, that are referred to as problem-solving style differences (Kirton, 1976; Selby, Treffinger, Isaksen, & Lauer, 2004), has potential to enlighten our understanding if and how creativity training can alter people’s beliefs in their creative abilities. Our argument is based on evidence that these style differences influence how people learn and apply creativity methods (e.g. Basadur, Gelade, & Basadur, 2014; Lomberg, Kollmann, & Stöckmann, 2017), and on other studies outside of the training domain, which have shown that people with an exploratory (i.e. out-of-the-box thinking) approach to problem-solving tend to have stronger beliefs in their creative abilities compared to those preferring a more developmental (i.e. inside-the-box thinking) approach (e.g. Phelan & Young, 2003; Tierney, 1997).

Therefore, this study seeks to investigate how problem-solving style differences influence the impact of creativity training on creative self-efficacy. Addressing this question, we first lay the foundations for our arguments by elaborating on the state of research investigating the impact of creativity training on people’s belief in their creative abilities and building on self-efficacy theory (Bandura, 1997) as well as the interactionist approach to creative behavior (Woodman, Sawyer, & Griffin, 1993). Following this, we outline the design of a style-balanced graduate creativity course at a German university. Using a mixed-methods approach, we investigate if and how students taking this course changed their beliefs in their creative abilities. Highlighting the key contributions of our findings, we discuss implications for creativity training courses and developing creative talent in organizations as well as future research in this area.

THEORETICAL FOUNDATIONS

Developing Creative Self-Efficacy Through Creativity Training

The concept of self-efficacy refers to “*beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments*” (Bandura, 1997, p. 3). As a central element of social cognitive theory, these self-beliefs influence individual goal setting and motivation and, therefore, serve as a mediating factor between actual skills and performance (Bandura, 2018). Self-efficacy does not represent a general trait, but rather constructs a system of self-beliefs that are linked to specific areas of performance, which is why it should be investigated close to the domain of interest (Bandura, 2018).

Within the creativity domain, creative self-efficacy has received considerable attention in recent research investigating its antecedents and consequences (Farmer & Tierney, 2017). In a recent meta-analysis, Haase et al. (2018) confirmed that creative self-efficacy impacts creative performance across a variety of different contexts, yet the strength of the relationship depends on the type of creativity that was measured and was strongest for self-rated creativity and general creativity scales, and weaker for specific performance tasks such as verbal or figural creativity tests. Although recent creativity research gained many insights about potential predictors of creative self-efficacy across a variety of contexts, little is still known about the mechanisms concerning its development over time and social influences on this process (Farmer & Tierney, 2017).

Self-efficacy theory (Bandura, 1997) clearly states that the personal beliefs in one's capabilities can be deliberately altered by four general sources of self-efficacy called *enactive mastery* (i.e. experiencing one's capability in actively performing certain tasks), *vicarious experiences* (i.e. observing other's performance and comparing one's capabilities), *verbal persuasion* (i.e. being socially convinced that one possesses certain capabilities), and *physiological and affective states* (i.e. judging one's capabilities in light of current body reactions and feelings). Yet, studies applying these principles to deliberately alter domain-specific self-efficacy beliefs in creativity training programs have shown ambiguous findings. Determining the current state of research, we found eight studies in peer-reviewed academic sources directly investigating the impact of various creativity training approaches on creative self-efficacy.

Gist (1989) conducted a field-experiment in which she compared the effects of different training approaches for innovative problem-solving on idea-generation efficacy among managers. She found that receiving the training generally increased self-efficacy beliefs to generate ideas to improve aspects of their organization, yet the most effective training condition involved cognitive modeling (i.e. self-monitoring of thought patterns such as following guidelines for creative thinking like separating idea generation from idea evaluation) in combination with lectures and practical experiences on relevant tasks.

Mathisen & Bronnick (2009) conducted a comprehensive intervention study and found that both, a five-day and one-day creativity course based on Bandura's (1997) sources of self-efficacy showed a significant increase in creative self-efficacy compared to a control group receiving no such training. These effects were observed both for students and employees and did not decline in a follow-up assessment two month after the training.

Byrge & Tang (2015) provided further support for the positive impact of creativity training on creative self-efficacy by evaluating a new designed university course on embodied creativity training. In addition to a quantitative assessment, they also conducted qualitative interviews after participants received the training suggesting that the increase in creative self-efficacy may also be influenced by the mindset and attitudes of participants (e.g. becoming more open-minded and curious through the training).

Other current studies also reported a positive impact of creativity training on creative self-efficacy across different cultural contexts using student samples from university courses in eastern (Azmi et al., 2018) or middle eastern (Vally et al., 2019) countries. Interestingly, Tang and Werner (2017) found positive effects of an intercultural training approach. Yet a follow-up study one year after the intervention showed a significant decrease in creative self-efficacy for students, while young professionals demonstrated further growth of their level of confidence in their creative abilities.

In addition to the studies showing a positive impact of training on creative self-efficacy, we also found two current investigations showing no such effect. Ohly et al. (2017) determined the impact of a design thinking course and did not find a significant training effect. Similarly, Meinel et al. (2018) evaluated a course on creativity and design and also did not find any significant effect of this training approach. In light of the positive impact reported in previous investigations, these findings are surprising, particularly as these studies were designed similarly to Mathisen & Bronnick (2009) and integrated Bandura's (1997) sources of self-efficacy. This suggests that individual or contextual factors might moderate this relationship.

The importance of considering individual and situational factors for the development of creativity has been supported by many scholars (e.g. Csikszentmihalyi, 2014; Mumford & Gustafson, 1988; Terborg, 1981). Woodman et al. (1993) expanded on earlier descriptions of an interactionist approach to understanding and developing creativity at the individual level of analysis (Woodman & Schoenfeldt, 1990) to the group and organizational levels, and indicated that: "*In sum, individual creativity is a function of antecedent conditions [...] cognitive style and ability, personality factors [...] motivation, social influences [...] and contextual influences*" (p. 926). This interactionist or systems approach to understanding creativity has also been applied in previous research to the learning and application of creative problem solving (Isaksen, Stein, Hills, & Grysiewicz, 1984; Isaksen, Puccio, & Treffinger, 1993).

This study seeks to shed more light on the ambiguous findings of previous research by exploring additional factors and creating new pathways for future inquiry in this domain. More specifically, we argue that the interaction between problem-solving style differences and the particular training context bears

potential to enrich our understanding of the various ways in which creativity training can stimulate or even inhibit people's beliefs in their creative abilities.

The Role of Problem-Solving Style Differences

In a broad sense, a problem represents a gap between a current and a desired state and creative problem-solving describes the cognitive activities to deal with fuzzy, complex, and ambiguous problems (Treffinger, Selby, & Isaksen, 2008). Furthermore, people have individual preferences how they approach the cognitive activities involved in problem-solving referred to as problem-solving style. Following Selby et al. (2004, p. 222), we define problem-solving styles in this paper as “[...] *consistent individual differences in the ways people prefer to plan and carry out generating and focusing activities, in order to gain clarity, produce ideas, and prepare for action.*”

The problem-solving styles construct belongs within the broad domain of individual differences, and more specifically, cognitive style (Kozhevnikov, Evans, & Kosslyn, 2014). Cognitive styles are “[...] *consistent individual differences in ways of organizing and processing information and experience*” (Messick, 1984, p. 61), and have a long history of relationship to creativity (e.g. Kogan, 1973; Messick, 1976). Both, problem-solving and cognitive styles, would be positioned as intervening constructs between deeper aspects of the personality and behavior or outcomes (Isaksen, Kaufmann, & Bakken, 2016; Martinsen, Kaufmann, & Furnham, 2011).

A long-standing issue within the cognitive style literature has been the distinction between cognitive abilities, and cognitive styles. Some styles have been shown to have strong relationship to abilities or level of performance (e.g. McKenna, 1990) and are typically conceived as unipolar constructs that have an attribution of value. Others are conceived as more purely stylistic, focused only on preferred ways of processing information and experience. These are often bi-polar constructs and have no inherent relationship to ability or level of performance.

Within the domain of creativity, Kirton (1978) has most sharply argued for making a clear distinction between creative level and style. Focusing on level of creativity addresses the question: How creative are you? Style of creativity relates more to: How are you creative? His adaption-innovation theory and problem-solving measure (Kirton, 1976; 2003) posits that maintaining clarity regarding this distinction is critical for research and practice. He argues that muddling level and style will produce confusing measures and asserts that adaption-innovation is purely stylistic. His bi-polar approach includes a spectrum that ranges from adaption (a preference for searching for incremental improvements within existing paradigms) to innovation (a preference aimed at searching for original solutions outside the existing paradigm). Kirton (2003) provides a substantial justification for maintaining the level-style distinction that both adaptors and innovators have potentially equal levels of creativity – that thinking within or outside the box has equal potential value.

Ironically, when individuals are asked to review detailed descriptions of adaptors and innovators and apply their implicit conceptions of creativity, they rate innovators as more creative (Puccio & Chimento, 2001). Individuals were not provided the labels, just the descriptions provided by Kirton. Further, analyzing the sub-sample that completed the KAI (Kirton adaption innovation inventory) indicated that those who had an innovative creativity style rated the innovator descriptions significantly more creative. These results were derived from a sample in North America. So, Ramos and Puccio (2014) conducted a follow-up multi-method study utilizing a cross-cultural sample. Participants included in this study indicated a clear and significant implicit assessment that Kirton's innovators were more creative. Other previous studies also indicated that those with a more innovative cognitive style see themselves as more creative (e.g. Klebba and Tierney, 1995; Phelan & Young, 2003; Tierney, 1997; Tierney, Farmer & Graen, 1999) These results imply that there is a bias that conflicts with Kirton's theory – people associate higher levels of creativity with an innovative, or out-of-the-box thinking style.

Empirical studies investigating the relationship between cognitive style and *actual* creative performance showed no clear results if people with an innovative style preference are in fact more creative. For example, Kubeš (1998) observed clear differences in behavior (the way they handled the task) between groups of adaptors and innovators, yet no significant differences in the number of ideas generated. In

another example, Brinkman (1999) studied students' musical compositions and found no significant differences due to problem type, creativity style, or the interaction of these two variables. On the other hand, Isaksen and Puccio (1988) found significant relationships between the KAI and the fluency, flexibility, and originality scores on the Torrance Tests of Creative Thinking. Further, Gelade (1995) examined the relationship between the KAI and divergent production scores on the Guilford Consequences and Alternate Uses tests, and found that innovators produced a higher number of uncommon responses, and a higher number of responses overall. In line with the interactionist perspective (Woodman et al., 1993), it is likely that a constellation of variables such as task type and task motivation (e.g. Amabile, 1983; Pounds & Baily, 2001), mood (e.g. Jones & Kelly, 2009), framing effects (e.g. Dew, 2009) or creative self-efficacy interact with problem-solving style preferences in predicting actual creative behavior in specific situations.

Beyond Kirton, others have developed similar bi-polar and single dimensional measures of style. For example, Kaufmann (1979) and Martinsen and Diseth (2011) used the constructs of assimilator versus explorer to assess problem-solving styles in a similar manner to the KAI. Selby et al. (2004) provided a multi-dimensional measure of problem-solving style. They introduced three dimensions of problem-solving differences called orientation to change, manner of processing, and ways of deciding. The orientation to change dimension closely aligns (and significantly correlates) with the adaptor-innovator approach and was identified as developer-explorer styles. These terms were chosen in an attempt to reduce the natural positive bias around the term innovation. The preferences in this dimension are mainly driven by three sub-factors which they refer to as people's preference for novelty, dealing with structure and authority, and search strategy. They argued for including a dimension that addresses individuals' preferences for processing information including both internal and external styles. In addition, they asserted that it was important to include consideration of how individuals prefer to make decisions including both person and task styles.

Problem-solving style preferences influence how individuals learn, apply, and react to creative problem solving (Basadur et al., 2014; Puccio, 1999; Puccio, Wheeler, & Cassandro, 2004). For example, Isaksen and Geuens (2007) found significant differences between explorers and developers when it came to their enjoyment and use of generating (divergent) and focusing (convergent) creativity techniques, guidelines for both kinds of problem solving, as well as stages of the creative process.

Given these linkages, we argue that problem-solving style could be a particularly promising perspective to gain a deeper understanding of and how creativity training impacts the level of confidence that people have in their creative abilities. In this paper, our focus is not on actual creative performance but rather on a deeper exploration of how people change their beliefs in their creative abilities.

METHODS

Research Design

Regarding the ambiguous findings of previous research concerning the impact of creativity training on creative self-efficacy on the one hand, and the scarcity of research explaining how people actually alter the belief in their creative abilities on the other hand, we followed a mixed-methods approach (Johnson, Onwuegbuzie, & Turner, 2007; Molina-Azorin, 2011) to investigate the role of problem-solving style differences in this context. Edmondson and McManus (2007) argued that mixed-methods approaches are more suitable for uncovering underlying mechanisms in maturing fields such as our domain of interest. Furthermore, Gibson (2017) recently showed the value of mixed-methods studies in unraveling complex phenomena and called for more applications of such research designs.

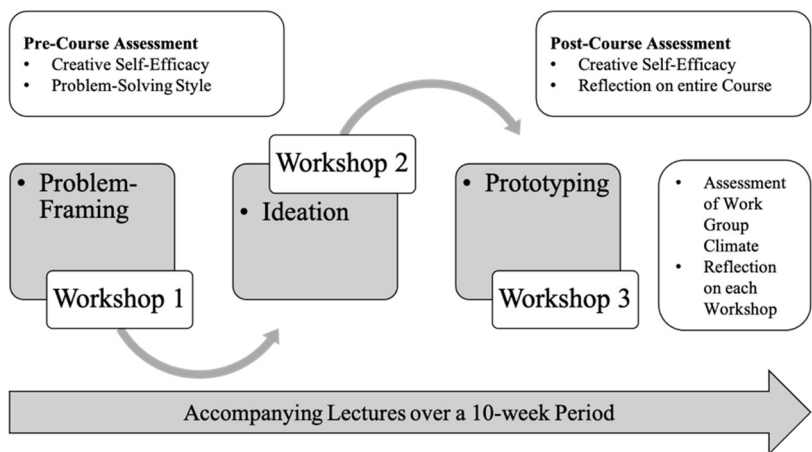
In this study, we combined a quantitative exploration of relationships between problem-solving style differences and creative self-efficacy in the context of creativity training with an in-depth qualitative analysis of how people were actually altering the belief in their creative abilities in this context. Our investigation is based on a graduate course at a German university that we redesigned for the purposes of this study. Figure One provides an overview of our research design and the multiple sources of data that we collected.

Following previous studies in this field (e.g. Mathisen & Bronnick, 2009; Meinel et al., 2018) our training intervention was based on both lectures and practical exercises related to the application of creative

problem-solving (Isaksen & Treffinger, 2004). As the course that we designed is part of a graduate program in human resources management, the overall theme focused on personnel training for innovation. Weekly 90-minute lectures over a period of ten weeks included content related to creativity and innovation such as creative process frameworks, theories of cognitive style, or innovation coaching, as well as content related to human resources management such as general vocational training. Given the focus of our study, the concept of creative self-efficacy, and self-efficacy theory were not part of the course content. All students participated voluntarily and were offered course credit regardless of their performance as an incentive for their participation. An overview of the elements of our training intervention is provided in Table One.

Following meta-analytical evidence that training programs focusing on realistic domain-relevant exercises to develop cognitive skills and related processes such as problem identification, idea production, conceptual combination, or solution monitoring are most effective (Scott et. al., 2004a), our course design incorporates a series of workshops. Furthermore, unlike most of the previous studies in this field (see Gist, 1989, for an exception), the practical applications of creative problem-solving in our course are not based on invented or artificial problems, but rather on real organizational challenges. Therefore, we formed a partnership with a local subsidiary of a global IT company that specializes in selling customized digital solutions and providing customer support for these systems. Senior managers of this subsidiary identified current challenges that we used as tasks for our training intervention. Ensuring that students have the domain-specific knowledge relevant for creative problem-solving (e.g. Julmi & Scherm, 2015; Reiter-Palmon, Illies, Kobe Cross, Buboltz, & Nimps, 2009), these tasks were related to the field of human resources management (see Table One for an overview). More specifically, as it is shown in Figure One, the applied part of our training intervention consists of three four-hour workshops reflecting different stages of the creative problem-solving process (Isaksen & Treffinger, 2004).

**FIGURE 1
OVERVIEW OF RESEARCH DESIGN**



Within these workshops, students applied creative problem-solving in groups of five to seven people on the practical challenges that they did not know before participating in the first workshop. At least two representatives of the partnering organization were present in each workshop to present the task, answer questions, and guide the creative process by providing direction for generating and focusing options. The tasks of the second and third workshop were dependent on the outcomes of the respective previous workshop that were reviewed by the partnering organization. All tasks were framed in accordance with the language recommended by Isaksen, Dorval, and Treffinger (2011) for different stages of the creative process (see Table One for an overview of all task statements). Each workshop followed a similar structure outlined in Table One. The main elements of each workshop were two distinct phases focusing on generating different options to address the respective task. This has been done by applying various generating techniques and selecting the most promising options by using various focusing techniques.

Consistent with Mathisen & Bronnick’s (2009) course design and most other previous studies in this field, we used warm-up exercises and examples to make participants familiar with these techniques. Furthermore, consistent with Gist’s (1989) intervention design, students were instructed to follow distinct guidelines for creative collaboration in the generating and focusing phases (see Table One).

Students completed a survey prior to the course assessing their level of creative self-efficacy and their problem-solving style. They also reflected on each workshop by quantitatively assessing the climate, that we defined as perceived behavioral patterns within participant’s immediate work group (Ekvall, 1996; West, 2002), and qualitatively identifying helpful and hindering factors as well as proposed changes to improve their perceived individual creative performance in the respective workshop. Finally, they reflected on the entire project and completed a questionnaire to reassess their level of creative self-efficacy.

In line with previous studies in this field, our intervention was designed to provide opportunities to experience the sources of self-efficacy described by Bandura (1997). More specifically we provided opportunities for enactive mastery experiences (e.g. by applying creative problem-solving on meaningful tasks), vicarious experiences (e.g. by observing group members applying the different techniques), verbal persuasion (e.g. by encouragement and appreciation through the partnering organization), and positive affective states (e.g. by playful warm-up exercises).

TABLE 1
ELEMENTS OF THE CREATIVITY COURSE

Element	Description		
Course Lectures	<p>Related to Creativity and Innovation:</p> <ul style="list-style-type: none"> • Process Perspectives on Creativity and Innovation • Cognitive Style & Problem-Solving • Innovation Coaching and Individual Roles • Talent Management in Context of Innovation • Team Development in Context of Innovation • Work Environment for Creativity and Innovation <p>Unrelated to Creativity and Innovation:</p> <ul style="list-style-type: none"> • General Vocational Training • Digital Learning • Internationalization 		
Workshops (4-hours each)	<ul style="list-style-type: none"> • Introduction • Warm-up • Task Presentation by the Client • Generating Phase • Focusing Phase • Summary by the Client • Next Steps 		
Workshop 1: Problem Framing Target: Definition of the problem from many perspectives	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">2018 Wouldn’t it be nice if we could help to lead the way in attracting talent to the region?</td> <td style="width: 50%; vertical-align: top;">2019 Wouldn’t it be nice if our employees try to explore new ways of doing things in their day to day work?</td> </tr> </table>	2018 Wouldn’t it be nice if we could help to lead the way in attracting talent to the region?	2019 Wouldn’t it be nice if our employees try to explore new ways of doing things in their day to day work?
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Workshop 2: Ideation Target: Creation of novel and useful ideas to address the selected problem	2018 How might we collaborate with partners to attract talent to the region?	2019 How can we motivate our employees to be proactively creative and avoid negative experiences?
Workshop 3: Prototyping Target: Elaboration of promising Ideas	2018 How can we create a shared talent pool with other organizations? How can we better collaborate with influencers and bloggers?	2019 How can we create local initiatives and structures to explore ideas together? How can we better communicate corporate global initiatives locally?
Applied Techniques	Generating: <ul style="list-style-type: none"> • Brainstorming • Brainwriting • Mind-Mapping • Guided Imagery • Visually Identifying Relationships • Reverse Technique (Headstand) • Morphological Matrix • LEGO Serious Play 	Focusing: <ul style="list-style-type: none"> • Selecting Hits • Highlighting (Idea Clustering) • Developing Criteria • ALuO (Advantages, Limitation, unique Qualities, overcoming Limitations)
Applied Guidelines	Generating: <ul style="list-style-type: none"> • Defer Judgment • Strive for Quantity • Freewheeling is appropriate • Build on each other's Ideas 	Focusing: <ul style="list-style-type: none"> • Affirmative Judgment • Consider Novelty • Be Deliberate • Stay on Course

Furthermore, we deliberately designed the training in a style-neutral way by applying a variety of creativity techniques that facilitate both, development of incremental ideas within existing boundaries, as well as exploration of completely new ideas regardless of the existing boundaries (McFadzean, 1998). For example, we used techniques designed to facilitate associative thinking by using stimuli that are more or less related to the task such as the morphological matrix as well as techniques designed to facilitate imaginary thinking with stimuli unrelated to the task such as guided imagery or other excursion tools (Isaksen et al., 2011). We also balanced techniques based on verbal (e.g. brainstorming) and non-verbal (e.g. brainwriting) information processing. Beyond the practical design of the workshops, the accompanying lectures provided participants with information on types of creativity and how problem-solving style preferences relate to creative processes.

Due to a small number of available students in our graduate program, we were not able to differentiate between different treatment groups and a control group which constitutes a limitation of this study. Yet, our course design involving extensive workshops with a partnering organization would have been impractical with a large number of students. Furthermore, the relatively small number of students gave us the opportunity for an in-depth exploration how they experienced the training in regard to their creative self-efficacy beliefs constituting our main contributions in this paper.

Measures

We measured problem-solving style differences by applying the VIEW assessment that corresponds to the three-dimensional conceptualization of style differences described above (Selby et al., 2004). Each dimension is measured on a bipolar seven-point scale on which participants should indicate to what extent two opposing manifestations of the statement “*When I am solving problems, I am a person who prefers ...*” applies to them. The orientation to change dimension of style was assessed by 18 items with five items assessing the novelty, structure and authority, and search strategy sub-dimensions respectively, and three additional items assessing the overall orientation to change dimension. The manner of processing and ways of deciding dimensions were assessed by eight items respectively. A sample item includes: “*to let my ideas flow freely*” as a description of an exploratory compared with “*to search for practical ideas*” as a description of a developmental search strategy. The orientation to change dimension has a theoretical mean of 72 with lower scores representing an exploratory (out-of-the-box thinking) preference and higher scores representing a developmental (inside-the-box thinking) preference. The three sub-scales of this dimension have a theoretical mean of 20 and the same direction of scores towards the respective style preferences. The manner of processing and ways of deciding dimensions both have a theoretical mean of 32 with lower scores indicating an external and person-oriented and higher scores indicating an internal and task-oriented style preference.

The perceived group climate in each workshop was assessed by the Situational Outlook Questionnaire (Isaksen, 2007). In line with previous studies showing a productive use of shorter versions of the original 53 items (e.g. Bertels, Kleinschmidt, & Koen, 2011), we used nine items assessing different dimensions of creative climate (i.e. challenge and involvement, freedom, trust and openness, idea-time, playfulness and humor, conflict, idea-support, debate, and risk-taking). The items are scored on a four-point scale including a positive and negative description of its observable manifestations and the referent of the items was changed into the respective group of participants. For example, we used “*The atmosphere in this team is rigid and characterized by gravity and seriousness. The atmosphere is stiff, gloomy, and cumbersome. Jokes and laughter are regarded as improper.*” as a negative and “*The atmosphere in this team is relaxed with good-natured joking and laughter. People can be seen having fun. The climate is seen as easy-going and light-hearted.*” as a positive anchoring description to assess the degree of perceived playfulness and humor in the respective groups. We aggregated all items to get a global climate score of each workshop.

Consistent with most previous studies in this domain, creative self-efficacy was measured by three items (Tierney, 1997; Tierney & Farmer, 2002) scored on a seven-point unipolar scale. All assessments were administered in German to provide participants the opportunity to respond in their natural language. They were translated from their original English version by applying to the guidelines for cross-cultural translation of assessments (Brislin, 1970; Geisinger, 1994). After two people who are familiar with the conceptual foundations translated the items into German, two other people unfamiliar with the original wording translated them back into English for comparison.

Data Analysis

In a first step, we conducted paired t-tests to determine if people changed the level of confidence in their creative abilities before and after their participation in the course. Furthermore, we explored the potential relationships of problem-solving style and creative self-efficacy beliefs in this context by examining correlations between these variables. In order to uncover the underlying mechanisms how people changed the level of confidence in their creative abilities, we inductively derived themes from the narrative reflections of participants by applying open coding and constant comparison of these themes (Saldana, 2016). In a next step, we categorized these themes into Bandura’s (1997) sources of self-efficacy by applying a deductive logic. Building on this, we explored similarities and differences in the perception of the sources of self-efficacy. Therefore, we linked the qualitative data to participant’s problem-solving style preferences. More specifically, we categorized participants into different groups based on their scores relative to the theoretical mean of these scales to allow for a systematic comparison of the coded narrative data in the software Atlas.ti. For example, all participants scoring below the theoretical mean of 72 on the

orientation to change scale made up the explorer group and those scoring above the mean made up the developer group.

RESULTS

Quantitative Findings

Forty-one students took part in this study and completed the course in 2018 (31) and 2019 (10) respectively. Gender was not distributed equally, as 34 participants were female. Table Two shows the descriptive results and correlations among the variables included in this study. As indicated, one participant did not provide data for the reassessment of the creative self-efficacy level, resulting in 40 paired datasets of pre- and post-study assessments. Furthermore, some participants did not provide usable data reflecting their perception of the group climate in each workshop, resulting in 34 complete datasets across all variables included in the study.

As shown in Table Two, the distribution of the problem-solving style dimensions in this sample is relatively balanced, yet shows a tendency towards the developer and external style. Ratings of creative self-efficacy prior to the course are relatively high above the theoretical scale mean of 4. Ratings of creative self-efficacy after the course reflect an increased mean of 5.2. Ratings of group climate across all workshops reflect a generally positive perception (above the mean) with only small variations. The reliability of the scales is generally acceptable, yet the structure and authority and search strategy sub-scales of the orientation to change dimension of problem-solving style as well as the assessment of workgroup climate in the first workshop are slightly below .70.

TABLE 2
DESCRIPTIVE STATISTICS AND CORRELATIONS

Variable	n	Mean	1	1a	1b	1c	2	3	4	5	6	7	8	9
1 Orientation to Change (OC)	41	79.4	(.83)											
1a OC: Novelty	41	20.7	.85**	(.82)										
1b OC: Structure & Authority	41	22.2	.70**	.42**	(.66)									
1c OC: Search Strategy	41	22.9	.65**	.39*	.15	(.61)								
2 Manner of Processing	41	28.4	.35*	.38*	.23	.17	(.89)							
3 Ways of Deciding	41	31.0	.10	.02	.00	.36*	.36*	(.86)						
4 Group Climate Workshop 1	39	3.2	-.42**	-.42**	-.24	-.28	-.27	-.12	(.60)					
5 Group Climate Workshop 2	39	3.1	-.34*	-.27	-.28	-.19	-.30	-.05	.24	(.80)				
6 Group Climate Workshop 3	37	3.3	.16	.18	.06	.11	-.27	-.26	-.20	.24	(.85)			
7 Creative Self-Efficacy _{PRE}	41	4.7	-.47**	-.48**	.00	-.50**	-.30	-.33*	.12	.01	-.06	(.81)		
8 Creative Self-Efficacy _{POST}	40	5.2	-.41**	-.40*	-.03	-.42**	-.09	-.20	.25	.14	.10	.58**	(.76)	
9 Creative Self-Efficacy _{DIFF}	40	.50	.14	.16	-.04	.16	.25	.18	.13	.13	.17	-.58**	.33*	-

Note: Cronbach's Alpha values indicated in parentheses on the diagonal. * $p < .05$ ** $p < .01$

Our next step of the quantitative data analysis involved exploring the potential relationships of problem-solving style differences in regard to the impact of creativity training on creative self-efficacy. Therefore, we conducted the correlations of the style dimensions with the creative self-efficacy and climate assessments that are also shown in Table Two. The dimensions of problem-solving style show some intercorrelations indicating that participants tending more towards the developer style (especially within the novelty subscale) are also likely to have a more internal manner of processing information. Furthermore, participants with an internal style preference and those tending more towards the developer style on the search strategy subscale tend to have a more task-oriented deciding preference. Climate perceptions of the first two workshops only show negative correlations with the orientation to change dimension, indicating that people with an explorer preference experienced the climate in these workshops as more positive. The climate ratings of the third workshop did not show any significant correlations.

Creative self-efficacy ratings prior to participation in the course are strongly correlated with the overall orientation to change and novelty, as well as search strategy subscales and moderately correlated with the ways of deciding dimension of problem-solving style. This indicates that stronger preferences for the explorer and person style are associated with stronger beliefs in one's abilities to be creative. Although slightly weaker, these correlations are also present for the creative self-efficacy ratings after the intervention except for the ways of deciding dimension. Interestingly though, these correlations were not observed for the differences between the two creative self-efficacy assessments, suggesting that the quantitative change in the belief in people's creative abilities is not related to differences in problem-solving style. Rather, our results suggest that the difference is related to the initial level of confidence that showed a strong and significant negative correlation indicating that a lower level of creative self-efficacy before the training is associated with larger increases in creative self-efficacy after the training.

In order to determine if the observed difference between the assessment of creative self-efficacy before and after the training is statistically significant, we conducted paired t-tests presented in Table Three. This analysis showed a highly significant mean difference of .50 between the two assessments. A closer look at the three items of the scale revealed that the overall difference is mainly driven by the first item whereas the other two items showed smaller and insignificant differences before and after participation in the course.

TABLE 3
COMPARISON OF CREATIVE SELF-EFFICACY BEFORE AND AFTER THE TRAINING

Creative Self-Efficacy Scale	Mean Difference	SD	95% Confidence Interval	t	p
Scale	.50	1.00	.18 - .82	3.17	<.01
Item 1: I feel that I am good at generating novel ideas.	.75	1.24	.35 - 1.15	3.84	<.01
Item 2: I have confidence in my ability to solve problems creatively.	.40	1.35	-.03 - .83	1.87	.07
Item 3: I have a knack for further developing the ideas of others.	.35	1.39	-.09 - .79	1.60	.12

Note: *df*=39

Overall, the quantitative findings suggest that although participants' initial level of creative self-efficacy was influenced by their problem-solving style preferences, they were able to benefit from the training regardless of their style preferences and held generally positive perceptions of their work group climate throughout the training. The next section focuses on a deeper investigation of the sources of creative self-efficacy that participants perceived throughout the training to shed more light upon the mechanisms how they increased their beliefs in their creative abilities.

Qualitative Findings

Open coding and constant comparison of the narrative data concerning participant's reflections on their experiences within the workshops revealed 79 positive, and 65 hindering factors as well as 50 different actions how they might increase their individual creative performance.

Perceived Sources of Creative Self-Efficacy

As this study particularly aims at gaining deeper insights into the ways how different people develop confidence in their creative abilities through creativity training, the next step of our analysis focused on identifying Bandura's (1997) sources of self-efficacy among these coded factors. Table Four shows the most salient factors, that were coded at least five times, categorized into the four sources of self-efficacy. Enactive experiences, vicarious experiences, verbal persuasion, and affective states were all present in this study and described by participants in positive and negative manifestations as well as intended actions. Physiological states were also present (e.g. in form of tiredness) but not as salient as the affective states presented in Table Four.

TABLE 4
MOST SALIENT SOURCES OF CREATIVE SELF-EFFICACY OBSERVED
DURING THE TRAINING

2nd-order Category	Helpful Factors	Hindering Factors	Actions to increase Creativity
Experience of Creative Mastery	<ul style="list-style-type: none"> • developing ideas together (30) • gaining methodological experience (24) • letting ideas flow freely (23) • elaborating on ideas (14) • high creative performance of the entire workgroup (12) 	<ul style="list-style-type: none"> • feeling uncreative (16) • too much focus on quantity of ideas (12) • low creative performance of the entire workgroup (6) 	<ul style="list-style-type: none"> • share all ideas (8) • think less constrained (7) • build more on other's ideas (6)
Vicarious Experience of Creative Mastery	<ul style="list-style-type: none"> • highly creative group members (6) 	<ul style="list-style-type: none"> • highly creative group members (6) 	<ul style="list-style-type: none"> • focus attention more on own ideas (7)
Verbal Persuasion	<ul style="list-style-type: none"> • appreciative reception of ideas within the group (14) 	<ul style="list-style-type: none"> • discussing and questioning generated ideas (14) 	<ul style="list-style-type: none"> • encourage others to share all ideas (11)

	<ul style="list-style-type: none"> • being encouraged to share ideas (11) 		
Affective States	<ul style="list-style-type: none"> • positive mood and relaxed atmosphere (56) • perceived safety to share ideas (28) 	<ul style="list-style-type: none"> • feeling not safe enough to share ideas (10) • self-doubts (10) 	<ul style="list-style-type: none"> • overcome self-doubts (11) • deepen relationships to group members (8)

Note: The numbers in parentheses indicate how frequently the aspects were mentioned. The table includes all aspects that are based on at least five different quotations.

Our findings show that the most salient experiences of *creative mastery* were associated with jointly developing ideas, making learning experiences with the progress of the course, and experiencing the free flow of ideas. Some participants also indicated that they felt creative while deeper elaborating on ideas, or when their workgroup was very creative. Negative experiences refer to situations in which participants felt personally uncreative or longed for a deeper elaboration of ideas instead of focusing too much on the quantity of ideas. Some participants also referred to their respective group as a referent of these negative experiences. Most salient actions include sharing all ideas, building better on the ideas of others, and becoming free of cognitive constraints that participants also described as “*thinking more outside of the box*”.

Vicarious experiences of participants mainly referred to observing highly creative group members that was perceived both positively and negatively. As a positive factor, it was described as a source of motivation helping participants to exercise their own creativity. As a negative factor, it was described as a source of distraction exerting pressure to keep up with their peers. Most frequently mentioned actions refer to reducing the negative impact of social comparison by focusing the attention more on one’s own thoughts and ideas.

Verbal persuasion was most saliently manifested in the way ideas were treated within the respective group. Appreciative reception of ideas or being encouraged by others to share one’s ideas served as sources of building confidence in exercising one’s creative capabilities, while discussing or even questioning generated ideas was described oppositely. Many participants also indicated that they would improve their own and group’s creative performance by encouraging others to share more ideas and not to question their own thoughts.

Affective states referred mostly to positive mood and the relaxed atmosphere in the work groups. Another salient positive factor referred to the perceived psychological safety to share ideas or, in the opposite case, a lack of psychological safety indicating different perceptions among participants. Some participants also identified the deepening of relationships to their group members as an action how they could increase their creative performance. Furthermore, many participants mentioned self-doubts as barriers to exercising their creativity (e.g. thinking that their ideas are not good enough to share, or that they do not have the right thinking skills for being creative), and overcoming these self-doubts as important actions they would take to be more creative.

Problem-Solving Style Differences

In a next step, we analyzed how problem-solving style preferences influenced the perception of the sources of creative self-efficacy. For each style dimension, we categorized participants in two groups with opposing preferences and explored which factors were most salient in each group. We found that most differences across all four sources of creative self-efficacy were associated with participant’s preferred orientation to change, while their preferred manner of processing information and making decisions when solving problems showed more similarities. Table Five summarizes how participants with an exploratory

(out-of-the-box thinking) and developmental (inside-the-box thinking) problem-solving style perceived the sources of creative self-efficacy.

TABLE 5
INFLUENCE OF PROBLEM-SOLVING STYLE ON THE PERCEIVED SOURCES OF CREATIVE SELF-EFFICACY

Sources of Creative Self-Efficacy	Primarily observed among Explorers	Similarities	Primarily observed among Developers
Experience of Creative Mastery	<ul style="list-style-type: none"> • high creative performance of the group (+) 	<ul style="list-style-type: none"> • developing ideas together (+) • gaining methodological experience (+) • letting ideas flow freely (+) 	<ul style="list-style-type: none"> • elaborating on ideas (+) • feeling uncreative (-) • too much focus on quantity of ideas (-) • low creative performance of the group (-) • action: think less constrained • action: share all ideas • action: build more on other's ideas • highly creative group members (+/-) • action: focus attention more on own ideas
Vicarious Experience of Creative Mastery			
Verbal Persuasion	<ul style="list-style-type: none"> • discussing and questioning generated ideas (-) 	<ul style="list-style-type: none"> • being encouraged to share all ideas (+) • appreciative reception of ideas in the group (+) • action: encourage others to share all ideas 	
Affective States		<ul style="list-style-type: none"> • positive mood and relaxed atmosphere (+) • perceived safety to share ideas (+) 	<ul style="list-style-type: none"> • self-doubts (-) • feeling not safe enough to share ideas (-) • action: overcome self-doubts • action: deepen relationships to group members

Note: Positive factors are indicated with (+) and negative factors with (-).

As illustrated in Table Five, most of the differences that we observed were concerning the negative manifestations of the sources of creative self-efficacy as well as the actions for improving the own creative performance that were almost exclusively mentioned by developers. The only negative factor that was described primarily by explorers refers to discussing and questioning generated ideas. Situations in which they felt uncreative, not safe enough to share their ideas or had self-doubts were common experiences among developers. However, they also described a lot of positive experiences. This shows that developers had more ambivalent experiences during the course than explorers.

Although the most salient positive experiences of creative mastery were mentioned by explorers and developers, they emphasized different aspects of those experiences. Overall, explorers emphasized the positive experience of dynamic creative engagement within their groups. For example, they pointed out the *“mutual support to generate more ideas together”*, the *“inspiring dynamic of tossing around ideas in the group without critical discussion”* or referred to the joint development of ideas as *“collective mastery experience”*. In contrast, developers emphasized experiencing their own creativity in the group context. They often referred to the diverse creativity techniques helping them to let their ideas flow freely or other group members helping them to formulate and further develop their ideas: *“my ideas were elaborated in the group and new thoughts included so that the original idea was not as bad as I thought as the group played with it until everyone was satisfied”*. Elaborating on generated ideas was particularly important for developers as they also indicated too much focus on generating new ideas as negative experience: *“After sharing a rough idea, others continued to share completely different ideas so that it was difficult for me to further develop my thoughts.”* Beyond the different experiences of creative mastery, the positive experiences of verbal persuasion and affective states were relatively similar among explorers and developers. However, developers also described more negative manifestations of these factors illustrating their ambivalent experiences.

Interestingly though, none of the explorers referred to the impact of observing their group members being creative, while developers indicated both positive and negative descriptions of vicarious experiences. On the one hand, they felt distracted by highly creative group members and could not develop their own ideas: *„I was uncertain because one or two group members wrote down many ideas in a very short period of time. It kept disrupting my own thoughts and it was difficult for me to contribute my own ideas”*. On the other hand, they described highly creative group members as a source of inspiration helping them to activate their creative thinking: *„For one person in our group it was very easy to quickly generate novel and creative problem statements that motivated me and the rest of the group to generate novel and creative ideas as well.”*. This latter aspect can also be seen in combination with the need for external help in developing their own ideas described above.

The other two dimensions of problem-solving style did not demonstrate as profound differences as those observed in the orientation to change dimension. Yet, the interaction of style preferences across these dimensions may help to further uncover patterns concerning the perception of potential sources of creative self-efficacy. For example, building more on other’s ideas and sharing all ideas with the group as actions to be more creative were particularly emphasized among developers with a preference for an external manner of processing information, while deepening the relationships to group members was an important action among developers with an internal manner of processing information. Furthermore, the lack of psychological safety was more salient for person-oriented developers.

Although we observed that the change in creative self-efficacy was uncorrelated with participant’s problem-solving style preferences, our qualitative findings suggest that gaining or losing confidence in creative abilities did not happen in a uniform way. On the contrary, the same training course was perceived very differently. In particular, people with a developmental and exploratory approach to problem-solving seem to have different pathways for achieving creative mastery and responding to other potential sources of creative self-efficacy. We discuss the implications of these findings in the next section.

DISCUSSION

Motivated by the ambiguous findings concerning the impact of creativity training on creative self-efficacy and addressing the call for more research how individuals alter their beliefs in their creative abilities over time (e.g. Farmer & Tierney, 2017), this multi-method study explored how problem-solving style preferences influence how people change their beliefs in their creative abilities in creativity training. Both, our quantitative and qualitative findings, showed clear differences among individuals preferring a more developmental (inside-the-box thinking) and exploratory (outside-the-box thinking) approach to creative problem-solving concerning the level of confidence they have in their creative abilities and the way in which they change those beliefs. In this regard, our findings highlight the importance of considering problem-solving style, and especially people's orientation to change, in creativity training and provides pathways for future research to further unravel patterns how people gain and lose a sense of creative self-efficacy. More specifically, our study contributes to the existing literature in two key areas.

First, we shed more light upon the relationship between people's preferred cognitive style in solving problems and the level of creative self-efficacy they hold. Our results replicate earlier findings, that people with a preference for an exploratory approach to problem-solving tend to be more confident in their creative abilities (e.g. Phelan & Young, 2003; Tierney, 1997). We contribute to this literature by using a three-dimensional conceptualization of problem-solving style indicating that the preferred manner of processing information and making decisions when solving problems is likely to be unrelated to the general level of creative self-efficacy. Further, by exploring the sub-dimensions of people's overall orientation to change, we extend on the previous findings by providing preliminary evidence that this relationship seems to be mainly driven by the way how people prefer to search for alternatives (i.e. broad rather than narrow search strategy) and the type of novelty they prefer (i.e. radical newness rather than incremental improvements), and not the way in which they prefer to deal with external structure and authority. Both, novelty and search strategy, reflect the common bias within the implicit perception of creativity that is mainly associated with high degrees of novelty and originality as well as the term "out-of-the-box thinking" (Ramos & Puccio, 2014). While novelty and search strategy both refer to internal aspects that are directly related to the kind of ideas people prefer to generate, structure and authority refers to a desire or need to fit within the norms of the social context. These findings provide pathways for future research to further explore the relationship between people's orientation to change and the level of confidence in their creative abilities.

Second, we contribute to the literature investigating if and how people change their creative self-efficacy beliefs in creativity training. By taking a style-balanced training approach, we provide some empirical evidence that people can increase their level of creative self-efficacy regardless of their problem-solving style preferences. Most importantly, we deliberately investigated the qualitative perception of potential sources of creative self-efficacy throughout the training. We found that all of Bandura's (1997) theoretical sources of self-efficacy were perceived in various forms in our study. Yet, most interestingly, we observed clear patterns how the kind of mastery and other sources of creative self-efficacy participants experienced within the training differed based on their problem-solving style preferences, especially their orientation to change.

Participants with a preference for exploratory (out-of-the-box) problem-solving had more positive perceptions of the potential sources of creative self-efficacy and described their experiences in a simpler way. This means that their narrative comments were generally shorter and less contradictory compared to those with a preference for developmental (inside-the-box) problem-solving. Concerning the positive aspects, they pointed out the benefits of learning new skills, being engaged in challenging tasks and collaborating with creative people. In regard to negative aspects and things they would change to be more creative, they primarily referred to stopping criticism in the group and encouraging others to share more ideas. In contrast to this, participants with a preference for developmental (inside-the-box thinking) problem-solving had ambivalent perceptions of the potential sources of creative self-efficacy and described their experiences in a more complex, and sometimes contradictory way. They experienced mastery within the context of developing ideas together and realizing that they can make creative contributions (although sometimes incremental and triggered by other ideas as inspiration). Further, they also described negative

situations in which they felt uncreative, had self-doubts, or felt not safe enough to share their ideas with others. Interestingly, they were also more affected by the creative contributions of their peers that were described both positively and negatively. Considered from an interactionist perspective (Woodman, et al., 1993), this suggests that other individual differences or contextual factors may determine if people built or lose confidence in their creative abilities from observing their peers being creative. The other two dimensions of problem-solving style, the preferred manner of processing information and making decisions, showed less systematic patterns of different perceptions. Yet, the interaction of these dimensions might provide deeper insights into the ambivalent perceptions of different sources of creative self-efficacy.

Those findings indicate that the same training design was experienced very differently based on people's problem-solving style. Building a sense of creative self-efficacy might be a more complex issue for people having a developmental preference for solving problems as for those with an exploratory preference. As their preferred, and therefore unconscious and routinized, way of solving problems is not commonly associated with creativity (Ramos & Puccio, 2014), people preferring developmental problem-solving often do not think of themselves as creative people and besides learning new tools and skills in the training, they also need to overcome self-doubts. This may contribute to the more sensitive feelings concerning the reactions of their social context. Our results revealed a potential paradox. In order to follow their preferred way of thinking, developers often need other ideas as inspiration to experience creative mastery by building on and further developing those ideas, while this might at the same time foster their perception that their own ideas are not creative enough. Our results further suggest that resolving this paradox requires an especially positive work environment to install feelings of psychological safety (Edmondson, 1999) to take on the perceived risk of sharing ideas that are, from their perspective, not creative enough and, therefore, might expose them as low-performers in the training. In this regard, our results offer a new perspective on the mixed findings in previous studies in this field reporting that some training interventions led to a significant increase in creative self-efficacy and others did not.

Practical Implications

Taking a deeper look at the underlying mechanisms how people change their creative self-efficacy beliefs has several practical implications for the design of creativity training programs and other initiatives aimed at helping people to become more confident in their creative abilities. Building or losing a sense of creative confidence does not happen in a uniform way. Our study showed meaningful patterns concerning different ways to experience creative mastery and other potential sources of creative self-efficacy based on people's problem-solving style preferences. As people's confidence in their creative abilities is influenced by the common misconception of creativity with an over dominant focus on novelty and out-of-the-box thinking (Ramos & Puccio, 2014), an important aspect of creativity training, especially for people with little or no experience in creative problem solving, is to demonstrate that a diversity of different approaches to creative thinking exist. This can be done by showing how meaningful examples of thinking inside and outside the box have led to creative contributions. Such an approach will encourage people with different kinds of mastery experiences to contribute to creative processes in various forms.

Beyond this individual level, the deliberate consideration of problem-solving style differences also influences group dynamics. Main, Delcourt, & Treffinger (2019) found that providing group members feedback on their problem-solving style preferences significantly increased their creative performance compared to people working in groups that did not receive such feedback. We argue that incorporating problem-solving style preferences in creativity training programs will not only help people better understand how they can improve their individual creative thinking skills, but also how they can better leverage and find more confidence in their creative abilities when collaborating with others. Creativity trainers and facilitators should be aware of those differences and create appropriate conditions to enable people to have different experiences of creative mastery in order to become more confident in their creative abilities.

From an organizational perspective, the increasing relevance of creative capabilities combined with the increasing scarcity of the available talent pool leads to a growing need for developing (in addition to recruiting) creative talent. Hiring or promoting exclusively people with a natural preference for out-of-the-

box thinking for jobs that require higher levels of creativity would not only unnecessarily reduce the pool of available talent but also increase workforce homogeneity. Cognitive diversity (i.e. differences in preferred thinking styles) can lead to more creative results, yet this requires that people are confident enough in their creative abilities to deal with those diverse perspectives (Shin, Kim, Lee, & Bian, 2012). Human resources managers should be aware of the influence of problem-solving style preferences on creative thinking and target talent development initiatives not only at developing creative thinking skills but also fostering people's confidence in their creative abilities. Our results suggest that those initiatives should be either style-balanced to enable a broad diversity of creative self-efficacy building experiences or tailored to the specific needs of a group's cognitive diversity (e.g. customized training programs) or individual problem-solving style preferences (e.g. coaching programs).

Limitations

The findings of this study should be regarded in light of several limitations. Given our main interest in exploring the underlying mechanisms how problem-solving style preferences influence the way in which people change their creative self-efficacy beliefs in context of creativity training, we only worked with a small sample of students and did not employ a control group. Therefore, the quantitative findings concerning the increase in creative self-efficacy as a result of the training need further confirmation, although triangulating the qualitative observations provided a good impression of the general effectiveness of the training approach. Another limitation lies in the distribution of problem-solving style preferences in our sample that is skewed toward an developmental orientation to change. As most of our findings relate to the orientation to change dimension, it should be taken into account that experiences from people with more exploratory problem-solving preferences might be underrepresented in our study. Although we might have observed other experiences if we had more participants with an exploratory problem-solving style, the qualitative elaboration on participants experiences revealed clear and meaningful differences how people with an exploratory and developmental problem-solving style perceived the potential sources of creative self-efficacy throughout the training.

Future Research

To our knowledge, this study was one of the first deliberate explorations how problem-solving style preferences influence the way in which people change their beliefs in their creative abilities in the context of creativity training. Our findings provided some preliminary empirical evidence that problem-solving style differences can help to deepen our understanding if and how creativity training alters people's confidence in their creative abilities.

Addressing the limitations of this study, future research should investigate if the same patterns are also found across different training approaches (e.g. working on real or invented tasks or different durations of the training) and outside the university context. Also, it would be interesting to study how long these effects last by using larger sample sizes and employing control groups. Furthermore, future inquiry should take actual creative performance into account to investigate the (in)congruence of people's self-perceived creative ability and the actual quantity and quality of their ideas.

Based on the correlations of the three sub-dimensions of people's overall preferred orientation to change with their level of creative self-efficacy, future research should investigate if novelty, search strategy, as well as structure and authority should be treated as separate constructs instead of aggregating them into a single orientation to change dimension in order to predict people's level of creative self-efficacy.

We also suggest that future studies should take a closer look at potential interaction patterns between the other dimensions of problem-solving style. Although our findings did not reveal major differences concerning people's preferred manner of processing information and making decisions when considered as separate dimensions, the interaction of those dimensions might help to further explain the ambivalent experiences that we observed concerning participant's preferred orientation to change. For example, the different perceptions of highly creative group members among developers might be explained by interaction patterns with the other two dimensions of problem-solving style. Due to our small sample size, we did not have enough data to further explore these patterns as not all theoretically possible style combinations were

present in our sample. Purposefully sampling people with extreme combinations of style preferences would be a promising next step to further unravel how the interaction of problem-solving style dimensions might influence the development of creative confidence in creativity training.

Another pathway for future inquiry in this domain is concerning the conceptualization of creative self-efficacy. We found that, although our training intervention led to a general increase in participants level of confidence in their creative abilities, this increase was mainly driven by participants confidence to generate ideas. The other two items of the scale that we applied did not show significant differences when considered separately. Abbott (2010) disentangled two forms of creative self-efficacy called creative thinking and performance self-efficacy. According to this differentiation, the positive impact of our training approach is mainly concerning creative thinking efficacy rather than creative performance efficacy. Furthermore, Beghetto and Karwowski (2017) recently argued that the way in which creative self-efficacy is currently measured (i.e. by retrospective judgments applying the widely used scale of Tierney & Farmer, 2002) is more congruent with the stable trait-like notion of creative self-concept and lacks a future-oriented and dynamic perspective that would be more in line with general self-efficacy theory. Karwowski, Han, & Beghetto (2019) provided a recent example how micro-longitudinal approaches can enhance our understanding of creative self-efficacy by dynamically exploring its fluctuations across different tasks and situations. A time-lagged perspective could also help to better understand how the potential sources of creative self-efficacy interact with each other (e.g. observing highly creative group members while being in a positive or negative affective state). Combined with the problem-solving styles perspective, this line of research could help to unravel which situational cues work for whom under what circumstances to induce feelings of creative confidence that have great potential for the deliberate management of creativity in organizations.

CONCLUSION

Without feelings of confidence in their creative abilities, people are less likely to engage in creative processes. The common bias in the perception of creativity toward out-of-the-box thinking is associated with self-doubts and lower levels of confidence in their creative abilities for people with a natural preference for inside-the-box thinking. However, both kinds of thinking can lead to creative contributions and people can learn to think more creatively by training their creative abilities. Beyond learning creative thinking skills, this study showed that creativity training can also induce feelings of confidence in people's creative abilities regardless of their problem-solving style. Yet, these stable and implicitly held individual preferences influence the manner in which this process occurs. This holds true particularly for those who have a preference to solve problems by thinking more within or outside the box. Creating conditions to enable different kinds of creative efficacy-building experiences is critical for an inclusive design of creativity training and other initiatives aimed at developing creative talent in organizations.

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