Creative self-efficacy: An intervention study

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A R T I C L E   I N F O

A B S T R A C T

This study examined the effects of creativity training on creative self-efficacy. We developed a creativity course based on social cognitive theory. The course was conducted in two formats: a five-day course and a condensed one-day course. Samples consisted of students and municipality employees (five-day course), and special education teachers (one-day course). Students from a mathematics and statistics course constituted a control group. We measured creative self-efficacy before and after the intervention, and self-efficacy improved significantly for both the five-day and the one-day courses, while the control group showed no changes in creative self-efficacy. Self-efficacy levels increased significantly for both students and municipality employees. A follow-up assessment two months after completing the five-day course showed no decline in creative self-efficacy.

1. Introduction

Several individual and contextual factors, such as personality, cognitive style and psychosocial work environment, influence creative performance (e.g., Barron & Harrington, 1981; Oldham & Cummings, 1996; Scott & Bruce, 1994). Recently, researchers have started to address more closely the mechanisms through which these factors promote creativity, and by doing so, try to open the "black box" (e.g., Choi, 2004; Zhou & George, 2001). One relevant concept in this regard that has received attention is creative self-efficacy, defined as "the belief one has the ability to produce creative outcomes" (Tierney & Farmer, 2002, p. 1138). Creative self-efficacy is derived from Bandura's (1997) more general concept of self-efficacy, explained as a person's belief that he or she can successfully perform in a particular setting. Bandura recognized a likely relationship between self-efficacy and creative performance.

> "Innovativeness requires an unshakable sense of efficacy to persist in creative endeavors when they demand prolonged investment of time and effort, progress is discouragingly slow, the outcome is highly uncertain, and creations are socially devalued when they are too incongruent with pre-existing ways." (Bandura, 1997, p. 239)

Thus, creative effort is usually a demanding activity requiring time and effort. Since it has a high risk of failure, it is paramount to maintain persistence in order to allow continuous creative action in the face of various hindrances. Given these demands, creative self-efficacy may be a necessary precursor of creative effort (Tierney & Farmer, 2002).

Since creative self-efficacy is a vital antecedent of creative behaviour and performance, we assume that efforts to enhance belief in one's creative abilities should be a central component of creativity courses and interventions. However, to our knowledge, only a couple of studies have examined training effects on creative self-efficacy (Gist, 1989; Locke,

Frederick, Lee, & Bobko, 1984). Therefore, the main aim of the present study was to investigate effects of creativity interventions on creative self-efficacy.

1.1. Creative self-efficacy and creative performance

Initial work in the area of creative self-efficacy has helped to establish conceptual and empirical support for the assertion that creative self-efficacy is related to creative performance. In an early study, Schack (1989) concluded that creative self-efficacy was a significant predictor of students' initiation of independent projects. Similarly, Choi (2004) demonstrated that a positive relationship existed between undergraduate students' creative self-efficacy and teachers' evaluations of the students' creative performance. Moreover, Choi found that creative self-efficacy completely mediated the effects of individual (personality, ability, and motivation) and contextual (social influences from leaders and peers) variables. This finding indicates that creative self-efficacy plays an important role in explaining how, and why, specific individual and contextual variables are related to creative performance. Tierney and Farmer (2002), who included two samples of employees from a manufacturing division and an operation division, found that creative self-efficacy significantly predicted supervisors' ratings of employee creativity. A similar relationship was found in a study involving an R&D unit of a chemical company (Tierney & Farmer, 2004). Finally, in a recent study, Carmeli and Schaubroeck (2007) demonstrated that creative self-efficacy predicted self-reported creative work involvement in a sample of two financial service organizations in Israel. Thus, findings from both a school context and a work context indicate that creative self-efficacy is an important precursor of creative effort and performance.

Hypothesis 1. A positive relationship exists between creative self-efficacy and creative performance.

1.2. Training for creative self-efficacy

According to Bandura (1997, p. 80), self-efficacy is best achieved by combining the development of knowledge of rules and strategies for the person's actual area of interest, while being self-assured that they can use these rules and strategies well. Thus, improvements in self-efficacy result from the cognitive processing of information about one's capability provided by performance success or failure (Bandura, 1997). Confirming this theoretical view, Schunk and Rice (1987) found that instructions in cognitive strategies, and practice in using such strategies, did not improve children's self-efficacy. On the other hand, reminders from instructors that the children were exercising better control over the tasks when they used the strategies, and conveying success feedback as confirmation that they were applying the strategies well, substantially improved the children's self-efficacy beliefs. Thus, cognitive training seems to be a more effective intervention strategy for enhancing self-efficacy than lectures and instructions alone.

A pioneering study of the effects of training and creativity-related self-efficacy on idea productivity demonstrated that the same theoretical principles seem to apply regarding creativity-related self-efficacy (Locke et al., 1984). The results from this study showed that training in cognitive strategies for thinking creatively, as well as in self-efficacy, was related to idea generation. The training procedure, in which the participants learned how to use three methods of idea generation for using objects, also resulted in elevated levels of self-efficacy. Additionally, Gist (1989) compared the effects of two different types of creativity interventions on creative self-efficacy, the first being a combination of lectures and practicing brainstorming, the second also including cognitive modeling. Cognitive modeling was provided by giving demonstrations of thought patterns that corresponded with the guidelines for brainstorming, such as not criticizing ideas, building on each other's ideas, and free association. Both intervention methods had positive effects on creative self-efficacy, but the one that included cognitive modeling was the most effective. While these two early studies made significant contributions to explaining training effects on creative self-efficacy, both studies had a relatively narrow approach to creativity because creative self-efficacy was assessed as the belief in one's ability to produce lots of ideas. However, additional attitudes are needed in order to behave creatively, such as confidence in one's ability to generate novel and useful ideas that can solve problems. Thus, more recent models of creative self-efficacy include broader aspects such as confidence in solving problems creatively and a special knack for developing others' ideas further (see Tierney & Farmer, 2002). Furthermore, the interventions were dominated by idea generation techniques, while idea evaluation and selection techniques were not included.

The present study elaborates upon these early studies by including a broader approach to creativity training and creative self-efficacy, as described in the Method section. Since Gist (1989) used a design that compared two creativity training groups without a no-training control group, there is a chance that the improvements in creative self-efficacy were due to the Hawthorne effect, particularly since positive effects were found in both groups. As a result, in the present study, we included a control group that received a completely different intervention (statistics and mathematics course) from the creativity intervention in an attempt to rule out the Hawthorne fallacy.

Hypothesis 2. Participants receiving a creativity training course will develop higher creative self-efficacy than participants receiving statistics and mathematics training.

The duration of an intervention may also have an effect on creative self-efficacy. While both Gist (1989) and Locke et al. (1984) found effects after a few hours of training, we assume that the effects would be stronger with longer interventions. This would be expected as such interventions offer the possibility for more demonstrating, practicing, and feedback than do

shorter interventions that need to devote a larger amount of the available time to lectures given by the course leader. In order to test these assumptions, we developed two different courses, one lasting a day, the other lasting five days.

Hypothesis 3. Participants receiving a five-day creativity training course will develop higher creative self-efficacy than participants receiving a one-day course.

Studies of training effects on creative self-efficacy have so far been conducted in an organizational setting that includes managers (Gist, 1989), or in a university setting involving students (Locke et al., 1984). Managers are often highly motivated individuals who, on introduction of the training, demonstrate relatively high levels of general self-confidence (Kirkpatrick & Locke, 1991). Thus, creative self-efficacy interventions with managers may produce particularly strong effects. Furthermore, training within organizational settings using immediately relevant tasks may promote, to a greater extent, a feeling that one can be creative in order to solve work-related problems. On the other hand, students may be more likely to experience the tasks as being hypothetical and less relevant to their situation as students. Also, we may assume that participants who attend the course during work hours, as well as in their spare time, are more motivated than students whose main motivation for attending may be to gain credits. Partially supporting this view, creativity intervention studies have suggested that training in organizational settings is more effective than training in academic settings that include students (Scott, Leritz, & Mumford, 2004). On the other hand, in their study that included a student sample, Locke et al. (1984) found that creativity training had a positive effect on self-efficacy. To date, no studies have included both student and organizational samples in order to study more directly the possible differences in the effects of training on creative self-efficacy. Therefore, we aimed to perform such a comparison in the present study.

Hypothesis 4. Participants from organizational settings will develop higher creative self-efficacy than student participants.

Effects from creativity training are of little consequence unless they endure. A potential problem with most creativity training studies is a failure to use designs that can demonstrate long-term robustness of training effects (see Scott et al., 2004). Results from one study, however, demonstrated long-term effects of creativity training on idea fluency, flexibility and originality of ideas (Glover, 1980). Nevertheless, no studies have investigated the long-term effects of training on creative self-efficacy. We may suppose that a few days of creativity training may lead to increased enthusiasm and creative self-efficacy immediately after finishing the training, but that after several weeks, this positive feeling will fade as the participants continue with their daily activities. On the other hand, given that the training provides significant experiences that radically change the participants' belief in their ability to act creatively, this effect may be long lasting. Furthermore, enhanced creative self-efficacy after course completion may also result in the participants behaving more creatively, which in turn may lead to further increases in creative self-efficacy from a long-term perspective. In order to explore these assumptions, we introduced two post training assessments of creative self-efficacy; one immediately after training and one two months after the end of training.

Hypothesis 5. The effect of training on creative self-efficacy will not decrease two months after the end of training.

2. Method

2.1. Experimental design and samples

A field experiment was designed to test the hypotheses concerning training effects on creative self-efficacy. The dependent variable was creative self-efficacy. Training was the sole independent variable in the design. The study included three interventions and one control condition, developed to evaluate the various research hypotheses. An overview of the intervention contingencies and sample sizes is presented in Table 1.

The total sample sizes consisted of 195, 152, and 27 participants, respectively, at preintervention, postintervention, and two months after the intervention had been completed. Intervention group 1 included third year bachelor degree students participating in a five-day course on creativity. The mean age of the participants in this group was 25 years and 43% were males. Intervention group 2 included municipal employees with higher education from several occupations, mainly nurses, architects and teachers. This group participated in an almost identical course to that taken by

Table 1
Overview of the intervention groups and the control group in terms of the research hypotheses.

	Intervention groups or control group	Hypothesis 1	Hypothesis 2	Hypothesis 3	Hypothesis 4	Hypothesis 5
1	Students attending a five-day creativity course ($n = 28$; $n = 26$; $n = 13$)	X	X		X	X
2	Municipal employees attending a five-day creativity course ($n = 25$; $n = 22$; $n = 14$)	X		X	X	X
3	Special education teachers attending a one-day creativity course ($n = 57$, $n = 53$)			X		
4	Students attending a course in mathematics and statistics (control group, $n = 85$; $n = 51$)	X	X			

Note: Numbers in parentheses indicate sample sizes at measurement times 1 (preintervention), 2 (postintervention), and 3 (two months after completing the intervention), respectively.

intervention group 1 but the course was organized as an integrated workplace-training program. The mean age of the participants in this group was 44 years and 32% were males. Intervention group 3 included special education teachers working in a school for children with learning disabilities. The teachers attended a one-day intensive course on creativity. For this group, the mean age was 42 years and 42% of the participants were males. Group 4 was a control group consisting of bachelor degree students attending a course in statistics and mathematics. The mean age of this group was 23 years and 32% were males.

2.2. Training approaches

The five-day intervention was a credit-bearing elective offered by the Faculty of Social Sciences at the University of Stavanger, Norway. Participants attended five-hour-long classes each day for one week. We attempted to develop a course that was in concordance with Bandura's (1997) sources of self-efficacy, as well as research findings on the types of training that are effective in promoting creative performance (see Scott et al., 2004). We emphasized three of Bandura's principles, namely enactive mastery experience whereby participants experience successful episodes that aim to build their creative efficacy belief, vicarious experience during which the participants observe the trainer or other participants using creative tools successfully, and verbal persuasion where the participants are convinced verbally that they possess the capabilities needed in order to act creatively.

The course was designed to include three primary components, each comprising approximately a third of the course. The first component included lectures, discussions, and demonstrations about central theories and research on creativity. The major topics were as follows.

(a) Defining creativity. A distinction was emphasized between "large C" creativity that describes unique attributes and activities belonging to very few individuals, such as famous artists and scientists, on the one hand, and "small c" creativity, on the other hand, which can be developed in most individuals (Gardner, 1993). The emphasis throughout the course was to point out that everyone can improve their creativity and be creative now and then, at least within their own context. In this way, the concept of creativity (i.e., verbal persuasion) can be demystified.
(b) Individual creativity and factors that promote as well as hinder creative performance. These lessons were based mainly on Amabile's componential model of creativity (Amabile, 1996), including domain-specific skills, creativity relevant skills, and motivation. The participants also read and discussed cases describing inventive national business people, the focus being on relating the cases to the component model.
(c) Factors that promote and hamper group creativity, such as social loafing, dominance by authorities, and cognitive factors. This lecture was based on Paulus and Nijstad's (2003) handbook of group creativity.
(d) Creative team climates, mainly derived from West's model of creativity and innovation implementation (West, 2002).

The second component of the course consisted of training in creative processes using an adapted and extended version of Creative Problem Solving, which includes several components that have documented effects on creative performance (Isaksen & Treffinger, 2004). A booklet describing numerous creative techniques, which was written for this special course, served as a "tool box". The participants, who were organized into groups of approximately five, stayed with the same groups throughout the course. This part of the course was introduced by learning relatively easy divergent and convergent techniques, such as brainstorming and brainwriting, and a selection of ideas using simple voting techniques. In this introductory section, there was a strong emphasis on following the guidelines for the successful use of divergent and convergent thought processes (Runco, 1999a, 1999b). This was achieved using simple problems such as "how to improve a hotel bed". The lecturer first explained the techniques and demonstrated how they could be used (i.e., vicarious experience). When they felt comfortable using these techniques, the participants' repertoire of techniques was gradually extended, and the groups were allowed to solve self-generated problems. Generous amounts of time were dedicated to discussions of positive and negative aspects of the techniques, and to provide feedback about how each member promoted the creative process and how the group functioned (i.e., enactive mastery experience and verbal persuasion). In these processes, the lecturer was available to provide feedback and praise for the groups when they showed behavior that promoted creativity (e.g., built on others' ideas, acted enthusiastically, and helped quiet members get a word in).

In the third component of the course, the participants were asked to plan and facilitate a creative process on a group outside the course, under the supervision of, and with feedback from, the lecturer. The problem should be a real one within an actual context, such as in their job or within their family. Our rationale was that this third component would promote participants' feeling of familiarity with creative processes, as well as their importance. The experience of facilitating a creative process would promote a feeling of being a specialist in the field, which in turn would promote the participants' creative self-efficacy (i.e., enactive mastery experience).

The one-day intervention lasted eight hours and was a condensed version of the five-day course. For the first component, the lectures were limited to presenting the main points, with case studies not being included. Although the second component included a reduced number of techniques, a relatively large proportion of the time was dedicated to practicing the creative process and providing feedback to each group member about their contribution to the process. The third component was not included.

The control group did not receive any creativity course but attended a class in statistics and mathematics.

2.3. Instruments

We measured creative self-efficacy with a three-item questionnaire, developed by Tierney and Farmer (2002) that included statements about perceived efficacy in producing ideas, solving problems, and in elaborating or improving upon others' ideas. The first version of this scale consisted of 13 items and reduced to three items after testing on a sample of 233 individuals and running of explorative factor analyses (Tierney & Farmer, 2002). The self-efficacy scale was scored on a seven-point scale ranging from 1 (disagree completely) to 7 (totally agree). Cronbach's alpha in the present study was .71. Means, Standard deviations, and ranges of the scale are presented in Table 2.

We measured creative performance by giving the following task to the participants: "List problems which might occur at work—your place of employment. These problems can be real (from your experience, or that of someone you know) or hypothetical and imaginary. Do not limit yourself; the more problems you can list, the better. (Do not worry about spelling, and take your time.)" (Runco, 2005). Two of the sub-samples in this study were students at a hotel management school, but we considered the task relevant since most of the students have part time jobs beside studies. In case there should be students not having a job, we added a sentence to the instruction "if you do not have a job, please list problems which may occur at your studies". However, no one used this option. Duplicates were removed, and the total number of generated problems was calculated for each participant. Mean, Standard deviation, and range of the creative performance measure are presented in Table 2.

2.4. Procedure and analyses

We used a quasi-experimental pre–post-test design. In the intervention groups, the self-efficacy measure was introduced at the beginning of the course and administered a second time at the end of the course. For the control group, we administered the self-efficacy measure at the beginning of a lecture and, after a week, repeated the procedure. For two of the intervention groups (groups 1 and 2, see Table 1), the self-efficacy questionnaire was administered a third time, two months after finishing the course. Data were collected by contacting the participants by individualized emails. The problem generation task was administered to groups 1, 2 and 4 (Table 1) at the same time as the second creative self-efficacy assessment. One of the authors of this article instructed the creativity courses.

In order to test whether the creativity training course would have a stronger effect on creative self-efficacy (intervention group) than a course in mathematics and statistics (control group, Hypothesis 2), a repeated-measures analysis of variance (ANOVA) was computed, with time being the repeated-measures factor (before and after the intervention), and a comparison of the intervention groups and the control group being a between-groups factor.

Table 2
Means, standard deviations and correlations between study variables.

	n	Mean	SD	Range	1	2	3
Total sample							
1. Creative self-efficacy Time 1	195	19.09	2.86	9–28	–		
2. Creative self-efficacy Time 2	152	20.26	2.97	12–28	.66**	–	
3. Creative self-efficacy Time 3	27	21.93	2.67	18–27	.48*	.68**	–
4. Creative performance Time 2	94	18.72	10.09	4–46	.27**	.35**	.39*
Students five-day course							
1. Creative self-efficacy Time 1	28	18.04	3.32	9–23	–		
2. Creative self-efficacy Time 2	26	20.81	2.40	16–24	.70**	–	
3. Creative self-efficacy Time 3	13	21.08	2.06	18–24	.39	.39	–
4. Creative performance Time 2	25	21.52	11.19	8–56	53**	.35	.31
Municipal employees five-day course							
1. Creative self-efficacy Time 1	25	19.52	3.08	15–28	–		
2. Creative self-efficacy Time 2	22	21.82	2.61	18–28	.52*	–	
3. Creative self-efficacy Time 3	14	22.71	2.99	18–27	.57*	.79**	–
4. Creative performance Time 2	22	23.18	9.92	8–49	.10	.24	.42
Special education teachers one-day creativity course							
1. Creative self-efficacy Time 1	57	19.21	2.55	14–26	–		
2. Creative self-efficacy Time 2	53	20.22	2.67	13–28	.65**	–	
Students mathematics and statistics course (control group)							
1. Creative self-efficacy Time 1	85	19.24	2.80	12–27	–		
2. Creative self-efficacy Time 2	51	19.33	3.37	12–28	.79**	–	
4. Creative performance Time 2	47	15.15	8.28	4–36	.20	.23	–

* $p < .05$.
** $p < .01$.

3. Results

Means, standard deviations, and correlations of the study variables are presented in Table 2. A zero-order correlation analysis showed a significant correlation between creative self-efficacy and creative performance measured at time 2 ($n = 94$; $r = .35$, $p < .001$). This finding supported Hypothesis 1. However, separate correlation analyses run for the specific groups showed that none of the correlations between creative self-efficacy and creative performance was statistically significant.

As shown in Fig. 1, there was a clear increase in self-efficacy at time 2, the ANOVA indicating a main effect of time ($F(1,71) = 28.68$, $p < .001$). There was also a significant interaction between group and time ($F(1,71) = 16.10$, $p < .001$). Results from a follow-up analysis with paired-sample t-tests showed that there was a significant increase in self-efficacy for the intervention group ($t(25) = 5.15$, $p < .001$), but not for the control group ($t(46) = 1.23$, $p = .227$). Thus, Hypothesis 2 was supported since the creativity course had a positive effect on creative self-efficacy, while the mathematics and statistics course did not have any effects.

Our next assumption was that the duration of creativity training would have a positive effect on creative self-efficacy, as stated in Hypothesis 3. As can be seen in Fig. 2, although both one-day and five-day creativity courses had a positive effect on creative self-efficacy, the effect was larger for the five-day course. The ANOVA showed a significant main effect of time ($F(1,73) = 39.62$, $p < .001$) and a significant interaction effect ($F(1,73) = 13.34$, $p < 001$). Results from a follow-up analysis using paired-sample t-tests showed that both the five-day intervention ($t(21) = 5.45$, $p < .001$) and the one-day intervention ($t(52) = 2.53$, $p < .05$) had positive, significant effects on creative self-efficacy. Nevertheless, the significant interaction indicated that the five-day creativity intervention had the strongest effect, supporting Hypothesis 3.
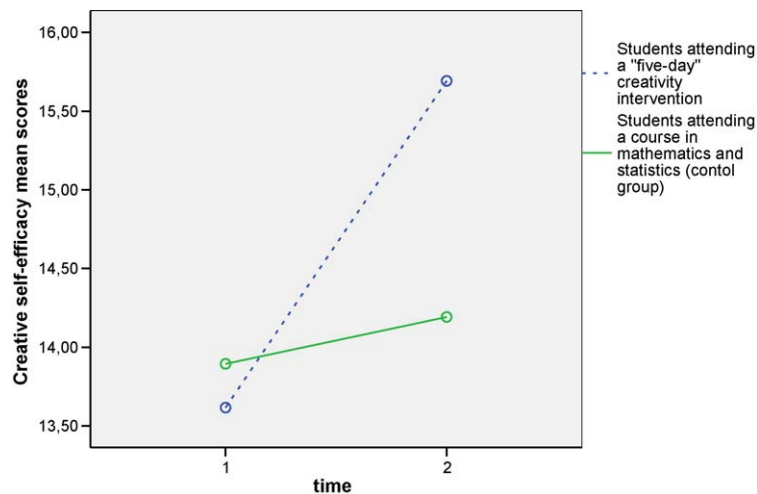

Fig. 1. A comparison of the effects of training on creative self-efficacy, measured before the intervention (time 1) and immediately after the intervention (time 2), for a student five-day intervention group and a student control group.
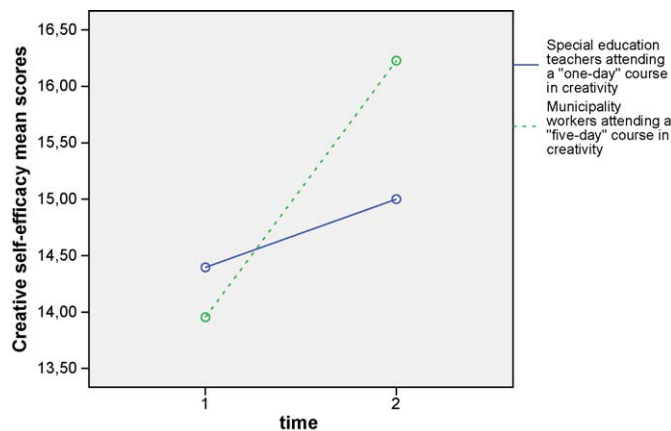

Fig. 2. A comparison of the effects of training on creative self-efficacy, measured before the intervention (time 1) and immediately after the intervention (time 2), for organizational employees attending a one-day and a five-day creativity course.
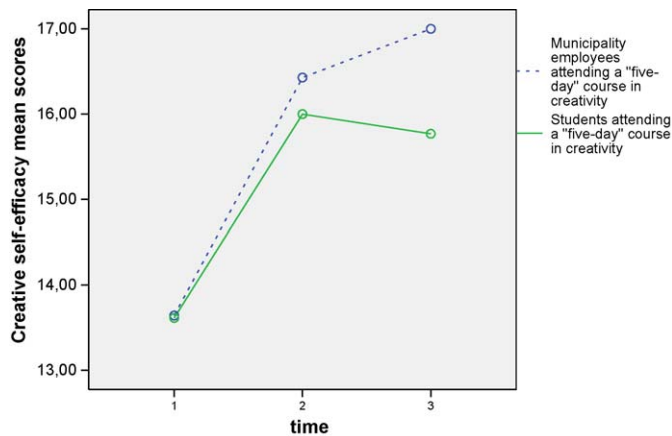
Fig. 3. A comparison of creative self-efficacy, measured before the intervention (time 1), immediately after the intervention (time 2), and two months after completing the intervention (time 3), for organizational employees and students who attended a five-day creativity course.

We further hypothesized that the five-day creativity course would have a stronger effect on creative self-efficacy when used with employees in an organizational setting than with students in a university setting (Hypothesis 4). As shown in Fig. 3, the creativity course seemed to have a strong effect on both students and municipality workers. The ANOVA showed a main effect of time ($F(1,46) = 55.70$, $p < .001$) but there was no significant interaction effect ($F(1,46) = 0.11$, $p = .738$). Results from follow-up analyses with paired-sample t-tests showed that interventions in both organizational ($t(21) = 5.45$, $p < .001$) and university settings ($t(25) = 5.15$, $p < .001$) had a significant and positive effect on creative self-efficacy, which did not support Hypothesis 4.

Finally, we expected that the effect of a course in creativity on creative self-efficacy would still be present two months after completing the creativity course (Hypothesis 5). Fig. 3 shows that the effect seemed to endure, and even to increase, for the municipality employee group, while there was a slight decrease in creative self-efficacy from time 2 to time 3 for the student group. Results from paired-sample t-test analyses showed that the changes in self-efficacy from time 2 to time 3 were not statistically significant for either the municipality employee intervention group ($t(13) = 1.42$, $p = .179$) or the student intervention group ($t(12) = 0.47$, $p = .650$). These findings are in concordance with the prediction of Hypothesis 5. The ANOVA results indicated no interaction effect ($F(1,25) = 1,60$, $p = .217$) from time 2 to time 3, implying that there were no significant differences between the student group and municipality employee group regarding the long-term effects of the interventions.

4. Discussion

This study investigated the effects of creativity training on creative self-efficacy. As one of the first to include a control group, the present study showed that creativity training had a positive effect on creative self-efficacy when compared with a course on statistics and mathematics. This finding ruled out the possibility that the Hawthorne effect might explain the improvement in self-efficacy. An implication arising from this finding is that creativity can be taught by enhancing individuals's belief in their own creative productivity. Possibly, after participants have become convinced that they have the necessary skills and knowledge to be creative, they persevere when meeting difficulties. In addition, they may quickly recover from setbacks, a behavior that is at the core of the self-efficacy concept. Consequently, while some components of creativity, such as personality and cognitive style, are stable and thus not easy to change, creative self-efficacy seems to be more amenable to change.

Another aim of the study was to compare the effects of training duration on creativity. Participation in both one-day and five-day creativity courses enhanced creative self-efficacy, although the effect of the five-day course was greater. A possible explanation of this finding may be that the more practice, feedback, and mastery experiences the subjects obtain, the greater will be their effects on creative self-efficacy. At the same time, since a one-day creativity course also had a significant effect on creative self-efficacy, a practical implication may be that interventions do not necessarily need to be long lasting in order to be effective. This makes it feasible to fit such courses into an already busy schedule. Nevertheless, the stronger effect of the five-day course may alternatively be explained as an incubation effect or by the fact that the two courses were somewhat different in content terms, or even the non-equivalence of the two groups of participants. Thus, there is a need for replication studies to rule out these possibilities.

As previous studies have suggested that creativity training is more successful in organizational settings than in academic settings, we examined whether the same applies to creative self-efficacy. However, our findings showed a large increase in creative self-efficacy both for students and within an organizational setting. Thus, it appears that duration and content are more important than the contextual setting within which the creativity course is conducted. In the creativity courses used in

this study, we strived to use examples relevant to the participants' daily settings, and after the introductory training, the participants were allowed to choose problems of current interest. Possibly, this gave all the students a feeling of having worked on problems of immediate relevance, as well as an increased level of confidence in their ability to master real-life problems, regardless of whether they belong to an academic or organizational setting. Thus, the most important issue is that the tasks and examples should be relevant to the actual context. In support of this view, a meta-analysis of creativity training studies reported that realism of practice exercises, as indicated by the content being related to the "real world", was positively associated with the effect size obtained in the complete study (Scott et al., 2004). A suggestion for further studies involves a comparison of the effects on creative self-efficacy of applying relevant and actual problems on the one hand, and examples from a more general framework involving simulated or more or less theoretical and irrelevant problems, on the other hand.

The last issue was concerned with the long-term effects of creativity training on creative self-efficacy, which were expected to still be evident two months after course completion. Our hypothesis was supported in that significant changes in creative self-efficacy did not occur in the period between time 2 (immediately after course completion) and time 3 (two months after course completion). Nevertheless, while the municipality employee group had a further increase in creative self-efficacy from time 2 to time 3, the opposite occurred for the student group. This may indicate that creativity interventions within organizational settings have greater long-term effects than within academic settings. However, as this effect was not statistically significant, this conclusion is only speculative. Thus, in general, our findings indicated that creativity courses have long-term effects on creative self-efficacy, meaning that the courses are more than simply fun but fruitless "happenings".

4.1. Methodological considerations

As is the case with most quasi-experimental studies, this study has several methodological limitations. First, while we found an overall significant positive relationship between creative self-efficacy and creative performance, these relationships were not significant when studying each of the groups separately. One reason for this is that with smaller samples the power declines; the correlations between creative self-efficacy and creative performance were identical for the student five-day course group and the total sample ($r = 35$), but reached statistical significance only for the total sample. Additionally, other factors than creative self-efficacy contribute to creative performance and self-efficacy may act more like a moderator than a direct predictor of creativity. However, this explanation is not plausible since several previous studies found that creative self-efficacy directly predicted creative performance (see the introduction of this paper). Another interpretation could be that our measure of creative performance focused on the fluency aspect of creativity and not other central aspects like originality and flexibility and thus was too narrow to grasp the whole concept of creativity. To conclude, since the correlations in our study were positive and in general moderate, and other studies have previously documented the predictive validity of the creative self-efficacy measure (Tierney & Farmer, 2002, 2004), we found it justifiable to apply it in the present study.

Since this study was conducted in a natural setting, we could not control sampling. This meant that the samples may not have been representative, and thus the findings may have limited generalizability. Furthermore, there was a substantial reduction in sample sizes from time 2 to time 3 (Table 1). There was also greater attrition in the control group than in the experimental groups, which could also invalidate comparisons. Additionally, the control group characteristics differed somewhat from the experimental group, in particular the participants were a bit younger. Consequently, there is a need for replications of this study.

A strength of the study in terms of external validity resulted from the use of samples from both an academic and an organizational setting. For both samples, positive effects of creativity training on creative self-efficacy were found.

A possible flaw regarding internal validity is that one of the authors of this study also served as a trainer in the creativity courses. There is the risk that demand characteristics and confirmation bias may have occurred, in which case the participants may have become aware of the research hypothesis, and to some extent, might have subconsciously sought confirmation of the hypothesis (see Nickerson, 1998). On the other hand, in a meta-analysis of the effects of creativity training, Scott et al. (2004) reported that studies in which the researcher was the trainer did not have larger effect sizes than studies in which the researcher was not the trainer, indicating that the abovementioned biases did not occur. Additionally, in order to reduce demand characteristics, during the course, information was not provided about the creative self-efficacy measure, so that the participants were as naïve as possible about the meaning of the concept.

4.2. Implications for educators

For educators, it is important to understand what factors that influence students' motivation and courage to engage in creative productive behavior. Creative self-efficacy theory asserts that students' belief about their ability to act creatively influences whether they even attempt to behave creatively, how much effort they are willing to use, and how long they preserve in the face of difficulty (Tierney & Farmer, 2002). The results from this study indicate that educators can boost students' creative self-efficacy when providing enactive mastery experiences, vicarious experience observing the educator or other participants using creative tools successfully, and verbal persuasion where students are convinced that they possess the capabilities needed in order to act creatively. The link between these teaching strategies and creative self-efficacy has

potentially important implications for educators in developing creativity-promoting educational environments. For instance, for students with low creative self-efficacy, teachers could structure tasks that allow the students to achieve successful results and ensure the students that they are capable to master tasks that are even more challenging.

5. Conclusion

The present study confirmed that creative self-efficacy can be improved through training. Moreover, our findings seem to be rather robust as the positive effects of training on creative self-efficacy were observed in both a student group and an organizational group, and the results were persistent over time. In particular, creativity training based on a cognitive modeling perspective seems to be a fruitful approach for schools and organizations that aspire to enhance creativity levels in their students or employees. As positive effects also resulted from a one-day creativity course, it is also suggested that this type of creativity training can be effectively and feasibly applied in natural settings. Nevertheless, although both five-day and one-day training had positive effects on creative self-efficacy, it is still unclear whether there are similar effects on creative performance. In the present study, we were only able to collect data on creative performance on one occasion. Thus, there is now a need for studies that examine both self-efficacy and creative performance before and after creativity training, and that compare the effects of different training conditions on both creative self –efficacy and creative performance.

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