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HOW CAN ART BE HELPFUL IN TEACHING ENTREPRENEURSHIP? CONSTRUCTIVE UNLEARNING AND POSITIVE EFFECTS ON ENTREPRENEURIAL SELF-EFFICACY: EMPIRICAL EVIDENCE

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How can art be helpful in teaching entrepreneurship? Constructive unlearning and positive effects on entrepreneurial self-efficacy: empirical evidence

ABSTRACT

In this paper we explore usefulness of art practices for teaching entrepreneurship on the example of one particular workshop. We analyze impact of the workshop on different dimensions of entrepreneurial self-efficacy and explore connections between self-efficacy, development of competences and unlearning. We find that teaching entrepreneurship through art can significantly increase different dimensions of entrepreneurial self-efficacy of students, especially the ones concerned with creativity and working in situations of uncertainty and limited resources. We also provide evidence for unlearning being strongly and positively correlated with improvement of competences.

Keywords: entrepreneurship education, self-efficacy

Using Art to Teach Entrepreneurship: Empirical Evidence of Efficiency of the Approach

Abstract: In this paper we explore usefulness of art practices for teaching entrepreneurship on the example of one particular workshop. We analyze impact of the workshop on different dimensions of entrepreneurial self-efficacy and study connections between self-efficacy, development of competences and unlearning. We find that teaching entrepreneurship through art can significantly increase different dimensions of entrepreneurial self-efficacy of students, especially the ones concerned with creativity and working in situations of uncertainty and limited resources. We also provide evidence for unlearning being strongly and positively correlated with improvement of competences. Our findings suggest implications for usage of art practices in entrepreneurship education in general, and for teaching effectuation and bricolage in particular.

Keywords: Entrepreneurship Education, Entrepreneurial Self-Efficacy, Art, Unlearning

INTRODUCTION

Economic growth and innovations are considered to be largely dependent on entrepreneurship (Landström, Harirchi, & Åström, 2012). Since Entrepreneurship Education (henceforth, EE) is widely recognized as important for stimulating entrepreneurship (e.g. Gorman, Hanlon, & King, 1997; Katz, 2007; Pittaway & Cope, 2007), the demand for and the offer of EE programs has been growing over the last years (Jones & Matlay, 2011; Kuratko, 2005; Neck & Greene, 2011). Moreover, enterprising skills are considered to be of importance not only for those starting a new venture, but also for people pursuing other careers (Gibb, 2002).

Yet, traditional entrepreneurship classes developing business planning, finance or management skills have a very limited focus that does not correspond well to what entrepreneurs really do. Entrepreneurs act in environments that are uncertain and fast-changing; they often have limited resources at their disposal and need to come up with creative ways to use what they have at hand (Baker & Nelson, 2005; Sarasvathy, 2009). In addition, traditional limited view of entrepreneurship does not fit well with a much broader understanding of entrepreneurship as method or everyday practice, suggested by many researchers (e.g. Neck & Greene, 2011; Sarasvathy & Venkataraman, 2011).

In search of new approaches to teaching entrepreneurship some authors turned to art and found it to be a very useful teaching tool (Bureau & Komporozos-Athanasidou, 2013). First of all, artistic practices can help students in learning to be more creative. Also, when students in entrepreneurship class are put into position of artists, it creates a significant disruption of what they are used to and introduces an absolutely different learning context. This drastic change of context leads to “shocks” which are “necessary for unlearning, new higher-level learning and readaptation to take place” (Cope, 2005). As will be discussed further, creation of a meaningful

piece of art makes students question their practices, ideas, beliefs and values. This questioning, enforced by unusual context, allows students to unlearn. Unlearning is crucially important for entrepreneurship education since what one has learned previously creates barriers preventing new learning (Navarro & Moya, 2005; Newstrom, 1983, p. 36), and entrepreneurial activities are often in conflict with conventional ways of doing things (Smilor, 1997).

In this paper we study an impact of one particular art-based workshop. Our findings show significant positive effect of the art-driven workshop on different dimensions of entrepreneurial self-efficacy (henceforth, ESE). We demonstrate that art practices embedded in EE curriculum can help students become more creative, unlearn and become more comfortable with uncertainty and challenging situations. ESE was chosen since, on the one hand, it has been shown to be a strong predictor of behavior (Bandura, 1997) and a valid measure of the EE impact (McGee et al., 2009; Wilson et al., 2007; Zhao et al., 2005), and on the other hand, it allows for detailed analysis of workshop's impact on different competences.

Yet, we find that change of ESE is generally positive for students with initially low ESE and negative for students with initially high ESE, and this is consistently true for different entrepreneurial competences. We also confirm findings of previous studies which demonstrate that female students generally have lower ESE than male students. Finally, we provide evidence for unlearning being strongly and positively correlated with improvement of competences. Implications for EE, limits of the paper and venues for future research are discussed.

ART, UNCERTAINTY, UNLEARNING AND ENTREPRENEURSHIP EDUCATION

Recently an interest has emerged in studying relationships between art and entrepreneurship, and researchers point out that there exist many similarities in practices of entrepreneurs and artists

(Scherdin & Zander, 2011). Meisiek and Haefliger (2011) suggest that “to understand entrepreneurship’s involvement with novelty creation scholars may benefit more from looking at the art than from studying start-up ventures”. They propose that studying creation of novelty in the arts can be a way around the problems related to the same process in business ventures, since in the art created artifacts are less valued for functionality than for the meaning which they create within existing context. Thus, studying creativeness of artists can help us understand creativeness of entrepreneurs (Bonnafous-Boucher, Cuir, & Partouche, 2011). Indeed, artists can spend much more time coming up with novel ideas than entrepreneurs who need to set up a viable business.

Creation of novelty comes hand in hand with great uncertainty. As artists spend a lot of time creating newness, studying their practices is an efficient way to explore uncertainty. Using discovered approaches in EE class can be extremely useful in teaching students to manage uncertainty which is intrinsic to new venture creation, thus helping educators to properly handle the issue that “entrepreneurship is neither linear nor predictable, but it is easy to teach as if it were” (Neck & Greene, 2011).

Another important dimension of art is its frequently subversive nature. Both creative artists and entrepreneurs must alter and transgress the operating rules of a field so as to change the status quo (Bureau & Zander, 2014). Again, practices found in art can be extremely useful to teach students to challenge and rethink current state of things and their own beliefs. During artistic practice students can concentrate on the essence of the issue and freely experiment with its diverse manifestations and interpretations, while this might be difficult to do with real entrepreneurial project. This aspect of “challenging one’s beliefs” makes teaching entrepreneurship through art a great way to foster students’ unlearning. Unlearning is discarding one’s knowledge (Hedberg, 1981; Newstrom, 1983), beliefs and pre-existing methods (Starbuck,

1996). Unlearning is necessary since what one has learned previously generates barriers preventing new learning (Navarro & Moya, 2005; Newstrom, 1983). For unlearning to happen, according to cognitive theory, students have to put into question their core values in the context of non-routine situations (Watzlawick, Bavelas, & Jackson, 1967; Watzlawick, Weakland, & Fisch, 1975) where they will need to develop new heuristics. Artistic practices during an EE course create a situation that is far from being routine, and thus they can provide a good context for unlearning.

To summarize, previous research suggests that thanks to integration of art practices in an EE course students can learn creativity, learn how to manage uncertainty and unlearn their previous beliefs and practices related to entrepreneurship.

ENTREPRENEURIAL SELF-EFFICACY

According to the theory and extensive research (Bandura, 1997), self-efficacy – individual's confidence that he/she can perform a task – is a strong predictor of behavior in many areas of human functioning. While there can be different definitions, in this paper by ESE (entrepreneurial self-efficacy) we mean self-efficacy related to performing different entrepreneurial tasks. In our study we analyze the change of numerous dimensions of ESE in order to evaluate the workshop's impact on different students' competences. ESE has been a subject of many studies that demonstrated importance of this construct in entrepreneurship. It has been found to be positively associated with entrepreneurial capital (Erikson, 2002), with entrepreneurial intentions (De Noble et al., 1999) and with being a nascent entrepreneur (Arenius and Minniti, 2005).

Given the importance of the construct, many researchers proposed EE as a way to increase ESE (McGee et al., 2009). Incorporation of ESE in the pre- and post-measurement of EE programs

could provide educators with better information about their programs' impact, about factors that influence ESE and its role (Wilson et al., 2007). For example, in the study done by Zhao, Seibert and Hills (2005), effects of perceived learning from EE, risk propensity and previous entrepreneurial experiences were fully mediated by ESE. Still, most ESE-related research suffers from using scales that contain only several items and from using a "total ESE" score instead of analyzing underlying dimensions (McGee et al., 2009). As a result, little is known about how specific teaching methods and contents influence different dimensions of ESE. With this paper we aim at contributing to the literature by providing evidence of the impact of teaching through art on different dimensions of ESE.

METHODOLOGY

Workshop

Our study comprises two groups of students on two campuses who followed an EE program at a European business-school from September to December 2015. The workshop, which is the subject of our study, makes part of the program; it took place at the program start in September and lasted 3 days. The same two instructors ran the workshop on both campuses. The first one is entrepreneurship professor, and the second one is artist. Thus, competences from entrepreneurship and art worlds were merged in this workshop allowing for a proper account of both entrepreneurship and art specificities. The first author of this paper was not involved at all in the pedagogy of the workshop, whereas the second author was fully involved as professor. This complementary role was helpful to gain at the same time very precise and qualitative elements on the empirical field (through a diary used on a regular basis) as well as an external vision with some distance and neutrality.

The workshop consisted in following. By the end of the 3rd day students had to create a contemporary piece of art on the subject of climate, and in the evening of the 3rd day there was a vernissage with a number of external people invited. Students worked in groups of 4-5 people. During the 3 days there were a number of mini-workshops and mini-presentations during which students were learning and practicing different concepts from entrepreneurship and art. In particular, they were going to city streets to find materials and inspiration for their creations, they were creating, destroying what they had created and then creating again. There were numerous discussions between instructors and each team, and quite often instructors could be rather critical and pushing students further in what they were doing. Because of the specificity of the approach students often had crises, felt frustration and other strong emotions, especially by the end of the first or second day.

As we have discussed, crises provide a fertile soil for unlearning and lead to more efficient learning. Moreover, students were working in groups on creation of something meaningful for all of them, and this additional requirement of co-creation was sometimes leading to quite complicated situations. Still, by the evening of the third day every team succeeded in creation of quite a nice piece of art.

Sample and Data

In total, 85 students attended the workshop, 51 male and 34 female. Students came from different backgrounds, some of them having several different experiences, even though most of them were business school students.

First survey was paper-based and students filled it out right before the workshop. The second survey was sent by email about one week after the workshop. One week delay was chosen so that

extreme emotions possibly caused by the workshop could calm down as thus students could evaluate themselves more objectively. In total, 67 students (around 79%) filled out both first and second surveys, allowing us to compare their ESE before and after the workshop. 56.7% were male, 43.3% were female. 51 students had business-oriented background, 9 – technology-oriented, 13 – design/art-oriented (some students had reported several different backgrounds, and so we counted them separately).

With the first survey we collected data about students' gender, background, and pre-workshop levels of self-efficacy for each of the 32 different competences listed in Appendix A. With the second survey we measured, for each of the 32 items, post-workshop levels of self-efficacy, sense of improvement and strength of unlearning. As a basis for our ESE scale we chose to follow Moberg (2013) who developed his scale by using three well-recognized ones as a basis (Chen, Greene, & Crick, 1998; DeNoble, Jung, & Ehrlich, 1999; McGee, Peterson, Mueller, & Sequeira, 2009), but replaced specific entrepreneurial jargon so that people with no business background can understand all the items. Indeed, before students involve into the program they might be unable to understand that jargon if they have not a business-school background, and therefore we cannot be sure that they evaluate the same thing before and after the EE.

We modified the Moberg's scale in order to include several items that students identified as important, the full list is provided in Appendix A. Before the program's start we sent students an email asking what kind of competences they would like to develop and what they deem as important for them. After reviewing and summarizing their responses we added items that now have numbers 25, 29, 30, 31 and 32 in Appendix A. The last item is not really a competence, but we decided to also include it in the list. We are aware that our resulting scale can be less reliable if we were to use an average ESE score, as some authors did. But our intention was to obtain a

list of items that would represent as much as possible the many different potential outcomes of the workshop, so that we can analyze the impact of the workshop on those different dimensions.

The part of the survey intended for the measurement of self-efficacy was created by following (Bandura, 2006), with the scale items for responses ranging from 0 (no confidence at all) to 100 (absolutely confident). In order to understand better how change of ESE during the workshop is related to students' improvement of competences and to their unlearning, in the second survey we included two items aimed at evaluation of these particular dimensions of learning. For the evaluation of competence improvement the following formulation was used: "Please assess, for each of the items provided below, how much **you have developed your competences** since the beginning of the program". The scale was 5-point Likert scale with items "Not improved", "Slightly improved", "Moderately improved", "Improved quite well", "Significantly improved". For the evaluation of unlearning the following formulation was used: "Please assess, for each of the items provided below, how true it is that from the beginning of the program you found your previous knowledge, beliefs or ways of thinking to be limiting or inefficient, and so you stopped using them (=unlearned)". The scale was 5-point Likert scale with items "not true", "rather not true", "cannot tell", "rather true", "true". For the analysis of our data we used match-pairs t-tests, simple and multiple regression analysis.

RESULTS AND DISCUSSION

Impact of Initial Level of Entrepreneurial Self-Efficacy

Before analyzing the change of ESE we need to properly deal with the impact that the initial (before the program start) level of self-efficacy has. As Figure 1 shows, students with initially low self-efficacy tend to experience its growth thanks to the workshop, and those with initially

high levels of self-efficacy tend to experience its decline. Regression analysis performed to estimate significance of the relationship between initial value of self-efficacy and its change gives p-value below $2e-16$ and R^2 of 0.37. According to the data provided in Appendix B, such a tendency is true for basically all the competences.

Insert Figure 1 about here

Explanation of this decline most likely lies in initial overestimation by students of their capabilities, and ones they are confronted with the non-routine and challenging demands of the workshop, they start evaluating their capacities more realistically. At the same time, those with initially relatively low self-efficacy discover that they can successfully perform tasks which they would otherwise see as too difficult. This result is coherent with previous research showing that students with initially low entrepreneurial intentions can higher them by the end of the program, and those with high intentions can lower them (Schutz, Fayolle, & Danner, 2015). As self-efficacy impacts intentions, one would expect that lowering of ESE would lead to lowering of intentions.

As follows from the Figure 1, level of self-efficacy equal to 70 approximately distinguishes those whose self-efficacy, in average, augments from those how experience its decrease. In order to separate two different effects of the workshop – “reassuring”, leading to increase of self-efficacy, and “bringing down to earth”, leading to decrease of self-efficacy – we conduct further analysis for two subsets of data: where initial self-efficacy is 70 or below and where initial self-efficacy is above 70. Yet, here we are more interested in the effects of the workshop on students with

initially relatively low ESE, and results for the second subset are provided in appendix, when relevant.

Impact of the Workshop on Multidimensional Entrepreneurial Self-Efficacy

Table 1 summarizes workshop's impact on different entrepreneurial competences (for cases where initial self-efficacy value is not larger than 70). Appendix C shows the same table for another subset of data (with initial self-efficacy higher than 70).

Insert Table 1 about here

As our data demonstrates, for many competences there was a significant change of self-efficacy, with mean change larger than 10 and mainly medium effect size. ESE increased the most for competences related to creativity, improvisation and handling of uncertainty, as we expected. Also networking competences were affected significantly, which must be due to a mini-workshop not discussed in this paper. At the same time, even though competences related to communication and work with people also exhibit growth of self-efficacy, the effect size is small (about 0.2-0.3). The same is true for competences related to handling failures and setbacks. This can be explained by the fact that through this workshop students face some of the really hard challenges related to these competences, and as a result they realize that there are a lot of things they do not yet master.

It is important to point out that gender did not correlate with change of self-efficacy: we performed one-way ANOVA and resulting p-value was equal to 0.49, therefore we cannot reject the null hypothesis of independence. At the same time, female students in average have lower self-efficacy than male students, and this is true both before and after the workshop, with p-value

given by ANOVA being practically zero. This result is consistent with previous findings showing that women score lower on ESE than men (e.g. Wilson, Kickul, & Marlino, 2007).

Relationships between Unlearning, Competence Improvement and ESE change

There is a strong correlation between competence improvement and unlearning: simple regression analysis, when performed for the whole of data where students evaluated whether they unlearned or not, gives a p-value lower than $2e-16$ and R^2 equal to 0.43, thus suggesting a quite strong correlation between unlearning and competence improvement. There is also a strong correlation between competence improvement and change of self-efficacy: simple regression analysis, performed for the whole set of data, gives p-value lower $2e-16$ and R^2 equal to 0.09. In order to demonstrate that there is important difference in ESE, in Table 2 we show mean self-efficacy change for different levels of competence improvement. If only data where initial self-efficacy is not higher than 70 is used, R^2 is equal to 0.12. In general, as demonstrated by Figure 2, the lower maximal initial self-efficacy level is, the higher R^2 becomes. Possible explanation of such a dependency is that for initially low levels of ESE development of competences contributes much more to the self-efficacy augmentation than in situation where values are initially higher, and other mechanisms of self-efficacy change become more important.

Insert Table 2 about here

Insert Figure 2 about here

Unlearning is correlated with change of self-efficacy only because competence improvement acts as a mediator. If the level of competence improvement is controlled, correlation between unlearning and self-efficacy disappears. Thus further we discuss only relationships between change of ESE and competence improvement, and between competence improvement and

unlearning. Table 3 provides R^2 values for both of these relationships for each competence. As we can see, R^2 varies significantly from one competence to another.

Insert Table 3 about here

While there are many different patterns in Table 3, here we discuss one specific case of high correlation of unlearning and competence improvement (e.g. “budget estimation” in Table 3). In this case learning is strongly connected with unlearning, meaning that both processes basically occurred simultaneously (or during the short time interval), and most likely this is because all that was needed to develop a new competence was to regroup already existing ones to take advantage of the new understanding that was established thanks to unlearning. For the budget estimation case ($R^2=0.74$), students must have realized that there is a completely different approach to creation of anything, different from what they knew before, and at the same time they must have made up some efficient strategies aligned with their insight.

But why self-efficacy could not change correspondingly, if there was unlearning and competence was developed? Such a situation means that there are other factors influencing estimation of self-efficacy, and given competence did not play an important role in this process. Bandura (1997) identified different elements contributing to construction of self-efficacy, and in order to understand many of the observed in Table 3 patterns a much deeper investigation is needed. Also a more elaborate analysis of data, compared to what we have done in this study, has to be done.

CONCLUSION

In this paper we studied the impact of an art-driven workshop in the context of EE. We found that such an approach can significantly increase different dimensions of ESE of students, especially the ones concerned with creativity and working in situations of uncertainty and limited resources. This means that art can be helpful in teaching such entrepreneurial methods as effectuation and bricolage (Baker & Nelson, 2005; Sarasvathy, 2009). We also determined that unlearning is strongly associated with development of competences, and competences improvement is strongly linked with growth of self-efficacy. At the same time, we show that change of ESE strongly depends on its initial value, so that the workshop leads to augmentation of self-efficacy of those who initially saw themselves as little efficacious, and to decrease of self-efficacy of those who initially were very confident.

Our results have several implications both for teaching and research. First of all, we demonstrate usefulness of studying different dimensions of ESE separately as it allows for understanding of what exactly kind of impact the intervention has. Secondly, we provide evidence of the usefulness and efficiency of art-driven practices for teaching entrepreneurship. These kinds of teaching approaches can be useful for teaching entrepreneurship as everyday practice or method (Blenker, Korsgaard, Neergaard, & Thrane, 2011; Sarasvathy & Venkataraman, 2011), independently from venture creation. We also demonstrate the importance of taking unlearning into account in the process of EE as development of competences correlates strongly with unlearning. Finally, the fact that change of self-efficacy has important dependence on its initial value calls for the need to adjust assessment practices correspondingly.

At the same time, our study suffers from a number of limitations. In particular, our sample is quite small, and there is not enough diversity in students' backgrounds which does not allow us

to see if the workshop has the same impact on learners with different experience. Because of the sample size limitations, we cannot analyze patterns in correlation of unlearning, ESE change and competence development in detail. As the result, we proposed a number of possible explanations of the observed relationships, but at the moment these explanations are hypotheses waiting for verification. Finally, here we study one particular workshop, and therefore it is unclear what elements of the teaching design have what consequences. Future research needs to address all these, and most likely many other, issues before we can fully understand the possibilities of art in teaching entrepreneurship and different relationships between self-efficacy, development of competences and unlearning.

Art can be extremely useful not only for aesthetic purposes. Maybe using some of its principles in our research could lead us to new creative solutions of some of the well-known world-old problems?

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APPENDIX A

List of 32 entrepreneurial competences used in the study

- 1 Lead and manage a team
- 2 Identify ways to combine resources in new ways to achieve goals
- 3 Improvise when I do not know what the right action/decision might be in a problematic situation
- 4 Manage time in projects
- 5 Tolerate unexpected change
- 6 Brainstorm (come up with) new ideas
- 7 Put together the right group/team in order to solve a specific problem
- 8 Conduct analysis for a project that aims to solve a problem
- 9 Read and interpret financial statements
- 10 Form partnerships in order to achieve goals
- 11 Persist in face of setbacks/unfavorable conditions
- 12 Identify potential sources of resources (e.g. sources of funding)
- 13 Network (i.e. make contact with and exchange information with others)
- 14 Set and achieve project goals
- 15 Perform financial analysis
- 16 Learn from failure
- 17 Get others to identify with and believe in my visions and plans
- 18 Manage uncertainty in projects and processes
- 19 Design an effective project plan to achieve goals (e.g. business plan)
- 20 Exercise flexibility in complicated situations when both means and goals are hard to establish
- 21 Clearly and concisely explain verbally/in writing my ideas in everyday terms
- 22 Work productively under continuous stress, pressure and conflict
- 23 Think outside the box / be open-minded
- 24 Control costs for projects
- 25 Communicate and negotiate with others in order to achieve project goals
- 26 Identify opportunities for new ways to conduct activities
- 27 Estimate a budget for a new project
- 28 Identify creative ways to get things done with limited resources
- 29 Market and sale a product or service
- 30 Use or understand technology (e.g. basics of programming) necessary to start a technology-dependent business
- 31 Work in a team
- 32 Develop and maintain passion and curiosity for a project

APPENDIX B

Dependence of the self-efficacy change on initial value of self-efficacy: data of the simple regression analysis. Text of the competences is cut to 40 symbols for presentation goals.

Competence	R²	p-value	coefficient
Brainstorm (come up with) new ideas	0,42	1,91E-09	-0,58
Clearly and concisely explain verbally/i	0,37	3,61E-08	-0,54
Communicate and negotiate with others in	0,51	5,47E-12	-0,80
Conduct analysis for a project that aims	0,54	1,24E-12	-0,73
Control costs for projects	0,37	3,23E-08	-0,48
Design an effective project plan to achi	0,24	1,38E-05	-0,43
Develop and maintain passion and curiosi	0,41	3,84E-09	-0,84
Estimate a budget for a new project	0,25	8,84E-06	-0,36
Exercise flexibility in complicated situ	0,57	1,05E-13	-0,83
Form partnerships in order to achieve go	0,45	2,94E-10	-0,62
Get others to identify with and believe	0,58	6,51E-14	-0,96
Identify creative ways to get things don	0,60	7,41E-15	-0,71
Identify opportunities for new ways to c	0,42	2,36E-09	-0,60
Identify potential sources of resources	0,40	4,33E-09	-0,69
Identify ways to combine resources in ne	0,50	2,03E-11	-0,72
Improvise when I do not know what the ri	0,50	1,17E-11	-0,76
Lead and manage a team	0,43	1,37E-09	-0,58
Learn from failure	0,51	5,95E-12	-0,71
Manage time in projects	0,51	5,26E-12	-0,64
Manage uncertainty in projects and proce	0,54	6,47E-13	-0,89
Market and sale a product or service	0,31	6,12E-07	-0,42
Network (i.e. make contact with and exch	0,62	1,11E-15	-0,73
Perform financial analysis	0,05	3,61E-02	-0,17
Persist in face of setbacks/unfavorable	0,52	4,88E-12	-0,87
Put together the right group/team in ord	0,30	1,01E-06	-0,55
Read and interpret financial statements	0,13	1,72E-03	-0,25
Set and achieve project goals	0,43	1,08E-09	-0,69
Think outside the box / be open-minded	0,49	3,26E-11	-0,65
Tolerate unexpected change	0,70	1,00E-18	-0,86
Use or understand technology (e.g. basic	0,33	2,58E-07	-0,58
Work in a team	0,23	2,12E-05	-0,60
Work productively under continuous stres	0,58	3,29E-14	-0,72

APPENDIX C

Impact of the workshop on different entrepreneurial competences: mean change of self-efficacy, Cohen's D (=effect size, see (Cohen, 1992) for details) and p-value from match-pairs t-tests. Only data where initial level of self-efficacy is higher than 70 is included.

Competence	Mean SE change	Cohen's D	p-value
Identify ways to combine resources in new ways to achieve goals	0,00	0,76	1,00E+00
Improvise when I do not know what the right action/decision might be in a problematic situation	-1,54	0,57	6,13E-01
Design an effective project plan to achieve goals (e.g. business plan)	-2,27	0,41	5,48E-01
Market and sale a product or service	-2,86	0,57	5,58E-01
Put together the right group/team in order to solve a specific problem	-3,33	0,36	5,24E-01
Conduct analysis for a project that aims to solve a problem	-3,85	0,51	2,99E-01
Work productively under continuous stress, pressure and conflict	-3,96	0,43	1,08E-01
Lead and manage a team	-4,71	0,33	1,83E-02
Identify opportunities for new ways to conduct activities	-5,00	0,60	3,48E-01
Identify creative ways to get things done with limited resources	-5,00	0,81	2,41E-01
Manage time in projects	-5,87	0,41	7,61E-02
Network (i.e. make contact with and exchange information with others)	-6,11	0,52	6,88E-02
Brainstorm (come up with) new ideas	-6,19	0,36	1,54E-02
Perform financial analysis	-6,47	0,07	2,05E-01
Tolerate unexpected change	-6,94	0,48	1,00E-02
Work in a team	-7,00	0,05	1,92E-02

Read and interpret financial statements	-7,50	0,22	2,28E-02
Clearly and concisely explain verbally/in writing my ideas in everyday terms	-7,86	0,30	1,51E-02
Think outside the box / be open-minded	-8,00	0,15	8,06E-03
Learn from failure	-8,04	0,28	1,01E-02
Estimate a budget for a new project	-8,18	0,36	6,50E-02
Exercise flexibility in complicated situations when both means and goals are hard to establish	-8,21	0,50	7,54E-03
Manage uncertainty in projects and processes	-8,50	0,52	1,09E-01
Get others to identify with and believe in my visions and plans	-9,00	0,33	7,77E-02
Set and achieve project goals	-10,23	0,14	5,80E-03
Develop and maintain passion and curiosity for a project	-10,65	0,02	8,29E-03
Persist in face of setbacks/unfavorable conditions	-10,95	0,30	2,07E-02
Control costs for projects	-11,67	0,14	2,16E-03
Identify potential sources of resources (e.g. sources of funding)	-12,50	0,42	3,69E-02
Communicate and negotiate with others in order to achieve project goals	-13,33	0,22	6,81E-04
Form partnerships in order to achieve goals	-15,00	0,33	3,49E-02
Use or understand technology (e.g. basics of programming) necessary to start a technology-dependent business	-18,50	0,26	7,01E-03

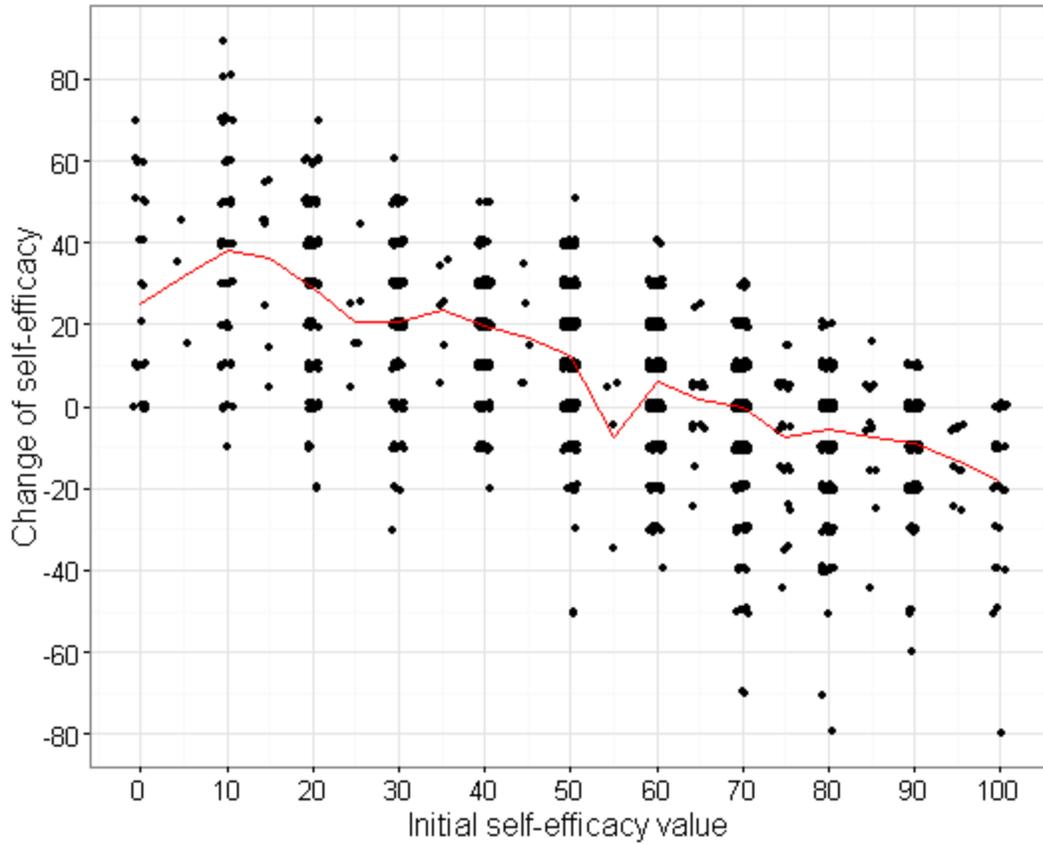


Figure 1. Dependence of the magnitude of self-efficacy change on initial value of self-efficacy.

Solid line shows mean value of the self-efficacy change for each of the initial values. Positions of points were slightly modified (jitter added) in order to provide a better representation of the number of points corresponding to each value.

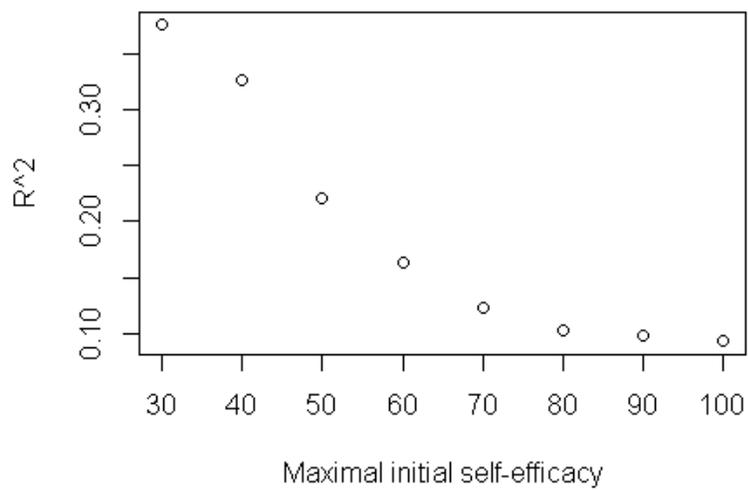


Figure 2. Dependence of the R^2 in a simple regression analysis of correlation of ESE change and competence improvement on the threshold value of initial self-efficacy. For each calculation of R^2 only data was used where initial self-efficacy was lower or equal than the threshold value.

Table 1. Impact of the workshop on different entrepreneurial competences: mean change of self-efficacy, Cohen's D (=effect size, see (Cohen, 1992) for details) and p-value from match-pairs t-tests. Only data where initial level of self-efficacy is not higher than 70 is included.

Competence	Mean SE change	Cohen's D	p-value
Identify creative ways to get things done with limited resources	20,8	0,81	1,65E-11
Network (i.e. make contact with and exchange information with others)	16,5	0,52	1,04E-07
Work productively under continuous stress, pressure and conflict	16,2	0,43	1,35E-05
Tolerate unexpected change	16,1	0,48	1,28E-06
Exercise flexibility in complicated situations when both means and goals are hard to establish	16,1	0,50	1,66E-06
Persist in face of setbacks/unfavorable conditions	15,0	0,30	5,41E-06
Improvise when I do not know what the right action/decision might be in a problematic situation	14,8	0,57	3,93E-06
Manage uncertainty in projects and processes	14,6	0,52	1,53E-06
Identify ways to combine resources in new ways to achieve goals	14,2	0,76	2,44E-08
Manage time in projects	14,2	0,41	3,00E-07
Identify opportunities for new ways to conduct activities	13,2	0,60	1,22E-07
Conduct analysis for a project that aims to solve a problem	12,6	0,51	6,43E-06
Use or understand technology (e.g. basics of programming) necessary to start a technology-dependent business	12,1	0,26	1,64E-03
Brainstorm (come up with) new ideas	12,0	0,36	2,11E-05
Learn from failure	11,8	0,28	1,21E-05
Identify potential sources of resources (e.g. sources of funding)	11,2	0,42	1,16E-04

Market and sale a product or service	10,8	0,57	4,33E-06
Get others to identify with and believe in my visions and plans	10,4	0,33	9,24E-04
Design an effective project plan to achieve goals (e.g. business plan)	10,0	0,41	3,98E-04
Develop and maintain passion and curiosity for a project	9,9	0,02	2,30E-03
Communicate and negotiate with others in order to achieve project goals	9,2	0,22	5,04E-04
Form partnerships in order to achieve goals	9,2	0,33	2,09E-04
Think outside the box / be open-minded	8,9	0,15	1,39E-03
Estimate a budget for a new project	8,7	0,36	1,33E-04
Clearly and concisely explain verbally/in writing my ideas in everyday terms	8,6	0,30	5,07E-04
Set and achieve project goals	8,6	0,14	4,15E-04
Put together the right group/team in order to solve a specific problem	7,8	0,36	1,13E-03
Lead and manage a team	7,5	0,33	2,30E-04
Read and interpret financial statements	7,2	0,22	7,77E-03
Work in a team	7,0	0,05	3,70E-03
Control costs for projects	6,9	0,14	1,23E-02
Perform financial analysis	3,9	0,07	1,31E-01

Table 2. Mean total ESE change for different levels of competence improvement

Level of competence improvement	Mean self-efficacy change
Not improved competence	0.288000
Slightly improved competence	4.563830
Moderately improved competence	7.982456
Improved competence quite well	15.194064

Significantly improved competence	20.851064
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Table 3. R² for two regression analyses performed for each competences. Column *unl.impr* contains values of R² for correlations of unlearning and competence improvement, column *SE.impr* contains values of R² for correlations of change of self-efficacy and competence improvement. Only values for which p-value is below 0.05 are shown. Not statistically significant values were removed from the table.

competence	unl.impr	SE.impr
Brainstorm (come up with) new ideas	0,376325	0,153701
Clearly and concisely explain verbally/in writing my ideas in everyday terms	0,443628	
Communicate and negotiate with others in order to achieve project goals		0,14306
Conduct analysis for a project that aims to solve a problem	0,497722	
Control costs for projects	0,593383	0,10085
Design an effective project plan to achieve goals (e.g. business plan)	0,741547	0,057091
Develop and maintain passion and curiosity for a project	0,259975	
Estimate a budget for a new project	0,741211	0,142699
Exercise flexibility in complicated situations when both means and goals are hard to establish	0,230893	0,100073
Form partnerships in order to achieve goals	0,317563	0,161404
Get others to identify with and believe in my visions and plans	0,067843	0,302575
Identify creative ways to get things done with limited resources	0,360393	0,057594
Identify opportunities for new ways to conduct activities	0,522745	0,091322
Identify potential sources of resources (e.g. sources of funding)	0,558214	
Identify ways to combine resources in new ways to achieve goals	0,120989	0,069984
Improvise when I do not know what the right action/decision might be in a problematic situation	0,313142	0,164067
Lead and manage a team	0,153332	0,090836
Learn from failure	0,321421	0,186723
Manage time in projects	0,49014	
Manage uncertainty in projects and processes	0,284154	0,13868
Market and sale a product or service	0,43451	
Network (i.e. make contact with and exchange information with others)	0,256062	0,111898

Perform financial analysis	0,443567	0,175007
Persist in face of setbacks/unfavorable conditions	0,199453	0,166684
Put together the right group/team in order to solve a specific problem	0,387023	0,144491
Read and interpret financial statements	0,239254	0,134628
Set and achieve project goals	0,508066	
Think outside the box / be open-minded	0,353692	0,154382
Tolerate unexpected change	0,215497	0,181305
Use or understand technology (e.g. basics of programming) necessary to start a technology-dependent business	0,386256	0,191799
Work in a team	0,202647	0,207165
Work productively under continuous stress, pressure and conflict	0,227638	0,105399