Article

Skills Development through Virtual Art-Based Learning: Learning Outcomes of an Advanced Training Program for Project Managers

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Abstract: With regard to emerging requirements of the professional field, uncertainty competence is a skill to be cultivated and integrated into project management education and training. Art-based learning seems to be a promising approach because the artistic mindset is a suitable model for coping with uncertainty. However, it is widely unclear to what extent art-based learning's experiential nature will result in soft skills development under the restrictions of distance education. The present quantitative study explores whether—in a virtual learning environment—art-based executive training has a measurable effect on uncertainty competence. Data collection and analysis applied a quasi-experimental pretest-posttest control group design. Participants in the experimental group completed a month-long virtual training program based on visual arts. Contrary to its objective, the program did not cause meaningful changes in uncertainty competence or perceived stress but had a significant effect on participants' attentiveness and presence. Participants achieved a higher level of mindfulness in dealing with complexity. The results imply that—even in virtual settings—art-based approaches enhance perceptive capacity and social presence but need to be long-term, related to participants' individual work-context, and disturb participants' routines to have an effect on uncertainty competence.

1. Introduction

As a reaction to growing complexity and environmental dynamics, organizations resort to projectification as a managerial approach [1,2]. In Germany, like other Western economies, 34.7% of work is organized in the form of projects [3]. Consequently, there is a growing need for managers who can develop, execute, and supervise projects; ergo, temporary organizations dealing with knowledge-intensive tasks [4–6]. Furthermore, the project manager's role has evolved from mere management to providing leadership [7,8].

Professional associations such as the International Project Management Association (IPMA) [9], the Association for Project Management (APM) [10], and the Project Management Institute (PMI) [11] have published frameworks on core competencies. These not only include expertise but also methodical, social, and personal competencies, which likewise have been linked to project success [8,12]. Within these frameworks, planning and control are still considered core project management skills [13], although the challenges of a complex, dynamic, uncertain, and ambiguous business environment often labeled VUCA world rather require a high level of self-efficacy [14,15] as well as contextual awareness, adaptability, and creativity [6,8].

When so-called critical situations characterized by limited information and time pressure need to be mastered, project managers must be able to cope with ambiguity and uncertainty. On the one hand, they are faced with unforeseen environmental influences and

technical incidents. On the other, they operate in more or less complex networks and need to balance mutable interests and conflicting requirements [16,17]. In fact, project managers improvise while they spontaneously combine intuition, creativity, and bricolage [18–20]. However, the ability to detach from planning in favor of an experienced-based, iterative, and flexible mode of action is a skill to be cultivated and integrated into project management education and training [17]. Project managers "need to learn and practice how to lead the changes into an unknown future by surfing on the edge of chaos" [8] (p. 313).

"Surfing" through subjectifying experienced-based action is characterized by proceeding in experimental steps, flexibility, and problem-solving without previous planning. It requires prospective perception and intuition as well as a strong connectivity to the environment and engaging with other people [17,21]. Moment to moment action relates to the concept of mindfulness, which can be "defined as a purposeful, non-anxious, reflective presence" [22] (p. 1). Mindfulness marks a state of non-judgmental attentiveness to self and others while being fully present in the moment. Peripheral vision and sub-sidiary awareness feed into consciously processing new information and perspectives. In unfamiliar or stressful situations, expertise is well supported by a mindful attitude of curiosity and non-judgmental openness, the so-called "beginner's mind" [22–25].

Meeting uncertainty with subjectifying experienced-based action [21] is a behavior pattern typical for the artistic process. Artists create novelty without a preconceived result or a replicable winning formula in mind [26,27]. As a matter of fact, uncertainty is a necessary precondition for artful creation. Artists tackle open situations and failure with holistic perception and a beginner's mind that allows for an almost naive and unconditionally open view [26]. The artistic approach is playful and intuitive as hands-on testing serves as a form of reasoning [28]. For artists, serious but unintentional play is a way to reduce complexity [26]. In this respect, the artistic mindset is a suitable model for coping with uncertainty in project management.

Conveying artistic skills and attitudes to non-artistic realms is a subject matter of art-based learning. The term stands for concepts in which learners actively engage in an art form to explore topics that are distant from the arts. Art-based learning counts on multimodal teaching activities that trigger felt experience through artistic material or techniques. In learning environments, the arts may serve as a vehicle for reflection or sensemaking [29,30]. As learning experiences are designed as aesthetic encounters, the approach is presumed to enhance sensory, corporeal, and implicit knowledge. Art-based approaches complement technical leadership skills by making learners transcend rational approaches to business topics [29,31–33].

In view of pitfalls common to conventional leadership development, such as outdated ready-made solutions and transfer gaps into the work environment [34–36], art-based learning offers a promising alternative that has attracted increasing attention from both scholars and practitioners [37–39]. Instead of defining learning goals in terms of explicit knowledge or behavior patterns, art-based learning is characterized by dealing with artworks or artmaking with an attitude of exploration and playfulness that promises to enhance soft skills [40]. Despite a lack of quantitative research on skills development [41] and research gaps in mechanisms of art-based learning processes [37,38], it is widely assumed that art-based learning adds value to leadership development [33,37,40,42].

From an application-oriented perspective, both conventional leadership development and art-based approaches recently came upon an educational landscape that has been severely altered by distance learning. As the COVID-19 pandemic and its subsequent social distancing regulations impeded face-to-face learning, professional training rapidly shifted into web-based self-learning formats (video tutorials, multimedia learning apps or wikis) and virtual classrooms [43,44]. In the wake of the pandemic, the extent of digital training opportunities has increased [45].

While the demand for executive training has been recovering from setbacks in terms of sales [46], the pandemic caused a lasting shift to distance learning and blended formats as the "new normal" [47]. Recently, time sovereignty and convenience are perceived as

the main perceived advantages of distance learning [48,49]. At the same time, providers recognize a need for experiential learning [47] and pedagogical approaches that maintain social inclusion as a contribution to individual psychological well-being [50].

There is strong evidence that there is no difference in learning outcomes between in-person training and virtual learning scenarios [51–53]. However, this holds true for conveying expertise and not necessarily for training manual or soft skills [49]. Art-based learning is a form of experiential learning that is fueled by corporeality and sensual perception [54]. To what extent this particular approach to soft skills development is transferable into virtual space is an open question.

This paper reports the results of a quantitative study on art-based learning. The aforementioned trends in project management, leadership development, virtual education as well as research gaps in art-based training are addressed by exploring results of a leadership program that took place in a virtual setting. The research was guided by the question whether and to what extent a virtual art-based learning intervention enhanced project managers' capacity for subjectifying experienced-based action [21] as a prerequisite for coping with uncertainty in projects [17].

After an overview of the state of research on skills development through (virtual) art-based learning, the pretest-posttest control group design of the quantitative study is presented. The findings are discussed against the state of research on art-based learning. This study contributes to research by putting qualitative data and overly optimistic views on the potential of art-based learning into perspective.

2. Literature Review

Aside from primary and secondary education [54–58], art-based learning has been discussed and empirically underpinned for various professional disciplines such as medical education [59–63], nursing education [30,64–66], pedagogics [67–70], and management education [29,33,39,71–75].

The research subject being situated in school and university education as well as an assumed methodological pragmatism has led to a body of empirical research that relies on students as research participants, be it within a qualitative (e.g., [39,73]) or a quantitative approach (e.g., [64,72]). Studies involving professionals are rare, although they provide a better base for the transferability of findings to the workplace.

Hereafter, research on art-based learning in leadership development is presented that was carried out with professional experienced people. The findings cover interventions related to visual arts, theater, dance, choir singing, expressive writing, or poetry. With only two exceptions [32,76,77], all studies pursued a qualitative approach, which affects the generalizability of research results so far.

In research on art-based leadership development, cognitive skills play a tangential role. Although creativity is an aspect usually attributed to art infusion [78,79], it is rarely mentioned as a learning value added [80,81]. Isolated studies report an increased ability for problem perception [82] or problem-solving [83].

Most empirical evidence of art-based interventions and their impact on skills formation is within social and emotional skills. Effects can be roughly divided into the two areas of intrapersonal skills that refer to self-awareness, achieving goals and dealing with one's own emotions, and interpersonal skills, which invoke working with others in terms of teamwork and leader-followership [84].

In research on art-based learning, the most prominent, coherent intrapersonal skills are self-awareness [80,82], self-perception, reflectivity [32,54,73,85], and self-efficacy [86,87]. In general, art-based learning fosters prosocial behavior [54,76,77,81,85]. Corresponding aspects are improved communication skills [32,83] and networking capabilities [81]. As an underlying construct, increased emotional intelligence was observed [32].

Attention, presence, engaging with others, beginner's mind, and other facets of coping with uncertainty are discussed as embodied practices of leadership [42] but hardly touched upon in empirical research on art-based learning. Being periodically exposed

to performance art has a demonstrably positive effect on stress resilience among managers [76,77]. A longitudinal mixed-methods study among medical students found that a museum-based visual arts program successfully addressed the issue of uncertainty in observations. Exercises in artmaking and verbal reflective practice significantly improved participants' ability to reflect. Furthermore, the course tended to strengthen tolerance for ambiguity and awareness of biases. Students enhanced their observation skills and learned to appreciate multiple perspectives while experiencing a stronger sense of community [88].

Research on art-based learning in virtual environments is still in its infancy. The literature encompasses descriptions of didactic concepts for virtual learning using photographs and conceptual quilting as reflection tools, creating micropoetry on course content [89–91], storytelling [92,93], improvisation, collaborative video work [93], and creating zines [94].

Although relevant empirical studies are exploratory and suffer from small samples, they provide notable indications on how virtual learning environments in higher education are perceived by students. Kates and colleagues [92], who report on storytelling in a flipped classroom, notice that students enjoyed the creative experience and experienced a sense of accomplishment. In another online setting, an art-based collaborative learning assignment effectively fostered students' creative skills [95]. Edwards and colleagues [96] state that art-based elements enhanced interaction among students. The approach fostered a sense of community and group identity because it facilitated rapport and a sense of trust.

As such characteristics are generally considered as learning factors, it is assumed that they have an equivalent effect on learning success in art-based environments [89,91]. However, there is no quantitative empirical evidence that art-based concepts not only "humanize the online learning environment" [91] (p. 305) but also have a verifiable effect on skills development.

In sum, most empirical research on skills development through art-based learning has weaknesses in terms of research approach and sampling. In addition, skills that enable managers to cope with complex and dynamic environments and consequently have been suggested as vital for modern project management have been beyond empirical research on art-based leadership development. Finally, art-based learning in *virtual* learning environments is under-researched in terms of skills development and further training. These research gaps were addressed with an online program in art-based leadership development evaluated in a pretest-posttest control group design.

3. Materials and Methods

3.1. Research Approach and Experimental Learning Environment

In this study, a quasi-experimental longitudinal control group design was applied. For the treatment group, an art-based training program on dealing with uncertainty in projects was designed. For the control group, a conventional program without art-based elements was set up. Each program took one month, and both were performed side-by-side in September 2021.

During each program, two half-day workshops were carried out online by means of videoconferencing technology. All workshops were prepared and debriefed by a series of assignments for reading and reflection, which participants had to handle individually. This supporting program was transmitted through a pre-existing, web-based learning application. Hence, the learning environment for both programs was virtual in nature, as it combined electronic content for synchronous online teaching and asynchronous learning [97].

The interventions aimed at training project managers to cope with unpredictable situations. They were designed and jointly performed by an artist and a psychologist to eliminate any facilitator bias between the two groups. The programs corresponded in learning objectives, framework and basic structure but differed in terms of training approach.

The art-based program designed for the experimental group counted on experiential learning. In its first workshop, the two facilitators used purpose-built paintings as a projection space for exploring personal strengths and self-management. In the second

workshop, they assigned small groups with co-creating window installations from Post-It notes provided beforehand. Each installation was executed by one group member following directions while the facilitators coached all groups through their creative process. Co-creating installations exposed participants to an experience of working without preconceived objectives or procedures.

The control group passed a program that drew on conventional coaching methods with an emphasis on instruction, thought-provoking impulses, and group conversation. In the first workshop, participants split into small groups and conducted a peer coaching session following the GROW model for goal setting and problem solving [98]. The second workshop comprised group work and a plenary session on difficult project situations and methods of resolution, which was topped off by the facilitators' input on the meta level. As a whole, the conventional program was based on mutual exchange on past experiences and joint verbal reflection.

The asynchronous units introduced participants to the issue and the respective program's approach. In addition, they helped identify individual concerns with project management to be addressed in the workshops. In the art-based program, impulses were visualized, and tasks had to be processed by drawing whenever possible. In contrast, the conventional program offered text and required written solutions. Within each program, participants received individual feedback on app-based assignments.

3.2. Research Design

The programs were promoted among project managers as soft skills training. Striving for random sampling, it was not revealed to registrants that the available schedules differed in their approach. They were free to choose the program dates they preferred without knowing if they enrolled for the treatment or the control group. To obtain groups with equal numbers, participants who were available on all dates were assigned to the control group. Therefore, sampling was not completely random. Participation was voluntary but tied to a EUR 35 attendance fee to ensure commitment. All 48 initial registrants provided written consent to take part in the study.

The timeline of the art-based program and data collection dates are displayed in Figure 1. Data collection took place at the beginning of the program (T1), immediately after the first workshop (T2), and following the second workshop (T3). Basically, the last measurement point (T3) represented the end of the program, since only one short online debriefing task followed.
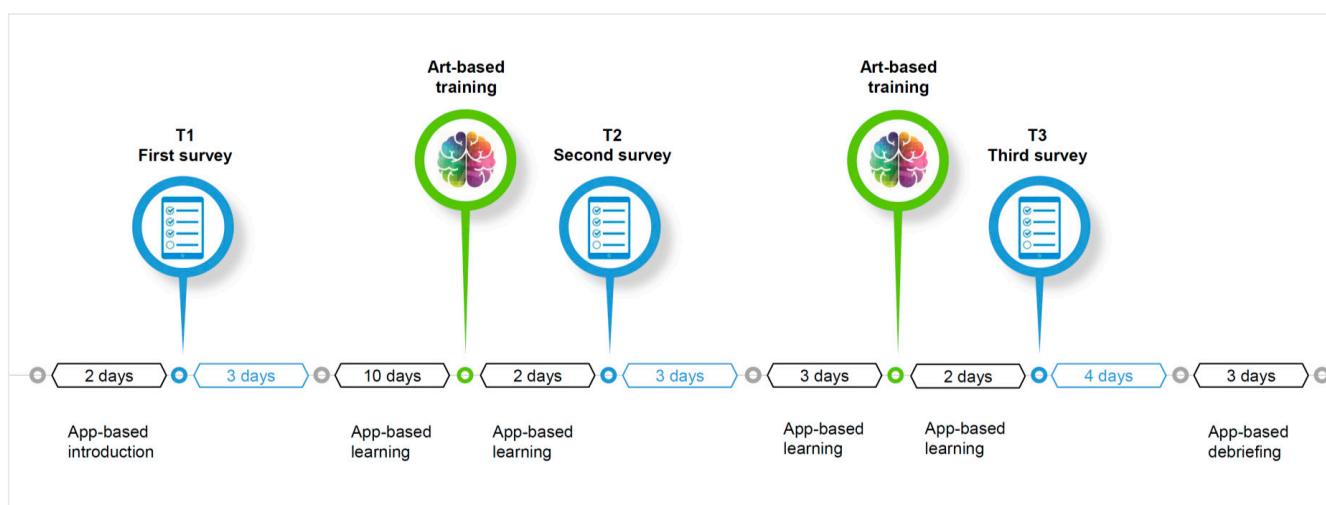

Figure 1. Study timeline (September 2021).

3.3. Participants

Initially, n = 28 participants registered for the art-based training program and n = 20 for the conventional one. However, there was a considerable dropout regarding workshop attendance and surveys in both groups. Besides the duration of the program, entrants mentioned they had expected another approach or underestimated the workload involved in completing both the program and the survey. Because of moderate attendance fees exit barriers were low.

To increase data quality and ensure that changes in measurement results were based on attendance, we only included complete data sets in the analysis ($n_{art-based} = 10$; $n_{conventional} = 6$). Participants in the art-based program (8 = female, 2 = male) were on average 50.4 (SD = 8.36) years old and had 24.3 years (SD = 9.68) of work experience. Participants in the conventional program (3 = female, 3 = male) were on average 37.2 years old (SD = 10.66) and had 14.5 years of work experience (SD = 10.11). Almost all participants had experience with project controlling ($n_{art-based} = 10$; $n_{conventional} = 5$) and disciplinary leadership experience ($n_{art-based} = 9$; $n_{conventional} = 4$).

3.4. Measurement Instruments

The items we used are based on established scales and were adapted for this study. Participants answered the items on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Item and reliability analysis were performed to establish and assess the quality of the scales. For these calculations, negatively worded items within a scale were inverted. Items were deleted if they did not have an item-total correlation of $r \geq 0.3$ for at least one measurement point. Scales that did not have a Cronbach's alpha of ≥ 0.6 for at least one measurement point were not used for calculations. Shapiro-Wilks tests showed that almost every item was not normally distributed.

Uncertainty. Intolerance of uncertainty describes an individual trait whereby a person is likely to perceive ambiguous information as dangerous or threatening, which in turn might lead to worry and anxiety [99–102]. Six items from the *prospective anxiety* scale and four from the *inhibitory anxiety* scale from the Intolerance of Uncertainty Scale were adapted to the work context to evaluate whether the training programs affected participants' insecurity [102].

Self-efficacy. Self-efficacy is the degree to which individuals believe they can achieve desired goals based on their own abilities, competencies, and behavior. Self-efficient individuals feel that they are in control and can influence their environment [103–105]. Three items from the general self-efficacy short scale were used to measure *self-efficacy* [105].

Attention. Attention is a cognitive process that selects incoming signals for further processing [106]. Items from the Kentucky Inventory of Mindfulness Skills (KIMS) [107] were adapted to create the *attention to self* scale. For the *attention to others* scale, items were adapted [108] or designed. The *attention to the environment* scale is based on the KIMS [107] and the work of Strauß and Struchholz [108].

Presence. Presence is defined as an individual's ability to attract the attention of others through their behavior [108]. The sub-scales *intention to appear to others*, *presence—through own behavior*, and *presence—effect on others* were adapted from literature and questionnaires on leadership and presence [108,109].

Engaging. To measure how interaction of participants in their working context was influenced by the program, the *avoiding*, *dominating*, and *integrating* scales from the Rahim Organizational Conflict Inventory-II (ROCI-II) [110] were adapted. Other items were taken from the Toronto Empathy Questionnaire [111] to measure *empathy*.

Resilience. Three items of the *extensive planning* scale from the Questionnaire for the assessment of resilient behavior at work were used to measure resilience [112].

Beginner's Mind. For measuring participants' tendency to be in the moment and not to judge prematurely based on their experience, the *accept without judgment* scale from the KIMS [107] was adapted.

Stress. Selected items from the *worries* and *tension* scales in the Perceived Stress Questionnaire (PSQ) [113] were used to display participants' current stress level.

4. Results

4.1. Development of Participants' Skills

Due to the non-normal distribution of most variables and the small sample size, Friedman tests with Bonferroni correction were calculated to evaluate skills development (Tables 1 and 2). In the art-based training group there was a significant difference between the measurement points for the scale *self-efficacy* ($X^2_{(2, n = 10)}$ = 7.28, p = 0.025). However, when calculating post-hoc-tests, this difference lost significance (z = −0.950, $p_{corrected}$ = 0.101). There was a significant difference between the measurement points for the scale *attention to the environment* ($X^2_{(2, n = 10)}$ = 9.50, p = 0.005). Post-hoc-tests revealed that the first and last measurement points significantly differed from each other (z = 1.10, $p_{corrected}$ = 0.042). The effect size was r = 0.35, which can be interpreted as a medium effect [114,115]. All items were negatively worded within the scale. Hence, the results show a significant increase in participants' attention regarding their environment. There was also a significant difference between the measurement points for the *presence—through own behavior* scale ($X^2_{(2, n = 10)}$ = 9.46, p = 0.006). Post-hoc-tests revealed the first and second measurement point significantly differed from each other (z = −1.20, $p_{corrected}$ = 0.022). The effect size was r = 0.38, which can be interpreted as a medium effect [114,115]. There were no significant differences in the other scales (Table 1).

Table 1. Skills Development in the Art-based Training Group.

Scale	Chi-Square	p	Mean Rank T1	Mean Rank T2	Mean Rank T3
Prospective anxiety	2.11	0.376	2.35	1.85	1.80
Inhibitory anxiety	0.08	0.994	2.00	1.95	2.05
Self-efficacy	7.28	0.025	1.55	1.95	2.50
Attention to self	7.88	0.713	2.05	2.15	1.80
Attention to others	1.23	0.568	1.80	2.20	2.00
Attention to the environment	9.50	0.005	2.65	1.80	1.55
Intention to appear to others	0.45	0.874	1.95	2.15	1.90
Presence—through own behavior	9.46	0.006	1.30	2.50	2.20
Presence—effect on others	4.90	0.087	1.50	2.20	2.30
Avoiding	0.21	0.936	2.05	1.90	2.05
Dominating	1.40	0.515	2.05	1.75	2.20
Integrating	0.06	0.992	2.00	2.05	1.95
Empathy	0.62	0.754	1.85	2.15	2.00
Extensive planning	2.14	0.343	2.30	1.95	1.75
Accept without judgment	1.83	0.460	2.05	2.20	1.75
Worries	0.00	1.000	2.00	2.00	2.00
Tension	2.57	0.313	2.30	2.00	1.70

Note. T1 = Before the program. T2 = After the first workshop. T3 = At the end of the program. p = exact significance.

In the control group, there was a significant difference between the measurement points for the scale *worries* ($X^2_{(2, n = 6)}$ = 7.11, p = 0.022) and *tension* ($X^2_{(2, n = 6)}$ = 8.27, p = 0.016). Post-hoc-tests revealed that this difference lost significance (z = 1.133, $p_{corrected}$ = 0.063). For the *tension* scale, post-hoc-tests revealed that the second and the last measurement points significantly differed from each other (z = 1.42, $p_{corrected}$ = 0.042). The effect size was r = 0.58, which can be interpreted as a strong effect [114,115]. Post-hoc-tests revealed that the difference between the first and the last measurement points lost its significance (z = 1.33, $p_{corrected}$ = 0.063). There were no significant differences in the other scales (Table 2).

Table 2. Skills Development in the Conventional Training Group.

Scale	Chi-Square	p	Mean Rank T1	Mean Rank T2	Mean Rank T3
Prospective anxiety	3.36	0.194	1.42	2.25	2.33
Inhibitory anxiety	3.90	0.170	2.33	2.25	1.42
Self-efficacy	0.43	0.907	2.08	2.08	1.83
Attention to self	1.65	0.524	1.75	2.42	1.83
Attention to others	0.20	1.000	2.08	1.92	2.00
Attention to the environment	3.44	0.185	2.08	1.50	2.42
Intention to appear to others	1.09	0.656	2.33	1.83	1.83
Presence—through own behavior	0.90	0.687	2.00	1.75	2.25
Presence—effect on others	3.71	0.160	1.83	1.58	2.58
Avoiding	1.60	0.490	2.00	2.33	1,67
Dominating	1.41	0.568	2.17	1.67	2.17
Integrating	3.29	0.210	2.33	2.17	1.50
Empathy	0.35	0.920	2.17	1.92	1.92
Extensive planning	3.00	0.174	2.33	2.17	1.50
Accept without judgment	0.78	0.769	1.92	2.25	1.83
Worries	7.11	0.022	2.67	2.00	1.33
Tension	8.27	0.016	2.42	2.50	1.80

Note. T1 = Before the program. T2 = After the first workshop. T3 = At the end of the program. p = exact significance.

4.2. Group Comparison

In order to explore the effectiveness of the art-based training in contrast to the conventional program, we compared the scale values at the end of the training program by calculating a Mann-Whitney U test. Due to the small sample sizes, (one-sided) exact significances are reported. For the scale *prospective anxiety*, there was a significant difference between the groups at the end of the program (U = 11.000, p = 0.042). Compared to the control group, the art-based training group has significant lower uncertainty values ($M_{art-based}$ = 2.33, SD = 0.85 vs. $M_{conventional}$ = 3.22, SD = 0.50; Table 3). In addition, there is a significant difference between the two groups at the beginning of the training program for the scale *worries* (U = 10.500, p = 0.031). Participants in the art-based program had significantly less worries than those in the control group ($M_{art-based}$ = 1.70, SD = 0.71 vs. $M_{conventional}$ = 2.61, SD = 0.60; Table 2).

Table 3. Central Tendencies for Relevant Scales in the Group Comparison.

	Prospective Anxiety T3		Worries T1	
Group	1	2	1	2
Mean	2.33	3.22	1.70	2.61
Median	2.33	3.33	1.83	2.67
SD	0.85	0.50	0.71	0.60
Middle rank	6.60	11.67	6.55	11.75

Note. 1 = Art-based program. 2 = Conventional program. $n_{art-based}$ = 10. $n_{conventional}$ = 6. T1 = Before the program. T3 = At the end of the program. SD = Standard deviation.

5. Discussion

5.1. Skills Development

The art-based program significantly fostered participants' attentiveness towards their environment. This result is in line with research that links an increased ability to perceive sensory cues to the experiential and aesthetic nature of art-based interventions. The arts can bring about the ability of "seeing more and seeing differently" [116] (p. 1505) while supporting peripheral vision and changes of perspective. Aesthetic reflection and the creation of artifacts are forms of aesthetic inquiry [117] and explorations of the perceptual field [118]. They require a state of mindfulness that may last beyond the initial intervention [29,116,119]. Correspondingly, there is sound empirical evidence for art-based

interventions fostering observation skills [62]. Regarding effects of art observation, there is no significant difference in gaze patterns if viewers explore an object in person or in a virtual environment [120]. Our data on perception capacity suggest that assignments to look at images online were not severely affected by the program's virtual setting.

As a result of the art-based program, there was a significant effect on presence. Participants took care to be perceived by others and adjusted their posture, movement, and voice to the situation. This effect appeared with the first workshop and remained on the same level throughout the program. It may be attributed to the fact that aesthetic experiences have an embodied dimension that allows for socio-emotional engagement [74,93].

In addition, increased presence implies that social presence in the given virtual environment was considerably stronger in the art-based program compared to the conventional coaching. Social presence refers to the degree participants are perceived as "real persons" although communication is mediated through technology [121,122]. Social presence has an influence on social interaction and contributes to realistic experiences in virtual environments. Along with teaching presence of facilitators and cognitive presence, social presence is considered a prerequisite for a successful learning experience in virtual settings [123–125]. In this respect, multisensorial-learning environments have an advantage over mere oral approaches because they offer a sense of aesthetic presence [93].

Our findings on presence corroborate empirical evidence indicating that virtual art-based learning has an impact on social presence and group interaction [96]. However, we did not utilize equivalent scales (e.g., [123]), given that exploring social presence as a construct was beyond our research goals. Furthermore, we did not find that participants changed their social behavior (outside of the workshops) in terms of engaging with others.

While participants did not include the beginner's mind in their cognitive repertoire, we found a tendency for the art-based program to increase self-efficacy. This finding supports other empirical evidence for increased self-efficacy as a value added by art-based approaches [75,86,87]. None of the aforementioned effects occurred in the conventional program.

5.2. Uncertainty Competence and Perceived Stress

Neither the art-based nor the conventional program had an effect on handling uncertainty as displayed by the *inhibitory anxiety*, *prospective anxiety*, and *extensive planning* scales. Participants did not perceive uncertainty as an impediment for decision making, and did not change their attitude towards planning as their familiar way to reduce complexity. However, in the course of the one-month intervention, the programs differed in their effect on perceived stress. The art-based approach was ineffective, while the conventional program had a strong effect in reducing tension and tended to diminish participants' worries. The joint documentation and reflection on dealing with difficult project situations in the second workshop evidently worked as a stress relief.

Just as in the art-based program, there was a considerable dropout during the conventional training. However, the values for skills development remained substantially stable, while stress indicators changed. People in the control group started out with significantly more worries than those in the treatment group. However, changes in this item were only tendentious. There was a significant decrease in tension within the control group. As groups did not significantly differ in tension at the beginning of the program, observed changes in perceived stress can be attributed to training.

The group comparison rendered a significant difference in prospective anxiety at the end of the intervention, indicating that the art-based program was more successful in conveying a serene attitude towards uncertainty than the conventional approach. However, this interpretation is not reflected in the values for each group, as those remained essentially stable. There was an extremely small decrease in prospective anxiety in the treatment group. This came upon an extremely small increase in the control group, likewise at the third data collection point. Therefore, it should not be concluded from the significance that the art-based approach had a stronger effect on attitudes towards dealing with uncertainty.

5.3. Program Design and Learning Environment

Nevertheless, the art-based and the conventional approach had different effects. Above all, reflecting on an artwork and jointly solving a creative assignment—the art-based set-up—improved participants perceptive capacity and presence. Reflecting on work experience and courses of action in group discussions—the conventional approach—diminished stress. This effect might stem from an immediate relation to individuals' work experience and context, which was not provided during the art-based program. The latter did not affect perceived stress, which contrasts with other studies that attribute enhanced resilience to stress in the workplace to confrontation with performance art [76,77]. However, these studies [76,77] are not directly comparable in their methodology and art-based approach to the current study.

The art-based program did not meet expectations in implementing another mindset and mode of action. In-depth research on art-based learning processes that include a comparison between presence and virtual environments is required to determine whether this result can be traced back to distance learning. Due to the online setting, barriers in aesthetic experience may have influenced results. Positive effects on mindfulness and presence support the idea that art-based approaches enrich virtual learning [89,91]. Nevertheless, successful skills development is obviously not guaranteed.

Our results display limited effects on uncertainty competence and individuals' propensity to planning. There is much to suggest that substantial changes in skills and behavior require longitudinal programs in repeated intervals. In general, short skills training programs lead to lower training success compared to long ones [126]. Empirical evidence on successful art-based interventions in leadership development points in the same direction. Flamand and colleagues [39] examined a four-day intervention, Romanowska and colleagues [76] held sessions over a period of ten months, and Jansson [85] describes an intervention of weekly or bi-weekly sessions for more than a year. Based on an extensive literature review on the arts in medical education, Alkhaifi and colleagues [62] suggest a time span of at least six weeks.

Hitherto, little is known about the reasons why some art-based interventions have an impact and others do not. Modes of action that explain what and how participants in art-based interventions learn remain under-researched [39]. One hypothesis for barriers to skills development refers to the balancing act between activation and overload. To develop an effect, art-based approaches need to confront individuals with a "constructive disturbance" [127] (p. 22) of behavior patterns and beliefs.

Transformative learning theory suggests that a change of perspective occurs when individuals experience unfamiliar situations that require sensemaking [128]. In general, sound learning effects result from dealing with cognitively challenging, destabilizing situations. The discomfort, frustration, and feelings of loss therein are part of a developmental experience [129]. When art-based training emphasizes its fun factor [40,117] without demanding some tangible hardship as a cause for reflection, the value added will be low [129,130].

In art-based interventions, it is easier to destabilize individuals' habitualized understanding when they deal with objects that entail an analogy to their everyday working life [116]. The art-based program under scrutiny did not support such a connection. In addition, participants enjoyed it very much [131] and facilitators, by all accounts, did not observe that anyone struggled with the workshop assignments. Therefore, the design may not have offered enough of a work-related challenge for achieving extensive improvements in uncertainty competence. However, this hypothesis would need further qualitative examination.

5.4. Limitations and Further Research

The main limitation of our study is its reduced database. Results are based on a small sample: Only one third of the initial registrants delivered complete data sets for the art-based program, and there was a considerable dropout in the control group. Although participants were almost randomly assigned to the different programs, group differences

showed. Participants in the conventional program had more worries than those who took part in the art-based training. Insofar, group effects may have distorted the results. Our mixed findings on skills development need to be put to the test by means of larger samples. They raise further issues concerning effect mechanisms of art-based learning that call for large-scale studies utilizing a mixed-methods approach. Aspects to be examined closer include the timing of interventions and references to the individual working situation of participants.

Our findings on learning effects are based on survey data alone. Although this quantitative approach contributes to closing a research gap in art-based learning, mixed-methods approaches would reveal in-depth information on art-based learning processes in virtual environments. Also, we did not compare the virtual art-based program to a twin in presence. Comparing virtual and in-presence training offers perspectives for further research.

In addition, we contribute to research by underpinning empiricism on positive effects of art-based teaching strategies in higher education. On the one hand, our findings support the idea that, in virtual learning environments, art-based approaches enhance the (social) presence of professionals. On the other hand, we do not provide clear evidence for the assumption that art-based teaching strategies contribute to skills development per se merely by providing supportive virtual learning environments [89,91].

Art-based learning is characterized by extremely individual designs and a broad range of art forms. While this is a challenge for the generalization of empirical findings, it spans a large domain for further research. Which approach is particularly suitable for which challenge in leadership development? For project management education and training in particular, there remains a research gap in the merit of improvisational theater. Improvisation techniques offer a direct approach to challenges of the VUCA world [132]. However, the strength of art lies in its non-deterministic nature.

6. Conclusions

Our study explored effects of a virtually implemented, art-based leadership program on skills development. A key question was whether and how much the intervention enhanced participating project managers' uncertainty competence. We found that integrating the visual arts significantly improved presence and attentiveness to the environment. Hence, participants achieved a higher level of mindfulness in dealing with complexity. In addition, the program tended to strengthen self-efficacy. However, the art-based experiential learning approach did not change familiar patterns in coping with uncertainty.

In the context of art-based learning research, our study stands out as it involved professionals with project management experience and was based on a longitudinal control group design. For this reason, despite a small sample, our findings put qualitative research on art-based leadership education and training into perspective. Results suggest that art-based learning works differently than conventional training but is not necessarily superior to it. We see that in art-based learning, effects cannot be taken for granted. Thus, surrendering to an art-based learning endeavor is a way of dealing with uncertainty as well.

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