

INTERDISCIPLINARY COLLABORATION IN PRACTICE – BALANCING CONFIDENCE AND COMPLEXITY IN EXPERIENTIAL LEARNING

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ABSTRACT

This paper investigates the impact of an interdisciplinary art and technology laboratory conducted within the “Performing the Digital. In Progress!” project on the perceptions and attitudes of students in Arts toward collaboration and the integration of digital tools in creative practice. Through a mixed-methods case study design, the research analyzed data collected from Pre- and Post-laboratory questionnaires of participants, and semi-structured interviews with mentors. The study aimed to test three hypotheses regarding (1) participants’ comfort and preparedness for interdisciplinary teamwork, (2) attitudes toward technology integration, and (3) the qualitative value of interdisciplinary collaboration. Quantitative analysis was used for testing the first two hypotheses and results revealed no statistically significant improvements in participants’ perceptions, which can be partly explained by the small sample size and communication challenges among mentors. These difficulties, together with divergent views regarding structure versus freedom, may have limited the collaborative potential of the laboratory. Our findings also showed a complex relationship with technology, with some mentors embracing it as a creative tool more than the others, who regarded it as less relevant or even distracting. On the other hand, the qualitative analysis confirmed the third hypothesis, and thus highlighting the richness of the interdisciplinary process and the importance of communication, flexibility, and individual learning preferences. Our study suggests that participation in the laboratory may have increased students’ awareness of the complexity of interdisciplinary collaboration. Overall, this paper highlights the need to design supportive communication environments, flexible structures, and thoughtful approaches to technology integration. Future studies should involve larger samples, control groups, and longitudinal perspectives to better assess the long-term impact of the interdisciplinary art-technology interventions on creativity and innovation.

KEYWORDS: *art-based research, emergent creativity, experiential learning, free and open methodologies, interdisciplinary collaboration, knowledge co-creation*

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1. INTRODUCTION

The rising complexity of contemporary organizational contexts calls for new forms of interdisciplinary collaboration and experiential learning. As digital transformation also keeps redefining how people learn, existing research often struggles to close the gap between theoretical models and real-world collaborative practices. Starting from the work of Guilford (1950, 1967) and Kolb (1984), and drawing on the newer contributions of Sawyer (2012) and Montuori (2013) and

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other scholars, this paper is further illustrated by a case study of a Romanian interdisciplinary art project – *Performing the Digital. In Progress!*.

The paper explores how arts-based research (ABR) can contribute to management and leadership studies by supporting the development of divergent thinking, emergent creativity, adaptability, and the co-creation of knowledge in interdisciplinary teams. In this sense, the project offers a concrete example of how theoretical concepts can be put into practice. The initiative was organized in Bucharest in the spring of 2025 by the Developing Art Association, and brought together emergent visual artists, performers, and technologists to explore, through artistic and collaborative practices, the impact of technology on the body and communication. Under the guidance of four mentors from different fields (choreography, music and sound, digital arts, and technology) participants engaged in a series of sessions, production phases, having a final collective exhibition of artworks. Technology has been proven to be very important in supporting the creative and learning processes within projects (Gârdan et al., 2025). Mentors play an essential role in the artistic projects, in guiding the creative process, and by encouraging both autonomy and collaboration (Radu & Radu, 2024).

During the collaborative process in the *Performing the Digital. In Progress!* project, what emerged as main concerns were issues of trust and creative autonomy. How can teams composed of people from various backgrounds work together on the same work of art, maintaining openness and curiosity in the face of different vocabularies of artistic expression? Using a free and open methodology, the project encouraged participants to rely on their intuition and open talk rather than on fixed outcomes or predefined roles. This high flexibility came with frequent moments of uncertainty, but also with moments of authentic discovery. Uncertainty itself became a source of creative inspiration.

This study aims to investigate how such a model can support adaptive thinking, self-confidence, and teamwork capabilities, which are valuable in both artistic and organizational contexts. The study also explores potential challenges, such as maintaining coherence in open-ended frameworks. Despite the challenges, this initiative suggests that free and experience-based methodologies can close the gap between theory and practice, while also offering a dynamic approach to developing collaborative skills and enhancing human leadership capacities in complex and interdisciplinary organizational settings.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

The theoretical framework for this study integrates perspectives from multiple related areas, including creativity theory, experiential learning, interdisciplinary collaboration, emergent creativity, free and open methodologies, and arts-based research methodologies. Together, these perspectives establish the conceptual foundations for understanding how the *Performing the Digital. In Progress!* project embodies and tests these theoretical principles in practice. The following subsections review relevant literature, highlighting how each perspective informs and contextualizes the practices explored in the *Performing the Digital. In Progress!* project.

2.1 Divergent Thinking and Creativity Theory

Guilford J.P. (1950, 1967) redefined creativity by distinguishing convergent thinking, aimed at singular solutions, from divergent thinking, which produces multiple solutions for complex problems. He found four critical facets of divergent thinking: fluency (idea generation), flexibility (varied problem-solving approaches), originality (unique creations), and elaboration (idea detail), which facilitate interdisciplinary collaboration where complex issues require different viewpoints. While Guilford's framework emphasizes individual cognition, contemporary research underscores the collaborative and systemic dimensions of creativity, as illustrated by Sawyer's (2012) notion of "group genius", where significant innovations arise from collective interactions rather than solitary efforts.

In interdisciplinary artistic collaborations like *Performing the Digital. In Progress!*, creativity is distributed across participants. It emerges through dialogue, material experimentation, and the interaction of different disciplinary perspectives. The choreographer's understanding of bodily movement, the technologist's knowledge of digital systems, and the sound artist's sensibility to acoustic environments interact to produce new perspectives that none could generate alone.

The relevance of divergent thinking extends beyond artistic practice into management and leadership studies. Amabile (1996) demonstrates that organizational creativity depends on domain-relevant skills, creativity-relevant processes (including divergent thinking), and intrinsic motivation. In contemporary organizational contexts characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), the ability to generate multiple perspectives and novel solutions becomes a critical leadership competency (Johansen, 2012). A better educational process involves the understanding of students' motivation and the continuous work on enhancing creativity (Radu, 2015). In this sense, the *Performing the Digital. In Progress!* project acts as a kind of workshop for developing skills that are useful in organizational settings: the ability to consider different viewpoints at the same time, handle uncertainty, try out new and unusual ideas, and combine diverse contributions into a coherent outcome.

2.2 Experiential Learning Theory

Kolb's (1984) experiential learning theory provides a framework for understanding how learning occurs through direct experience. It follows a four-stage cycle: Concrete Experience, involving active participation in an activity; Reflective Observation, which allows learners to step back and think about what they experienced; Abstract Conceptualization, where theories or ideas are formed based on reflection; and Active Experimentation, in which learners test these concepts through new experiences. This cycle emphasizes active construction of knowledge. Learners are not passive recipients of information.

In *Performing the Digital. In Progress!*, Kolb's experiential learning cycle becomes evident throughout the project. Participants first engage in lab sessions, experimenting with materials, technologies, and collaborative processes, representing the stage of concrete experience. Later, guided discussions and informal conversations allow them to reflect on their creative work, corresponding to reflective observation. These reflections support the development of an understanding of how technology shapes embodiment, communication, and collaborative creativity, illustrating abstract conceptualization. Finally, participants test these perspectives in subsequent sessions and refine them toward the final exhibition, enacting the stage of active experimentation. The iterative nature of the project- with multiple lab sessions leading to production phases and culminating in a collective exhibition- embodies the cyclical process as Kolb describes. Moreover, the interdisciplinary composition of the team enriches each stage: different points of view during reflection generate more varied conceptualizations, which in turn foster increasingly innovative experiments.

Even if influential, Kolb's model has been critiqued for insufficient attention to social and cultural contexts (Holman et al., 1997). Contemporary scholars argue that learning is not only individual cognitive processing but socially situated practice (Lave & Wenger, 1991). In this sense, experiential learning in collaborative settings involves collective reflection (groups making sense together, not just individuals reflecting alone), distributed cognition (intelligence spread across people, tools, and artifacts), power dynamics (who gets to define what counts as valid knowledge and experience), and cultural contexts (how norms and values shape what and how people learn). *Performing the Digital. In Progress!* project tackles these aspects by forming a “community of practice” (Lave & Wenger, 1991), where people learn by participating together, artworks act as shared reference points to help communication, and trust and autonomy are emphasized to manage the natural power dynamics in collaborative work.

2.3 Interdisciplinary Collaboration

Regarding types of cross-disciplinary work, Klein (2010) distinguishes three levels. First, multidisciplinary involves juxtaposing disciplinary perspectives without integration, resulting in parallel work. Second, interdisciplinarity refers to the integration of knowledge and methods from different disciplines to create new understanding. Third, transdisciplinarity goes further by transcending disciplinary boundaries to generate unified frameworks that incorporate non-academic knowledge. In the context of *Performing the Digital. In Progress!*, the project operates at the interdisciplinary level, integrating artistic, technological, and performative practices. But at the same time, it incorporates transdisciplinary elements by valuing experiential and embodied knowledge alongside technical expertise, underlying the potential of collaborative processes that connect multiple forms of knowing.

Research also underscores several challenges inherent when discuss the interdisciplinary work (Lattuca, 2001; Repko, 2008). Epistemological differences arise because disciplines maintain distinct assumptions about what constitutes valid knowledge and appropriate methods. Communication can also be hindered by language barriers, as specialized and technic vocabularies often impede understanding. Power hierarchies may privilege certain disciplines over others. Finally, assessment of interdisciplinary work poses difficulties, as traditional evaluation metrics may fail to adequately capture complex outcomes.

2.4 Emergent Creativity in Collaborative Contexts

Emergent creativity refers to new outcomes that arise from interactions within a system and cannot be predicted only from the properties of individual components (Johnson, 2001; Sawyer, 2003). According to complexity theory, emergence happens when people with different viewpoints interact, organize themselves without a central authority, learn from feedback, and stay open to new information from their surroundings. In the context of collaborative creative work, emergence is reflected in ideas, insights, or artifacts that no single participant could have produced alone and that were not predictable at the outset.

Research on collaborative creativity underscores several conditions that support the emergence of novel ideas (Sawyer, 2007; Montuori, 2013). Having people with different skills and perspectives work together regularly is key. Clear but minimal rules help organize the work without restricting creativity. Feeling safe to take risks encourages experimentation, and working directly with materials, along with enough time for ideas to grow, supports the creation of new, unexpected outcomes. Montuori's (2013) concept of "creative inquiry" underscores that emergence also requires tolerance for ambiguity, playfulness, and what he terms "epistemological humility" - a recognition that participants do not have all the answers and must remain open to discovery.

A key challenge in collaborative creativity is finding the right balance between structure, which gives guidance and reduces stress, and openness, which allows new ideas and unexpected discoveries to emerge. Too much structure constrains creativity, but too little creates chaos (Brown & Eisenhardt, 1997). Research suggests that minimal critical specifications (Plowman & Duchon, 2008) offer optimal balance, providing just enough constraints to focus activity while leaving process and outcomes open.

In *Performing the Digital. In Progress!*, minimal structural specifications were established to guide the collaborative process without constraining creative emergence. These included clearly defined time limits, such as lab session schedules and the exhibition deadline, a thematic focus on technology's impact on the body and communication, and clarity of roles distinguishing mentor guidance from participant autonomy. Shared values of trust, openness, and curiosity, further shaped the collaborative environment.

2.5 Arts-Based Research and Knowledge Co-Creation

Built on principles of emergent creativity, arts-based research (ABR) provides concrete methodologies through which these collaborative processes can be enacted and studied. ABR employs artistic processes and products as primary modes of inquiry and representation (Leavy, 2015). It challenges traditional research paradigms by embracing subjectivity, valuing personal experience and interpretation as legitimate data, and privileging aesthetic knowing, recognizing that certain forms of knowledge are best expressed through artistic media. ABR combines making art and conducting research at the same time, creating art serving as the method, the analysis, and the way of presenting findings. In management and leadership studies, arts-based research offers useful methods for exploring phenomena that are difficult to quantify or describe in words, such as organizational culture, embodied leadership presence, tacit knowledge, and the emotional dynamics of teamwork (Barry & Meisiek, 2010; Taylor & Ladkin, 2009).

Several arts-based research (ABR) methods are very important to understanding the *Performing the Digital. In Progress!* project. A/r/tography (Irwin & Springgay, 2017) integrates artist, researcher, and teacher identities in a “living inquiry,” where art-making, research, and learning are inseparable. Participants embodied this integration as they simultaneously created art, investigated the impact of technology, and developed collaborative skills. Performative inquiry (Fels & Belliveau, 2008) employs performance (including theater, dance, and ritual) as a method for generating insights, analyzing experience, and communicating findings. In this way, the project’s performance elements allowed participants to explore digital embodiment through direct, bodily experience, using the medium itself as part of the investigation. Collaborative art-making (Leavy, 2015) emphasizes co-creating artifacts as part of the research process, using art as a boundary object to facilitate cross-disciplinary dialogue. The final collective exhibition represents not only the final outcomes but also the research process itself, materializing the group’s integrated understanding of technology and embodiment.

These all approaches do more than structure the creative work. They create conditions for participants to generate knowledge together. In this way, the project exemplifies knowledge co-creation, the collaborative production of understanding that goes beyond individual contributions (Pralhad & Ramaswamy, 2004). In interdisciplinary work, co-creation means everyone shares ownership of ideas and results, and understanding develops through ongoing conversation instead of working alone.

Within *Performing the Digital. In Progress!*, knowledge co-creation was embodied through the collaboration of participants with varied expertise who collectively investigate the relationship between technology, the body, and communication. The resulting knowledge is not an aggregation of individual contributions but rather an emergent product of their interaction. The artworks produced throughout the process function as “epistemic objects” (Knorr Cetina, 2001), artifacts that both embody and generate new forms of understanding.

Arts-based approaches make important contributions to management and leadership development by cultivating a range of cognitive, emotional, and relational capacities. They develop aesthetic sensibility, enhancing leaders’ ability to perceive subtle patterns, interpret complex contexts, and make intuitive judgments (Ladkin & Taylor, 2010). Moreover, arts-based practices also help leaders become more comfortable with uncertainty, turning ambiguous situations into opportunities for experimentation and discovery (Adler, 2006). Working across different media (words, visuals, and performance) broadens the ways they can communicate ideas and connect with others (Barry & Meisiek, 2010). At the same time, these experiences foster creative problem-solving, encouraging innovative approaches to challenges that organizations face (Austin & Devin, 2003).

2.6 Free and Open Methodologies

Free or open methodologies are grounded in philosophical traditions that value adaptability and plural ways of knowing more than fixed or prescriptive research designs (Reason & Bradbury, 2008). Rather than adhering to a universal protocol, they encourage flexible approaches that evolve in response to

context and participant experience. From a pragmatist perspective, as articulated by Dewey (1938), methods are considered tools to be chosen according to what works best in a given situation rather than imposed as general rules. Knowledge, in this view, is validated through its consequences and practical usefulness rather than its correspondence to an external reality. Complexity thinking (Stacey, 2001) further supports this orientation by emphasizing that adaptive systems require methods capable of responding to emergence. Instead of treating uncertainty as a problem to be eliminated, free methodologies embrace it as a generative condition that fosters innovation and discovery.

Free methodologies emphasize flexibility, participation, and reflexivity. They rely on emergent design, allowing methods to evolve in response to discoveries that arise during the process. Participant agency is central, as those involved actively shape the direction of inquiry. Continuous reflexivity ensures that methodological choices remain transparent and context-sensitive. Such approaches are marked by responsiveness to situational dynamics, plural epistemologies that value multiple ways of knowing, and a process orientation that privileges learning and transformation as much as outcomes. Of course, free methodologies are not without their challenges. A key challenge is balancing legitimacy and innovation. Traditional academic and institutional systems often doubt methods that break the usual rules, yet real innovation usually requires trying new approaches (Denzin & Lincoln, 2005). Another challenge involves efficiency versus emergence, meaning that predetermined plans tend to be more time-efficient, yet emergent processes require space for reflection and the gradual unfolding of unexpected insights (Brown & Eisenhardt, 1997). Similarly, assessment can be difficult, because standard assessment systems are built for fixed outcomes and may not capture learning that emerges through flexible, adaptive processes (Patton, 2011).

2.7 Trust, Autonomy, and Psychological Safety

Research on team dynamics confirms that trust is foundational for effective collaboration (Edmondson, 1999). In other words, it represents a fundamental condition for effective interdisciplinary teamwork, shaping both relational and creative dynamics. Within creative collaboration, trust enables essential behaviors such as risk-taking, where participants feel safe to share half-formed ideas without fear of judgment. Also, it supports interdependence, encouraging participants to rely on each other's contributions rather than reverting to isolated work, thus becoming a catalyst for co-creation.

The autonomy (the sense of volition and self-direction) has been recognized as a key driver of creativity and intrinsic motivation (Amabile, 1996; Deci & Ryan, 2000). Within collaborative environments, autonomy appears through several connected dimensions: the ability to make choices that influence direction and methods, the voice to express individual perspectives and be heard, the ownership of collective outcomes, and a sense of self-determination. Yet, the relationship between autonomy and collaboration is inherently paradoxical. Excessive autonomy can fragment collective effort and weaken shared focus, while overly rigid coordination may suppress individual creativity and intrinsic engagement. As Hoegl and Parboteeah (2006) note, the creative potential of teams lies precisely in balancing these opposing forces, allowing enough freedom for innovation while maintaining coherence around shared goals.

Edmondson's (1999) concept of psychological safety (the shared belief that individuals can take interpersonal risks without fear of negative consequences) plays an important role in enabling learning and innovation within teams. Psychological safety allows members to speak up freely, ask questions, admit mistakes, and propose unconventional ideas. It helps people try new things without fear of failing and encourages them to ask for feedback to improve together.

In the context of *Performing the Digital. In Progress!*, psychological safety was cultivated through several mechanisms. Mentors modeled openness and vulnerability, demonstrating that uncertainty and experimentation were integral to the creative process. The iterative structure of the lab, with multiple sessions preceding the final exhibition, allowed ideas to evolve gradually, without premature evaluation or closure.

2.8 Transferability to Organizational Contexts

As stated before, contemporary organizations increasingly operate in VUCA (Volatile, Uncertain, Complex, and Ambiguous) environments, which demand adaptive leadership and flexible problem-solving (Johansen, 2012; Heifetz et al., 2009). Adaptive thinking involves several capacities: cognitive flexibility, the ability to shift perspectives and approaches as situations evolve; tolerance for ambiguity, enabling effective action despite incomplete information; systems thinking, or understanding interdependencies and emergent patterns; and a learning orientation, which frames challenges as opportunities for growth and development.

The experiences cultivated through *Performing the Digital. In Progress!* directly exemplify all these competencies. Participants navigated frequent moments of uncertainty while maintaining openness and curiosity across diverse disciplinary perspectives. They engaged in open conversation without reliance on fixed outcomes or predefined roles, thereby exercising both cognitive flexibility and tolerance for ambiguity. By negotiating complex collaborative situations and integrating multiple viewpoints, participants practiced systems thinking and reinforced a learning-oriented approach, translating the experiential work of the lab into skills relevant for adaptive leadership in contemporary organizational contexts.

Beyond individual adaptive thinking, contemporary organizations increasingly require collaborative competencies that enable teams to function effectively across disciplines. Such competencies include perspective-taking, or the ability to understand others' viewpoints and expertise; communication across differences, translating between specialized languages; conflict navigation, engaging disagreements productively; shared leadership, distributing influence according to situational expertise rather than formal hierarchy; and co-creation, integrating diverse contributions into coherent outcomes. Interdisciplinary artistic collaboration, as exemplified in *Performing the Digital. In Progress!*, offers intensive experiential practice in these areas. Participants continuously translated between choreographic, sonic, visual, and technological languages, navigated aesthetic disagreements, shared leadership based on expertise relevant to particular tasks, and collectively integrated their contributions into coherent artworks, thereby exercising the collaborative skills central to contemporary organizational success.

3. RESEARCH METHODOLOGY

3.1 Main objectives and hypotheses

The project used as a case study for our paper is entitled *Performing the Digital. In Progress!*. The project consisted of three distinct stages:

1. *The interdisciplinary laboratory* (one week in April 2025) - this stage focused on exploring technology and its impact on the body and communication;
2. *Artwork production* (four weeks in April-May 2025) - participants created interdisciplinary video artworks with financial support and collaborative teamwork.
3. *Collective exhibition* (one week in May 2025) – this event involved the presentation of the produced artworks in an exhibition.

The primary objective of our study is to evaluate the impact of the interdisciplinary art and technology laboratory on participants' perceptions and attitudes toward collaborative work and the integration of technology in artistic practices (stage 1). More specifically, we aim to assess any changes in participants' self-reported comfort, interest, preparedness, and openness related to interdisciplinary collaboration and technology use (pre- and post-laboratory), to explore mentors' experiences related to the process of facilitating the interdisciplinary laboratory, and to identify the key factors influencing its success.

Therefore, we formulated the following three hypotheses:

H1. Participation in the laboratory improves participants' confidence and comfort in interdisciplinary collaboration.

This is tested by comparing pre- and post-intervention questionnaire scores on self-reported comfort and preparedness for interdisciplinary teamwork.

H2. The laboratory enhances participants' positive attitudes toward the integration of technology in artistic practices.

This is examined by comparing pre- and post-intervention questionnaire scores related to perceptions of technology's influence on artistic processes.

H3. Mentor interviews identify the key challenges and facilitators of effective interdisciplinary collaboration.

This qualitative analysis explores the key themes reflecting the laboratory's dynamics and factors influencing collaboration.

3.2 Participants

Our study is based on two distinct groups of participants: (1) students in the Arts, who took part in the interdisciplinary art and technology laboratory, and (2) mentors who facilitated the laboratory experience.

- *Students in the Arts* – A total of 13 students were recruited for the laboratory. These participants represented a diverse range of artistic disciplines, including: stage design, painting, choreography, acting, puppet acting, photo-video, and music composition and worked in four different interdisciplinary teams by using the free and open methodologies. Participation in the laboratory and subsequent data collection was voluntary and informed consent was obtained from all participants prior to their involvement.
- *Mentors* – Four mentors representing diverse disciplinary backgrounds – choreography and contemporary dance, music and sound art, multimedia visual arts, and 3D technology and digital art – were recruited to facilitate the laboratory sessions.. Mentors were selected based on their professional experience and their demonstrated ability to guide and support participants in interdisciplinary projects. Mentors provided feedback on their experiences through semi-structured interviews (post-laboratory).

3.3 Design, procedure, and instruments used

Our study involved a quantitative, longitudinal design with repeated measures (Pre-Post) and a complementary qualitative component. The purpose was to evaluate the impact of an interdisciplinary laboratory on the perceptions and attitudes of participants regarding collaboration between art and technology.

Pre measurements were taken before the start of the laboratory, and then Post measurements immediately after completion, in order to assess potential changes in participants' perceptions and attitudes. Also, at the end, mentors were invited to answer a set of open questions about their experience in the laboratory through a semi-structured interview.

We used two main instruments: (1) a Pre–Post questionnaire comprising 10 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), which assessed participants' comfort, interest, preparedness, and openness regarding interdisciplinary collaboration and the use of technology in art; and (2) a semi-structured interview guide for mentors containing five open-ended questions addressing challenges encountered, strategies for collaboration, approaches to stimulating dialogue, mentors' evaluation of participants' progress, and suggestions for improvement.

For the quantitative part of our analysis, we used the statistical software JASP 0.19.3, while for the qualitative one we read the mentors' answers in the interviews and assigned codes and measured frequencies in order to identify the recurring themes.

4. RESULTS

4.1 Quantitative results

In order to compare the Pre- and Post- scores for each of the 10 questions in the questionnaire, we used the non-parametric signed-rank test Wilcoxon, as it needs fewer assumptions such as the normality of the distribution of differences and it is appropriate for our small sample size (13 participants). Also, while we hope for higher Post- values, we cannot say we have a strong justification for using one-tailed test, so we chose the two-tailed test, as a more conservative approach. Results are presented in table 1.

Table 1. Wilcoxon Signed-Rank Test Results for Pre-Post Questionnaire Items

No	Question	Mean - Pre	Mean - Post	Wilcoxon W	z	p-value
Q1	To what extent do you feel comfortable working in interdisciplinary teams?	4.000	4.154	5.000	-0.674	0.286
Q2	How interested are you in the interaction between art and technology?	4.308	4.385	2.000	-0.535	0.386
Q3	To what extent do you think technology can influence artistic processes?	4.769	4.769	5.000	0.000	0.579
Q4	How prepared do you feel to contribute effectively with your specific skills in an interdisciplinary context involving art and technology?	4.077	4.077	5.000	0.000	0.574
Q5	How well do you feel prepared for the challenges and opportunities of collaborating in interdisciplinary teams?	3.923	4.077	8.500	-0.419	0.375
Q6	To what extent do you feel you know your strengths and areas for improvement in interdisciplinary collaborations?	4.000	3.769	11.000	0.944	0.865
Q7	To what extent do you think working in interdisciplinary teams can stimulate creativity and personal innovation?	4.692	4.462	8.000	1.095	0.907
Q8	To what extent do you think your perspective on the interaction between art and technology is well defined?	2.923	3.077	13.500	-0.630	0.530
Q9	How confident do you feel in integrating technology into your artistic process?	3.538	3.769	10.500	-0.592	0.588
Q10	To what extent do you feel open to learning new approaches and working techniques in an interdisciplinary context?	4.846	4.769	2.000	0.447	1.000

Source: authors

As it can be seen, Wilcoxon signed-rank tests did not reveal any statistically significant differences between Pre- and Post-laboratory scores for any of the 10 questionnaire items (level of confidence $\alpha = 0.05$). This suggests that, overall, participation in the interdisciplinary laboratory did not lead to measurable changes in participants' self-reported perceptions and attitudes related to interdisciplinary collaboration and technology integration.

However, it is important to consider the small sample size we could analyse (with only 13 participants in the project), which for sure limited the statistical power to detect subtle, but potential meaningful effects. Therefore, while the quantitative results do not allow us to conclude that the laboratory had a statistically significant impact, some trends in the data are worth noting. For example, several items showed a slight increase in the mean score from Pre- to Post-laboratory (questions 1, 2, 5, 8, and 9), suggesting a possible movement towards more positive perceptions on the interdisciplinary collaborations, although these increases were not very big and did not reach statistical significance. On the other hand, we can observe that, in the case of questions 6, 7, and 10 there was a slight decrease from Pre- to Post- test. This might mean that, through participating in such a project, students could be more aware of the complexities of working in interdisciplinary teams. Thus, the decrease in Q6 and Q10 could indicate that students became more conscious of their own strengths and limitations when collaborating with others, while the decrease in Q7 might suggest a growing openness to leveraging creativity and personal innovation within a team context.

Looking at the first two hypotheses, we can observe the following:

- *H1. Participation in the laboratory improves participants' confidence and comfort in interdisciplinary collaboration.* The results of the Wilcoxon signed-rank tests provided only partial support for this hypothesis. While increases in the mean scores were observed from Pre- to Post-laboratory results for questions related to comfort (Q1: Mean Pre = 4.000, Mean Post = 4.154) and preparedness (Q5: Mean Pre = 3.923, Mean Post = 4.077), these increases did not reach statistical significance (Q1: p-value = 0.286; Q5: p-value = 0.375). Therefore, while the trends suggest a possible positive impact on confidence and comfort, we cannot definitively conclude that the laboratory had a measurable effect based on these quantitative findings.
- *H2. The laboratory enhances participants' positive attitudes toward the integration of technology in artistic practices.* The results of the Wilcoxon signed-rank tests did not support the hypothesis that the laboratory enhances participants' positive attitudes toward the integration of technology in artistic practices. The means were equal (Q3: Mean Pre = Mean Post = 4.769) with a p-value of 0.579. Therefore, we cannot conclude that the laboratory had a measurable impact on participants' perceptions of technology's influence on artistic processes.

The fact that no statistically significant differences were found indicates that our quantitative results are not conclusive. The limited changes observed in these quantitative measures suggest that the effects of the laboratory may be subtle, context-dependent, and are actually difficult to quantify using a short-term Pre- and Post- design, particularly given the small sample size we had in this project. We believe that, even in the absence of statistically significant change, the laboratory may have facilitated reflective learning and self-awareness among participants. Therefore, the qualitative feedback obtained from mentors through the interviews becomes even more important, as it provides richer, nuanced insights into the processes, challenges, and interactions that shaped the laboratory experience.

4.2 Qualitative results

Mentors' responses were analyzed qualitatively through thematic analysis. Each identified theme was coded, and the frequency of occurrences was assessed to highlight patterns across the data. Selected quotes were included to exemplify these themes (table 2), offering insight into the mentors' perspectives on collaboration, structure, integration of technology, role of mentors in the creative process, and mentorship practices.

Table 2. Themes identified in mentor responses (four mentors)

No.	Theme	Relevant quotes (Examples)	Frequency
1	Communication & collaboration difficulties (Mentioning difficulties in establishing effective communication between mentors and participants, as well as in facilitating interdisciplinary collaboration)	<ul style="list-style-type: none"> • <i>The application of the methodology was a bit complicated from the beginning, due to some small communication errors in the implementation team – Mentor 2</i> • <i>One of the teams had visible difficulties in finding a common workspace, not so much because they were incompatible, but because they were too open to extensive dialogue – Mentor 2</i> • <i>We didn't have chemistry; I feel we could have done more – Mentor 4</i> 	7
2	Structure versus freedom (Divergent opinions regarding the optimal degree of structure needed to stimulate creativity and learning – some mentors preferred a more structured framework, while others valued freedom and self-organization)	<ul style="list-style-type: none"> • <i>I always tried to be flexible and treat everything like a blank slate – Mentor 1</i> • <i>The structure was even more rigid than it should have been; they needed unsupervised and uninterrupted time together – Mentor 2</i> • <i>Personally, I would have needed more structure, coherence, and involvement – Mentor 3</i> • <i>Freedom is the biggest challenge – Mentor 4</i> 	9
3	Impact of technology (Reflection on how technology was integrated into the creative process, with mentions of accessibility, relevance, and potential to extend artistic practices)	<ul style="list-style-type: none"> • <i>I chose to present them with some more simple projects (i.e. projects in which I used simple techniques/ technologies applicable during the time they had available) – Mentor 2</i> • <i>My workshop was built around body and movement proposals, without including technology – Mentor 3</i> • <i>I combined the creative and artistic part with the facilities offered by the current technology (light & camera) – Mentor 4</i> 	5
4	Role of mentors (Discussions about the role of the mentor in guiding and supporting participants, with mentions of the importance of providing constructive feedback, facilitating dialogue, and adjusting expectations to the reality of the project)	<ul style="list-style-type: none"> • <i>It's too early for some relevant answers to come from me, given that I estimate that the bulk of the activities will be after the delivery of this material" – Mentor 1</i> • <i>"I took a non-invasive position and let them come to me" – Mentor 2</i> 	4
5	Mentorship practices (Emphasizing the importance of creating a safe space for dialogue, critical reflection, and constructive feedback, as well as encouraging participants to express their opinions and learn from each other)	<ul style="list-style-type: none"> • <i>Every time I talked to teams, I insisted that everyone express their unbiased opinion about what they hear coming from the other colleagues – Mentor 1</i> • <i>It was with argumentative discussions in which each team, collectively, and not individually, presented and stood up for their approaches – Mentor 2</i> • <i>The technique of ensuring perceptive support for discussions was very useful – Mentor 4</i> 	6

Source: Developed by the authors, based on the semi-structured interviews

Despite having not statistically significant quantitative results were not, our qualitative analysis has shown some interesting connections with the themes identified in the mentors' responses, such as:

- *Paying attention to a series of communication and collaboration difficulties.* This theme is consistent with the lack of significant changes in the perceptions of participants regarding interdisciplinary collaboration. If mentors encountered difficulties in facilitating communication and collaboration, it is possible that participants did not experience a significant improvement in these abilities.
- *Importance of a balance between structure and freedom.* This polarity may reflect a lack of clarity in the „most appropriate” laboratory design, which could have affected the results; perhaps some participants may have benefited from more structure, while others may have preferred more freedom.
- *Differences with respect to the perceptions of the impact of technology on the artistic processes.* Although we did not find a statistically significant change in the participants' perception of the impact of technology, some mentors emphasized the importance of integrating technology into the creative process, while others preferred to focus on more traditional aspects of art.

Therefore, regarding our third hypothesis, we could state the following:

- *H3. Mentor interviews identify the key challenges and facilitators of effective interdisciplinary collaboration.* This hypothesis was confirmed. The qualitative analysis did reveal key themes related to the challenges and facilitators of successful interdisciplinary collaboration, as evidenced by the identified themes presented in table 2.

5. DISCUSSION AND CONCLUSIONS

This study investigated the impact of an interdisciplinary art and technology laboratory on students' in arts perceptions and attitudes toward collaborative work and the integration of technology in artistic practices. By examining participants' and mentors' experiences, the study offers insights into both the opportunities and challenges of integrating digital tools into collaborative artistic processes.

The recurring theme of communication and collaboration difficulties among mentors might explain, in part, why quantitative measures of comfort and preparedness in interdisciplinary teamwork (Q1 and Q5, that were the base for testing our first hypothesis) did not show significant increases. This situation is actually consistent with Edmondson's (1999) conclusions on psychological safety. If mentors themselves struggled to establish effective communication, this may have limited the participants' ability to fully benefit from the collaborative aspects of the laboratory. However, we concluded that this hypothesis was partially supported, since results Post- were slightly higher than the results Pre-, even though without a statistical significance for our very small sample of participants.

The divergent opinions regarding structure versus freedom raise questions about the optimal design for interdisciplinary learning experiences. The lack of a universally preferred approach suggests that a more flexible laboratory structure, catering to individual-, and sometimes team-learning preferences, might be beneficial. The high frequency on this trend might be a case of hampering the positive impact of the laboratory. This is line with the conclusions of Hoegl and Parboteeah (2006), who emphasize that effective creative teamwork requires balancing individual autonomy with collective direction. Also, this observation aligns with prior research suggesting that minimal structural guidance combined with sufficient openness fosters emergent creativity, whereas either extreme (too rigid or too loose) may constrain innovative outcomes (Brown & Eisenhardt, 1997; Plowman & Duchon, 2008).

With respect to the impact of technology (our second hypothesis), our conclusion is that technology has a complex role. While some mentors actively integrated technology, others found it less relevant or even a distraction. This diversity of approaches might explain the lack of significant changes in the participants' attitudes toward technology integration (Q3). The varied engagement with technology

observed among participants reflects findings in the literature, where digital tools can either enhance or distract from creative collaboration depending on the integration strategies (Gârdan et al., 2025; Sawyer, 2007).

As highlighted in arts-based research frameworks, qualitative feedback and reflective observation are critical for capturing emergent creative processes that quantitative measures may overlook (Leavy, 2015; Sawyer, 2003). Therefore, despite the absence of statistically significant changes in the quantitative measures we took into account, the qualitative analysis of mentor responses provided valuable insights into the dynamics of the laboratory experience and thus we concluded that our third hypothesis was confirmed. Our qualitative findings offer valuable insights into the complexities of facilitating interdisciplinary collaboration and the importance of considering individual learning preferences and communication styles.

Our findings suggest that future interdisciplinary interventions should prioritize creating supportive communication environments, adopting flexible structural approaches, and carefully considering the role of technology in creative processes. These recommendations are consistent with the literature emphasizing the development of adaptive thinking, perspective-taking, and collaborative competencies through interdisciplinary experiential learning (Johansen, 2012; Amabile, 1996). The small decrease observed in the results Pre- and Post- for Q6 and Q10 made us reflect more on the need of comparison for an increased realism. It is possible that, after participating in the laboratory, some participants became more aware of the complexity of interdisciplinary collaboration and the limits of their own abilities.

Future research should try to address the limitations of this study in order to provide more robust and generalizable findings. Thus, we plan to employ larger sample sizes to increase statistical power and the likelihood of detecting subtle but meaningful effects, and to include control groups that would allow for more rigorous comparisons and a clearer understanding of the laboratory's impact. Longitudinal designs, despite being more difficult to conduct, could further analyse the persistence of the learning outcomes and the collaborative skills over time, capturing both immediate and delayed effects of interdisciplinary interventions. It would also be valuable to explore different approaches to structuring interdisciplinary learning environments in order to deepen the understanding of the impact of interdisciplinary interventions (i.e. variations in mentorship styles or different degrees of integration of technology in the artistic process). We strongly believe that interdisciplinary collaboration has enormous potential to stimulate creativity and innovation, by offering participants rich opportunities to develop the cognitive, emotional, and relational capacities necessary for effective teamwork in complex, real-world settings.

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REFERENCES

- Adler, N., J. (2006). The arts and leadership: Now that we can do anything, what will we do? *Academy of Management Learning & Education*, 5(4), 486–499. [https://doi.org/10.1016/S1475-9152\(07\)00211-6](https://doi.org/10.1016/S1475-9152(07)00211-6).
- Amabile, T., M. (1996). *Creativity in context*. Westview Press.
- Austin, R. & Devin, L. (2003). *Artful making: What managers need to know about how artists work*. Financial Times Prentice Hall.

- Barry, D. & Meisiek, S. (2010). Seeing more and seeing differently: Sensemaking, mindfulness, and the workarts. *Organization Studies*, 31(11), 1505–1530. <https://doi.org/10.1177/0170840610380802>.
- Brown, S., L. & Eisenhardt, K., M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1), 1–34. <https://doi.org/10.2307/2393807>.
- Denzin, N., K. & Lincoln, Y., S. (Eds.). (2005). *The SAGE handbook of qualitative research* (3rd ed.). Sage.
- Deci, E., L. & Ryan, R., M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01.
- Dewey, J. (1938). *Experience and education*. Macmillan.
- Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44(2), 350–383. <https://doi.org/10.2307/2666999>.
- Fels, L. & Belliveau, G. (2008). *Exploring curriculum: Performative inquiry, role drama and learning*. Pacific Educational Press.
- Gârdan, I., P., Manu, M., B., Gârdan, D., A., Negoită, L., D., L., Paștiu, C., A., Ghiță, E. & Zaharia, A. (2025). Adopting AI in education: optimizing human resource management considering teacher perceptions. *Frontiers in Education*, 10, 1–24. <https://doi.org/10.3389/educ.2025.1488147>.
- Guilford, J., P. (1950). Creativity. *American Psychologist*, 5(9), 444–454. <https://doi.org/10.1037/h0063487>.
- Guilford, J., P. (1967). *The nature of human intelligence*. McGraw-Hill.
- Heifetz, R., Grashow, A. & Linsky, M. (2009). *The practice of adaptive leadership*. Harvard Business Press.
- Hoegl, M. & Parboteeah, K., P. (2006). Autonomy and teamwork in innovative projects. *Human Resource Management*, 45(1), 67–79. <https://doi.org/10.1002/hrm.20092>.
- Holman, D., Pavlica, K. & Thorpe, R. (1997). Rethinking Kolb's theory of experiential learning in management education. *Management Learning*, 28(2), 135–148. <https://doi.org/10.1177/1350507697282003>.
- Irwin, R. & Springgay, S. (2017). A/r/tography as practice-based research (pp. 162–178). Routledge. <https://doi.org/10.4324/9781315467016-17>.
- Johansen, B. (2012). *Leaders make the future: Ten new leadership skills for an uncertain world* (2nd ed.). Berrett-Koehler.
- Johnson, S. (2001). *Emergence: The connected lives of ants, brains, cities, and software*. Scribner.
- Klein, J., T. (2010). A taxonomy of interdisciplinarity. In R. Frodeman, J. T. Klein, & C. Mitcham (Eds.), *The Oxford handbook of interdisciplinarity* (pp. 15–30). Oxford University Press.
- Knorr Cetina, K. (2001). Objectual practice. In T. R. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (pp. 175–188). Routledge. <https://doi.org/10.4324/9780203977453>.
- Kolb, D., A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

- Ladkin, D. & Taylor, S., S. (2010). Enacting the 'true self': Towards a theory of embodied authentic leadership. *The Leadership Quarterly*, 21(1), 64–74. <https://doi.org/10.1016/J.LEAQUA.2009.10.005>.
- Lattuca, L., R. (2001). *Creating interdisciplinarity: Interdisciplinary research and teaching among college and university faculty*. Vanderbilt University Press. <https://doi.org/10.2307/j.ctv167563f>.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511815355>.
- Leavy, P. (2015). *Method meets art: Arts-based research practice* (2nd ed.). Guilford Press.
- Montuori, A. (2013). Creative inquiry: Confronting the challenges of scholarship in the 21st century. *Futures*, 44(1), 64–70. <https://doi.org/10.1016/j.futures.2011.08.008>.
- Patton, M., Q. (2011). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. Guilford Press.
- Plowman, D., A. & Duchon, D. (2008). Dispelling the myths about leadership: From cybernetics to emergence. In M. Uhl-Bien & R. Marion (Eds.), *Complexity leadership, Part 1: Conceptual foundations* (pp. 129–153). Information Age Publishing.
- Prahalad, C., K. & Ramaswamy, V. (2004). *The future of competition: Co-creating unique value with customers*. Harvard Business School Press.
- Radu, C. (2015). Motivation in the educational process and English as a medium of instruction. *Proceedings of the 9th International Management Conference "Management and Innovation For Competitive Advantage"*, 1, 191–197.
- Radu, C. & Radu, M. (2024). Innovative Approaches to Mentorship – AI and Women in the Film Industry. *Proceedings of the 18th International Management Conference "Management in the Algorithmic Era: Harmonizing AI Mastery and Human Collaboration"*, 1, 178–190. <https://doi.org/10.24818/IMC/2024/02.09>.
- Reason, P. & Bradbury, H. (Eds.). (2008). *The SAGE handbook of action research: Participative inquiry and practice* (2nd ed.). Sage.
- Repko, A., F. (2008). *Interdisciplinary research: Process and theory*. Sage.
- Sawyer, R., K. (2003). *Group creativity: Music, theater, collaboration*. Lawrence Erlbaum.
- Sawyer, R., K. (2007). *Group genius: The creative power of collaboration*. Basic Books.
- Sawyer, R., K. (2012). *Explaining creativity: The science of human innovation* (2nd ed.). Oxford University Press.
- Stacey, R., D. (2001). *Complex responsive processes in organizations: Learning and knowledge creation*. Routledge.
- Taylor, S., S. & Ladkin, D. (2009). Understanding arts-based methods in managerial development. *Academy of Management Learning & Education*, 8(1), 55–69. <https://doi.org/10.5465/amle.2009.37012179>.