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Connected Art Practice: Transformative Learning Environments for Transdisciplinary Competences

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Abstract: This article explores the implementation of Connected Art Practice in diverse learning environments, serving as an immersive entry point for students and researchers to develop collaborative transdisciplinary skills. This innovative approach integrates audio, educational, and sustainability research, employing sound-interaction methods applied to tangible objects. Participants engage in exploring the interplay between objects representing interests or values, fostering the creation of a visual and linguistic network of interconnectedness. Inspired by artistic research, particularly Dérive, the practice provides experiences of connectedness to others and the environment, intertwined with reflections and discussions that foster a community of inquiry. This community collaboratively designs shared practices or projects, encouraging a holistic approach to transformative learning, addressing heterogeneity, complexity, authenticity, critical awareness, and emotional connectedness. All three case studies utilized qualitative analysis in artistic and academic settings. Datasets were collected in case study two from group discussion, participant observation, press releases and documentary photographs. In case studies one and three, audio–visual recordings, participant observation, field notes, and photo-documentation were collected. This study demonstrates that "Connected Art Practice" enhances competences in artistic expression, communication, and collaboration across disciplinary, social, and cultural boundaries. Specifically, it contributes to creative reinvention, personal sharing, self-reflection, and the capacity to co-design diverse projects. The paper concludes by discussing findings and pointing out the essential qualities of Connected Art, providing insights and resources for educational and research institutions seeking to foster transdisciplinary engagement and transformative learning in their curricular activities.

Keywords: education; intercultural; critical thinking; community of inquiry; Connected Art; arts-based research; transformative learning; sustainability

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1. Introduction

Connected Art is an innovative arts-based research approach developed by Dan Norton and Stella Veciana [1], fostering collaborative transdisciplinary creative practice.

In Connected Practices workshops, participants employ 3D objects to represent research interests, fostering discussions on heterogeneity, interdisciplinarity, theory, collaboration, and complexity. The practice-based research cultivates a Community of Inquiry [2], characterized by collaborative critical discourse and reflection to construct personal meaning. Within the Connected Art Practice methodology, interdisciplinary science and visual language integrate to build a common narrative, encouraging collaboration and practical projects. Workshops generate a semantic network of connections, serving as a foundation for co-designed shared practices and collaborative projects across interdisciplinary languages.

To foster effective collaboration in group projects, researchers and students face various challenges. These include transcending specialist jargon in transdisciplinary work, facilitating clear and empathetic communication in new student groups to address wariness and inexperience, and navigating the shift from high school to university where students must engage with unfamiliar peers and address unexpected interpersonal issues during group projects. These challenges can trigger fear of failure and a lack of self-confidence, especially heightened by the COVID-19 pandemic, which has increased symptoms of anxiety and a growing feeling of disconnectedness among youth [3]. Similarly, adult learners returning to university after a long hiatus may experience these feelings, often going unnoticed.

In addressing these challenges, particularly in the fields of arts education, relational and socially engaged art practices offer transformative learning approaches [4–6] to connect people and ideas. Connective Art is originally derived from audio culture. It shares common ground with "Connective Aesthetics" [7] in its approach to art that transcends individualism and emphasizes empathetic listening, the value of interdependence, and a commitment to social responsibility and the common good. In contrast to the philosophical connotations of Connective Aesthetics, Connected Art underscores action, creative practice, and the act of connecting. In this way, it aligns with "Relational Art" [8], which encourages participation in shared activities and the creation of enriching interpersonal encounters, enabling the collective creation of meaning rather than individual expression. However, Connected Art practice includes a critical perspective on socially engaged art and on how to evaluate relations as art, but does not follow Bishop's conception of "Relation Antagonism" [9], which advocates disruption and confrontation as aesthetic ideals.

In Connected Art, physical objects are employed as tools, processes, forms of knowledge, or research, not necessarily as traditional artworks. In education, Connected Art conceives art practice as an ongoing shared process that promotes cross-disciplinary thinking, embodied experiences, and engaged creativity, ultimately supporting transformative thinking. Moreover, it trains individuals in techniques for fostering productive interactions and dialogues within teams, guiding them from initial apprehension to confidence and, ultimately, to new possibilities.

Connected Art practice integrates diverse educational approaches, including RealLab[1] approaches for internal and external transformative learning [15–17]; environmental and sustainability research and practices [18–20]; critical, caring, and creative thinking [21,22]; liminal learning spaces [23,24]; creativity learning practices based on DJ information interaction models [25]; and embodied learning and cognition [26,27]. The latter is particularly related to Embodied Art forms such as theatre, performance, and dance, which provide powerful means to create experiences, address emotions, and gain insights into concepts and ideas. This approach recognizes that "the active body learns in ways that are eminently more personal, applicable, critical, and long-lasting than any other teaching method" [28]. Connected Art not only aims to encourage researchers and students to develop creative innovations and critical thinking skills but also to help them cope with uncomfortable feelings, learn through connecting with others, discover their authentic pursuits, and cultivate a sense of community within a team.

As an educational approach, Connected Art is valuable for both advanced researchers and first-year student groups. It promotes quick and easy group work, enabling students to swiftly acclimate and engage in the educational process. For groups of researchers and professionals from diverse fields, it facilitates transdisciplinary projects by combining specializations and the rich experiences of practitioners to seek alternative ideas and solutions. The method inherently fosters creativity, allowing originality to emerge rapidly during the presentation and exchange process.

The term "Connected Art"[2] was coined in 2013 during a workshop at the "Kiblix Art Science Technology Festival" in Maribor, Slovenia (Figure 1). The workshop[3] brought together artists and scientists to explore interaction techniques and encouraged participants to share their implicit knowledge and memories by integrating them into shared practices. This approach generated a network of connections around each participant's chosen object

or research, leading to the creation of the "Kult i Novacija," a "mobile art and science school" designed to tour marketplaces. Frances Norton has since further developed and independently used the Connected Art method in her educational approaches.

Figure 1. "Revaluing Memories" workshop. Left: workshop and selected objects. Right: connected objects installation at Kiblix Art Technology Festival.

This paper adopts a constructivist ontology [29], acknowledging the active construction of knowledge through multiple realities shaped by human thought and experience. The epistemology is hermeneutic [30], interpreting three case studies and experiences to fuse horizons and build joint understanding.

2. Objectives

Connected Art represents an innovative artistic method and practice tailored for higher education. This article offers a comparative examination of three cases, deployed in different contexts and designed for diverse training purposes. To better understand these forms of transformative and connective learning environments, our article seeks answers to the following questions:

1. How does the Connected Art method facilitate transformative, liminal, embodied, and creative learning environments?
2. What types of artistic and communal experiences are nurtured, and what skills, attitudes, and competences does Connected Art instill in students?
3. What insights and knowledge emerge from the three case studies?

With these questions in mind, we structure the article as follows:

Analysis: In this section, we delve into three case studies, detailing the teaching methodologies, learning goals, progress in student capabilities, and specific task outcomes.

Discussion: We compare evaluations from students and teachers across the three cases, extracting the unique qualities of each Connected Art Practice applied.

Conclusion: We conclude the paper by critically assessing the findings in terms of benefits and lessons learned, along with how they can inform future applications of Connected Art Practice.

Our study adheres to ethical guidelines from the British Educational Research Association. Bera guidelines were followed in recognizing the diversity of approaches in educational research. We treated participants fairly, sensitively, and with dignity and freedom from prejudice. In case three, participants were given information about how their data would be used; they gave informed and voluntary consent. Participants are anonymized in the text so as to cause no harm. We sought permission from participants to interview them. Volunteer participants received a pre-research information sheet outlining what the study was for, who was conducting it and how data might be used in research

papers and publishing, as well as them signing a participant release form. Participants had the right to withdraw from research at any time. In case one and two, oral consent was given for data gathering, for the evaluation, and for potential future publications. In addition, this article has ethical approval from the Ethics Committee at Leeds Arts University.

3. Case Study Analysis

3.1. Case 1: GoodLife RealLAB Seminar at Leuphana University

3.1.1. GoodLife RealLAB—Connecting Potatoes, DJ Practice, and Transition Research

In 2014, the original Connected Art practice, initially developed for the Kiblix Art Festival, was introduced into an academic setting at Leuphana University in Lüneburg, Germany. This five-credit course was part of the Complementary Studies program, focusing on "Art and Aesthetics perspective." It welcomed twenty-five undergraduate students from various semesters and diverse fields, including cultural, sustainability, environmental, political, and economic sciences, digital and social media, and pedagogy.

During the first day of the seminar, students were asked to represent their research field and interests with an object the size of a potato. By connecting these objects playfully with strings and word associations written on post-its, four interconnected study groups were formed. This connecting process draws inspiration from audio culture, specifically in the skill of mixing distinct auditory elements seamlessly, allowing for the rapid amalgamation of diverse ideas into co-created concepts through object-play.

Students were introduced to sustainable urban initiatives, transition research, and good life concepts through a real-world project, emphasizing academic–practitioner collaboration and sustainable transformation [18,31,32]. They were tasked with developing an experimental research project for implementation as a RealLab in an urban setting. This project was expected to define a research question, outline research methodologies, and be accomplishable in one day. During an urban field study, following the "Dérive"[4] artistic practice, students collected observations and audio–visual recordings for their group projects (Figure 2).

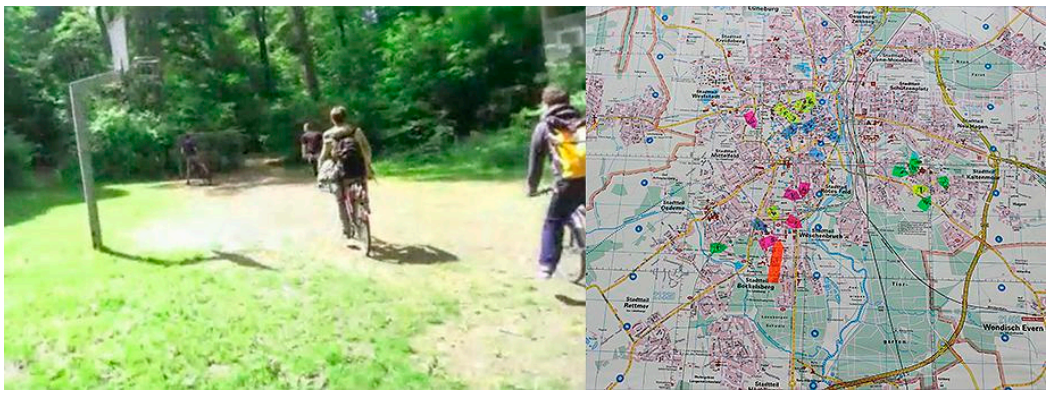

Figure 2. (**Left**) "Dérive" experience and research. (**Right**) Lüneburg map with the four student team routes.

The next day, students learned a method which combined digital art and DJ practices with research methodologies from social and environmental sciences. This encouraged them to select, mix, connect, and integrate the data collected during the field study to create meaningful links and narratives for their transdisciplinary projects. After this, the findings and first project ideas were presented and discussed in the whole group. The rest of the day was spent preparing interactive project presentations. On the last day, students presented and discussed their project results and teamwork experiences.

3.1.2. Specific Learning Objectives and Capacity Development

The seminar aimed to enhance students' perception of their disciplines and their value by encouraging them to contextualize and share their knowledge across different fields. The "Dérive" practice offered students a liminal learning space outside the university, helping them overcome shyness and build self-confidence while collaborating with team members, particularly when engaging with neighbors and other citizens during interviews.

Students were expected to gain a deeper understanding of their own research and develop inter- and transdisciplinary capabilities for sustainability transitions [33,34] The seminar trained students in a creative and playful method to create inter- and transdisciplinary projects, improving their communication and presentation skills. The presentations enhanced the communication skills in the English language of the primarily German-speaking students. In a similar way, students enriched their artistic expression skills by creating engaging self-produced videos and Prezi visualizations, developing their own website to communicate and facilitate good living, or designing a physical brochure, but also by experimenting with performative skills such as raising text banners to emphasize conclusions or combining physical noise making devices (a bicycle) with rhythmic, well-edited video material.

Combining scientific research and artistic expression in transformative learning environments resulted in collaborative and innovative projects [35], including the RealLab approach, aimed at making a real sustainable and social impact [16,36]. In essence, the seminar was designed to train change agents through internal and external transformative learning [6,15,20,36]. Datasets were collected via (a) photos of students while developing their concepts by creating/mixing/connecting, analyzing the way their ideas came together in the project development; (b) audio–visual recording of and notes about "Dérive" experiences, interviews, presentation materials by students; (c) audio–visual recording of and taking notes during student presentations by teachers.

3.1.3. Results

The integration of the Connected Art practice with transdisciplinary research methodologies led to the presentation of four well-researched and engaging student projects. These 15-min presentations were expected to explain how the project idea emerged from the object/potato connections and real-world problems. Students had to address the research question, transition approach, science-practice cooperation method, and expected social impact, and provide a conclusion. A 30 min feed-back discussion followed.

For instance, one student team presented their project, which originated from the associations they made with objects like a tuning fork, Dixie Music stick, electric guitar strings, music concert ticket, and a tennis ball. This led to the question, "can we find 'good life' in playgrounds?" (Figure 3). Their project emerged from real-world observations during the "Dérive" practice, revealing that no one was using the city's playgrounds, which they first perceived as shocking and later saw as an opportunity. Drawing on the musical elements in their selection of objects, they developed the concept of "Mobile Festivals,"[5] itinerant festivals held anywhere, particularly playgrounds. Through critical thinking and research, the team designed a transition approach, "Be part of the Good Life Motion!" (Figure 4), that involved residents rediscovering their playgrounds through mini festivals, supporting local artists and musicians. This was expected to foster community, connect people with nature, and potentially transform the social tissue.

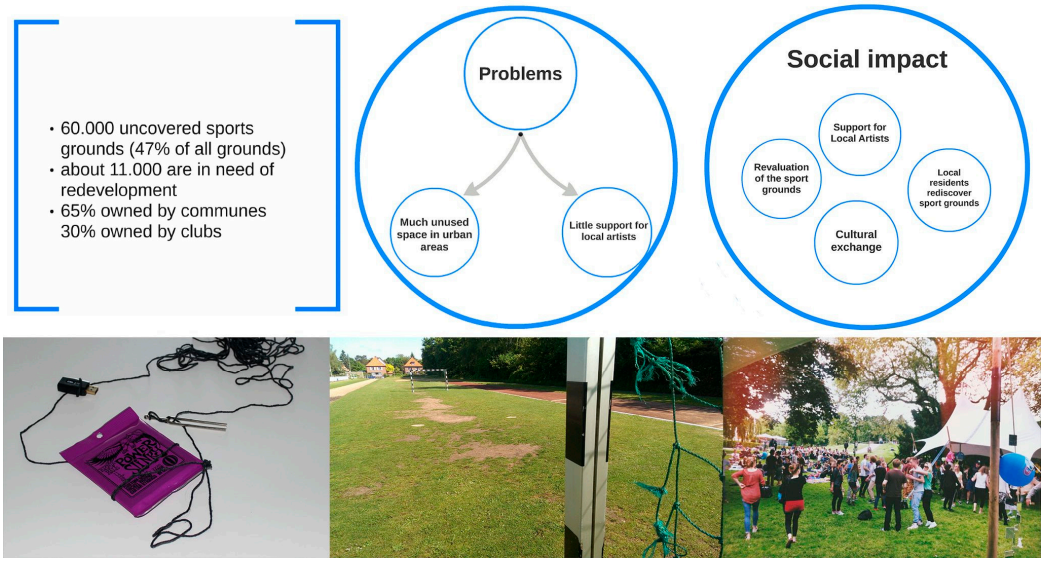

Figure 3. The "Mobile festivals" project development based on the "Good Live Motion" transition approach showing researched statistics, tackled problems and expected social impact of solution.

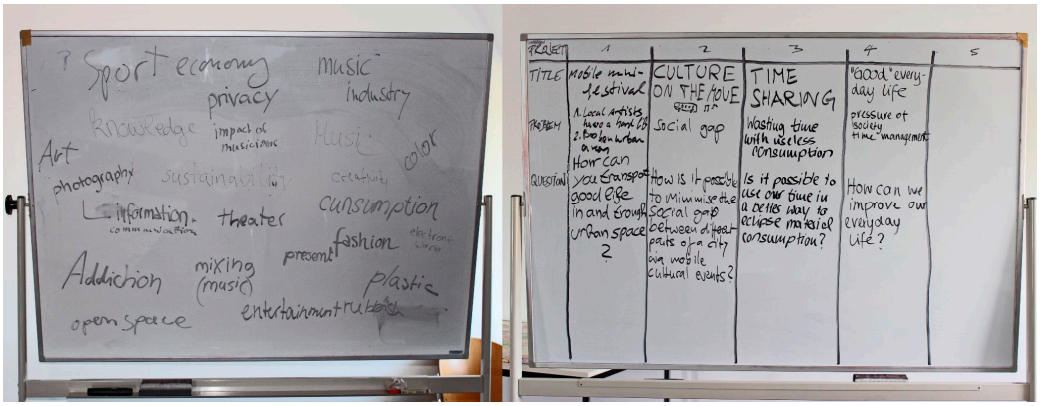

Figure 4. Project development based on chosen and interrelated objects in small groups with a whole group feed-back session refining the title, problem, and research question addressed.

The students' learning improvements were evaluated in regard to the performance and outcomes of the presentations following a set of parameters that were communicated to the students in advance: Content criteria (30%): structure/justified basic assumptions; clear problem/topic and its interrelation to chosen objects; own field research during Dérive; explanation of own transition approach; methodological reflection; discussion/conclusions. Scientific (20%): scientific style; comprehensible, coherent argumentation; well-founded research; explanation/application of central concepts. Presentation (30%): mode of presentation; audience involvement; appropriate choice and moderation of a performative method; answering questions; coordinated distribution of tasks, teamwork. Formal criteria (20%): targeted and creative use of media; format management (time/scope); citation/spelling.

The presentations were discussed for about 30 min each by the whole student group and the teachers. Students commented, among other things, that they felt they had to work very hard for the presentation but that they enjoyed the whole experience, particularly developing connections through the initial objects between their own interests and those of their colleagues, overcoming shyness interviewing strangers or being rejected several times by citizens that said "I am in a hurry", getting out of the "Leuphana sustainability bubble", getting in touch with real people and real problems, and the feeling of cooperation, enjoyment, and commitment within the team rather than competition as they had in previous group work experience.

3.2. Case 2: Workshop: Potato Heads Potato Bodies

3.2.1. Potato Heads Potato Bodies—The Body and Its Representations

This case examines a workshop conducted at ADEMA University School at the University of the Balearic Islands, Spain. The four-hour workshop was for first-year fine art students during their second week of classes in their first semester. The workshop focused on the human body, with each student bringing a small object, the size of a potato, representing a significant concern or observation related to the body.

The objects were displayed together (Figure 5), and connections were established between them using strings or tape, accompanied by brief descriptions of the observation which linked the objects. This created a mesh of interconnected ideas about the body, emphasizing the body as a web of meaning and metaphor rather than simply as an object.

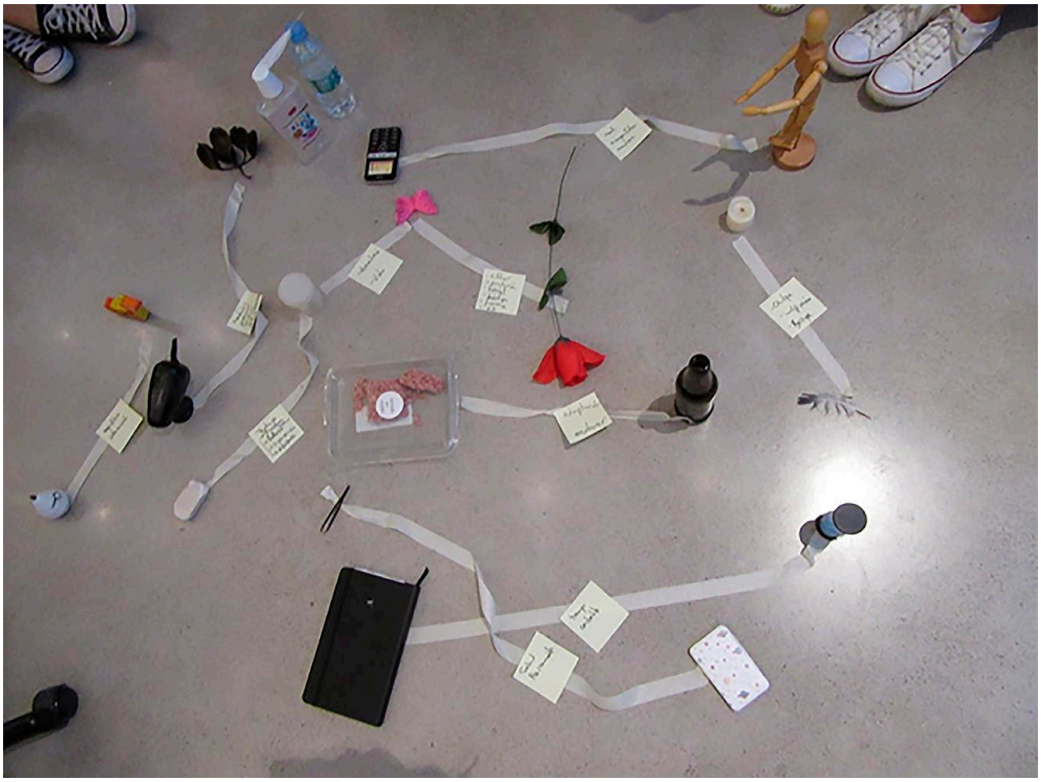

Figure 5. Objects, "the size of a potato" representing notions regarding the human body.

Students were divided into smaller groups, and each group worked on connecting their selected objects. They then used these connections to develop a sculptural representation using waste materials collected from home and the street.

3.2.2. Specific Learning Objectives and Capacity Development

The workshop aimed to foster interaction among students who had only recently met, encouraging shared ideation and building confidence in collaborative creative processes. Essentially, it sought to encourage students to explore the concept of the body beyond mere objectification. Students were required to connect abstract elements, i.e., the observations represented by potatoes, and these connections served as conceptual foundations, facilitating dialogue and offering visual cues for creative exploration centered around the theme of the body.

3.2.3. Results

The workshop resulted in the students creating a series of rapid sculptures in their groups, each representing different ideas related to the human body. These included the representation of the soul, issues of body weight and size, color and embroidery, and the

experience of a kiss (Figure 6). The sculptures were displayed in a studio, and the students assessed both the process and the outcomes. As a concluding step, the students placed the sculptures back into the street, exploring this liminal space, an overlooked urban area, which was the source of the original discarded waste materials.

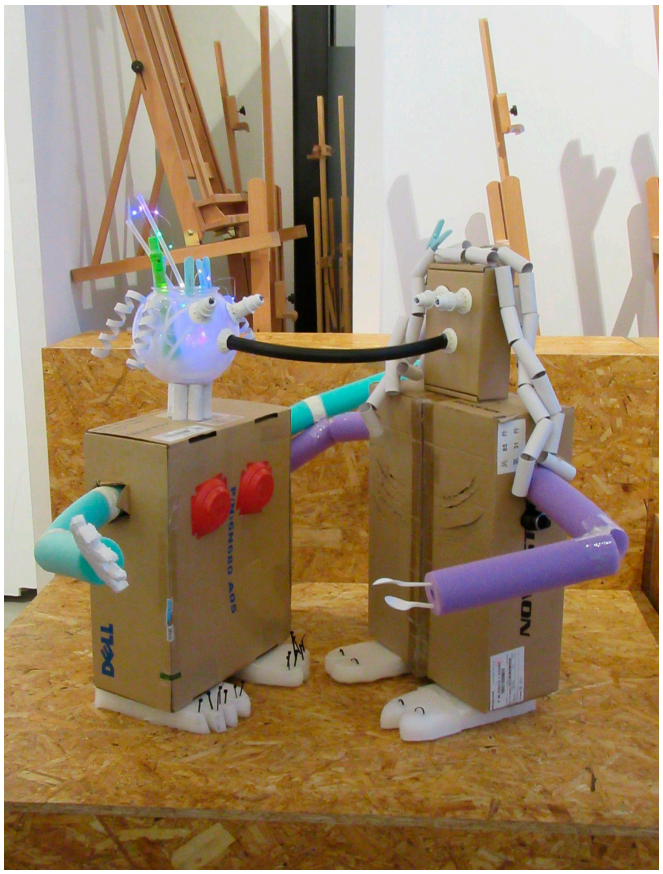

Figure 6. Sculptural object generated from semantic field.

Following the workshop, ideas and discussions around the theme of the body and its environment developed further and resulted in a public exhibition. Field notes were taken by the author of case two. Further students were observed to be motivated to solve problems related to preparing an art exhibition, setting it up, inaugurating an opening event, and finally closing the art exhibition in a venue outside the university.

The students worked on a series of artworks[6] that were exhibited in a public forum, "Legado 2030, Palma Sostenible,"[7] organized by the Palma City Council. The exhibition featured body sculptures made from waste materials (Figure 7) and a violent performance involving a "piñata" in the shape of an endangered seal, filled with beach waste (Figure 8). This manifested the critical thinking and creative process encouraged by the Connected Art practice, with the final exhibition receiving media coverage[8].

Figure 7. Body sculptures made from waste materials.

3.3. Case 3: Workshop—Connected Art Practice/Mixing Potatoes: From Wariness to Confidence

3.3.1. Connected Art Practice/Mixing Potatoes: From Wariness to Confidence

Case study three examines a Connected Art practice workshop conducted at Leeds Arts University in the UK. The workshop engaged lifelong learners enrolled in two classes: Access to Higher Education in art and design (AHE), a UK Level 3 qualification, and Level 7 MA in Creative Practice. Adult learners may have recently returned to education after a long gap [37,38], typically after periods of employment or caregiving responsibilities. For these participants, Connected Art practice was a new and unfamiliar experience, requiring them to be open to the transformative potential of education [4]. The educational theory, Transformative Learning, describes three modes of transformation: psychological, convictional, and behavioral, and often focuses on adult education or andragogy. Data collection methods include video interviews with participants, who signed a participant release form and understood that the interview would be used for research and publishing. During my research, I also kept a day book of observations and field notes, recording the results of the Connecting Art workshop as well as my thoughts and feelings about events of the day. Twenty-three students took part.

Participants were asked to bring an object no bigger than a large potato that represented their art practice and research interests (Figure 9). In the classroom they were asked to lay their object on the ground and, using colored string, to walk to the next object and tie the string to that new object and engage in dialogue with the owner of the object about them and their art and research, making notes as the conversation flowed and adding the notes to the connecting string (Figures 10 and 11). From there, they proceeded to continue making connections with other students until everyone in the room had a good idea about who their colleagues were and the collaborative possibilities in art and research could begin to connect.

Figure 8. Piñata performance.

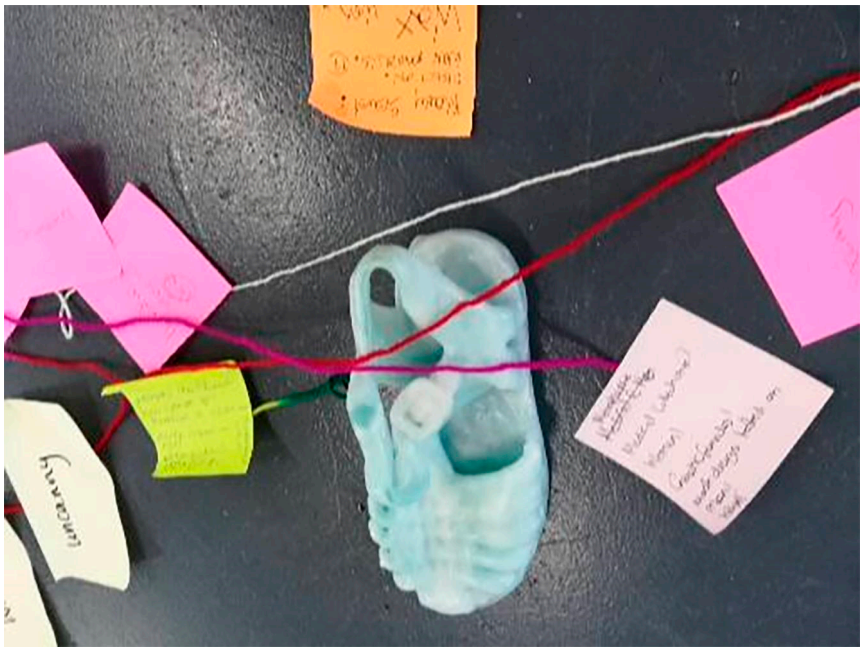

Figure 9. Connected Art Practice—participant research object at Leeds Arts university.

Figure 10. Students use objects, string, and written notes to make connections.

Figure 11. Participants developing community through critical thinking at Leeds Arts university.

The learning objectives for case three were to develop collaborative research skills and to engage in experimentation. The workshop aimed to build a Community of Inquiry [2], allowing participants to get to know one another. The captured post-it note words from conversations were collected and typed up into a list, a semantic field of plurilingual language. This list was then returned to participants for further starting points of creativity.

At the beginning of the workshop, many participants felt uncomfortable due to the lack of traditional educational structure. The workshop was conducted during lunchtime, providing a more relaxed environment. Foucault [39] speaks about the historical power asymmetry inherent within the architecture of the classroom and the education system itself, going back to ancient Greece.

Some participants found this newfound freedom challenging, as they were more accustomed to structured learning. One participant in a video interview asks "why am

I here? Just to look interesting?" Participants are out of their comfort zone; they are confrontational and disruptive. Nevertheless, they are curious as long as the process leads to divergent creative ideas. Another participant asks what to do, looking for guidance. The goal was for participants to develop critical thinking skills, enabling them to explore alternative ways of conceptualizing their art practices.

Through the workshop, they moved from tentative and anxious to open and confident. One participant says in the video interview "I think it has helped me think about things differently. It has made me not overthink things. I have tried just to go with it". Another participant says, "I enjoy it. It makes me do things that I would not normally ever do. It makes me examine what and why we are doing things. Explore materials and process. It is just a nice opportunity to, with no pressure, talk through ideas with other people." These quotes represent the success of the workshop in developing critical thinking and allowing space and time for students to engage in higher-order thinking skills through dialogue and action.

Participants were encouraged to discuss the objects they brought and to share the ideas and feelings that arose during the creative process (Figures 10 and 11). This allowed them to question and challenge their own art practices, a fundamental part of the conceptualization process in art. The emphasis was on being instinctive, creative, intuitive, and even spiritual rather than overthinking the process.

As a result, participants reported enjoying the opportunity to consider, discuss, and expand their thinking about art, materials, techniques, and conceptualization [40]. Group critique, common in art colleges, provided a forum for discussion and debate about art works [41]. Through this process, participants gained the confidence to articulate their creative process and the significance of their work. One participant articulated that connecting with other artists encouraged open-mindedness and the freedom to be creative. With newfound confidence and courage, they allowed critical thinking and dialogic processes to guide their practice, moving from tentative wariness to a more assured and confident stance in their critical thinking and its impact on their art practices.

3.3.2. Specific Learning Objectives and Capacity Development

In the Connected Art practice workshop, students meeting for the first time, instead of having a seated introductory lecture, start the year actively; they are out of their chairs and their comfort zones, engaging in real and useful research conversations. This sets the investigative tone for the rest of the year. Teaching methods included small group work where students worked in pairs and large group work where students interacted with the whole cohort. They were also engaged in collaborative Community of Inquiry learning contexts and the integration of practice research methods—thinking through doing.

The workshop successfully achieved its learning objective of developing collaborative research skills and engaging in experimentation through these objectives, fostering friendship and developing a Community of Inquiry among participants (Figure 11). It notably improved their critical thinking skills, transitioning from initial wariness to confidence in a unique liminal space created outside regular class hours. By using group dialogue, individual perspectives on chosen objects were employed to connect through storytelling and Narrative Inquiry [40], combining dimensions of critical thinking, caring thinking, and creative thinking [21,41]. This enhanced students' perception of democratic and transformative learning processes.

The heuristic methodology employed allowed students to bridge the gap between embodied self-discovery and generating ideas through physical actions. This approach began within the university context, working with lifelong learners, and extended to broader meanings in education and society. After some of the participant/art students graduated, they formed the Diva Collective. The group bids for national funding and has been an educational partner of the British Library and local museums, facilitating art classes and creative cultural projects. In this example, the Diva Collective, through participation in Connected Art, helped participants link to their own authenticity and creative understand-

ing. Social locators, factors that define a person's identity and perspective [42], played a significant role in shaping the participants' experiences. They worked collaboratively in the creative workshop, acknowledging their biases and connoting meaning through heuristic, constructivist, and interpretive methodologies.

3.3.3. Results

The Connected Art practice session objectives aimed to develop collaborative research skills and to engage in experimentation. Participants found they had deepened their understanding of the relevance and application of critical thinking in their art practice. Collaboration is successfully engaged in by students as they work together, connecting their objects and connecting their research interests through discussion and the written post-it notes to capture the conversation, which they also photograph for documentation in their portfolio. They used experimentation to try out new ideas and talk through their research in new ways, hermeneutically joining their horizons to create a larger world view.

The facilitator and students discovered how Connected Art could instill confidence in academic research, articulation, and critical thinking through the act of creation. The future goal is to use the data gathered from Connected Art practice to develop a curriculum for art students that integrates critical, creative, and caring thinking [21]. This approach recognizes that critical thinking is most effective when complemented by creative and caring thinking. The intention is to encourage students to develop an embodied and situationally aware practice that is critically aware [22]. This method of Connected Art practice might be of use to other educators for use in their classrooms as a strategy for developing research skills and creative critical thinking.

4. Discussion

This section delves into the Connected Art method and its impact on the learning environments it stimulates, the experiences and competences it fosters, and the relevant benefits and lessons learned. Connected Art primarily serves as a method to rapidly facilitate creative practice, which, in turn, supports transdisciplinary development. The core interactions involve selecting a simple objective representation and mixing linguistic interpolation that grows from this starting point. These interactions alone are sufficient to spark creativity and novelty.

In the first case, students were tasked with developing local research projects with a sustainability transition approach, creating a transformative learning environment that demanded a range of skills. They had to engage in analytical, critical, strategic, and value-oriented thinking to address real-world sustainability problems [15,16] in Lüneburg. Additionally, they needed to cultivate interdisciplinary, creative, and interpersonal competencies to tackle individual and group challenges throughout the project's lifecycle.

The second case involved sculptural representations of the human body [28] and it enhanced students' creative interaction and ideation skills. Using waste materials encouraged creative upcycling techniques and led to the exploration of memory and representation in seemingly ordinary items. This approach also embedded a political context within the art, centered on urban and beach waste as well as endangered marine species. The process of exhibiting the art further seemed to hone students' management skills and interpersonal competencies.

In the third learning environment, there were no specific tasks or structural guidance. This open-ended approach pushed participants to explore their authenticity and self-confidence outside the confines of traditional academic frameworks [23,24]. This unique challenge particularly stimulated intra-personal skills like self-care and self-empowerment [13]. The discussions held during the Connected Art practice and the group critique appeared to nurture participants' critical, caring, and creative thinking abilities, particularly in the context of their own artistic practices [40]. This scaffolding approach allowed students to incrementally acquire thinking, language, and speaking skills.

The three case studies based on literature and datasets develop the relationship between theoretical concepts and arts-based research findings. For example, a common challenge across all cases involved overcoming uncomfortable feelings, such as disconnection [3] and inhibiting inner voices of judgment, fear, or cynicism [35]. Students in the first case described their shock at seeing so many unused playgrounds, but they transformed this challenging perception into an opportunity to build more community and feel more connected to their neighbors. The key to successful transformative learning environments is to prevent students and researchers from feeling overwhelmed and incapable of addressing challenging situations. Facilitators must remain open, empathetic, and supportive throughout the process.

In the second case, the challenge of pollution and waste led students to create a powerful performance and installation that served as an outlet for tension in the face of human activities damaging human and marine life. In this example, Connected Art acted as a channel through which to connect with their inner shadows and transform emotion into creative processes.

The third case placed a particular emphasis on personal sustainability [13,16] and Pedagogic Rights [41], enhancement, inclusion, and participation. Through dialogue, critique, and a democratic forum, participants engaged in problem-solving strategies and interconnected discussions. This workshop, driven by the belief that students should feel included, enhanced, and enabled to participate in their own education, seemed to boost not only their confidence but also their sense of belonging and value within a community. Connecting with others appeared to contribute to personal well-being.

Another fundamental aspect of this Connected Art method is its ability to combine personal interests in a collective endeavor. For instance, in the first case, shared interests in sports, dance, and music added depth and embodied research to the project. The team spirit fostered by defining a common research question based on shared interests helped transform initial critical thinking into a fluid and creative project development experience. This process appeared to add to the students' sense of self-efficacy and self-confidence, as they aimed to improve their community's "social tissue".

The three case studies illustrate some aspects of the effectiveness of Connected Art in creating transformative learning environments; they address inner processes, helping researchers and students understand themselves in relation to others, and to be critically aware of the broader environment in which they are situated. This awareness enables them to engage and intervene, creating new possibilities for sustainable action.

5. Conclusions

The presented case studies suggest that there is a relationship between theoretical concepts and arts-based research findings in the development of a promising Connected Art practice method that can foster community-building through art by emphasizing social interaction, creative practices, and transformative growth. Although these case studies took place in Slovenia, Germany, Spain, and the UK, the shared Connected Art practice enabled facilitators to establish inspiring learning environments that promote both social and personal interaction. The method used not only successfully surpassed potential barriers arising from different cultural or disciplinary backgrounds but also led to the creation of practical, creative, and imaginative outcomes.

Our comparative study has some limitations. One is the difficulty of generalizing or transferring the findings from our three examined cases with only 73 participants to other settings. The analysis and evaluation of more cases will be needed. Another limitation is the papers' scope, which does not allow us to extend the case descriptions with more detail from the collected data. Our qualitative research design is not complemented with statistical findings and does not include explicit interdisciplinary nor cross-cultural comparisons. In further research, more evaluation tools will be developed to determine more precisely both the effectiveness of the Connected Art practice in different contexts and the specific

improvements for their practitioners. This could also be valuable for other researchers working in this field.

In conclusion, the study delves into the application of Connected Art Practice to cultivate collaborative transdisciplinary skills in creative learning environments. The findings underscore several key points:

Innovative Learning Methodology: Connected Art practice functions as an immersive learning methodology, seamlessly integrating audio, educational, and sustainability research. Participants undergo a transformative learning experience by applying sound-interaction methods to tangible objects.

Interconnectedness through Artistic Exploration: Inspired by Dérive, Connected Art practice strives to evoke connectedness to others and the environment. Participants create a visual and linguistic network of interconnectedness through the exploration of symbolic objects, generating insight and new possibilities.

Community Building and Collaboration: The study emphasizes the role of Connected Art practice in nurturing a community of inquiry, where reflections and discussions lead to co-designed practices or collaborative projects. Community building emerges as a vital aspect of the learning process.

Integrated Approach to Transformative Learning: Advocating for a transdisciplinary and integrative approach, Connected Art practice addresses heterogeneity, complexity, authenticity, critical awareness, and emotional connectedness. It transcends traditional disciplinary boundaries, promoting a comprehensive learning approach.

Enhanced Competences: Examining case studies, the research concludes that Connected Art practice enhances competences in artistic expression, communication, and collaboration, extending beyond disciplinary, social, and cultural boundaries.

Contributions to Creative Invention and Project Design: Through case study analysis, Connected Art practice emerges as a catalyst for creative invention, personal sharing, self-reflection, and co-designing diverse projects, showcasing practical applications for enhancing creative and collaborative capacities.

Valuable Insights for Educational and Research Institutions: The study provides valuable insights and resources for educational and research institutions interested in fostering transdisciplinary engagement and transformative learning. Connected Art practice stands out as a potentially beneficial approach for enriching curricular activities.

To further enrich knowledge and experiences and encourage the adoption of "Connected Art practice" in higher education programs, additional practical research is recommended. This involves the method's implementation by more researchers and teachers who can adapt the practice to their specific requirements and settings and subsequently share their experiential results.

In summary, the research suggests that Connected Art practice holds promise in promoting transformative learning experiences, transcending disciplinary boundaries, and enhancing collaborative skills in diverse settings.

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Notes

1 "The German term 'Real-world laboratory' or 'Reallab' is a concept mostly referring to research that addresses real-life problems and bases on academic-practitioners knowledge co-production and practical co-implementation by jointly elaborated solutions. Schäpke et al. [10] refer to related concepts as living laboratories, urban transition labs, social innovation labs and further niche experiments. The experimental lab environment is combined with the real-world context to test transferable solutions for sustainability challenges [11,12]. (. . .) Reallabs intend to foster societal sustainable transitions by cultivating students' personal sustainability [13] and by exploring ways of up-scaling practitioners' socio-ecological innovations" [14].

2 A closely associated concept that also has been discussed and used in this context is "Connecting Art". This concept emphasizes more the ongoing process of connecting, the performing of the creative practice, and the activity of getting in contact or empathizing.

3 More information available at http://www.research-arts.net/kooperieren/ra14_cooperating_raablab.html (accessed on 14 November 2023).

4 In "Theory of the Dérive", first published in Internationale Situationniste #2 (Paris, December 1958), Guy Debord describes one of the basic situationist practices of the Dérive (or Drift) as a technique of rapid passage through varied ambiences that involve playful–constructive behavior and an awareness of psychogeographical effects and are thus quite different from the classic notions of journey or stroll.

5 Project can be viewed at http://www.research-arts.net/kooperieren/ra14_cooperating_mobilefestivals.html (accessed on 14 November 2023).

6 Artworks may be viewed at http://aba-virtual.es/foro-de-sostenibilidad-de-palma-expo-nov-2022 (accessed on 18 February 2024).

7 Legado 2030, Palma Sostenible at https://www.ademaescuelauniversitaria.com/los-alumnos-de-bellas-artes-adema-uib-sorprenden-en-el-foro-de-sosteniblidad-de-palma-con-dos-obras-para-reclamar-mayor-proteccion-del-mediterraneo/ (accessed on 18 February 2024).

8 More details at https://www.ademaescuelauniversitaria.com/arte-y-sostenibilidad-exposicion-alumnos-bellas-artes-adema-uib/ (accessed on 18 February 2024).

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