

DIVERSIFY EXPERIENCES: MOTIVATE SUSTAINABILITY IN DESIGN PROJECTS

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ABSTRACT

The research seeks to explore the pedagogical choices that can encourage or limit design students' choices to address a variety of sustainable initiatives as part of their design projects. The research method is based on a focus group during which participants were asked to share a significant design project experience related to sustainability. As participants were design students, the discussions highlighted which factors can motivate or prevent students from considering sustainable aspects of their design as part of their projects. Data analysis highlights challenges and good practices from the learner's perspective. The discussion exposes three main considerations: the paradox of designers, the timing and complexity of projects, and the social scope of sustainability.

Keywords: Design education, sustainability, teamwork

1 INTRODUCTION

Historically, design education is based on a strong Bauhaus-inspired "signature pedagogy" [1], which values project-based learning to encourage active learning, exploration, and creativity. Although this pedagogic frame is well adapted to design practices, many researchers and educators are questioning how design education can adapt to focus on sustainability-related skills, knowledge, and experiences. We identified many initiatives that were organised in the last decade to question design education, its values, and foundations regarding our new reality. For example, Norman and Vredenburg's Future of Design Education [2] seeks to discuss how designers can be better prepared to face the complex challenges ahead. They state that "designers today are asked to address new situations and consequences at scales very different from those of the past." The Design Council [3] seeks to use their influence as an organisation to "upskill 1 million designers by 2030" to "fuel the green transition." They encourage research initiatives that focus on the "many significant evidence gaps around design education" (p. 24). In 2023, Davis edited a She Ji special issue on Rethinking Design Education for the 21st century. Davis and Dubberly [4] stated that we are ongoing a paradigm shift that encourages the renewal of design practices and the adaptation of designers' skills. Moreover, Noël [5] also edited two She Ji special issues on design education. At a more global level, the United Nations published a report stating that education is the only possible way to reach sustainable development goals [6]. Although no clear framework has emerged yet from these discussions, a few findings are starting to be confirmed as possible future guidelines for design educators. Among these, we note particular emphasis on systemic thinking, situated learning, and participatory approaches.

Systemic thinking is a mindset that encourages the consideration of all active and passive aspects of a complex situation. Systems expose the network of interacting relations between humans and non-humans [7,8]. According to systemic thinking, local actions are considered holistically: "Even when responsible for only a small part of the system, designers need to understand the interdependent relationships within situations that produce particular patterns of behaviour and effects" [4, p. 108]. Moreover, design projects should encourage students to contextualise their ideas by considering social, historical, and cultural aspects to ensure that solutions are adapted and durable [9, 10]. In a previous paper, we mentioned, "The act of designing is situated both socially, as well as contextually, with the variables that are specific to the designer, project context, and projected uses" [11]. Inclusivity in the design process is a result of the previous two aspects. It seeks to "respect the voices of all affected by their actions" [4, p. 110]. To do so, individuals, stakeholders, potential users, and experts are included in the design process to ensure their needs are considered. Participatory approaches ensure designers are

well equipped to understand the system and situation they are studying, but also that they are accompanied and supported by communities in the transformative process [12]. The study seeks to present a preliminary investigation on the subject based on learning experiences and to share and assess our research methodology before conducting the research at larger scale.

2 THEORETICAL BACKGROUNDS

This study's theoretical background is based on Tessier (2021) and was shared in recent publications [11, 13]: the zone of proximal development for learning teamwork skills model (ZPD teamwork model). The ZPD teamwork model offers a framework for the integration of teamwork over the course of design formation programs (Figure 1). Based on Vygotsky's previous work [14], the model is based on the zone of proximal development. This concept distinguishes three levels of autonomy: what the learner can do on their own, what they can do with guidance, and what they cannot do even with guidance. Learning is interpreted as cyclic (continuously evolving) and socially influenced (supported by others).

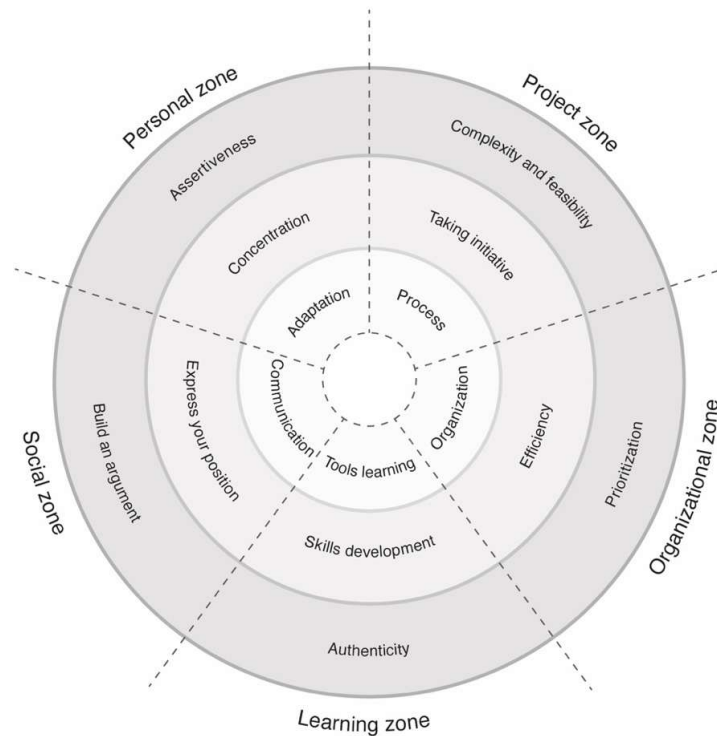


Figure 1. Zone of proximal development for learning teamwork skills model (Tessier, 2021)

The ZPD teamwork model identifies three levels of learning. The first level, closer to the centre, refers to basic skills learned when integrating a design program. The second level refers to design-specific skills acquired over the first and second formation years. The third level, nearer to the exterior boundaries, refers to a more complex set of skills requiring authentic, professional, and personal experiences. The model is the result of the analysis of 22 bachelor students working on team projects. The analysis resulted in 33 characteristics organised in 5 zones. Each zone groups thematic characteristics that are distributed across different levels of complexity (Table 1). Learners can evolve across the different zones as they experience various design situations.

Table 1. Descriptions of the ZPD teamwork skills zones

Zone	Description
Personal zone	This zone exposes individual characteristics such as adaptability, motivations, self-esteem, stress control, concentration, and assertiveness.
Project zone	The project zone is centred on the design process and project phases, such as expressing ideas, taking initiatives, creating shared understanding or receiving feedback, attention to detail, complexity, and feasibility.
Organisational	This zone includes characteristics such as time management, deadlines, work

zone	distribution, priorities, and disciplinary expertise. Structure over the length of the project and between team members is the focus.
Learning zone	The learning zone refers to the program's specific competencies. It includes characteristics related to industrial design specific technical and technological tools, thematic and disciplinary knowledge, complementary skills in group composition, expert advice, and project authenticity.
Social zone	The social zone offers a focus on person-to-person relations through communication, teamwork, efficient sharing of tasks and roles in the team, agreeing on project-related decisions and scheduling team meetings.

3 RESEARCH METHOD

Since this research is intended as a pilot study in preparation for a larger research endeavour, we chose the focus group method to access participants shared experiences, while also promoting discussions between them. We sought to access past experiences linked with sustainability and design projects to enhance our comprehension of the brakes and levers of these projects. Before the focus group session, participants were informed that they would be sharing a significant experience in detail of designing with sustainable aims (either positive or negative). Three questions were shared before the meeting to ensure that participants were prepared to talk about their experiences: first, describe an educational or professional project experience related to sustainability; second, detail any aspects that make you proud or frustrated; third, share how teamwork or social actors contributed to the project.

The focus group was guided by the lead researcher and a research assistant. One at the time, participants were invited to share their experience, while additional questions were asked to ensure full comprehension. Other participants were invited to comment or react. Four participants were recruited to participate in the focus group (90 min). Three of these were industrial design bachelor students (fourth year) and one was a design master's student. We valued a diversity of backgrounds to access a diversity of perspectives. The focus group was transcribed into verbatim to facilitate its analysis.

Participant 1 shared experience was about the design of a shared space for an NPO with upcycled wood from sick ash trees, while Participant 2 talked about the design of refillable and reusable makeup packaging. Participant 3 shared a project focused on finding alternative uses for waste products in the textile industry (synthetic insulation) and Participant 4 discussed the exploration of the potential of a specific ceramic technique to fight against heat islands. These experiences were analysed according to the ZPD teamwork skills model. Emergent coding allowed to make sense of repeated topics, emphasising challenges, doubts, or recommended practices. To ensure coding consistency, two research assistants and the lead researcher coded the data before combining their findings.

4 DATA ANALYSIS

The analysis was conducted to differentiate between a diversity of good practices and challenges that were mentioned during the discussions with the help of the ZPD teamwork skills model. The transcription was coded according to (a) good practices, (b) challenges, and (c) challenges that are also considered good practices. Good practices are considered as integrated skills or practices, challenges are considered as not or hardly integrated, and challenges that are good practices are situated in between.

4.1 Personal zone

The discussions related to the personal zone were centred on the roles, values, and frames that influence their practices. The designer was identified as being accountable for certain responsibilities. The participants discussed how they felt when reflecting on this influence and their values:

Often, I question what is my value as a designer? But after that, I think about it... I can do things better so that the next products are more durable. (Participant 3)

I quite agree, because it is a question that followed me over my studies. What do I ultimately bring as a designer? Am I not just going to produce another plastic toy? (Participant 4)

Reflectivity was identified as the only good practice in this zone. The resulting reflections led to an overarching paradox. Consumerism is especially paradoxical when trying to develop new sustainable products. Moreover, in relation to this discussion, a challenge that is also a good practice was identified in maintaining your professional values, which can be challenging for novices lacking assertiveness

(level 3, personal zone). A possible solution discussed is inspired by other creative disciplines, such as architecture, which are bound to disciplinary rules to structure their decisions. Especially challenging aspects were identified by adopting a global vision when working alone, assuming a role and standing for its decisions as a novice and developing an interest in sustainability in design students. Although this last challenge was surprising to the researchers, the participants confirmed that some students are not interested in designing more sustainably, and others make it their own prerogative to always explore positive sustainable outcomes.

4.2 Project zone

The aspects noted in the project zone relate to the influences encouraging or limiting a project's sustainable scope. The following good practices were discussed: seek to understand user needs, work with already available materials, choose durable materials, design reusable objects, always consider sustainability in the design criteria, and openly receive feedback. The participants discussed a challenge that is also a good practice regarding the complexity of design projects that are proposed to students. They felt that sometimes projects do not favour innovation and creativity. They critiqued projects that focus on redesigning existing products (e.g., a chair) and advocated for more freedom in project briefs.

What is interesting in our projects now is that you can identify your own problem and find something that has not been done before. [...] When you have more freedom, you can find stuff to design that is more useful. (Participant 1)

They also mentioned the difficulty of answering all sustainable aspects of a project, underlining the importance of making choices. Then, the challenges identified related to some characteristics (like recyclability, flat packaging, modularity), the adoption of a global vision, and considering sustainability at each phase of the process.

4.3 Organisational zone

Characteristics identified in the organisational zone relate to schedule constraints often imposed on educational projects. Participants seemed to think that if more time was allowed, more attention could be given to sustainable aspects. The choice seems easy to make, since sustainability is sometimes not on the assessment criteria list.

But once we really get into the design phase, especially in an educational context, since projects are in such short time frames. Unfortunately, we have to take shortcuts and often there are notions of sustainable design which are put aside. (Participant 4)

4.4 Learning zone

The participants discussed various topics related to learning, but mostly pedagogical alignment. Among the challenges identified, we note to encourage the integration of sustainability-related notions from the start of the formation, integrate more opportunities to experiment with practical applications of sustainability, ensure assessment criteria on sustainability, encourage workshop tutors to demonstrate and share their views on sustainability, and offer specific training related to teamwork and collaboration.

We are encouraged to collaborate in general with classmates. But, sometimes, they tell us like, "You should talk to this person for this information" but in the end, we are pretty much alone. We don't learn about collaboration and even less regarding sustainability. (Participant 4)

Two challenges that are also good practices are identified: consider the life cycle assessment of products and value traditional know-how to value more sustainable practices.

4.5 Social zone

The last zone relates to decisions, norms, and existing rules for the designers and the other project's stakeholders. The participants understood the importance of valuing exchanges with clients, managers, and experts to enrich their ideas, but wished to learn more about teamwork in complex contexts (such as interdisciplinarity or with potential users). They were puzzled when the researcher asked what the social scope of sustainability is. Surprisingly, the challenges identified are very similar to the good practices just mentioned: collaboration with other experts and non-designers, facilitating communication between stakeholders, and integration of interdisciplinarity in their projects. A challenge that is also a good practice resides in the difficulty of strategically adapting their designer's discourse according to

the economic context and clients' aims. Some mentioned they wished to choose clients with similar values, and others said they could adapt their discourse according to the client's views to detail more or less explicitly the sustainable features.

For me, it's important to create a good concept that is ecological. I say to myself, "Ah, it's good because it's sustainable." Or it's cheaper this way; it's also more sustainable. (Participant 2)

5 DISCUSSIONS

The analysis brings us to synthesise three tensions which emerge from the diversity of influencing factors identified in the previous section. First, we note a tension between the subject (designer) and the object of design. This tension questions the paradox of the designer that works to produce new artifacts in an era where we seek to reduce and reuse. This tension tends to confirm Papanek's 1970 reflection on industrial design: "There are professions more harmful than industrial design, but only a few of them." Accordingly, the participants seemed to question their values and their roles as designers as well as their power of influence and limits as positive agents of change.

I think it is important that we question ourselves about our place in the consumption market. To create and be conscious: why am I doing this? Is there really a need for this? (Participant 4)

These questions raise ethical challenges that can be disturbing to design students. Such questions reveal a sense of responsibility, but also some important gaps which should be addressed in design curricula.

5.1 Timing and complexity

We identified a second tension between the aims for innovation and the limited time offered to educational design projects. This tension seeks new and unprecedented solutions within very limited time frames. This is challenging for learners who are not yet experts. As a result, they tend to make strategic choices and consider only the aspects that will contribute directly to their project evaluation, limiting the development of certain aspects of their design solution. As mentioned earlier, the complexity of design projects should be high enough to motivate investigations and innovations for more sustainable outcomes. More complex projects could motivate students to reach out more, work collaboratively, seek expert knowledge, and test and assess with community actors. Still, complexity should always be integrated in relation to the overall students' level. Otherwise, projects that are too complex are known to limit creative abilities [13]. Therefore, time limitations and complexity, when too drastic according to the formation level, limit innovative endeavours. This can also result in incomplete systemic vision and a lack of contextual data to frame the project.

5.2 Social scope of sustainability

Thirdly, the social components of design projects seemed hardly considered and understood by the interviewed students. Although we know sustainability should consider as equally important environmental, economic, and social dimensions, a clear lack of knowledge was sensed in the focus group regarding the social scope of their design projects. On the one hand, we note a clear tendency of individuality over teamwork or participative practices. Sometimes, this can be explained as a desire to 'get things done,' but also because this part of the process is often not made explicit. Ways to encourage more exchanges with external parties, such as experts and communities, need to be encouraged through various means (theoretical presentations, workshop exercises). This also relates to teamwork and collaboration skills and interdisciplinary experiences that should be valued within curricula. On the other hand, social inputs and outputs of sustainable design initiatives must be made explicit. Seeking a co-design practice that is sustainable thus requires not only individual commitments to participation and inclusion of other values, but also structural changes to our projects and our ways of working [15]. Participative practices are increasingly being used in practice but are difficult to put into action in a pedagogical context. Efforts should be orchestrated in that direction to offer more emphasis on participative practices and the importance of context for sustainability.

6 CONCLUSIONS

This paper raises important questions about current and future forms of design education. We underlined the importance of addressing sustainability in design education, but also other factors that can influence the learning experience of design students. The study identified a diversity of factors that can be

combined and developed in various combinations to diversify students' learning experiences according to their formation level and abilities. Further studies would be needed to refine their organisation or create a coherent hierarchy. Among the elements discussed: using reflectivity to question the students about their ethical stance and values, allow more time to address sustainable aspects of projects, motivate the search for innovative solutions, and favour teamwork and participative methods. Overall, a balance can be promoted between the innovative aims of design projects, the challenging aspects of finding new solutions, and the complexity of projects. Also, we should use the reflections shared in this paper to frame the projects we propose to design students to develop their interests and motivate their considerations of sustainability. Of course, this study is limited, as the data is sourced from one focus group, but the results are promising for the upcoming research program, which will enable the confirmation and refinement of the preliminary factors identified in this pilot study. Considering the focus group and analysis experience, we wish to integrate additional interview questions on the topics of social sustainability, teamwork and participative approaches. The analysis method based on the ZPD teamwork skills model was comprehensive and useful in organising experiential data but could be enriched based on the present study. In conclusion, sustainability should be addressed and can be motivated from a diversity of angles and perspectives. This plurality is what strengthens pedagogical experiences and raises awareness about the direct and future impact of design choices. This research was funded by Fonds de recherche du Québec Société et Culture, Grant 2025-NP-343724.

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