Tidsskriftet Læring og Medier

Expanding possibilities for student participation in online learning environments for practice-based teaching

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Abstract

Developing primarily practice-oriented university courses for an online format challenges pedagogical ideas about learning communities, participation, and involvement in learning situations. Here, we report on a didactic design experiment, the aim of which was to design an online learning environment that supported practice-based learning and in which possibilities for participation were strengthened and expanded. The experiment was conducted during a 14-week university course on co-design, in which the teachers designed different digital tools and learning activities to strengthen the students' feelings of belonging and community and student-to-student inspiration. The topics discussed in this paper include how to rethink teaching practices in relation to online digital learning spaces and—a new practice that emerged from the design experiment—how to create "in-between spaces." These spaces can be considered slow spaces that support reflection and discussion, are less exposed, and can be created within and between lectures.

Introduction

In this paper, we—the authors (one of the teachers and one former learning consultant)—present and discuss a didactic design experiment that consists of a combination of different digital tools and techniques for online teaching and that is not based on emergency remote teaching (Hodges et al., 2020) and last-minute changes (as in spring and fall 2020). Instead, it aims to rethink how to teach a practice-based course in an online setting. In this paper, we focus on different forms of learning spaces inspired by Christian Dalsgaard and Thomas Ryberg (2022) and on the potential opportunities for different forms of participation in the design of different digital tools and learning activities.

Teaching a design- and practice-based course in which a collective exploration of the current situation and potential solutions for the future are based on tangible interactions with materials and design artifacts can be challenging when a course is carried out online. This didactic design experiment was carried out when the possibility to supplement online teaching with physical interactions—and with project group work—was challenged and constrained by a lockdown of society in the spring of 2021. The lockdown kept both teachers and students from meeting physically. However, being able to plan for online teaching from the beginning (and not as an act of emergency) provided an opportunity to rethink the learning spaces and the possibilities for participation.

In this paper, we focus on how to design digital technologies and learning activities to support and foster active engagement and participation in this practice-based course. As an analytical lens through which to understand the kinds of digital learning spaces created, and especially students' possibilities for

action, the study draws on Dalsgaard and Ryberg's model for digital learning spaces (2022). The approach and model are unfolded after a presentation of the motivation behind the course design. After this, the course and the method will be described. The main part of the paper is a presentation of the design of the different digital tools and learning activities, including the designers' intentions and what possibilities for participation they fostered. This is followed by a discussion of how to rethink practices using digital technology, as well as a closer look at what new pedagogical practices and learning spaces emerged from this didactic design experiment.

Background

We report on a Bachelor university course in co-design (collaborative design with the involvement of users and stakeholders throughout the design process) at the IT University (ITU) of Copenhagen. A new Danish national lockdown was announced on 3 December 2020, and it was a realization for all teachers by January that this would be the circumstances under which the course would be executed throughout the course's 14-week duration. The course had to be fully moved online. The motivation for redesigning the course was based on ongoing dialogue with students in our programs prior to the course and the spring 2021 semester in general. They emphasized that after almost a year of remote teaching (and having to also keep physical distance on campus), they felt isolated and missed the physical presence at the campus as well as the interaction with their fellow students in relation to project work and courses.

Due to the lockdown of all of Danish society in spring 2021, it was not even possible to meet on campus during this period (not until the last month of the course, April, and then still under severe restrictions). This essentially conflicts with the nature of co-design, which is practice-based, very material-oriented, and tangible. Furthermore, the teachers on the course had, from previous experiences (teaching spring and autumn 2020), learned how difficult it is to grasp exactly how much students take with them from an online course or remote teaching. However, the online teaching in spring 2021 was not categorized as an emergency; the teachers were expected to be prepared for the situation. This meant that the feeling of emergency and a sense of patience and goodwill related to a societal crisis were no longer present (Lyngdorf et al., 2021).

The teachers (including one of the authors) come from a research background in co-design. In the approach to teaching, they draw on a situated and participatory learning approach inspired by a community of practices (Lave & Wenger, 2003). In the design of the course, the teachers emphasized providing possibilities of practice and supervised reflection on practice for students on the course with group projects using 'real life' cases, group supervision based on project work, design critique sessions, as well as the use of hands-on tools. This approach was challenged by the move to an online setting, including the students' project, which would normally be based on engagement in and participation by real-life people and situations. Based on this, the students' wishes and needs, the teachers' built-up experiences during the first year of lockdown and physical distance requirements, and a wish to include advantages of the online format instead of running a course based on workarounds and emergency solutions, the teachers decided to design learning activities in which active and multiple forms of participation were emphasized, including interactions between students and teachers and among students. In the redesign of the course, the following central design principles were formulated by the teachers:

- Different forms of active participation should be facilitated using digital tools and techniques.
- Interaction (and community-building) should be enhanced through the design of activities, including adaptation of existing activities.

The focus here is on learning activities in relation to lectures. The students also worked in their groups, were supervised on their projects, and had exercises with teaching assistants.

Learning spaces and digital technologies

In this paper, digital technology is not perceived as neutral or as simply a tool or tools that teachers and students can use to achieve a given goal. Technology is shaped by social and organizational structures, and technology takes part in shaping and reorganizing everyday practices and social dynamics (Dalsgaard & Ryberg, 2022, p. 27). When teaching moves online, the learning space itself moves online. The technologies thus become the social spaces where teachers and students meet and where relations are created and negotiated. We perceive digital technologies as learning spaces that offer different forms of participation and the possibility of action in different ways for the students.

Digital technologies create opportunities for participation and interactions (Dohn & Hansen, 2016, p. 34; Ellis & Goodyear, 2016, p. 157); that is, they make certain options for actions that supports and enhance learning available to teachers and students. The meaning and possibilities of using technologies (and spaces) are determined based on the teachers and students' previous experiences, understandings, and adaptations (Dohn & Hansen, 2016, p. 154; Ellis & Goodyear, 2016, p. 157). All participants are co-creators of these spaces in diverse ways, suggesting that the plan and intentions—the viable options for action—inscribed in the technology do not necessarily dictate how it unfolds in situated practices (Suchman, 1987; Akrich, 1992).

In a new book, Dalsgaard and Ryberg (2022) establish a model for digital learning spaces that they propose as a vision for online education. In the model, four digital learning spaces are identified: individual, working group, community of interest, and open connection learning space. The authors describe the learning spaces as overlapping entities in which activities feed into each other. The learner, who is interpreted as a network learner (Dalsgaard & Ryberg, 2022), is central to creating these connections. This means learners connect the activities in the different learning spaces. These four spaces are not mutually exclusive, separate rooms, and from the teacher's perspective, movement across these rooms is important in the design of learning activities. The fluidity of the spaces also means they cannot necessarily be identified uniquely in practice. To create digital learning spaces, Dalsgaard and Ryberg (2022) consider three different dimensions: social forms, learning activities, and digital technologies. They argue that their model helps teachers to specify the social forms for which the learning spaces are created, to distinguish the different learning activities within the four spaces, and to distinguish the different potentials of digital technology (2022, p. 16). Hence, the designer is concerned with the following:

* For what social forms do we create learning spaces (individual actions, collaboration, collectivism, etc.)?
* How can we distinguish the different learning activities within the four spaces? What do we want to expand or strengthen?
* How can we distinguish the different potentials of digital technology? Do we perceive digital technology as cognitive partners, tools for sharing, etc.?

Digital technologies have different potentials in each of the four learning spaces, which offer different possibilities concerning how students can act and concerning what and how students can learn. Learning spaces cannot be perceived as purely digital, but they are expressions of special potentials made possible by digital technologies.

Learning activities

Sociologist Jens Tonboe (1993) has a similar understanding of space and emphasized that the meaning of space depends on the relationship between the material and the social. In the interaction between

space and acting individuals or groups, space becomes a relational space (Tonboe, 1993, p. 32). Concerning this design experiment, this means technologies as learning spaces can have different meanings and implications for different teachers and students. Some teachers and students will, to a greater extent than others, be able to access and create forms of participation in specific spaces using the specific technologies they want. According to Tonboe (1993), the material and the social space are always described in relation to each other (Tonboe, 1993, p. 514). In this paper, we consider such technologies tools and platforms that allow video conferencing, online polls, online shared documents, and online whiteboards to become social spaces, and based on Tonboe's understanding of the relational space, we consider these spaces both constitutive of and constituted by the teachers and students' actions therein.

The planned learning activities are central to understanding how and what kind of participation is fostered by the different spaces. However, participation is also shaped, hindered, and reorganized by the choices and designs of digital technologies implemented to support and facilitate the participation and interaction of students and teachers.

The case: Co-design course

Co-design is a fourth semester course in the bachelor's program Digital Design and Interactive Technologies at the IT University of Copenhagen. The course has been running since 2009 but with a change of approach and content during this period. It is a 15 ECTS course with 4 hours of lectures and 4 hours of exercises every week for 14 weeks. Apart from the lectures, students work in groups of 4 to 6 on a live co-design project, in which they work with a user group on a specific matter of concern to this group. In the spring of 2021, there were 55 students in the course, with 3 teachers and 3 teaching assistants (former students on the course). The first author is one of the three teachers and the course manager.

The course is based on the Scandinavian tradition of participatory design, which was founded in the 1970s to support unskilled workers whose jobs were made redundant by technological developments. This approach to IT design emphasizes democratic design, direct participation, and mutual learning, including the understanding that everyone is an expert in their own field or life. The idea is therefore to involve users and stakeholders (those who are influenced by the design) in the whole design process as design partners—and not only at the end to test results. In participatory design, different competencies and knowledge are brought together to take part in formulating the problem and possible solutions (Simonsen & Robertson, 2013; Ehn, 1993; Halse et al., 2010).

Apart from theoretical and historical framing, the course has strong methodological content and is very practice-based. The role of a designer (researcher and student) in a co-design process is—other than being the one with the design skills and technological knowledge—to create possibilities and facilitate non-designers' participation in the design process. Possibilities are created through the design of artifacts, devices, dialogue material, and a workshop for gatherings and engagement (Halse et al., 2010). An important part of the course is therefore the introduction to different (non-digital) tools and techniques, as well as the supervision of the students' own projects and co-design processes (Christiansson et al., 2018).

Learning co-design requires training and experience to be capable of running a co-design process as a designer and facilitator. The teachers are therefore, as mentioned, inspired by the idea of community of practice, including learning as peripheral participants. However, this is a large university course with limited interaction between teachers and students compared to design schools and studio-based teaching (Christiansson et al., 2018). In the design of the course, the teachers emphasized providing possibilities for practice and supervised reflection on practice for students using real-life cases, group supervision based on project work, design critique sessions, and the use of hands-on tools (physical

material). Each group is connected to one of the three teachers and receives supervision approximately 6 times during the 14 weeks. There are three critique sessions in which each group presents the current state of their project and receives formative feedback from teachers, teaching assistants (TAs), and fellow students. Practice possibilities are provided through workshops and exercises throughout the course, as well as an exhibition in the end, during which students show their projects and test their concepts in interactions with teachers, other students, and visitors.

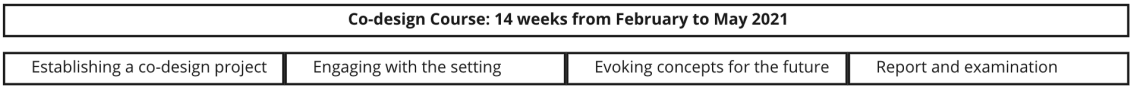

Figure 1: Timeline for the 14-week co-design course, spring 2021

The timeline (Figure 1) shows an overview of the course, including the different phases for the project work—the students' co-design project. The schedule of the lectures follows these phases to prepare the students for working with the group. The co-design projects are formed by the students themselves, and they must recruit the group of people (users and stakeholders) with whom they want to work. The project work is, however, supported, and structured by the framing of the course and the focus of each phase, including the supervision they receive.

Design process and method

The focus of the paper is the design process of designing the different tools, techniques and learning activities that were carried out by the teachers. Goodyear et al. (2021) has developed a model for what they called activity-centered analysis and design (ACAD) to conceptualize the design problem space (Figure 2) during design time. The double arrows show how the student activity imagined at design time is influenced by and influences the design of the set (what resources and learning spaces), epistemic (how to structure the course, pace, tasks), and social (how to group learners and division of labor) designs.

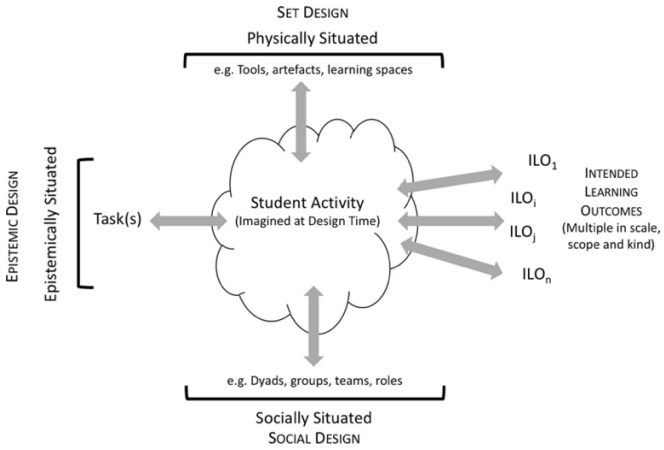

Figure 2: Activity-centered analysis and design: Conceptualizing the design problem space (Goodyear et al., 2021)

The design process was the focal point of this experiment, specifically, the way in which the teachers designed the tools, techniques, and learning activities. In most cases, the course manager (who is also the author) was responsible for this aspect of the study. An iterative design process was used to define the subject of the activities, create drafts and sketches of how to conduct the activities, and determine

what technologies would be used. Each aspect was discussed with the co-teachers and adjusted until there was agreement that it was ready for use in the class.

In the design of the course, the teachers followed a process in which these different elements (cf., the ACAD model) were designed, adjusted, and accommodated in relation to the local situation and the design principle. There were iterations in the development of the different tools and techniques during the design time, and some of these iterations and/or configurations also took place during the course. Table 1 shows how the tools and techniques are distributed in these different forms of design. Together (as shown in Figure 2), the intention was to create different possibilities for participation in relation to the lectures.

Table 1: The co-design course's set, epistemic, and social designs (The ACAD wireframe adapted from Goodyear et al., 2021)

Activity	**Set Design (Physically situated)**	**Epistemic Design (Epistemically situated)**	**Social Design (Socially situated)**
Reflection, feedback, and questions	Mailbox (shared, online document)	Mailbox	In-between lectures
Group work in relation to lectures	Breakout rooms, shared slide show, shared interactive polls	Lectures, shared presentations, questions based on course literature	Shifting between whole class and (project) groups, guests, teacher (lecturer), and facilitator
Critique sessions	Video call, chat function	Time schedule Project presentation Critique and questions	Constellation of 2–3 groups (dividing the class), teacher and teaching assistants, and timekeeper
Quiz	Video call, chat function, breakout rooms, online whiteboard	Questions, alternative answers	From project groups to whole class, discussants, and facilitators (teachers)
Workshop trial	Video call, chat function, breakout rooms, online whiteboard	Research question, task questions, empirical material (quotes and pictures), scenario stages	Shifting between whole class and groups, facilitator (teachers), and timekeeper

The data used in this paper were derived from several diverse sources, including material, notes, and discussions from the digital technologies, learning activities, design processes, and shared reflections on actions and didactic discussions with the course observer (the second author). Based on Dalsgaard and Ryberg's (2022) model of digital learning spaces, we examined how the new spaces created in the classes strengthens different forms of participation and what social forms were supported. From our perspective, participation is a broad term that includes involvement, taking part, engagement, contribution, and sharing. However, participation can also be silence, passivity, and resistance. Therefore, we have added descriptive words, such as direct and active, to describe the type of participation being referenced.

The examination focuses on the design process and the development of the learning environment throughout the course, including the teachers' intentions and motivation. The findings shed light on how to design digital learning spaces that support different forms of participation, foster feelings of belonging and community, and encourage students to be inspired by each other's work. Here, the emphasis is on how teachers design and use digital technologies to create different learning activities and spaces and on how the spaces should provide students with different options for action.

Technologies and tools to facilitate different spaces for participation

In what follows, we present the types and mixture of digital platforms and tools that were adapted and designed for the specific purposes of the course. The design and adaptation followed the main principle of 1) using digital tools and techniques to facilitate active participation, and 2) designing for new activities and adapting existing activities to foster interaction (and community building).

Shared learning spaces

The course lectures were presented as classic lectures but were made available online using a video conferencing platform. According to Dalsgaard and Ryberg (2022), this method of transferring lectures to an online format using a conference call or meeting platform also constitutes an interaction following much of what is traditionally interpreted as meeting practices. In online classes, there is one presenter, and only one can speak at a time. Everyone can (most of the time) see the other people in the room. A participant can raise their hand to contribute, or they can add emojis, turn off their camera, or disable the chat function to allow participation by writing. In the present course design, different platforms were added to the lectures and video conference calls to soften and break up the format including the conference call-shaped interactions. In what follows, we present the diverse ways in which technologies were adapted and designed for different learning spaces.

An individual space for reflection and questions

At the beginning of the course, the teachers introduced a mailbox. It was made using a shared online document accessible to everyone in the course. It contained a table with two questions and space for writing (see Figure 3). The purpose of the mailbox was to create a space for comments and questions outside lectures and exercise classes, thus encouraging asynchronous participation. This activity follows the idea of extending the encounter to make space for participation and reflection outside the classroom and between the weekly lectures (Yndigegn, 2010).

The intention of the mailbox was to add an in-between space to the shared space of the lectures. In-between spaces are inspired by Jan Gehl's (2013) architectural approach to the space between houses, which encourages designing these spaces for social interaction. The term 'in-between spaces' has been translated into learning spaces by many researchers to address the space that has been missed in the sudden transition to online teaching during the COVID-19 lockdown (Ryberg, 2020). The intention of the mailbox in a shared online document was to give all students and teachers access to a platform for missing in-between interactions, as small and more informal meetings between teachers and students—normally experienced before and after lectures and during breaks—were difficult to arrange now. The mailbox allows for asynchronous participation, a function that Akyol and Garrison (2008) supported in online learning environments in their theory of community of inquiry. According to them, an asynchronous space for participation gives learners time to think, often altering who is participating.

Creating an in-between space was a way to expand the possible forms of participation online. The capacity of the online document, designed as a mailbox, was online access and visibility to all participants. It allowed written; individual; or collective, anonymous, asynchronous, and slow participation (time for writing at one's pace). It stands in contrast to the participation expected in video conference call lectures, where active participation is often quick, exposed, and synchronous. The mailbox is different from the chat function in the video conference call, thus offering alternative forms of participation to students.

The individual learning space created by the digital mailbox enabled students to engage with teachers and (other) students in search of answers and reflections concerning the lectures and course in general. It was an individual action determined by the student themselves, but it was connected to the space shared by both the students and the teachers, who brought the questions and comments into the shared space in the next lecture.

Mailbox

Lecture 2

Questions and comments	I agree / want to ask this too (set x)
It really works well, when all three teachers are present at the same time. It gives a good, dynamic, and interesting lecture with different perspectives.	x

Questions and comments for next lecture	I agree / want to ask this too (set x)
What is the Digital Bauhaus?	
..... In relation to preperation for your first encounter with the elderly. Did you prepare any questions, or what kind of goal did you come in with?	
What is the difference between co design and participatory design?	

Figure 3: Mailbox between Lectures 2 and 3, February 2021

The mailbox was used primarily by the students in the first half of the course. They used it both to provide feedback on lectures and course-related activities and to ask questions. Figure 3 shows entries from the mailbox, a comment about the last lecture, and three questions about the topic from the course or literature. One was specifically directed toward one of the teachers' presentations. In this sense, it acted as a cognitive partner, where students could search for answers. However, it depended on the teachers or fellow students to act, and in this sense, it also supports collective asynchronous interactions. Project work and its supervision were the main activities in the second half of the course, which could have reduced the need to use the mailbox.

Working group learning space to soften the lecture room

To engage the students in a shared exploration of the topic of a lecture, texts or similar digital tools were designed by the teachers. These tools supported the work in the breakout rooms that were used during lecture time. Combining the breakout rooms with platforms for group work supported a working-group learning space that allowed other kinds of participation.

One of the participation forms was a shared online slideshow document with empty space. In this document, questions (e.g., based on texts the students had read as preparation) were distributed among student groups to be discussed in breakout rooms as part of the lecture. During the group activity, the students were asked to fill out specific slides in the shared presentation and to present them when they returned to the main room.

Another tool used similarly was an online poll platform—a digital tool designed to create interactive polls, quizzes, and word clouds. In an open answer function, the groups were asked to write their answers, reflections, or questions based on a group exercise in the breakout rooms and to write their group number first as part of completing the 'open answer' (see Figure 4). For example, one group exercise was to discuss a text and prepare questions for the author (guest lecturers), and another was to discuss video clips presented in class.

This method of using the online poll platform was introduced by the teacher during the course to improve the group work–lecture room transition in unusual ways and to expand the possibilities for interaction. The shared and visible outcome of using an online poll platform (and online document) meant the teachers could observe how the groups were doing while the students were away in the breakout rooms, a function otherwise lacking in the online space. Further, it helped the teacher to prepare follow up, facilitate comments and questions, and provide feedback when the groups returned. This can often be a difficult part of the transition from breakout rooms to the plenary room. In this transition to the plenary room, a new practice emerged, where the teachers could engage the students by addressing a specific group's answers or comments and asking them to elaborate. Addressing the group, instead of an individual, created a safer space for students (cf. course evaluation), and the teachers experienced that, often, more than one group member responded (but not the entire group).

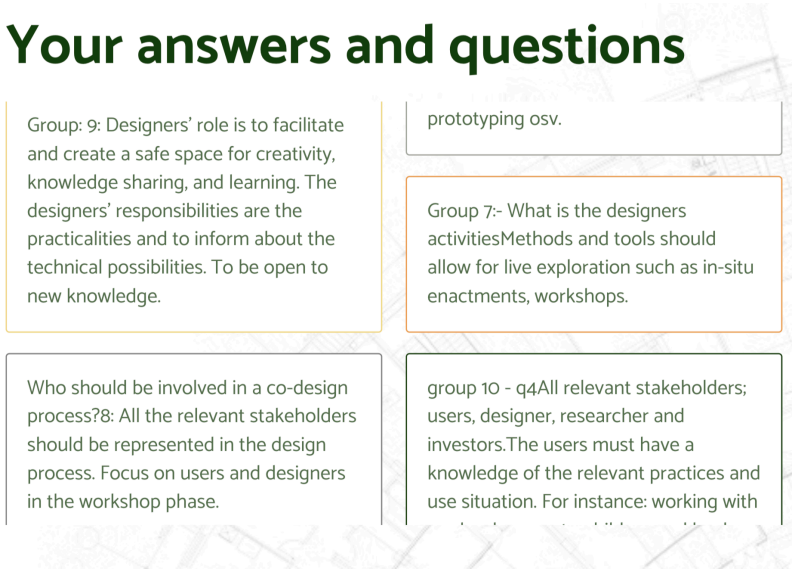

Figure 4: Online poll platform with questions and comments from students on the course, March 2021.

The work(ing) group space was supported by platforms and questions that should facilitate collaborative work in the group and exploration of the topics. It expands the possibility for collaborative knowledge production. The capacity of the platforms being used was collaborative writing but also visibility for the rest of the class and the teachers. The intention was to create space for participation in smaller groups for more intense and active engagement than what the lectures could provide. The groups in the breakout rooms shifted from being randomized to being built into student project groups to allow for interaction among the students across the class.

In general, some students found that these tools supported their group work in useful ways, as they concretized the outcomes of their internal discussions, as one of the students explained (cf., evaluation in class).

Collaborative space for hands-on experiences

To introduce and give the students hands-on experience with how to bring people together in a co-design session, the teachers designed a learning activity based on a digital whiteboard. It was created as a co-design workshop in which the students played the roles of participants and the teachers of facilitators. The workshop was centered on the questions, "What forms of sharing are found at ITU among the students, and how can the study environment be supported and improved through sharing and exchanging?" We ensured the chosen subject was one in which all students had knowledge and were interested, similar to an actual co-design workshop. The program and layout for the workshop followed a format the teachers have significant experience with from co-design research projects. The original purpose of the co-design workshop was to bring together different people (users, stakeholders, and other relevant persons) in an exploration of a current issue and in the formulation and development of possible solutions.

In the design of the online whiteboard (see Figure 5), the teachers chose to create an almost identical layout and material as in a physical workshop. There were quotes and pictures from the empirical fieldwork (among ITU students) that laid the foundation for a shared exploration (current situation with sharing among ITU students—the middle part of the board, see ill. 3), as well as a layout design to support the creation of future scenarios (the right part of the board, see ill. 3) of how to improve the study environment. The workshop took around 1.5 hours.

The structure and activities for the workshop were as follows:

1. What and where do ITU students share, and exchange based on exploring the empirical material (groups in break-out rooms)?
2. Share and map the stories from step 1), and in the groups, find a theme/issue to work with (small main room with one of the teachers).
3. Make a future scenario of how to improve the current situation based on the group's theme/issue (groups in break-out rooms).
4. See scenarios and shared reflections on the day (main room).

The digital workshop (the designed whiteboards, video conference call, and breakout rooms) created a potential digital learning space for working groups (steps 1 and 3) in which students in smaller groups analytically explored the empirical material and added their own stories and experiences. It also created a learning space of community of interest (steps 2 and 4), where the group work was communicated and presented (made visible for comments and reflections). The intention with the design whiteboard was to support shared exploration and the construction of future scenarios in the groups, as well as to expose and involve them in the practice of being co-designers, facilitators, and participants.

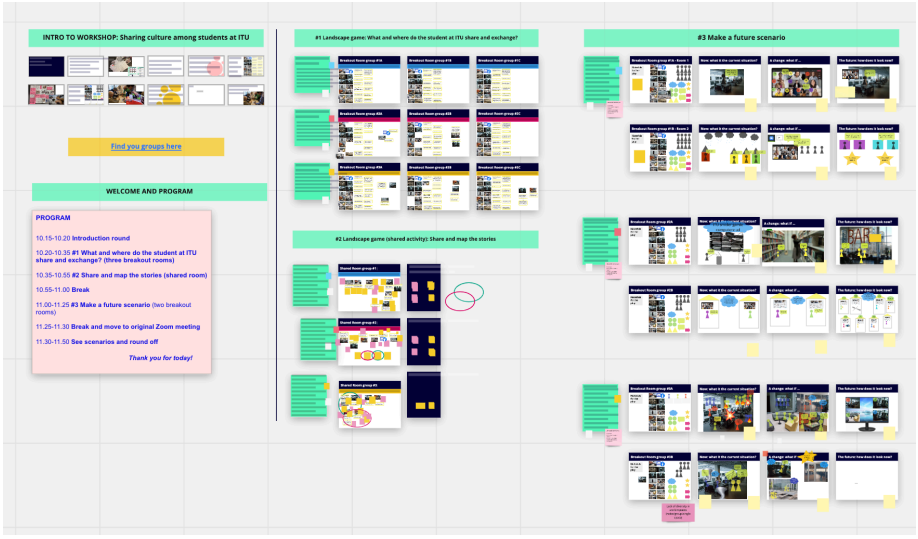

Figure 5: Overview of the whiteboard: Online co-design trial workshop, February 2021.

The material component was central to the workshop. The whiteboard—the game board for this shared exploration—played a leading role in structuring and facilitating participation and interaction. It was made visible to everyone at the same time, and in the design of the board, the teachers also provided concrete instructions and guidelines (see Figure 6). This was different from the physical workshop, where the facilitator was more in charge and had to explain orally the activities in steps.

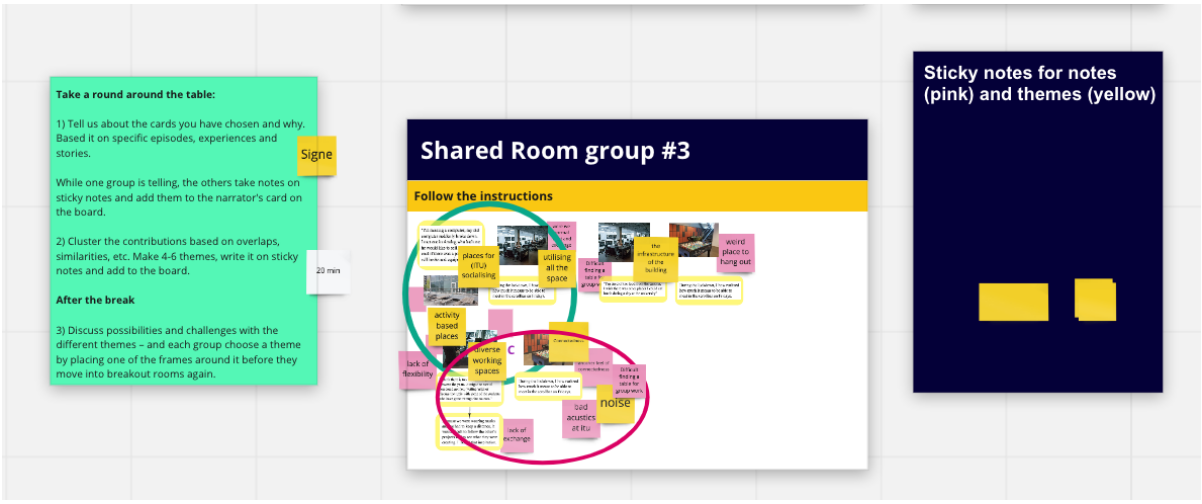

Figure 6: Part of the whiteboard: Example of instructions and the result of a shared exploration, February 2021.

The board allowed participation, which shifted throughout the different steps of the workshop program. There were shifts from shared exploration and production in the working group learning space to sharing, presenting, and shared exploration in the community of interest's learning space. It provided different forms of possibilities for participation, for example, shaped by different social forms. Lastly, participation included a material and productive aspect, especially in the third step, which allowed for active participation in a way that prioritized making.

The digital learning space expanded the possibilities for students to act in terms of both constructing knowledge about co-design and, especially, learning the practices of how to conduct a workshop. It made it possible for them to explore this collaboratively and to rehearse a co-design workshop in a 'protected' space.

A quiz for competition and discussion

The other activity in the course was a quiz. For the previous 4–5 years of the course, a test had been a mandatory component. It was implemented and placed in the middle of the course (course weeks 6–7) to encourage students to read throughout the course. It was based on the experience that most students read only prior to exams (at the end of the course), which became evident and created problems for their live projects during the course, as these projects were sometimes carried out with a great lack of theoretical and methodological knowledge on the topic. In previous years, the quiz was an individual test, but this year, based on the online teaching approach of fostering active participation and collaboration among students, the teachers decided to make this a group-based activity that could foster interaction with and among students, as well as hopefully create an explorative discussion within the field of co-design open to the whole class.

Using a whiteboard, 15 questions on the course topic were presented. For all the questions, there were three possible answers. Each group had rows of small dots, and they were told to work in their project groups to discuss and answer all the questions (one hour). Some questions had more than one right answer, and points were given only if they had put their dots on both right answers. As a group-based activity, the aim was to stop halfway through the course and get a sense of where the students were in terms of their ability to discuss and reflect on theoretical and methodological questions in relation to participatory design.

Three of the questions (Questions 5, 8, and 15) were set up as discussion points. Here, all three answers were right, and the three teachers had planned a discussion where each teacher took a position to argue in favor of one of the answers while the teachers collectively examined the questions with the students.

The most important material components of creating this space for interaction were the questions formulated with proper answer alternatives, which were aimed at fostering engagement with the topic, as well as class discussion. The point rules create ambivalence in how to answer (whether the students should add dots to one, two, or all three answer alternatives), which forced all groups to make their own choices, rather than simply look to the other groups. The whole whiteboard setup was vital, as it facilitated the group work of answering the questions, but more importantly, it structured shared discussions and allowed everyone to share their different perspectives. When administering the quiz, there was a competitive but humoristic atmosphere among the groups, as well as with the teachers, which led to active engagement (especially visible in the chat). The groups of students took turns presenting their answers when chosen by the teachers, and many students took part in the discussion in the chat or were interested in the points scored by the various groups.

Time schedules for (more) intimate feedback spaces

Mandatory critique sessions were held three times during the 14 weeks of the course. Here, students presented the current state of their project, what they had accomplished, and their reflections. These sessions differed from the supervision sessions, as all three teachers were present, and it was a class-based activity. This was done over a video conference call, and the crucial tool here was the time schedule. To foster active participation, the teachers decided to reduce the number of participants in each session, which meant the class was split into teams of 2–3 groups per session (10–15 students + all teachers and teaching assistant in each). In these sessions, each group played opponent to the other group. After each group presentation (8 minutes), there was time (12 minutes) for comments, feedback, and questions. The distribution of time was adjusted during the course. Both parts started out at 10 minutes each but this was slightly changed to allow more space for discussion and engagement in each other's work. The class split fostered a more intimate space for active participation compared to a situation in which all groups were present. Further, these critique sessions depended highly on the

teachers' engagement in the students' presentations, as well as on creating a safe environment for groups presenting and for the opponent groups to give formative feedback and ask questions.

The use of small group sizes in online teaching was addressed by Akyol and Garrison (2008) as one of the keys to fostering a community of inquiry. According to the authors, small groups offer the opportunity to engage and interrupt, and this was addressed by the students, who valued a more intimate space for interaction. In the final course evaluation, one student wrote, "Making presentations and offering feedback in smaller blocks of 3–4 groups was really great! No one can follow 11 presentations in a row, and when presenting, it felt like people listened more closely and provided better feedback" (24 of the 31 students who participated in the evaluation agreed). What the student especially expressed here is engagement in each other's work, which could point to a feeling of belonging to a community of interest by actively participating and showing interest in each other's work.

These critique sessions, facilitated by the time schedule and distribution of groups, where the constellations of groups changed every time, created a space for mutual inspiration among groups. The groups gained insight into the work of others in these sessions and could engage with others, as well as listen to the teachers' engagement and critique. One student explained that he had never gotten so much out of these kinds of presentations before in online courses (c.f. interviews with students). However, some students complained they had too little time during their presentations to explain their projects sufficiently.

In the quiz, but especially in the workshop and critique sessions, the technology and learning activities allowed the students to gain feedback and participate in other people's work. The workshop created a master learning experience (c.f. Dalsgaard & Ryberg, 2022, p. 105), where students could follow and learn from the teachers how to facilitate workshops. In the critique sessions, the students could actively engage in each other's work, ask questions, and receive feedback. Dalsgaard and Ryberg (2022, p. 106) emphasize that participation takes place in diverse ways, and not all students must participate in the same way. However, the size of the group of active participants matters to creating a well-functioning community of interest. In our case, we split the students into smaller groups to create a safer environment and to strengthen the possibilities for participation.

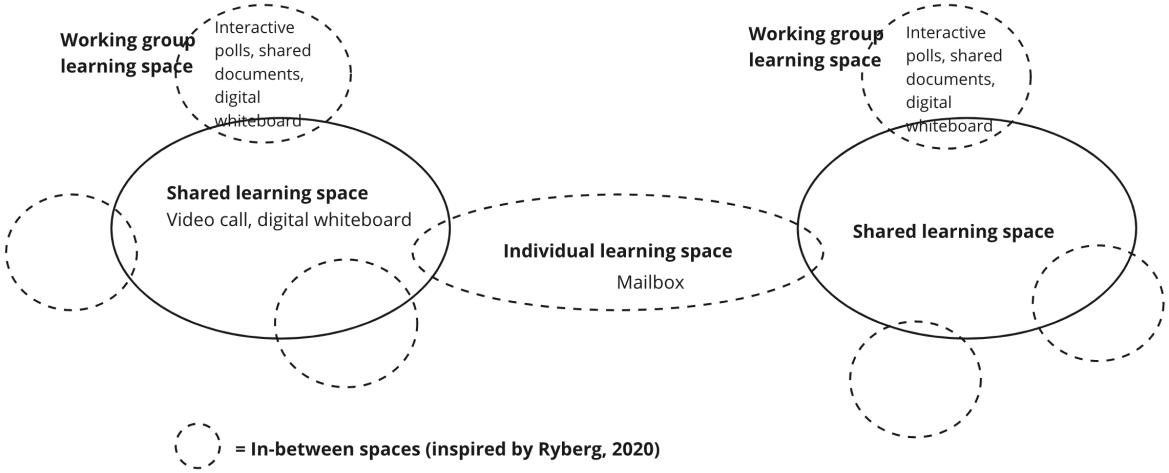

Figure 7: An illustration of the different digital learning spaces in the course and how they are connected.

Concluding discussion

In this paper, we reported on an experiment whose aim was to design an online learning environment using different digital technologies that supported and strengthened student participation. We have focused on how different digital technologies and learning activities have created and expanded the opportunities for students to act and interact with each other and their teachers.

Dalsgaard and Ryberg (2022) have how to develop new teaching practices that unfold over time, and they questioned the role of technology in establishing such practices. Reflecting on our didactic design experiment, we initially had ideas about the potential of different technologies and how they could contribute to the creation of an online environment in which opportunities for participation were strengthened and expanded. However, our decision-making concerning the technology and learning activities to be incorporated was based on our knowledge of and experiences with the offline version of the course. This means little attention was paid to rethinking our teaching practices and how to establish practices that suitably exploited the benefits of these technologies. Nevertheless, in some instances, we challenged our existing practices and experiences, especially in the case of the quiz, where collaboration and shared discussion were emphasized over individual performance.

When designing a learning environment, one may have theoretical ideas about its actual impact, but there is a degree of uncertainty due to the unique circumstances found in every situation. We briefly touched on the impact of new learning environments in practice without full analysis of our empirical material. However, something that emerged during the course and in the students' feedback was the impact of softening the lecture (conference call) format with collaborative learning activities, including the transition to—and the visibility of group work in—shared learning spaces (See Figure 7). These in-between spaces (which are different in-between spaces from the mailbox) provide and strengthen other forms of participation than video conferencing, as the social design allows for interaction and discussion in smaller groups instead of raising your voice in front of the whole class. Students have different preferences concerning forms of organization and interaction, i.e., social design and the design for learning create different forms of participation. Some students commented that they were better able to discuss the course content and their questions with their peers in the in-between spaces compared to the one-way lecture format sections of the course. Given the positive experience with these new practices, including the mailbox, our aim is to introduce them to offline course formats in the future to expand students' possibilities for actions in these learning spaces.

Because the design experiment was applied to a lecture-based course (which also included supervision, exercises, and project work), the different learning activities were tightly controlled by the teachers and the technologies. The intention was to expand the possibilities for student participation and, as Dalsgaard and Ryberg (2022) have argued, for students' ability to act. Hence, it is worth considering whether the facilitated activities had the desired effect or led to other reactions in the students, such as feelings of apathy and a lack of agency. One student commented that she sometimes felt powerless in the lectures (conducted via post-course interviews) but that she could have agency or control by turning off her camera. This small example gives insight into how participation, agency, and possibilities for action can be designed for but unfold in multiple ways that also surprises the designer (and teacher).

Ideas and pedagogical motivations were the main drivers, in our choice and use of digital technology in the online teaching. When we used platforms and digital tools, most of the time, we had to adjust them to suit our specific purpose. We did not utilize advanced technologies however, and there were limited instances of plug-and-play.

Acknowledgement

We would like to thank the co-teachers and students at the co-design course Spring 2021 for a very inspiring cooperation and participation in this course of teaching.

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