

Building relationships with remote participants through playful technology interactions in online codesign

Jeni Paay, Swinburne University of Technology, Australia

Simone Taffe, Swinburne University of Technology, Australia

Sonja Pedell, Swinburne University of Technology, Australia

Abstract

“Hybrid is here to stay!” If that is so, then how we educate design students and the techniques they learn need to work in a technology-driven online environment as well as face-to-face on campus. Learning codesign typically involves students being in a design studio environment where they create activities using tangible materials, for use in workshops, giving participants hands-on experiences to gather useful design insights. The question is, how does codesign need to be adapted to be effective in an online environment? To identify those elements of codesign that work effectively online, we offer lessons learned from teaching codesign online during the lockdowns and the resulting isolation of academics and students imposed by the COVID-19 pandemic. This necessitated rapidly adapting on-campus codesign techniques to online versions using available technologies to engage remote participants in online participatory experiences. We describe codesign activities of design teams who created 24 unique online activities to explore designs for *Welcoming Community onto Campus*, trialling them in virtual workshops with the local community. Case study method was used to collect and analyse weekly student reflections and educator observations using thematic analysis and basic inductive coding. The unexpected finding is that online codesign activities need to remain tactile and include multisensory qualities. We argue that online codesign needs to focus on building relationships, engaging the senses, keeping it simple and allowing flexible timing. We identify the benefits, challenges and implications for online codesign and provide a checklist for designers wanting to prepare for a hybrid codesign future.

Keywords

Online codesign, everyday technologies, community participants, creativity, design education

Introduction

In the past four decades, codesign and participatory design have gained increased use in design practice (Stappers et al., 2007, September) and increased prominence within design research (Slattery et al., 2020), with these methods finding their way into university design education programs (Stam & Boon, 2018, August). In generating codesigned solutions, student designers need to both understand the user’s viewpoint and share their own design expertise and knowledge toward the generation of suitable solutions. When involving participants, it is important that information is shared in a way that a common objective and understanding of the problem is formed and maintained, creating and sustaining interest in codesign among prospective participants from the beginning (Pederson, 2016). Student created codesign activities need to be engaging for both the students and the participants to effectively help generate and consolidate innovative design ideas toward building feasible design outcomes (Taffe, 2017). Codesign flourishes when flexibility, openness and innovation is encouraged while closed structures often fail to produce meaningful and usable outcomes (Mattelmäki,

2008). This is best done with projects in real-world settings and with participants who have a stake in the issue being designed (Christiansson et al., 2018, August). Codesign requires that we not only situate our design teaching and research within the context of use, but acknowledge the role that the context plays in making design outcomes matter (MacKinnon, 2012).

Codesign is an effective process for drawing communities together and developing connections and increased levels of caring about the future of their urban environment (Freeman et al., 2019, May). As Lenihan and Briggs (2011) suggest, engaging the public is particularly relevant when designing with communities for better community services. Engaging local communities to collaborate with student designers in learning codesign gives student designers experience in understanding real user needs while finding solutions for real community problems. Practising codesign on existing problems and their complex context gives students an opportunity to reflect on the success (or not) of their tools and techniques toward gaining design insights. However, engaging communities and end-users in codesign in meaningful ways is not trivial (Bødker & Kyng, 2018).

The benefits of real-world learning and the benefits of doing codesign with real participants and live case studies are well known (Bødker & Kyng, 2018; Morley & Jamil, 2021). While educating design students, we aim to produce future-ready graduates, who have the content knowledge, the habits of success, the creative know how, and the abilities to successfully navigate life, which is reinforced by realistic contexts for their learning. In working with community, students learn about relationship-building, understanding local culture and working in real-time with immediate and visible outcomes (Cozens, 2011; Setiawan et al., 2018).

Learning codesign is usually done in a design studio, where potential users are invited to come into the studio and participate in design workshops. However, during the COVID-19 world pandemic, going online to both teach and practice codesign was a necessity, and as educators, we were left with no alternative but to explore online alternatives to our traditional teaching of codesign (see figure 1).

We found very little research on learning and conducting codesign online, exceptions being Voorend et al. (2019, April) on distributed card based codesign and Jiménez-Narváez et al. (2013, July) on remote codesign experiences between participants collaborating in different countries. We believe we are contributing to new knowledge in this area by sharing our experience of teaching codesign online.

In this research, we wanted to understand how codesign needs to be adapted to be effective in an online environment. This paper illustrates how online codesign can be achieved through sharing the processes, activities and outcomes of a project called *Welcoming Community onto Campus* conducted with a local council and a team of Master of Design students. We present our findings, based on collected student reflections of the whole cohort, our observations of their workshop sessions and educator reflections on their outcomes. Our contribution is methodological, we share insights on adapting and augmenting traditional codesign approaches to support effective student learning on conducting codesign in an online context. The result is a proposed checklist of important conditions required for the design of successful online codesign activities with focus on building relationships, engaging the senses, keeping it simple and allowing flexible timing, through the use of appropriate technologies that support remote codesign education.

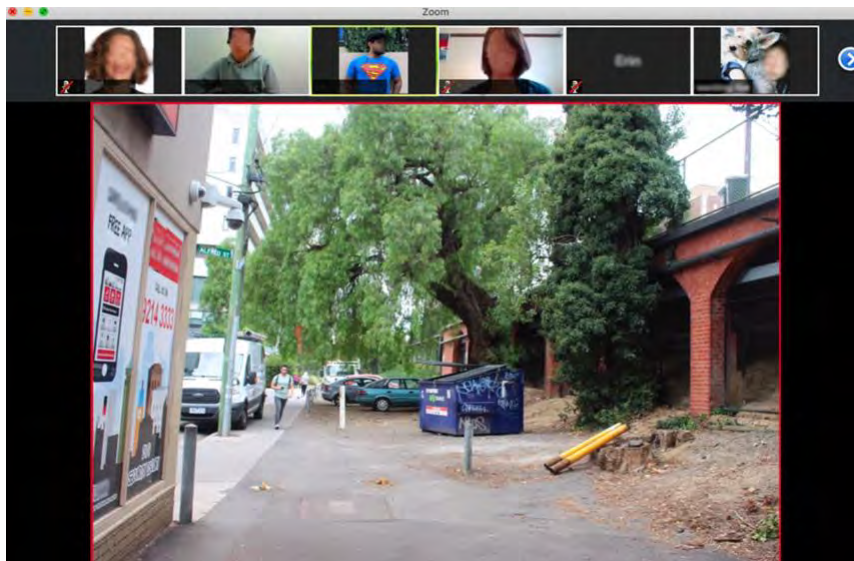


Figure 1 *Sharing photos using the Zoom platform. Participants discussed the blue bin as a distraction to Welcoming Community onto Campus.*

Background

For codesign to be effective, it is important that designers select tools and techniques appropriate to the project at hand so that communication is clear and open (Steen et al., 2011). Trying out different combinations to create collaborative activities helps to identify important issues with users (Sanders & Stappers, 2008, 2014). Steen (2013) also talks about a “process of joined inquiry”. These are the skills that students need to learn, but there is very little research and very few examples of academic work in the participatory design and codesign literature that investigate or describe the teaching of participatory design and codesign (Christiansson et al., 2018, August; Simenson et al., 2020). As Christiansson et al. claim, “few papers actually address how we teach PD and codesign as part of an academic curriculum” (pp. 1). Christiansson et al. acknowledge the benefits of using Donald Schön’s (1987) concept of reflective practicum and real-world projects. This provides students with first-hand experience of the participatory design process, teaching them how to collect and use field data, and gives them realistic expectations of a codesign process and its participants. At the same time, Simonsen et al. identify the need for including participatory design methods in curriculum at university level to teach techniques and collaboration tools as well as encourage student reflection on outcomes. In this way, participatory design education is not just about the teaching methods, techniques and project context, but the education should include the development of personal and professional qualities for the student, leading to social sensitivity and responsiveness (Stam & Boon, 2018, August). As an educational approach, Simonsen et al. (2020, June) offer a checklist of important conditions required for successful participatory design for students working with external partners, including: focussing on clearly defined projects that are highly relevant to the users; commitment from the client; engaged and relevant participants; adequate project resources; potential to effect change; and understanding what can be achieved in a short time frame.

Learning and conducting online codesign with remote educators, students and participants, adds a level of complexity in trying to satisfying these conditions and educational aims. Unlike on-campus design studios and workshops, virtual classrooms and workshops make personal

interaction that bit more difficult and require creative thinking about how data will be generated, collected and shared (Fleischmann, 2022). Simple conversations online, in terms of non-verbal cues, audio clarity and turn taking are more difficult than face to face (Swezey & Vertesi, 2019, November). At the same time, online workshops allow for greater flexibility in time and space. Activities can be conducted both synchronously and asynchronously, without limits on the number of people who can participate at any one time, or over time. There are no material or refreshment budgets and no travel time or painstaking coordination required to get participants together in one room at the same time. This makes online codesign more accessible to researchers, for example, students without a budget, but also to those who may otherwise not be able to participate because of time or mobility constraints.

Our research adds new knowledge about online university education in codesign and the implications of involving students in real world projects with remote clients and participants. We discuss how this might impact a hybrid on-campus online future for codesign education and practice. Our findings are based on analysis of documented student reflections from individual students' weekly journals, reporting on tool design, stakeholder engagement, team collaboration, personal learnings and feelings about the process. Students were especially asked to reflect on how they adapted existing codesign techniques and tools to work in the online context, what they created and what they learned from this experience. This was augmented by our observations of the workshops.

Methods and Materials

The *Welcoming Community onto Campus* project was jointly undertaken between the university and its local council. The aim was to redesign the campus to create a welcoming experience encouraging the local community to enter, enjoy and linger on campus. Our university has porous boundaries, is not gated, has a public train station on campus and has good accessibility for pedestrians.

As educators, we started the semester thinking it would be business as usual. However, by the second week the university was closed to all on campus activities due to COVID-19. We soon realized that the traditional codesign methods we usually taught would need to be adapted to work online and would also need to be exclusively taught online after week one. We were interested in what qualities of on-campus codesign techniques would be transferable to an online environment looking forward to a new hybrid model of codesign. We rapidly changed from a teaching plan that was based around the students conducting a series of on-campus codesign workshops with local members of the community, to development of a student-driven set of diverse, synchronous and asynchronous activities to be delivered in online "virtual" workshops. However, it was still important for the student learning experience that they design for a real project and context, collect rich field data (as much as possible within isolation restrictions) and create shared ownership of the solutions with the local community. At the beginning, this caused heightened stress in the students with feelings of "missing out on doing the fun stuff" of codesign and lacking the personal interactions with participants that happen in face-to-face workshops.

The Participants

Three academic educators were involved in guiding the process. The students were 25 Master of Design students, some of whom were practising designers with industry experience, working

in five project teams. The students were a multicultural group coming from all over the world to study at our university. For many, the isolation was compounded by living far away from home, and not being able to visit or return to their families. The teams were tasked with finding appropriate activities and adapting them to work online to answer the research questions that they developed in response to the problem of welcoming the community on campus, as specified by the educators and the client. The client had met with the students in the first week of semester, pre-lockdown, to elaborate on their needs. All teams were required to hold two “virtual” workshops, which resulted in a total of 24 synchronous and asynchronous activities across the class (4-5 unique activities per team).

The Technologies

As educators, we helped students create their activities by giving them recommended readings on online codesign and online data collection (e.g., Friedrich, 2013; Jiménez-Narváez et al., 2013, July; Lefever et al., 2007; Nakki & Antikainen, 2008, October; Walsh et al., 2012, June, Voorend et al., 2019, April). Rather than mandate a particular technology, we allowed teams to choose their own preferred platform. The different off-the-shelf communication, productivity and software tools that the teams used as platforms to create their unique activities included: Adobe XD¹, Blackboard Collaborate², Facebook³, Google Slides⁴, Instagram⁵, Google Jamboard⁶, MIRO⁷, OptimalSort⁸, Sketchup⁹, Skype¹⁰, SurveyPlanet¹¹, Typeform¹², Twitter¹³ Wordpress¹⁴, YouTube¹⁵, and Zoom¹⁶.

The Activities

The activities created were inspired by findings from traditional (face-to-face) codesign studies. This included the use of visuals for communicating more effectively than words and their power in eliciting memories and experiences, including the potential of photographs to generate deep and rich stories from participants (Harper, 2002). Students used card sorting as a way to understand user preference and needs, and ‘closed’ card sorting as an inexpensive method that could be used with online platforms (Paul, 2008). Card sorting activities were also used as means to engage non-designers in collaborative activities of making, telling and enacting (Durl et al., 2017). Students created customer journeys around an experience to reveal customer motivations, behaviours and problems, followed by brainstorming to help ideate solutions to the problems revealed and investigate appealing campaign elements (Daems et al., 2017). Word association exercises were used to facilitate conversations where participants reacted to

¹ <https://www.adobe.com>

² <https://www.blackboard.com>

³ <https://www.facebook.com>

⁴ <https://www.google.com.au/slides/about/>

⁵ <https://www.instagram.com>

⁶ <https://jamboard.google.com>

⁷ <https://miro.com>

⁸ <https://www.optimalworkshop.com>

⁹ <https://www.sketchup.com>

¹⁰ <https://www.skype.com>

¹¹ <https://surveyplanet.com>

¹² <https://www.typeform.com>

¹³ <https://twitter.com>

¹⁴ <https://wordpress.com>

¹⁵ <https://www.youtube.com>

¹⁶ <https://zoom.us>

different campaign elements and revealed consumer behaviours, followed by brainstorming to ideate new campaign strategies (Kim et al., 2020). Students were also inspired by reading practitioner generated advice on how to do fieldwork in a pandemic (Lupton, 2020).

Pilot Codesign Sessions

Pilot testing codesign sessions for the students gave them the opportunity to trial their activities with their peers before conducting the virtual workshops. The short time frame and situation of students working from home, often with poor internet connections and limited access to high-end technologies or specialized software, necessitated rapid experimentation with available mainstream technologies and off-the-shelf communication products. To provide an equivalent to traditional codesign, activities needed to be adapted to work in online, virtual delivery mode.

Case Study Method

Research data were collected using case study method (Yin, 2003). A case study is particular in its methodology and suitable for this research, as it follows the logic of analytic induction. Rather than using large samples and following a rigid protocol to examine a limited number of variables, case study methods involve an in-depth analysis of a single instance or event, or a case. Case studies can be seen to satisfy the three tenets of the qualitative method: describing, understanding and explaining (Yin, 2003). Case studies provide evidence or illustrations with which some readers can readily identify (Smith, 2004). Authors of case studies have to reveal how the investigation was conducted and how collected evidence was handled and interpreted (Bartlett & Vavrus, 2017). According to Crouch and Pierce (2012) it is important in case study research, due to the complexity, that the focus of the research is identified upfront as we did in our case. Most importantly case study research allowed us to investigate design processes and specific details at the same time (e.g. Neuman, 2003).

As researchers, we did not have a lot of control over the complex design activities. Codesign is a very creative and flexible process and the relevant behaviours cannot be manipulated. The case study method allowed us to retain the holistic and meaningful characteristics of real codesign processes. Case studies are conducted in a way that incorporates the views of the “actors” – in this case, the design students and participants – and are therefore able to explain conditions from the perspective of the actors (Zonabend, 1992). According to Darke et al., “Case study research is an appropriate research strategy where a contemporary phenomenon is to be studied in its natural context” (1998, p. 278).

Educator Observations

The case study consisted of a range of methods. The three educators acted as facilitators and were conducting observation during the online workshops visiting all teams in turn in their breakout rooms and collecting data on the students’ reflections which also included feedback of the participants as described below.

Student Reflections

During the process of creating and conducting online codesign activities, all 25 students were required to document individual weekly reflections, including: 1) their contributions to team processes; 2) participation and discussions in weekly online classes; and 3) reflections on their experiences and learning of codesign, with a visual summary of what they had worked on that

week. These reflections were emailed weekly to the educators, from weeks 2-12 of semester, and submitted as a final reflection report at the end of semester. At touchpoints during semester, weeks 4, 10 and 12, students were asked to respond to the following questions: 1) how they felt about running codesign activities in an online format? 2) what their experience was in participating in virtual workshops of other teams during pilot testing? 3) which activities were the most engaging? 4) which activities inspired good ideas? and 5) how activities could be improved? These reflections were collected and reviewed by the three educators to get insight into how the education process was going, and how the students and participants were responding to online codesign as a method. This gave us the opportunity to address negative comments on the process as they happened and to provide encouragement and advice.

At the end of semester, we asked students to reflect on: 1) benefits and challenges of conducting codesign online; 2) to share the most memorable participant responses; 3) to recall their most insightful moment during the process; and 4) to reflect on what they learned overall. Students were also required to submit a project report detailing the project's design outcomes and give a presentation to the client.

Analysis of Outcomes

We analysed the student reflections, the educator observations and the final design outcomes using a process of inductive coding combining Yin's five-phased analytical cycle for qualitative data (2011) with Braun and Clarke's (2019) steps for inductive and iterative reflexive thematic analysis. Combining these methods allowed us to create themes from the data.

Illustrative Case Study: Welcoming Community onto Campus

All five design teams worked on the *Welcoming Community onto Campus* project, but to exemplify the processes and outcomes, we share in this paper the practice, activities and design outcomes of just one team. This team was selected as an illustration to show what can be achieved through online codesign by sharing activities and images from their final design report.

To explore design alternatives for *Welcoming Community onto Campus*, the team held their virtual workshops over a period of six weeks. They conducted an initial pilot online survey of the context and two virtual workshops. In Virtual Workshop 1, the first activity (Visual Appeal) was completely asynchronous, the second activity (Elements) was run in both synchronous and asynchronous modes, and a third activity was synchronous (Safety & Amenity). Virtual workshop 2 included an interview (Missing Elements) and a collaborative activity refining details on popular elements suggested during the interviews (Seating & Wayfinding).

Online Pilot Survey

Pilot Activity: The initial pilot online survey was achieved in a social media campaign using a Typeform survey, Facebook polls, and Twitter feeds. These were sent out through local networks and social groups in the community. The Typeform survey was to find the most used entrance to campus, the Facebook poll asked about best access to the campus with additional comments, and the Twitter poll asked how to improve the campus environment. This was to get rapid feedback from the university and local community about entrances to the university, and how they felt about them.

Participants: In the pilot study, participant diversity was not controlled, no demographics were collected, and all responses were included in the design data. The Typeform survey had 51 responses. The Facebook poll had over 400 responses. The Twitter feed had no responses.

Participant Outcomes: Responses indicated that the area around the train station was the most used entrance, and yet most respondents regarded the space as dirty, dark and uninviting, with suggestions that food trucks, areas to linger and colourful architecture would improve the environment. The codesign activities going forward from this survey were aimed at re-designing the area around the train station.

The different rate of responses was interesting. The Typeform survey took some time to fill in, which may have discouraged responders, whereas the Facebook polls were fast to complete and easy to share amongst friends and contacts. We were surprised by the lack of response in the Twitter feed and can only assume that this platform is not popular with university students and the local community.

Virtual Workshop 1

The first workshop was designed to identify the kinds of spaces that participants (students and local community) found visually appealing and welcoming, and to understand how they regarded existing spaces in the university and surrounding precinct. It comprised three different activities which were a mixture of asynchronous and synchronous approaches and were conducted across three different digital platforms, over two weeks, with a new set of participants for each activity.

Activity 1: The Visual Appeal activity used a Typeform survey where participants were shown fifteen different images of urban environments and artefacts, including spaces, buildings, lane ways, textures and colours and were asked to select 3-5 images they found visually appealing. This was done to ascertain people's preferences for different urban styles (see figures 2a and 2b).

Participants: This survey was taken by 69 participants (32 males, 37 females), aged between 18 and 66 years.

Participant Outcomes: Responses indicated that the area around the train station was the most used entrance, and yet most respondents regarded the space as dirty, dark and uninviting. The participants discussed the blue rubbish bin as an off putting first thing that the community sees when transiting from the train station to the campus (see Figure 1). The codesign activities going forward from this survey were therefore aimed at re-designing this area.

The use of the Typeform survey in this case was ideal for showing sample images and getting affective responses to these urban environments and artefacts. The high response rate could be attributed to finding people who were genuinely interested in making a difference to the university's physical environment.

Case Results: In terms of benefits of using online codesign in this activity, the students were able to reach a high number of participants (69) with a wide range of ages. They were able to look at images of spaces and rate them, using the medium of a computer display showing high resolution images with the ability to zoom into an image if necessary. Another benefit was that

it was conducted over a week, in asynchronous mode, so participants could do the activity at a time that suited them, in a time frame that supported due consideration of the alternative designs.

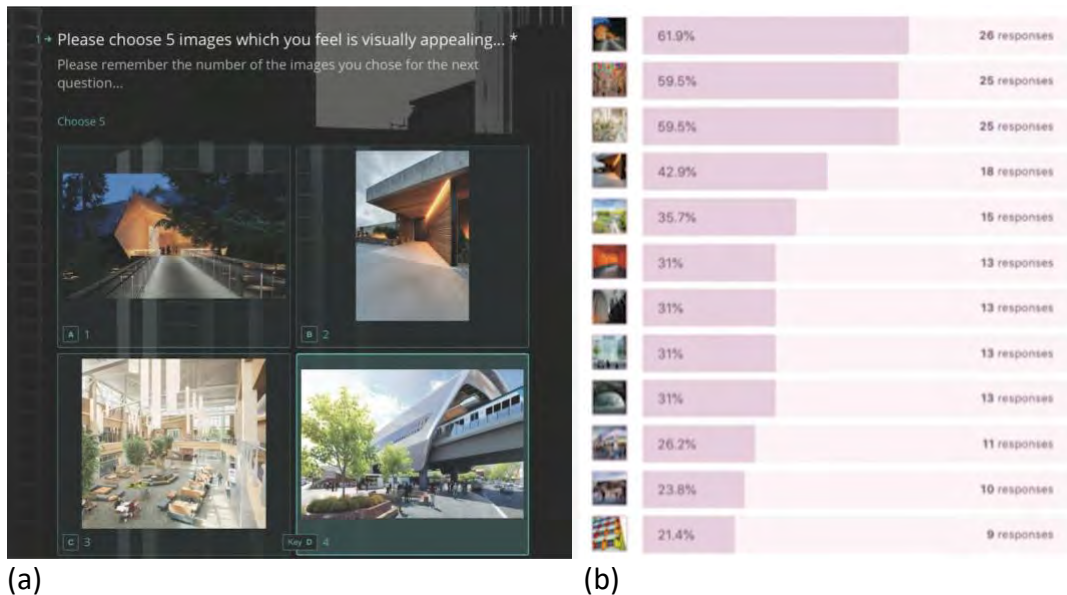


Figure 2 Activity 1, discovering places people find visually appealing: a) the Typeform form survey showing images, b) the results aligned with images

Activity 2: The *Elements* activity used a card sorting method with the OptimalSort program to drag and drop their choices. This activity invited participants to sort a set of 24 predefined elements presented on cards (e.g., bike racks, media walls, pedestrian zones, public seating, pathways, rubbish bins), into four predefined categories (ambience, diversity, accessibility and safety) to indicate important elements and associated feelings (see figure 3).

Participants: The online card sorting activity was completed by 103 participants (47 males, 56 females), aged between 18 and 98 years.

Participant Outcomes: Outcomes showed that participants regarded: state-of-the-art design and maintenance as important to ambience; festivals and food vendors as important for supporting diversity; amenities, cycle zones and relaxing areas as important aspects of accessibility; and navigation help and well-lit and open paths as important for feeling safe.

Case Results: With respect to benefits of online codesign in this activity, again as an asynchronous activity, participants could respond in their own time with as much time to consider the ranking of elements as they wanted. The high number of participants in this activity (103 people) was made possible by the ability to simply send out a link and encourage people to take the time to complete it. It would also have taken the designers a long time to do this activity with so many people in a design studio context. The spread of ages (18-98) is also impressive, as it is usually a challenge to get very old or less mobile participants to come into a physical location for face-to-face codesign.



Figure 3. Activity 2, graphed results from discovering how people perceive urban elements as contributing to place.

Activity 3: The *Safety & Amenity* activity had semi-structured interviews conducted using Zoom.

Participants: 16 people from Activity 1 agreed and participated in this activity.

Participant Outcomes: Users shared that a well-lit, colourful and well-maintained environment is the first step towards a pleasant space. The participants suggested adding wayfinding as they felt lost. In summary, we discovered that consistent design, basic facilities, and good lighting can elicit a sense of safety and belonging in users.

Case Results: Doing semi-structured interviews using an online platform is not so very different in terms of time taken to run the session for the designers. In fact, they reported some frustrations about connecting with interviewees and reading their non-verbal responses, in the same way they could have with face-to-face interviews. However, from the participant point of view, although they could not leave their homes due to lockdown restrictions, they were able to save a lot of travelling time and expense, by being able to do the interview from home, as well as the ability to include any members of the community, irrespective of mobility issues. In this way, activity 1 enabled recruitment for activity 2, keeping community members involved and engaged without them having to commit to a lengthy workshop.

Virtual Workshop 2

Activities in the second virtual workshop were conducted online over a two-week period, using Zoom to interview and Google Jamboard to share design concept visualizations of an initial design idea with participants, based on outcomes from the first virtual workshop (three activities), to get their feedback and design input on creating a welcoming entrance to the university.

Activity 4: The *Missing Elements* activity was conducted as an epistolary interview (Fergusson, 2009) where the researchers conducted several interviews simultaneously, so that data from one interview was tested in and used to develop other interviews. SketchUp was used to create

3D rendered images of the space using photographs of the area, showing ideas for a new university entrance. These images were shown on Google Jamboard while conducting interviews in Zoom. Four different models showed the entrance from different viewpoints, and participants were asked to critically evaluate elements of the designs and suggest missing elements and changes using notes placed on the images (see figure 4), to share their reasons for including these elements. Participants were shown images of existing entrance spaces to prompt discussion to share their personal experiences of these spaces, with respect to safety and amenity.

Participants: A total of seven participants, (2 males, 5 females) aged between 18 and 60 years were selected from different sectors of the university community, for the interviews.

Participant Outcomes: Outcomes from the interviews showed that people felt the space was unsafe at night due to lack of lighting and being poorly maintained. They agreed that a well-lit, colourful and well-maintained environment would be more pleasant, suggesting that wayfinding, sitting areas and places to wait, coffee shops and an emergency phone are essential to making a place feel safe and welcoming.

Case Results: This activity combined both a visual platform for showing design ideas for a new entrance, with an audio channel for the interviews. Electronic sticky notes were used to record participant responses, much as the paper equivalent would have been used in a physical workshop. Like activity 3, the main benefits of doing this online were related to convenience and accessibility for participants. The students found that community members were quite comfortable with being interviewed using Zoom, so this did not form a significant barrier to information gathering for the designers' purposes. Combining this with the visual platform was an important contributor to the success of the activity.



Figure 4. Activity 4 where participants critically evaluate elements of the designs and suggest missing elements and changes using notes placed on the images.

Activity 5: The *Seating & Wayfinding* activity took findings from Activity 4 and using Google Jamboard, participants were shown 24 images, eight on ideas for public seating alternatives, nine on ideas for lighting design, and seven images of different types of wayfinding elements,

and asked to choose those they preferred and to place notes on them explaining what they liked about them and why.

Participants: Same as Activity 4.

Participant Outcomes: We found that users preferred modular benches for public seating, as both comfortable and flexible for dwelling in a place. The original design had an abundance of red in it, as this is the university logo colour, but participants found this alarming, and asked that more 'playful' colours be used in the final design. As wayfinding plays a vital part in peoples experience of spaces and in making them more welcoming, most participants added colourful and bold wayfinding elements to their selections, noting that wayfinding signage should be integrated into the new environment. Lighting was also identified as important to both wayfinding and a sense of safety.

Case Results: As a synchronous activity, it was possible for the designers to follow up on participant choices with questions about why they liked particular elements and why, giving a similar experience to face-to-face codesign. Again, the combination of visual and auditory channels was vital to getting the kind of feedback required in this activity. In particular, the participants ability to place notes on the images was important to record their feedback for later consideration by the designers.

Final Design Outcome

The workshops informed this final design proposal for a welcoming entrance to the campus. By combining vegetation with natural materials such as sustainable reclaimed timber and stone (figure 5a), the entrance becomes more welcoming. A series of thin red arches, the university branded colour, define preferred pathways into the heart of the campus (figure 5b). Large colourful wayfinding signs on walls and floors, and large situated screens and interactive media walls, provide necessary information to community and commuters. Sheltered seating pavilions encourage activity and dwelling. Bright lighting along paths both highlights the entrance and helps guide people along paths at night (figure 5c). Colour coded bins encourage recycling and give a sense of cleanliness. Overall the proposed design covers all key elements found in the online codesign process.

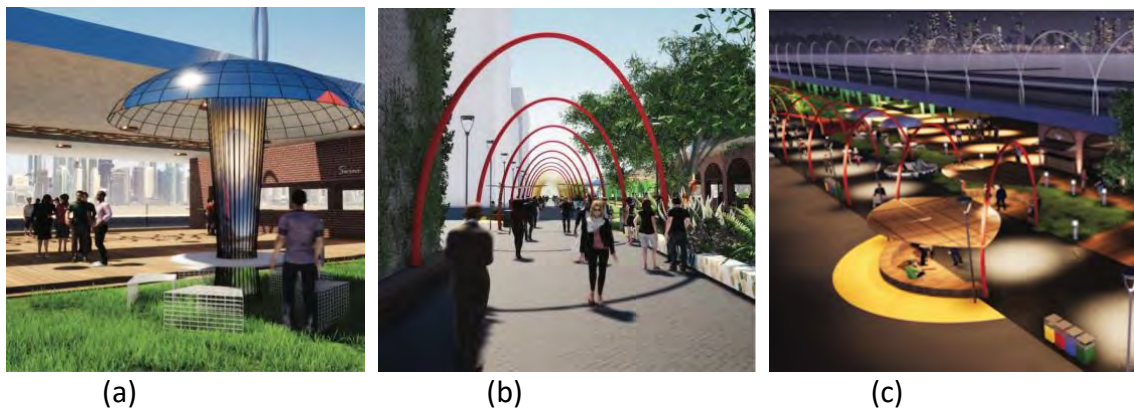


Figure 5: Design Ideas for Welcoming Community onto Campus: a) vegetation and natural materials, b) thin red arches for branding, c) lighting along paths at night.

Reflections and Observations

Although the previous section gave the example case study of activities from just one of the five design teams, the following discussion is based on our learnings from all 25 Master of Design students. The collected data in the form of the student reflections and responses and the end of semester team reports, represent the students' perspective and informed the insights and findings shared in this paper. Students reflected on how the online situation influenced conducting the activities and participant experience. They shared interesting comments made by participants during the process, and insightful moments they experienced. From our observations of the process as educators, we could see that online codesign was able to broaden the reach of the design groups in involving the community as participants, while not negatively impacting the interactions they were having with them, and the outcomes the design teams were getting. These reflective instruments were also an important part of our connection to and communication with the students, given that face-to-face interactions did not happen.

In looking at the final design outcomes of the class, we as educators could see that the students had devised a broad range of creative interactive activities that could be successfully conducted online, garnering enthusiastic participation. Their activities were well designed and achieved appropriate and meaningful input from participants, directly informing final designs, whereby the client was overwhelmingly pleased with the breadth and depth of the final solutions.

While we reported on five distinct codesign activities, examining the way they built on each other and attention to the overall process is crucial. The order of asynchronous and synchronous activities was important to work towards the outcomes, with large numbers of participants early on which built rapport and continuity with some of the codesign participants who continued through the process. In supporting the educational aspect of the process, educators continued to monitor responses and feelings of all codesign parties involved. We needed to ensure that students reflected on and understood the progress of their learning of codesign as well as teaching them to monitor their participants' feelings and engagement. Additionally, we needed to ensure that the data being collected was useful and valuable in inspiring design outcomes.

As educators, we were interested and impressed in how well students appropriated off-the-shelf digital communication and productivity tools and adapted them to accommodate the participatory process of data gathering and design ideating. In assessing the design outcomes, we found that being online was equal if not more effective for learning about codesign processes, compared with previous years teaching on-campus, as evidenced in our assessment of the quality of final reports, design outcomes and the maturity of their weekly reflections about the value of codesign.

Benefits of Codesign Online

Benefits of Building Relationships

Being virtual did not detract from learning about the value of codesign. As one student shared with us about doing codesign online, *"I find this method excitingly chaotic because the chaos caused during the data collection ... is directly proportional to the quantity and quality of the findings."* When reflecting on what worked well online, student designers noted that production tools allowing participants to interact through drag and drop gave participants the

feeling of playing a game, which they enjoyed. The most effective tools were those that supported parallel activity and voice communication channels, so that the students could interact verbally with participants while doing audio and visual tasks, asking them what they were doing and why. This helped build the designer's understanding, their connection to the participant, as well as keep participants engaged in the activity. They also said that using a multiplicity of online platforms and tools in a rapid sequence kept the sessions lively and helped bridge the electronic chasm between student designer and participant.

From this we can see that building relationships, not only within the codesign team, but with the participants, is vital for keeping them engaged. This becomes more important when working online, because there is the natural barrier of the technology interface that sits between designer and participant, while at the same time providing a good conduit to participants. If a participant is in a physical workshop they are unlikely to walk out mid-way, be distracted by things around them, or stop paying attention to the designer. These are much more problematic when working online.

Benefits of Engaging the Senses

Students were building capacity over the workshops to communicate visually and using tangible activities in an online forum, using card sorting or interactive design boards, where their previous online experiences had been primarily video conferencing with only conversational interactions. We encouraged this as educators, running our online classes as interactive sessions, using MIRO board for presentations and class discussions, and encouraging students to trial and share different tools in pilot testing during class time. Students liked learning a range of new technological skills from each other, and learned to use technology as a way to gamify interactions with participants, adding fun to the activity, and supporting integration of different media. Students said it was important to have activities that asked participants to do something enjoyable, such as watching snippets of popular movies, listening to music, or drawing.

This indicates that people's senses play an important role in how information is shared and received in an online context. To compensate for the lack of physical tangibility in online activities it is vital that they are designed to engage multiple senses within what is technologically available, for example, the tactile effect of dragging and dropping alternative choices, typing in notes and the use of audio and video snippets to enrich communication. This adds to participant engagement, as well as eliciting more nuanced and richer responses.

Benefits of Keeping It Simple

The shift to online required the students to carefully think what they wanted to get out of the workshops and they were less distracted by the material aspects of the codesign activities, and more focussed on information gathering while still having engaging elements. In many cases the quieter students reported benefits of feeling more comfortable and confident in an online environment, saying, *"I felt quite comfortable running the co design online, as I felt less pressure to perform. Somehow it feels comforting that everyone is at home under these circumstances ... I have the feeling the participants and students feel more open to discuss and talk, it's more of an open environment ... it makes it a little easier to focus on our tasks and roles within the group."*

In our experience of teaching codesign on-campus we have noted that students typically develop overly complicated activities, losing sight of the design intention and the information they needed to collect to answer their research question. They spend a lot of time and effort on creating fun and colourful physical objects and games that they want the participants to interact with, while losing sight of the specific design feedback they want to gather. In an online context, students created more simple activities using technology, while learning to be flexible, concise and to the point, to use media well, and to organise their time, all of which are important skills for codesign.

Benefits of Allowing Flexible Timing

Virtual workshops, where participants met the students online, were easy to schedule and coordinate, with participants being directed from a “virtual” waiting room, where they were greeted and gave informed consent, to a series of virtual rooms where they could participate in different activities with different groups.

The workshops were also not tied to a single time or place, because including both synchronous and asynchronous activities allowed students to take advantage of the opportunities offered by online technologies whereby activities could be done in the participant’s own time, giving them time for reflection. Students also managed to attract more participants, due the flexibility in timing and synchronicity of activities.

The flexible timing and virtual workshops meant that students could run workshops at times that suited their participants, over a lengthened period of time, with some activities that participants could do on their own. This resulted in higher numbers who could participate, accessibility for those with time and movement constraints, and time for reflection by participants.

Challenges of Codesign Online

In the early student reflections, there was a belief that online was not going to be as good as on-campus. As one student reported, *“Though working and studying remotely is a better choice, subjects such as codesign need to be done with people around in order to get the relevant results for the proposed question”*. Another saying, *“considering how codesign is actually done, performing the activities and working with group members narrows the availability of resources and lowers motivation to work on anything.”*

Challenges of Building Relationships

It was difficult to keep participants engaged while having difficulties communicating over electronic channels. Online codesign was seen as more challenging than traditional codesign with respect to clearly and intimately communicating with participants. There were problems understanding what was being said by both the students and participants, as audio was not always clear, and depended very much on quality of home internet connections. People accidentally spoke over the top of each other, unable to discern conversational non-verbal cues. This made it difficult to record and understand what participants were saying. There were also difficulties understanding participant experience and guiding them through the activities without their physical presence. Facial expressions showing confusion or difficulty were also hard to read and judging the pacing of activities without access to people’s body language was

more difficult online, while being aware of the need to be sensitive to people's attention limits for being online.

To solve this, where ever possible, designers tried to use and adapt platforms that the participant was familiar with. Given the diverse ages (from 18-98 years) and different levels of computing experience of participants, this was not always possible. The challenge was to create an activity that would be interactive, engage most participants, clearly and precisely convey what the designers were asking from participants, while ensuring they felt comfortable doing the activity.

Challenges of Engaging the Senses

Interacting and working with paper, glue, pens, etc., is intuitive for most students, while having to source and learn how to use appropriate and readily available digital tools and platforms in a short time frame is challenging. Due to the lack of physical props, it became important to introduce digital visual and auditory aids into the communication, so that participants had a clearer understanding of what was required. The usefulness, features and adaptability of different tools was an ongoing conversation between students on discussion boards, resulting in a broader range of technologies and media use than otherwise would have happened had we just specified a platform.

The skills needed to guide people through an activity and the variety of digital interaction channels used is important when working remotely. This can be achieved by having both an activity channel (with different visual, tangible and auditory interactions) and a speech channel open at the same time, using different software platforms concurrently.

Challenges of Keeping It Simple

Student designers said that a lack of physical tangibility in the activities meant they had to be more creative in making them. The student designers thought that running workshops online was inspiring, in that it made them think outside the box and come up with simple and creative activities.

Challenges of Allowing Flexible Timing

Being online meant dealing with technical issues before and during the workshops. Students experienced technical difficulties in executing the workshops, due to unreliable and inconsistent home internet quality for both students and participants. Even with extensive pre-testing and preparation, technical difficulties with software and connectivity during the live workshops managed to cause frustration, time delays and personal disconnection for both designers and participants.

These problems were overcome by including some asynchronous activities. They did not require an active internet connection. When activities required participants to communicate through text and image messaging, using Instagram or mobile apps, they did not have these communication issues.

Online Codesign Checklist

Effective online codesign activities should include:

- Tactile activities like simple drag and drop to give the feeling of playing a game and feeling in control and manipulating content
- Parallel activities using audio and visual tasks to keep participants engaged and connected
- Quick, rapid sequencing of activities to keep sessions lively and help bridge the electronic chasm between participants
- Diversity of media like watching snippets of popular movies, listening to music, or drawing to create a fun and lively gamified interaction with participants
- Virtual waiting rooms to allow for large numbers of participants as they are not tied to a single time or place
- Asynchronous activities to suit introverted participants as they have time to reflect, resulting in feeling confident to get involved
- Simple and flexible activities to avoid getting distracted by over complicated physical materials, focusing on the aim of the activity
- Facilitation of conversations so that participants know when to talk and feel comfortable

Implications for Hybrid Codesign

For codesign to be effective it needs to be engaging for both the students and the participants to effectively help generate and consolidate innovative design ideas toward building feasible design outcomes. This usually involves: collaboration and communication with participants; hands-on participative activities that generate useful ideas for the design space; and participants and designers gathering in a shared space.

For online codesign to be effective it needs more emphasis on the following key elements: participant-centred collaboration and teamwork, so that they feel part of the process (despite being remotely located); multi-channel communication modes which engage multiple senses to compensate for narrow online speech communication capability; simple, concise and clear activities requiring minimal instruction to produce specific outcomes; and both synchronous and asynchronous activities to give greater flexibility and circumvent connectivity issues.

The extreme situation in which we found ourselves during the pandemic provided an opportunity to discover new modes of working that gave us different and unique insights. It also facilitated a new level of accessibility and inclusion for participants. Given the benefits and opportunities of online codesign discussed in this paper, we argue that future codesign should embrace a hybrid approach, incorporating the advantages of online codesign into our traditional codesign toolkit.

In a hybrid future where online and on-campus learning is looking more prevalent, it is vital that design education, specifically the teaching of studio-based techniques, such as codesign, be better understood with respect to what works online and what does not. By understanding the responses of both the students and the community participants to online participative activities we can better design the types of tasks that are most effective and engaging for a virtual workshop. We can also see the importance of engaging students in a reflective process during the learning, which has to be primarily self-driven by the students so that they take time to record their experiences and their thinking about what they are learning. This made students more critical and intentional about the activities they created and the relationships they built with their participants.

Conclusion

At the beginning of this research, we asked the question, “how does codesign need to be adapted to be effective in an online environment?”. To answer this, we have reflected on lessons learned from teaching codesign online during the isolation imposed by the COVID-19 pandemic with Masters of Design students. Driven by the physical isolation, under academic guidance, these student designers successfully translated traditional face-to-face codesign methods into online codesign activities, using everyday technologies and existing software platforms. In future, we will combine our lessons learned from online only codesign and incorporate them into our traditional teaching of on-campus codesign, to further explore the benefits and challenges of a hybrid online and face-to-face codesign process.

We showcase an exemplar student case study demonstrating five unique online activities and their outcomes. The project, *Welcoming Community on Campus*, involved local community members co-creating solutions for the local municipality around making the university campus more welcoming. The activities demonstrate working as a team with the participants, engaging multiple senses, simple activities with simple instructions aimed at a relevant solution, and a mix of synchronous and asynchronous activities for flexibility and accessibility.

Using basic inductive coding and thematic analysis on the written student reflections, educator observations and design outcomes from the whole cohort, we have identified those aspects of their experience that contribute new understandings of online codesign. Specifically, what can be gained from working online and where the challenges are. This knowledge can help inform us in a future that encompasses hybrid learning and hybrid codesign for effective design outcomes, participant engagement and increased inclusivity and accessibility.

Online codesign is about borrowing from the past and transforming it for a hybrid future. We offer a checklist of key elements that requires particular emphasis for successful online codesign. The unexpected finding was that online codesign activities need to remain tactile, and have multisensory qualities. We also found that effective online codesign activities should allow participants to engage in their own time and space. They should be multisensory, tactile, parallel, quick, simple, diverse and asynchronous. They should feel fun, playful and lively.

Understanding and knowing about the benefits and challenges of online codesign can be combined with our understanding of what works well in on-campus codesign to create new understandings for a future of hybrid codesign. Hybrid codesign is appropriate to future ways of learning and practising design, where technology supports new ways of doing things in situations where this produces new, innovative and useful results. In summary, hybrid codesign should engage participants in the online activities, while being tactile, parallel, quick, flexible and multisensory, and should feel fun and playful for all involved.

Overall, we argue that online codesign needs to focus on building relationships, engaging the senses, keeping it simple and allowing flexible timing, through the novel use of technologies to support the future of hybrid codesign education.

References

- Bartlett, L. & Vavrus, F. (2017). *Rethinking Case Study Research*. Routledge.
- Bødker, S., & Kyng, M. (2018). Participatory Design that Matters—Facing the Big Issues. *ACM Transactions on Computer-Human Interaction*, 25(1), Article 4.
- Braun, V., & Clarke, V. (2019). Reflecting on Reflexive Analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589-597.
- Christiansson, J., Grönvall, E., & Yndigegn, S. L. (2018, August). Teaching Participatory Design using Live Projects: Critical Reflections and Lessons Learnt. In *Proceedings of PDC '18 – Volume 1*. 15th Participatory Design Conference, Hasselt and Genk, Belgium (11 pages). <https://doi.org/10.1145/3210586.3210597>
- Cozens, P. M. (2011). Urban planning and environmental criminology: Towards a new perspective for safer cities. *Planning Practice & Research*, 26(4), 481–508.
- Crouch, C. & Pearce, J. (2012). *Doing research in Design* (English ed.). London: Berg.
- Daems, K., Moons, I., & De Pelsmacker, P. (2017). Co-creating advertising literacy awareness campaigns for minors. *Young Consumers*, 18(1), 54-69.
- Darke, P., Shanks, G. & Broadbent, M. (1998) Successfully completing case study research: combining rigour, relevance and pragmatism. *Information Systems Journal*, 8(4), 273-290
- Durl, J., Trischler, J., & Dietrich, T. (2017). Co-designing with young consumers – Reflections, challenges and benefits. *Young Consumers*, 18(4). <https://doi.org/10.1108/YC-08-2017-00725>
- Ferguson, R. (2009). *The construction of shared knowledge through asynchronous dialogue*. PhD Thesis. Open University. <https://doi.org/10.21954/ou.ro.00004dc4>
- Freeman, G., Bardzell, J., Bardzell, S., Liu, S-Y., Lu, X., & Cao, D. (2019, May). Smart and Fermented Cities: An Approach to Placemaking in Urban Informatics. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, Glasgow, UK, Paper 44, (1–13). <https://doi.org/10.1145/3290605.3300274>
- Friedrich, P. (2013). *Web-based co-design; Social media tools to enhance user-centred design and innovation processes*. (PhD Thesis). Aalto University School of Science, Espoo 2013. VTT Science 34 185 p. + app. 108 p., <https://www.vttresearch.com/sites/default/files/pdf/science/2013/S34.pdf>
- Harper, D. (2002). Talking about pictures: A case for photo elicitation. *Visual studies*, 17(1), 13–26.
- Fleischmann, K. (2022). A paradigm shift in studio pedagogy during pandemic times: An international perspective on challenges and opportunities teaching design online. *Journal of Design, Business & Society*, 8(2), 247-272.
- Jiménez-Narváez, L., Dalkir, K., & Gardoni, M. (2013 July). Harnessing ICT on innovation projects: Managing remote co-design experiences from 24 Hours of Innovation. In *Proceedings of PICMET '13: Technology Management in the IT-Driven Services (PICMET)*. IEEE, San Jose, CA, USA (695-704).
- Kim, J., Rundle-Thiele, S., Knox, K., Burke, K., & Bogomolov, S. (2020). Consumer perspectives on household food waste reduction campaigns. *Journal of Cleaner Production*, 243(10 January 2020). <https://doi.org/10.1016/j.jclepro.2019.118608>

- Lefever, S., Dal, M., & Matthiasdottir, A. (2007). Online data collection in academic research: advantages and limitations. *British Journal of Educational Technology*, 38(4), 574–582.
- Lenihan, D. & Briggs, L. (2011). Co-Design: Toward a new service vision for Australia? *Public Policy Forum*, January – March 2011. Available at: <https://www.middlegroundengagement.ca/wp-content/uploads/2019/05/2011-co-design-new-service-vision-lenihan-Briggs.pdf> (Accessed: April 10, 2023).
- Lupton, D. (editor) (2020). *Doing fieldwork in a pandemic* (crowd-sourced document). Retrieved March 28, 2020 from <https://docs.google.com/document/d/1cGjGABB2h2qbduTgfqribHmog9B6P0NvMgVuiHZCl8/preview#heading=h.ze8ug1cqk5lo>
- MacKinnon, K. (2012). Context matters: The value of analysing human factors within educational contexts as a way of informing technology-related decisions within design research. *International Journal of Computer-Supported Collaborative Learning* 7, 379–397. <https://doi.org/10.1007/s11412-012-9149-9>
- Mattelmäki, T. (2008). Probing for co-exploring. *CoDesign*, 4(1), 65–78. <https://doi.org/10.1080/15710880701875027>.
- Morley, D. & Jamil, M. G. (Eds.). (2021) *Applied Pedagogies for Higher Education: Real World Learning and Innovation across the Curriculum*. SpringerLink.
- Nakki, P., & Antikainen, M. (2008, October). Online Tools for Co-design: User Involvement through the Innovation Process. In *Proceedings of NordiCHI 2008 Workshops: New Approaches to Requirements Elicitation & How Can HCI Improve Social Media Development?* Norway: Tapir akademisk forlag, Lund, Sweden, (92-97). <https://aaltodoc.aalto.fi/bitstream/handle/123456789/10255/publication1%20.pdf?sequence=3>
- Neuman, W.L. (2003). *Social research methods. Qualitative and quantitative approaches* (5th edition). Boston: Allyn and Bacon
- Paul, C. L. (2008). A modified Delphi approach to a new card sorting methodology. *Journal of Usability studies*, 4(1), 7–30.
- Pederson (2016) War and Peace in co-design. *Codesign* 12(3), 171-184. <https://doi.org/10.1080/15710882.2015.1112813>
- Sanders, E. B. N. & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign: International Journal of CoCreation in Design and the Arts*, 4(1), 5-18.
- Sanders, E. B. N. & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign: International Journal of CoCreation in Design and the Arts*, 10(1), 5-14. <https://doi.org/10.1080/15710882.2014.888183>
- Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. Jossey-Bass.
- Setiawan, A., Dunn, N., & Cruickshank, L. (2018). The Influence of Collective Culture on Co-design Practice in Indonesian Cities: Case Studies from Jakarta, Solo, and Malang. *The International Journal of Architectonic, Spatial, and Environmental Design*, 12(4), 25–35.
- Simonsen, J., Zahoor Malik, A., From, G., Filippson Parslov, M., & Sørensen, L. T. (2020, June). A Checklist for A Successful PD Student Project. In *Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise - Volume 2 (PDC '20)*. Association for Computing Machinery, Manizales, Columbia, (119–123). <https://doi.org/10.1145/3384772.3385132>
- Slattery, P., Saeri, A. K., & Bragge, P. (2020). Research co-design in health: a rapid overview of reviews. *Health Res Policy Sys* 18(17). <https://doi.org/10.1186/s12961-020-0528-9>

- Smith, R. (2004). Rural rogues: A case story on the 'smokies' trade. *International Journal of Entrepreneurial Behavior & Research*, 10(4), 277–294.
<https://doi.org/10.1108/13552550410544231>
- Stam, D., & Boon, B. (2018, August). What You Gain and What It Takes: A Student's Reflection on a Participatory Design Project. In *Proceedings of PDC 2018*. 15th Participatory Design Conference, Hasselt & Genk, Belgium, (5 pages).
<https://doi.org/10.1145/3210604.3210626>
- Stappers, P. J., Hekkert, P., & Keyson, D. (2007, September). Design for Interaction: Consolidating the User-Centred Focus in Industrial Design Engineering. In *Proceedings of E&PDE 2007*. 9th International Conference on Engineering and Product Design Education. Newcastle Upon Tyne, UK.
- Steen, M. (2013). Co-Design as a process of joint inquiry and Imagination. *Design Issues*, 29(2), 16–28. https://doi.org/10.1162/desi_a_00207
- Steen, M., Manschot, M., & De Koning, N. (2011). Benefits of co-design in service design projects. *International Journal of Design*, 5(2).
- Swezey, C. & Vertesi, J. (2019, November). Working Apart, Together: The Challenges of Co-Work. In *Proceedings CSCW '19*. ACM, Article 204, Austin, USA (22 pages).
<https://doi.org/10.1145/3359306>
- Taffe, S. (2017). Generate don't evaluate: how can co-design benefit communication designers? *CoDesign*, 14(4), 345-365.
- Voorend, R., Derboven, J., & Slegers, K. (2019, April). Distributed User-Generated Card Based Co-Design: A Case-Study. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems (CHI EA '19)*. ACM, Paper LBW0211, Glasgow, UK (1–6).
<https://doi.org/10.1145/3290607.3312815>
- Walsh, G., Druin, A., Guha, M. L., Bonsignore, E., Foss, E., Yip, J., Golub, E., Clegg, T., Brow, Q., Brewer, R., Joshi, A., & Brown, R. (2012, June). DisCo: A co-design online tool for asynchronous distributed child and adult design partners. In *Proceedings of IDC '12*. 11th International Conference on Interaction Design and Children. ACM, Bremen, Germany.
- Yin, R. (2003). *Case study research: Design and methods*. 3rd Ed. Newbury Park, CA: Sage Publications.
- Yin, R. (2011). *The phases of qualitative research from start to finish*. New York: The Guilford Press.
- Zonabend, F. (1992). The monograph in European ethnology. *Current Sociology*, 40(1), 49-60.