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Ideas and challenges of the online classes under the COVID-19 pandemic



Asia & ASEAN Center for Educational Research
Faculty of Education, Chiba University

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CHIBA UNIVERSITY

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Foreword

Our lives have completely changed under the COVID-19 Pandemic which started in 2019. There have also been many changes in in university education. Admission to university campuses has been restricted under these circumstances. Therefore, University classes were forced to change from face-to-face style to online classes. This rapid change in class styles has caused many challenges over the past two years.

Those circumstances are likely to continue for several years. Therefore, we need to set up a new education style to adapt to the new era, the so-called "the post corona world." A record of those changes and difficulties will be helpful to look back on and evaluate in the future.

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Enabling Online Collaboration in Problem-Based Learning During COVID-19: Reflection from Human-Computer Interaction Course

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Abstract

COVID-19 pandemics caused substantial challenges in online learning, one of them is to maintain the collaboration remotely in the class. Human-Computer Interaction Course at IPB University is designed as problem-based learning, where groups of students solve a real-world problem through their design. In face-to-face format, the students will work closely as a group, having a lot of brainstorming sessions which utilize standard tools like pen, paper, and sticky notes, which substantially contribute to the learning outcome achievement. In this chapter, we aim to provide our journey to transform the class from face-to-face to online learning, while keeping collaboration in mind. We also provide the ways we eventually conducted the class, the student feedback, the challenge we have, and the best practice we learn in the process. We hope this chapter can spark a discussion and further nurture the way online collaboration in class can happen effectively to engage the students in their learning journey.

Main topics

This chapter will be organized into 5 sections. In the first sections, we provide the introduction of the Human-Computer Interaction (HCI) course at IPB University and the learning process before the COVID-19 pandemic. In the second section, we will talk about the process we have when transforming from face-to-face to online learning, and how the community can help us as the lecturer in this process. In the third section, we provide the details of the online learning process in our course to enable collaboration, and in the fourth section we provide the reflections from the attempt. Lastly, we close with the last chapter about the future works we can do to improve online collaboration which is essential in problem-based learning.

Section 1. Introduction to Human-Computer Interaction (HCI) Course for Undergraduate Student and The Learning Process Before the COVID-19

1.1 Course Description

The Human-Computer Interaction (class) is a mandatory class in the Computer Science Undergraduate Program and also offered as a supporting course and information system minor course for students in a non-CS major without a prerequisite. The learning outcome

of the course is for the students to be able (competent/credible) to analyze, design, develop, evaluate / test, and communicate a form of interaction between humans and computers in limited scope. The course was designed as problem-based learning with 2 credits for lecture and 1 credit for practicum. The lecture is designed to develop a core understanding of the HCI concept and design process through case studies and discussion, while the practicum is designed to give scaffolding through facilitation, mentorship, and guidance to apply their understanding to the problem. The course is taught by three lecturers and assisted by several teaching assistants. The class size is varied between 100 to 150 students, around a quarter of them are from non-computer science programs.

2. Problem-Based Learning Through Reimagine Experience Challenge

The course is delivered using problem-based learning approaches (Wood 2003; Koutsabasis and Vosinakis 2012). Group of 3-4 students working together to create new interaction to solve real-world problems in the given problem area. General design-brief is given to the student in the first week. Students then work for 12 weeks to create the solution using a well-established interaction design framework. Finally, they present their solution at week 14. We adopt the Double Diamond design methodology (designcouncil.org.uk) as a guideline to help students solve the problem in the problem-based learning, which consists of the following phases: discover-design-develop-deliver. The problem-based learning approach requires a lot of collaboration between team members and between team and their targeted user. The typical situation in our classes involves a lot of group discussion, brainstorming, in-campus user research, sketching, and a lot of sticky notes.

3. A Community of Practice to Support Learning and Nurturing Professionalism

We also provide the students with access to engage in the HCI and user experience (UX) community of practices on our campus, which is the IPB University ACM SIGCHI Student Chapter. The students can join the community to engage with fellow students, alumni, and professional networks in related fields (user experience, product design, interaction design) who graduated from IPB University. We aim for better exposure to the HCI and UX practitioner community for the students, which is in line with one of the principles of the Computing Curricula 2020 (Impagliazzo and Pears 2018), and allow the sharing of the best practices in the industry to the students. Their activities include workshops, hands-on lab, seminar, talks, and competition.



Fig. 1. The activities of the IPB University ACM SIGCHI Chapter as a community of practice between students and professionals.

Section 2. Transformation Process from Face-to-Face to Online Learning

When COVID-19 spreads in Indonesia, one of the Government policies is to bring the university students back to their respective home and have the class conducted online. These abrupt changes force us to adjust the learning process in the course to still achieve the learning outcome, although with a lot of technical challenges present. There are several problems in our mind back then that we considered when crafting online learning, which includes (a) how to transform collaborative activities (which relies on a lot of physical objects and tools) to an online format? (b) How to make the collaboration engaging? (c) How to manage the quality of students' work and learning outcome achievement?

We also consider several things that can influence online learning. For example, most of the students might not have any previous experience in doing complex online collaboration beforehand. They also might not have the equipment or internet access to conduct the collaboration. And also, although we have conducted several courses online before, this is the first time we teach the HCI course in an online format. To help us design a good online course experience, we connect with the HCI communities.

HCI education is always a major focus of both the academic and professional community. The effort to improve the quality of education is led by the Association for Computing Machinery, Special Interest Group on Computer-Human Interaction (ACM SIGCHI). As the pandemic hit not only Indonesia but also the majority of the countries, the same problem arose in the worldwide community. This caused a lot of discussion in the SIGCHI forum, and eventually some initiative to discuss and share the best practices of teaching HCI online was initiated. German ACM SIGCHI Chapter created an online panel discussion, titled 'how to make remote HCI teaching useful, engaging and exciting?¹'. EduCHI Living Curriculum also creates an 'EduCHI: Teaching HCI Online' virtual event that enables the community to share various pedagogical practices and tools that can support HCI education in a pandemic situation. We also reach our alumni to discuss our draft of the teaching plan to get feedback from them related to the best practice of online

¹ amp.ubicomp.net/hciedu

collaboration in an industry that can be applied in this condition (Fig. 2). As the online collaboration is nurturing in Indonesia, we saw a potential to implement similar approach in class to provide stud

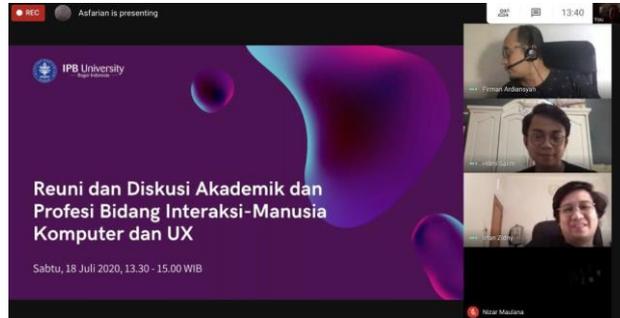


Fig. 2. Online discussion with alumni to gain feedback related to the online learning.

The presence of the community of practice in HCI (St-Cyr et al. 2018) is really helpful to ensure rapid dissemination of best practices between practitioners. From the sharing session from the community, we got a lot of input regarding the pedagogical best practices and tools for HCI online education. Based on these inputs, we finalise the online lesson plan for the HCI class.

Section 3. Online Collaboration in HCI Course

3.1 Platform and Tools Preparation

We utilise the facility provided by IPB University, combined with other products to support online collaboration. The teaching team also research and compare the collaboration tools which has the potential to be used in the course. We used various tools, commonly used in industry, which provide free access to their services for students or educational purposes (Tabel 1). Most of the tools related to HCI education are inspired by the community that explained in the previous section.

Table 1. Tools used in course and their role in learning

Tools	Role in Learning
Moodle-powered Learning Management System	Serve as primary resource page for students: the main portal to access every course materials and activities
Google Sites	Alternative for wiki-style collaboration platform in course activity
Zoom and Google Meet	Enabling a synchronous session and discussion, and provides video recording; Also used as remote qualitative user research tools
WhatsApp and LINE	Serve as communication channel to discuss or

	information sharing in textual format
Mural	Supporting online brainstorming and discussion; Serves as a virtual whiteboard, table, or paper; Good alternative to sticky notes
Figma	Supporting online collaboration in creating a high-fidelity prototype
Maze Design	Enabling remote quantitative usability testing platform

Note: Most licenses are freely available for students or education purposes with limited functionality. Each group Mural and Figma workspace is accessible by both lecturers and teaching assistants.

In summary, during the pandemic, lectures and practicum are conducted online 14 times each. Learning methods can be synchronous or asynchronous under those listed in the online learning plan document. These activities can include online lectures synchronously through video conferencing applications, independent activities in the form of literature review, program code collection, quiz work, storing materials in video or audio, etc., following online learning activities. Synchronous sessions through video conferencing are held in the 2nd, 6th, 10th, 12th, and 14th weeks where discussions and questions and answers on the material take place. Students who cannot participate in activities due to limited access are expected to report to the course coordinator.

We prepare a landing page (Fig. 3) to introduce the 5 problem design briefs: Reimagine Bogor Botanical Garden, Reimagine IPB University, Reimagine GLAM: Galleries, Libraries, Archives, and Museums, Reimagine Personal Health and Reimagine Design in Pandemic. Lecturer selected the topics based on the previous/current work of the lecturers. We provide illustrations, possible ideas, and previous works that have been done in that problem area, either created by previous students, IPB lecturer, or products. We introduce each design brief to the students in the first week of the practicum session, and the student group can choose which problem they want to focus on.

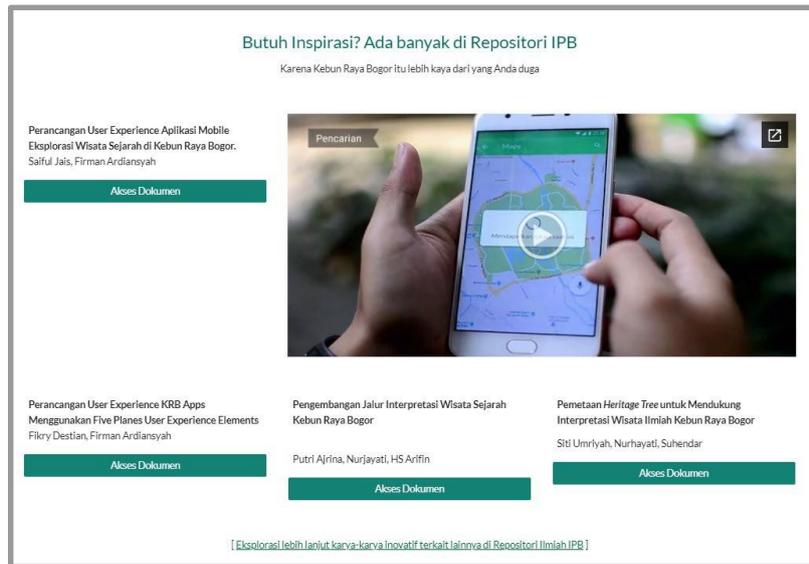


Fig. 3. Example landing page of the reimagine experience challenge which depicted previous works in IPB University in relation to the challenge.

3.2 Assessment and Acknowledgement of Prior Knowledge/Experience in HCI

The assessment of HCI courses originally consists of three components: Lesson Activity (Quiz, Exam), Project (Prototype, Report, and Presentation), Peer Assessment. The final grade is the cumulative value of the following components, with a proportion presented in Table 2.

Table 2. Proportion of each component in HCI class

Components	Proportion
Lesson activities: Midterm, Final term, quizzes etc.	60%
Practicum activities: Project	30%
Involvement in Online Lectures: Reflection Form, Discussion	10%

To help students cope with their own circumstances caused by pandemic (e.g. economic problem, connection and device issues), we also implement a prior-knowledge recognition (Cooper and Harris 2013) in the course. This also inline with the Government policy of Merdeka Belajar Kampus Merdeka (Freedom to Learn, Independent Campus) which recognizes students' activity outside the conventional course system as a part of their learning credits. This policy is a flagship program from the Indonesia Government to transform higher education system in Indonesia

In this HCI course, we implement the mini version of it, called Merdeka Learning Points, which allows student involvement outside of the course activities (but are related to HCI

courses) to be recognized in the learning process. Students can propose their completed activities through the form available at the LMS, verified by the course team. The maximum total percentage that can be recognized is 25% as a substitute for lesson activity. The activities and their respective points that can be given to the students are presented in Table. 3.

Table 3. Type of activities that can be recognize in prior-knowledge recognition system

Activities	Points*
Achievement (Winner 1 - 3) International Level in HCI / UX Related Fields	15
Achievement (Winner 1 - 3) national Level in HCI / UX Related Fields	10
Participation in International Level Competitions in HCI / UX Related Fields	8
Participation in National Level Competitions in HCI / UX Related Fields	5
Completing an online course	10
Participation in Meetups with speakers from abroad	2
Participation in Meetups with speakers from within the country.	1
Digital Applications or Products Participated in the Incubation Program / Business Plan Training	10
Membership in Profession / Community Associations in the field of HCI / UX	5

*Weights per activity

3.3 Brainstorming via Mural

Mural allows groups to have a live brainstorming session. Students use mural templates created by lecturer as guidelines for them to conduct secondary research where they are asked to summarize and present found insights by reviewing several works of literature or similar applications related to the chosen topic. Students were also asked to prioritize volume over value to encourage them to find as many insights as possible while researching. From the secondary research, they found what kind of opportunities can be applied to their idea that hasn't been found or implemented in any existing products. The research process was also supported by discussion sessions using google meet where groups discuss selecting which of the found opportunities needs to be prioritized by considering the effort and user value to it.

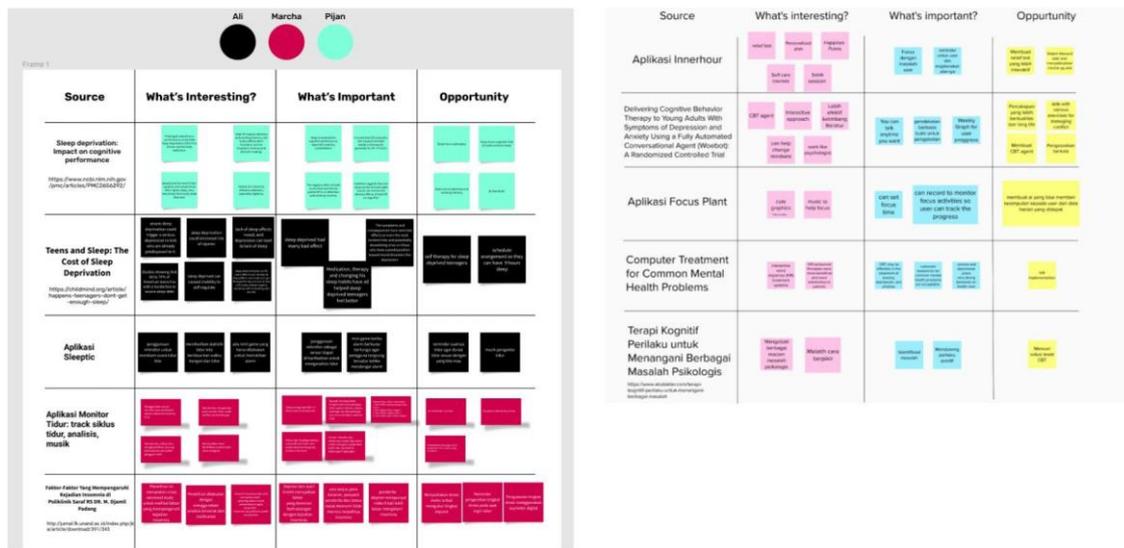


Fig. 4. Example of utilisation of Mural as a student collaboration platform for brainstorming and discussion..

3.4. Collaborative Prototyping using Figma

Figma has features such as real-time collaboration and prototyping, it allows group members to make their project's prototype and see other's work in real-time. Figma also has a community feature which is a public space to share live design files. The practicum facilitator uses this feature to create a template file with pages and examples that acts as guidelines for the project's workflow where groups can then duplicate. After having a set list of selected opportunities from previous brainstorm sessions using Mural, groups start by sketching out their interface screens on paper. These are often called paper wireframes that act as the skeleton of the interface. This is also where groups first found the tangibility of their product and start to nominate which of the insights needs to be in the scope of their project. Group then started to use Figma to make low wireframes, it usually included the basic content and simple user interface elements with white and black schemes. Then it progresses to medium-fidelity wireframes where it contains more realistic user interface components and added aesthetic details with simple colour schemes such as shades of grey. The Practicum facilitator was also monitoring their project progress through the group's Figma and then gave aid or insight if needed. All of these processes were synchronously conducted with group's discussion using google meet or other video conferencing tool.

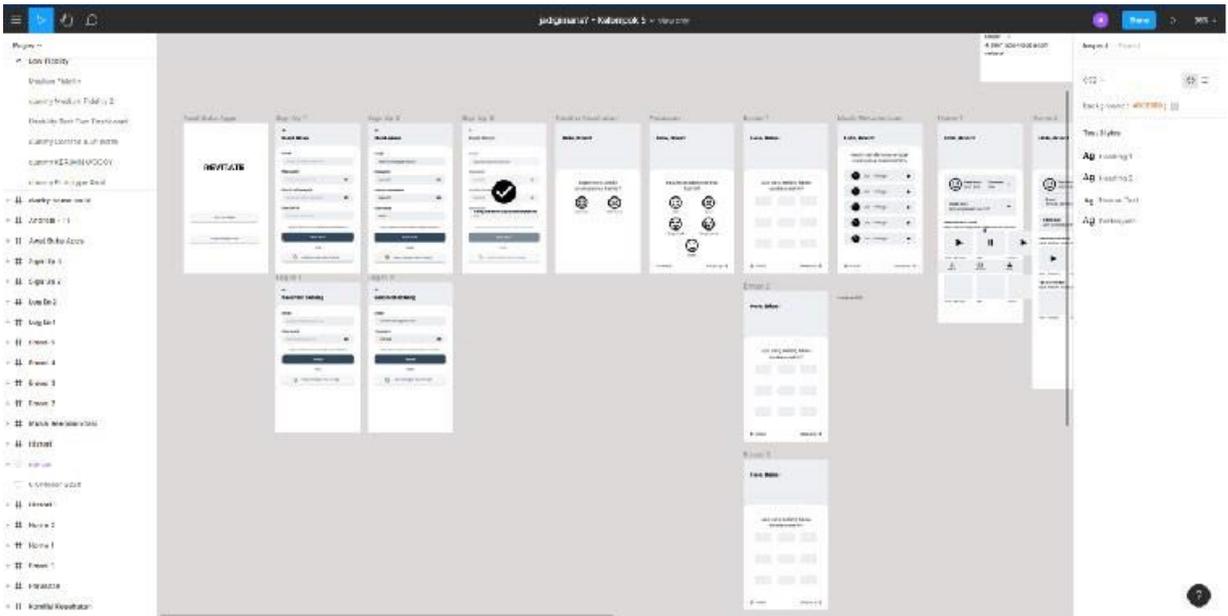


Fig. 5. Example of utilisation of Figma as a student collaboration platform to prototyping their design.

3.5. Peer Feedback through Social Media

Peer feedback (Liu and Carless 2006) is a part of the HCI course. In online format, the peer feedback is enabled by encouraging students to share their works online and have them giving feedback to their peers. In Fig. 6., one group of students share their concept through video, and other students give them feedback in the comments. The group is then compiles the feedback and use it as an input to revise their works.

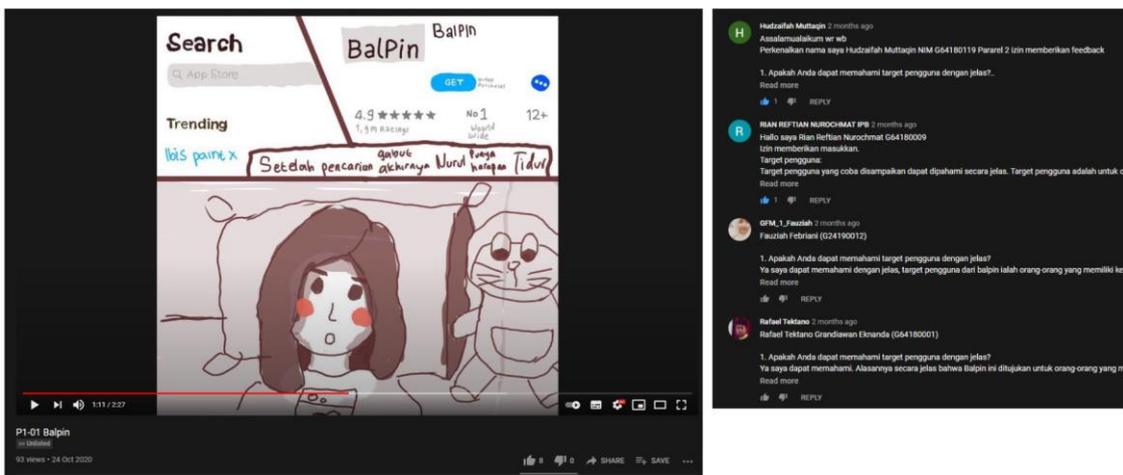


Fig. 6. Example of peer feedback through YouTube video by the students..

3.6. Selected Students Works

In this subsection, we present two of the student works. These two works are then submitted as a poster presentation at the Asian CHI Symposium 2021 and already presented and currently under publication process in the ACM Digital Library:

Design Concept: Get Comfortable Sleep Using Ambient Experience with Smart Pillow. This study aims to create a smart pillow design concept to help sleep-deprived sufferers get a better sleep experience. From the design process, we create a smart pillow capable of creating an ambient experience to help sleep-deprived sufferers through four interactions: lullaby music player, alarm, temperature control, and sleep data recapitulation (Ammarullah *et al.* 2021).

CURHAT: Telling Your Story to a Multimodal Conversation Bot to Alleviate the Stress Caused by Pandemic Fatigue. Their work aims to generate a design concept of a multimodal conversation bot to help people who have difficulty confiding in others or their family, especially during the Covid-19 pandemic. They generate a multimodal conversation bot that will listen and respond to user stories to alleviate the stress caused by pandemic (pandemic fatigue). They present three main interaction modes of conversation: chat-based, voice-based, and holographic avatar (Putra *et al.* 2021).

Section 4. Reflections

At the end of the course, we capture the feedback from students, lecturers, and teaching assistants, and reflect on it to evaluate the online course design. Students feedback was gathered using an online questionnaire. The Quantitative data indicate mid-high overall satisfaction for online learning (Fig. 7.). However, glance to the lower satisfaction indicates some people still have difficulties by doing online collaboration; Either the difficulties with the internet access or not adjusted yet to the online format. More in-depth analysis required.

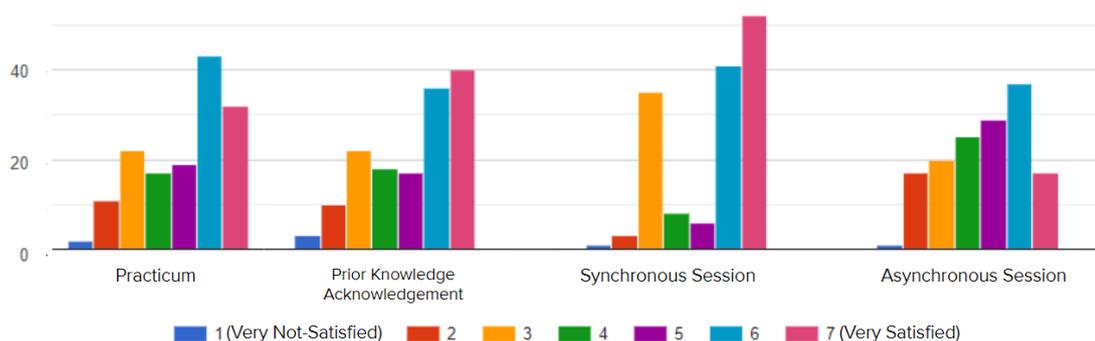


Fig. 7. The summary of student feedback.

From the lecturers and teaching assistants perspective, which we gather in the post-course meeting, we conclude that online collaboration in online learning demands good engagement between students and facilitators. The limited numbers of facilitators (9 people) are not enough to engage with the student body of 159 students. As a lot of courses are moving online, without enough time to adjust, the transformation process puts a heavy

burden on both lecturer and facilitators who also have other academic activities. The online collaboration also put high demands on adequate infrastructure, devices, and access on the students' side. This raise questions about how to maintain inclusivity in learning? The utilisation of unfamiliar tools also demands scaffolding and guidance for the first-timer students. This is true for both computer science and non-computer science students who need more guidance or training to use the platform well. We add some live tutorial sessions eventually, but the students need time to adjust to the new interaction in learning.

We received a lot of submissions for prior knowledge recognition. Some students said that this helps them to be more active in gaining experience outside campus; It also has potential to serve as alternative activities for students with the lack of access to heavily synchronous collaboration sessions which demand stable internet connection. In total, we accept 187 submissions for prior knowledge recognition. This indicates a strong interest of students for this kind of activity in learning. Further feedback and data in relation to this activity will be published in other works.

Table 4. Accepted submission to the prior knowledge recognition

Activity	Submission
Achievement or participation in HCI/UX-related competition	19
Related online course completion	137
Conference/Meetup/Webinar/Talks	22
Application or Product Released or Submitted to Entrepreneurship Training	4
Membership activity in HCI/UX professional association	5
Total submitted	187

Section 5. Future Works

Based on reflections and feedback, in the future, we will work on several aspects to improve the online learning experience. Firstly, the enrichment materials about working with specific user groups (marginalised, disabled, elderly, farmers, etc.). Some student groups have a strong interest in this user group (Asfarian et al. 2020), but the current syllabus and course resources haven't included in-depth case studies on this area. Secondly, providing a richer method bank and case studies repository. Provide a collection of method and case studies application that can give the students insight into the why and how of the design method. This will allow students to choose more variation of method and technique. This also can support them in mastering the course material. Thirdly, implementing better analytics and research to measure student performance and

engagement. A better way to capture students' interaction is needed, especially on the off-LMS platform. The data measured can be very useful feedback for us to see the student condition and impact of the learning methods on students' engagement and performance. Fourthly, an alternative method of learning for students with limited connectivity. We are still gathering input regarding how to conduct the problem-based learning in limited connectivity conditions. And lastly, as the accepted submission to the prior-knowledge recognition shows huge interest from students, we will further research this to explore this treatment and their impact to learning outcome fulfillment.

Conclusion

In this chapter, we have presented our journey to transform HCI courses from face-to-face to online format. There are several key takeaways that can be concluded from this journey, that we hope can be applicable for other courses. Connecting with the academic (and professional) community is beneficial to help us design a better course. The community of practices really help us, and other HCI lecturers, by disseminating best practices and experience from people who have it to the people who are just starting their journey. If such a community does not exist yet in your course subject, it's probably going to be a good idea to establish one. Our experience shows that online collaboration is feasible with the currently accessible tools. However, giving a student a resource and scaffolding to learn and adjust with the tools is necessary. The experience of having online collaboration also introduce students to remote working culture in Indonesia technology company industry and can serve as real experience for them in campus. The reflections of this transformation journey also open up new opportunities that we will explore in the future research.

Acknowledgments

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