Workshops as a Tool for Engaging Students with User-Centered Design in Software Engineering Courses

Alena Suvorova
HSE University
St.Petersburg, Russia
asuvorova@hse.ru

Ilya Musabirov
University of Toronto
Toronto, Canada
imusabirov@cs.toronto.edu

Denis Bulygin
Delft University of Technology
Delft, Netherlands
bulygindi@gmail.com

Rustem Faidrakhmanov
HSE University
St.Petersburg, Russia
rvfaydrakhmanov@edu.hse.ru

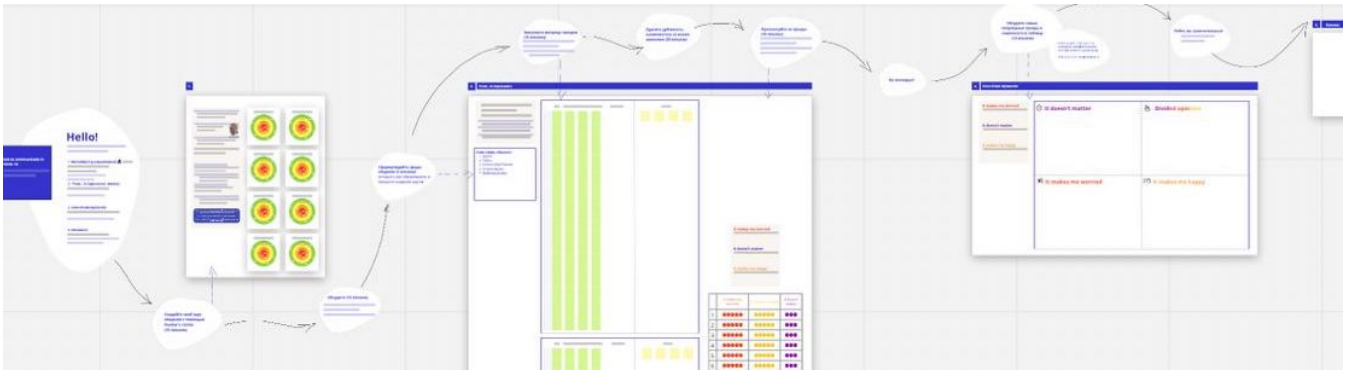

Figure 1: Part of Miro board for workshop

ABSTRACT

Introducing students to different perspectives and roles in the development process allows them to engage in the work of cross-disciplinary diverse teams and even can enable them to change roles in designer-developer interactions. However, full co-alignment of courses requires additional resources and significant efforts from the program developers and instructors, and sometimes it is not possible due to time or technical constraints. This paper describes an attempt at partial co-alignment of software engineering (SE) and user-centred design (UCD) courses through workshop-based activities. We aimed to engage students in workshop participation and organization, which was helpful in two ways. Firstly, it introduced students to a valuable but often underused user research method. Secondly, it also helped enrich software requirements in a further SE course with user needs and perspectives, and helped students to follow the transition from a user study to a software engineering project.

EduCHI'22, April 30-May 1 2022, New Orleans, LA, USA

ACM ISBN 978-x-xxxx-xxxx-x/YY/MM.

CCS CONCEPTS

• **Human-centered computing** → *Interaction design*; • **Social and professional topics** → *Computing education programs*; *Information systems education.*

KEYWORDS

user-centered design, information systems, workshop, curriculum

ACM Reference Format:
Alena Suvorova, Ilya Musabirov, Denis Bulygin, and Rustem Faidrakhmanov. 2022. Workshops as a Tool for Engaging Students with User-Centered Design in Software Engineering Courses. In *EduCHI'22: 4th Annual Symposium on HCI Education, April 30-May 1 2022, New Orleans, LA, USA.* ACM, New York, NY, USA, 5 pages.

1 INTRODUCTION

In successful development teams, it is crucial for the team members to understand each other's contexts and backgrounds [2]. While this understanding can emerge with experience, there are potential benefits of aiming at achieving that earlier within the framework of university education. Prominent venues for that are Master's programs in Information Systems and Human-Computer Interaction with specialized yet multidisciplinary foci. Such programs are often aimed both at students with a computer science background who are interested in acquiring a deeper understanding of user-centred design (UCD) principles, and social and behavioural science students who have or aim to achieve some expertise in information

systems design or analytics [7]. However, this is also true if we look at more traditional single-focus programs in Software Engineering (SE) and HCI. In both cases, students' preferences are often polarized towards different ends of the designer-developer scale. This polarization can lead to a lack of understanding of each other's needs, priorities, contexts, and languages [5, 6], hindering teamwork. Thus, it is essential to form a holistic picture of the process among students, look at the task from different angles, and develop interaction skills [11], overcoming compartmentalization.

Unfortunately, these skillsets are usually taught in different disjoint courses, limiting cross-skillset link formation. On the one hand, in SE courses, students typically work on projects on predefined topics and sets of features. Instructors in these assignments rarely ask students to go beyond bare technical implementation and dedicate some time and effort to thinking about user experience. On the other hand, in UCD courses, the generation and analysis of ideas rarely make it to the implementation stage [10]. Thus, students are only formally required to evaluate the feasibility of their design ideas, how easy it is to implement, and what the limitations are when implementing a product [4].

One possible way to overcome compartmentalization is the synchronization of courses with each other [8], when a project within one discipline is based on the results obtained within another discipline, for example, as suggested in [7]. This paper discusses another solution, introducing additional learning activities as mediators between the courses aimed at different skillsets.

Specifically, we organized and conducted an idea-generation session on a specific topic as a UCD workshop. The purpose of the workshop was twofold. Firstly, it aimed to enable students to generate richer ideas for implementation in the further SE course. Secondly, by demonstration and follow-up discussion, students learned why and how to organize such workshops in their practice.

2 WORKSHOP DESCRIPTION

We present our experience of workshop organization as a cross-discipline activity at the Master's Program in Information Systems and Human-Computer Interaction. Students generate ideas to implement in the Software Engineering course, learn about workshops as a user research method, and understand the limitations and opportunities of design studies [7].

2.1 Planning Initial Workshop

We chose challenges with communication during COVID-19 as a topic for the workshop, focusing on the following questions: How did the pandemic affect people's communication? How did our social interactions change? How do people use various digital technologies to mitigate emerging communication challenges and keep in touch? The workshop format seemed appropriate for such a task. It allows the participants to share their experiences, reflect, analyze and discuss the role of social media, trends in Information and Communications Technology and emerging social practices.

The organization of the workshop followed several steps:

- Choosing an online platform for the workshop
- Selecting appropriate activities
- Modifying activities for online use [9]
- Timeline and scenario development
- Instruction session with moderators
- Running the workshop in five parallel groups
- Group and joint retrospectives

We selected several methods that seemed to be the most appropriate for our format during the planning phase. Since the participants were the students of the same Master's program, the only ice-breaking activity was also aimed to introduce participants to theories and concepts related to the structural organization of their communication networks [1], nudging them to look at their personal networks in terms of relationship strength and investment in the relationship. Using this perspective, the participants recalled their relationships (close friends, associates, relatives, etc.). The key idea-generation activities included "From...To Exploration" [3] to identify main changes in communication and further classification into Hero-Villain-Bystander [3].

Adapting these model activities to our goals, we planned the workshop as follows:

- Structuring participants' personal networks was a "warm-up" activity during which the participants reflected on and described their social circles so they would be able to analyze how these circles changed over time and the reasons for the changes.
- During the "From...To Exploration" activity, the participants filled in a form with fields "from" (how was it?), "to" (how is it now?), "trends" (what have you noticed?) for each social circle ("scope"). All participants tried to recall specific cases of communication that highlighted the changes caused by the pandemic.
- Inspired by the Hero-Villain-Bystander framework, we developed another form for participants to fill. The fields included: "It makes me worried," "It makes me happy," "It doesn't matter," and "Polarized opinions ."The participants expressed their opinion on each of the described cases suggesting putting it in one of 3 categories: "It makes me worried," "It makes me happy," and "It doesn't matter ." When participants could not reach a consensus on a case, the case would be put in the "polarized opinions" category. An example of the table with votes is presented in Fig. 2, and the summary table is shown as Fig. 3.

2.2 Procedure and Results

The workshop was attended by 1st and 2nd year Master's students, forming five groups of eight people and following the same plan in parallel. The students filled out the informed consent form to allow further use of the results in research. The moderators and participants communicated via Zoom video call, and the activity took place on the Miro platform (Fig. 1)[1].

The detailed structure of the workshop is presented in the Table 1.

As a result, we gathered various examples of social interactions that changed during the pandemic according to the participants. Some outlined communication problems emphasized during the workshop are presented below:

[1]The Miro board template is available at https://miro.com/app/board/uXjVO5jUk0A=/?share_link_id=423465769319

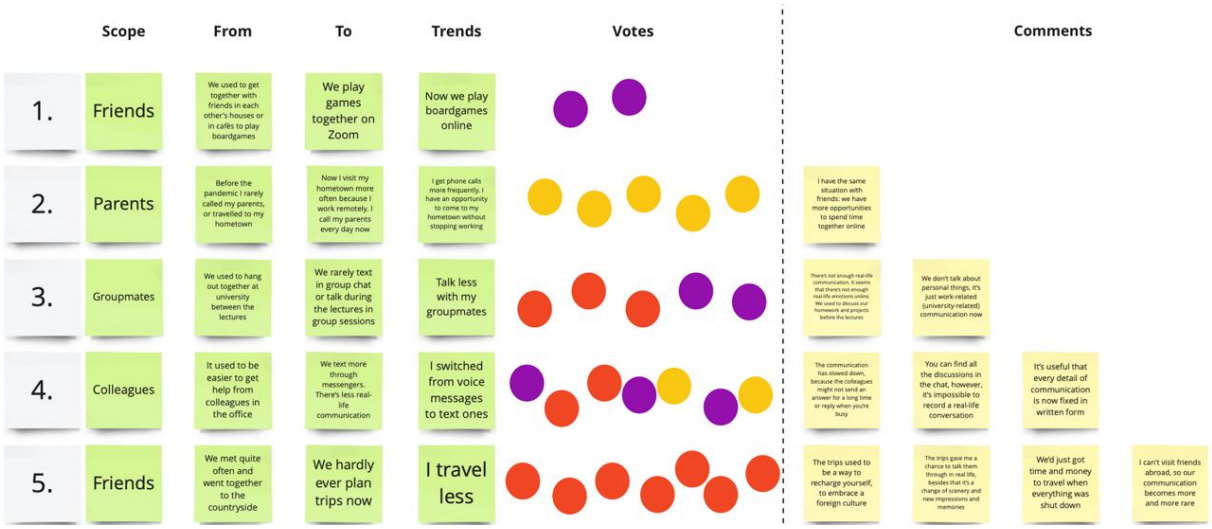

Figure 2: Example of trends generation and voting

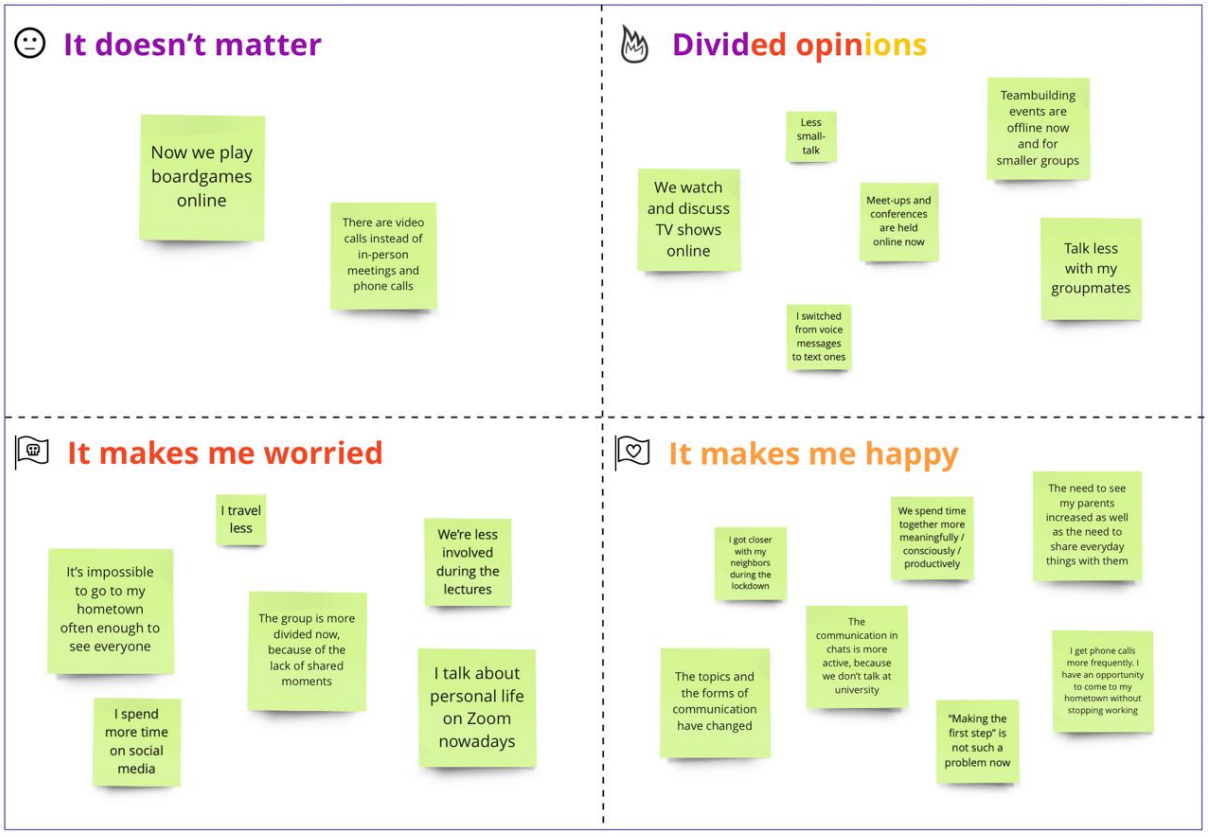

Figure 3: Example of classified trends

- "It makes me worried"
  - I am less involved in communication, perceive less information, etc. via video calls
  - The team is more divided now because there are no teambuilding activities at the moment
  - I spend too much time on social media
  - It is harder to network

(5 min)	Introduction
(15 min)	Each person fills in their social circles
(15 min)	General discussion of changes in social circles
(5 min)	Brainstorming additional examples of social interactions
(15 min)	Describing changes in communication
(10 min)	Break
(20 min)	Extra time to look at each other's cases, discuss and merge the repeated examples.
(15 min)	Individual voting, explaining why it makes you feel this way
(10 min)	Summarizing the results of the vote
(10 min)	Group discussion of the results
	General discussion

Table 1: Workshop timing

  - I have a feeling that the community that existed before the pandemic is gradually disappearing
  - Hobbies that require offline presence are losing popularity
- "It makes me happy"
  - I get phone calls more frequently because it is easier than meeting in person. I am talking to some of my friends more often now
  - I got closer with my neighbours during the lockdown
  - I feel the need to meet the closest ones more often
  - The topics and the forms of communication have changed
  - Online education is more affordable now
- "Polarized opinions"
  - I started chatting online more
  - Team building has become less widespread
  - I began watching films / series together with friends online
  - The communication with colleagues is mostly about work-related questions now, not about personal things
  - I am thinking about my old friends and acquaintances

2.3 Use as an Idea-Generation Activity

The ideas generated during initial workshops were summarized and became the basis for project topics in the Software Engineering II class. The SE project included prototyping a cloud-based chat-bot system, and the final project was about board games since moving board games online was one of the ideas discussed during workshops. In both cases, students were free to refer to the original workshop materials to ground their work in elicited ideas.

2.4 Students' Workshops

To show the students how the workshop works from the inside, they were provided with an analysis of how it was planned and carried out and guidelines of materials we used. Then they were given the assignment to organize a workshop themselves in groups of 5–6 people. They were free to focus on some of the ideas generated during the initial workshop, think over how their workshop goals would be different, and define its goals, objectives, expected results, and the plan. They were required to reflect on the sample they need and find a way to engage 6–8 people to take part, prepare all the necessary tools (Miro / something similar / offline) for the workshop, write a script for a moderator, conduct the workshop, reflect on its results, and draw conclusions.

As a result, students prepared, conducted and analyzed six workshops.

2.5 Evaluation

A year after the workshop, before the next round with new students, we conducted an anonymous survey which invited the participants to reflect on their experience with the workshop. The questionnaire consisted of six open-ended questions about students' impressions of workshop participation and organization and four multiple answer questions about their use of materials and general thoughts about the workshop as a method. Of the 20 students in the course group, we received 13 responses. Participants' answers are summarized below.

- 9 participants mentioned that they "understand how to plan and conduct a workshop, I can do it if needed."
- 7 participants mentioned that they "know where to find examples of activities that a workshop can consist of."
- participants knew the qualities and features of the workshop as a method. For example, participant 4 mentioned that workshops can help "develop and generate new ideas / directions, see how the opinions of the participants will change during the dispute / discussion, how they will refute / complement each other"; participant 13 stated that "there is a collaboration during workshop that is not present during a interview, and much more ideas are born that can be immediately challenged, while during an interview there is no such possibility".

Participants described how challenging it was to organize a workshop and recruit people. Several participants mentioned that it was challenging to plan the timing "because, in fact, everything turned out to be completely different from what we expected, and many activities had to be changed on the go ."Another challenging part was recruiting and managing the participants: "being a moderator was stressful," and "getting people involved was very difficult."

Unfortunately, only 3 out of 13 participants said that "the ideas from the first workshop helped shape the topic of our own workshop ." One of the students even recommended that the instructors should "suggest some topics if the team has no ideas."

On the other hand, it should be noted that awareness of limitations and possibilities of workshops led to the fact that students more often considered workshops as a method for user research

in their Master's thesis projects compared with previous cohorts where workshops were only discussed as a research method (4 out of 13 as compared to none in previous cohorts).

3 DISCUSSION AND REDESIGN IDEAS

We introduce a partial co-alignment of Software Engineering and UCD courses via workshops as a method to generate ideas for SE projects. This year, the instructor selected the topic, but next year we plan to make the integration even stronger and provide more flexible topics based on students' workshops.

The first round of workshops revealed several limitations, including issues with idea development, recruitment and moderation. The analysis of feedback led to the redesign of the post-workshop activity. Next year, we will provide students with additional materials about the moderation process and possible ice-breaking activities.

While it presents various challenges, we consider this attempt to align the disciplines to be important. Most of these problems can be fixed in the next rounds, and we believe it is essential to continue working on the co-alignment to introduce students to different perspectives when working on the same project. Moreover, an in-depth multi-step introduction to the method makes workshops an active part of the students' toolbox.

At this stage, we implemented our idea in the framework of an interdisciplinary program where students learn both User-Centered Design and Software Engineering Elements. However, we believe that this activity can also be helpful as an entry point to introduce students of SE programs to UCD principles and perspectives without imposing heavy curriculum, timetable and coordination constraints required by co-aligning separate SE and UCD courses.

REFERENCES

[1] R. I. M. Dunbar. 2016. Do online social media cut through the constraints that limit the size of offline social networks? *Royal Society Open Science* 3, 1 (Jan. 2016), 150292. https://doi.org/10.1098/rsos.150292

[2] Sean Kross and Philip Guo. 2022. Five Pedagogical Principles of a User-Centered Design Course that Prepares Computing Undergraduates for Industry Jobs. In *Proceedings of the 53rd ACM Technical Symposium on Computer Science Education*. ACM, Providence RI USA, 168–174. https://doi.org/10.1145/3478431.3499341

[3] Vijay Kumar. 2013. *101 Design Methods: A Structured Approach for Driving Innovation in Your Organization*. Wiley, Hoboken, N.J.

[4] Carine Lallemand. 2021. Creative Pedagogical Activities for User Evaluation Methods Courses. In *EduCHI 2021: 3rd Annual Symposium on HCI Education*.

[5] Craig M. MacDonald, Emma J. Rose, and Cynthia Putnam. 2021. How, Why, and with Whom Do User Experience (UX) Practitioners Communicate? Implications for HCI Education. *International Journal of Human–Computer Interaction* 0, 0 (Dec. 2021), 1–18. https://doi.org/10.1080/10447318.2021.2002050 Publisher: Taylor & Francis _eprint: https://doi.org/10.1080/10447318.2021.2002050.

[6] Angela Minichiello, Joel R. Hood, and Derrick Shawn Harkness. 2018. Bringing User Experience Design to Bear on STEM Education: A Narrative Literature Review. *Journal for STEM Education Research* 1, 1 (Dec. 2018), 7–33. https://doi.org/10.1007/s41979-018-0005-3

[7] Ilya Musabirov, Alena Suvorova, Denis Bulygin, and Pavel Okopnyi. 2019. Co-aligning UX & Development Courses: The Case of MSc in Information Systems and HCI. In *EduCHI 2019: 1st Annual Symposium on HCI Education*.

[8] Dwiarso Rubiyanto, Mai Anugrahwati, and Nurcahyo Iman Prakoso. 2018. Problem based learning (PBL) method as a synchronization approach of chromatography course and chromatography laboratory work. *AIP Conference Proceedings* 2026, 1 (2018), 020090. https://doi.org/10.1063/1.5065050 _eprint: https://aip.scitation.org/doi/pdf/10.1063/1.5065050.

[9] Vikram Singh. 2020. Workshops Are Now Required to Be Conducted Remotely: Is This a Bad Thing? *Interactions* 27, 4 (July 2020), 52–54. https://doi.org/10.1145/3406102 Place: New York, NY, USA Publisher: Association for Computing Machinery.

[10] Gülşen Töre Yargın, Sedef Süner-Pla-Cerdà, and Aslı Günay. 2018. Modelling User Experience: Integrating User Experience Research into Design Education. In *International Conferences Interfaces and Human Computer Interaction*. Madrid, Spain.

[11] Qian Yang, Alex Scuito, John Zimmerman, Jodi Forlizzi, and Aaron Steinfeld. 2018. Investigating How Experienced UX Designers Effectively Work with Machine Learning. In *Proceedings of the 2018 Designing Interactive Systems Conference*. ACM, Hong Kong China, 585–596. https://doi.org/10.1145/3196709.3196730