HCI and Design Thinking:
a Survey about a Blended Educational Experience

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ABSTRACT

This paper reports the results of a HCI course designed for the students of the undergraduate Computer Science curriculum at the Università Ca' Foscari Venezia and delivered using blended learning methodologies. The blended course, rather than being an attempt to apply the flipped classroom concept, where the lessons are delivered online and the classroom is reserved to collaborative activities, represents an attempt to manage remotely all the the design activities of the course targeted at the realization of the conceptual prototype of an interface. This paper focuses on the results of a survey filled in by the students at the end of the course, which highlights which were the points of strength and weaknesses of the course, with the goal of gaining insights for improving the quality of the educational experience.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**; • **Social and professional topics → Computing education**; • **Applied computing → Education**;

KEYWORDS

design thinking, blended learning, education

1 INTRODUCTION

The course of Human Computer Interaction takes part to an educational experimentation started by the Università Ca'
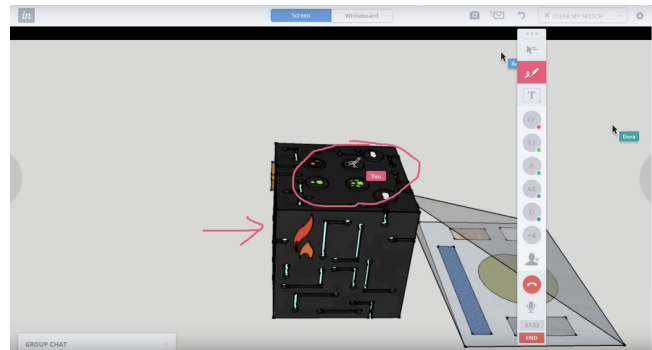
Figure 1: A screenshot from the shared whiteboard and audio chat

Foscari Venezia and focused on blended and remote learning. The course takes advantage of the constructivist and connectionist educational models [1], but instead of reserving the lessons in presence to the collaborative activities and delivering the remote lessons as self-paced videos, as it happens for the flipped classroom model, it has been designed for managing online all the project work, which represents half of the course activities.

A course focused on design activities has some peculiarities that makes it different from other typical courses of an undergraduate Computer Science curriculum [3]. Rather than being focused on scientific and computational thinking, it is based on design thinking, whose teaching methodology relies on the progressive and iterative refinement of the project, starting from the definition of the initial requirements to the delivery of prototypes with different degrees of fidelity and to the final product. It is a process that has a strong collaborative nature, based on the discussion among the components of the working group and on reviews with the teacher, which acts as a facilitator for making the design ideas to come to an interesting design result. Compared to other educational activities this kind of course, held in presence, has some typical drawbacks, among which the difficulty to share the results among different groups (i.e. each group acts typically as an island that is not aware of what is happening in other groups) and the scalability, derived

partly from the previous issue, that leads to dedicate a time for the review of the projects which is proportional to the number of projects themselves. So the teacher of a course with a high number of students must allocate a lot of time for discussions, even though the critical parts of the projects are related to the same issues.

The blended version of the course has tried to cope with these problems, experimenting the use of online tools as an opportunity to improve the cooperative design experience. From a technical point of view the course has been based on the use of Moodle [4], chosen by the University as the common platform for blended and remote education. We have used this platform for delivering documents, organizing regular textual chats that were recorded for permitting to access them even after the end of the chat, managing the upload of the projects' drafts, their review and peer-review. However, in order to trespass the limits of the platform, the students of the course were invited to use complementary tools, among which Invision [2], a web platform for creating hypermedia content that in the context of the course was used for creating and sharing the project drafts as low-fidelity interactive prototypes. Invision includes also whiteboard functionalities that permit to annotate collaboratively the project while while making comments through an audio and text chat. The latter functionality was used in the course for experimenting project reviews open to all the course participants.

The final results of the course were a set of conceptual projects of interfaces for eco-feedback, designed for making people aware of the consequences of their actions for the environment. For the sake of space it is not possible to five further details about the course. However a full description of the structure of the course and of the educational results can be found in [5] [1].

2 SURVEY

In order to have insights about how the students perceived the educational experience, we proposed at the end of the course an online survey based on a set of closed and open questions which were targeted to understand:

- how the students scored the different facets of the experience, using a 5 points scale;
- which were the three most appreciated features of the experience;
- which were the three less appreciated features of the experience;
- how the students evaluated the possibility to access the online reviews of other working groups;

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[1]This journal paper is referred to the previous edition of the course that however has in common the same organizational structure and design theme
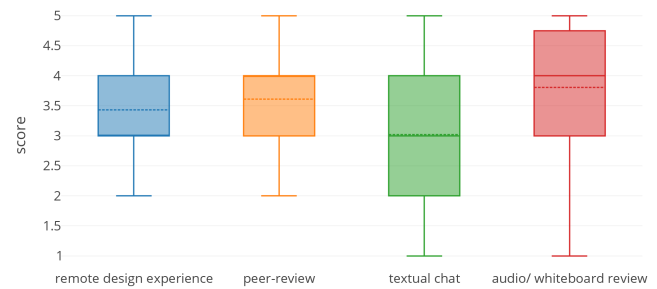

Figure 2: Answers to the closed questions of the survey - box plot based on a 5 points Likert scale

- which were the additional tools that they used for the project work, aside from those ones explicitly proposed at the beginning of the educational experience;
- which were their suggestions, related to tools or methodologies, for improving the remote design experience

3 RESULTS

51 students filled in the survey, contributing to gaining insights about different facets of the experience. Figure 2 resumes, using a box plot representation, the distribution of the scores. The mean and the median are represented, respectively, through a dashed and thick horizontal line. Overall the remote design experience received a positive appreciation by the students. The use of the standard Moodle chat received mixed scores, mainly for the limits of the tool that lacked the possibility to share documents or to have a feedback about the activity (i.e. typing by remote partcipants), as it happens for most modern chat tools. The peer-review was well appreciated by the students, but it was the shared online review based on the whiteboard and the audio/textual chat that received the best scores. Summarizing, the online collaborative activities were appreciated.

This result was confirmed by the answers to the question related to which were the three most appreciated features of the experience. Of course the most appreciated feature was the possibility to work from any location and, because of the fact that the tools were all accessible from the web, the possibility to use a variety of devices for accessing the information, collaborating and sharing content in a variety of formats. The answers confirmed the appreciation for the peer-review and the chat tools, including the possibility to save it for further access. A number of students pointed out that the use of online tools had enhanced the participation even by shy people that wouldn't have expressed their opinion in a physical classroom. The tools, including Invision, were generally perceived as easy to use, even if some of the students complained again about the quality of the Moodle chat. The exam of the less appreciated features

of the experience evidences a number of technical issues, such as problems with the Invision audio chat, related to the quality of the connection and the number of users that simultaneously accessed it. The experimental results showed that things went reasonably well up to 15-20 participants. We tried to cope with this problem by recording the sessions and making it available for later access. However this is a result to keep in mind for courses with a large number of participants. Aside from that, the students complained about the lack of integrated graphical tools in Invision [2]. A part of the users expressed also their complain about the lack of expressivity of some tools and the lack of a sense of immersion in the educational experience. For this reason they expressed the desire to have a part of the meetings in presence. Finally a number of students complained about the difficulty of obtaining a structured discussion using the Moodle textual chat, because of the high number of participants that were interested to different topics and caused different thematic threads to be discussed in the same chat sequence. We have to underline that however the students preferred the chat to the forums, which were available for all the course but that were barely used by the students.

Concerning the access to the online reviews of other groups, a number of students declared that it was very useful, for learning from the proposals and even from the errors of the other colleagues. The projects of the other groups worked as case studies from which it was possible to understand if and how the design requirements were respected. Overall a number of the students believed that the shared reviews had a good impact on the quality of the projects, even though a minority of the students underline the risk that their ideas might have been copied by other groups. A number of students emphasized the positive features of the Invision audio chat compared to the Moodle textual chat, including the possibility to maintain the discussion on a single track, more involving and more easy to follow.

Concerning the request of declaring the additional tools that the working groups had used for the project work, aside from those ones that we established at the beginning of the course, we obtained a variety of answers. The most used tools were web platforms, such as Google Drive and Dropbox, for storing and sharing any kind of document requested by the project, and instant messaging applications, such as WhatsApp and Telegram. In particular Telegram was the preferred solution for its possibility to share any kind of document. Additional choices, underlined by a lower number of students, included the use of Google Docs, TeamViewer, Skype and e-mail messages.

Finally, concerning the request of suggestions for improving the quality of the educational experience, about 30% of the respondents declared that they were satisfied with the tools used. In coherence with the practices that characterized the projects that they had completed, a number of students suggested the use of WhatsApp/Telegram groups and the use of online storage for sharing the project materials among the participants. A number of students asked for improvements to Invision, including the introduction of graphic tools and librarie of components for easing the creation of mockups. Finally other students suggested the use of the video chat, as a means to improve the sense of immersion in the educational experience.

4 CONCLUSION

Resuming, the survey offered interesting insights about the educational experimentation. Overall, the shift of the design experience in a blended educational context brought a number of advantages in terms of communication and sharing of design proposals that were evidenced in the students' answers.

The answers underlined even a number of technical issues and request for functionalities that will be reasonably resolve with the advance of the technology and with the availability of other tools integrating new functionalities. Invision itself offers in the current version new functionalities and integrates tool for graphic design and components for easing the realization of prototypes.

The answers evidenced also the request to integrate tools that are already part of the students' life and social communication, confirming a tendency, visible also in other situations, to mix the practices related to free and work/study time. The improvement of the sense of immersion is another interest issue that should be taken into consideration for the future development of the educational experience.

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[2]The comments were referred to the previous edition of Invision, which now integrates a number of new features, including some tools for graphical editing