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Video Coursework: Opportunity and Challenge for HCI Education

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ABSTRACT

Human-Computer Interaction (HCI) is a challenging subject to study due to its highly multidisciplinary nature and the fast change of advancing technology. Keeping pace with these changes requires innovation in pedagogical approach, such as student-authored video, which is presented here. In case studies from two UK universities, students were assessed on video making. The results suggest increased student engagement and satisfaction, as well as acquisition of design skills taught in HCI, not typically taught elsewhere in computer science. Here we share our experiences of using this practice along with key challenges and some preliminary findings from analysis of the student artefact-creation process. We also outline future research directions in this space.

CCS CONCEPTS

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

1 INTRODUCTION

Human-Computer Interaction (HCI) stands out within Computer Science due to its multidisciplinarity and flexible boundaries. The combination of theoretical and technical knowledge, along with design, psychology, health, security, and other domain specific knowledge can make teaching and learning HCI specifically challenging. HCI educators look for the most effective ways to prepare well trained professionals who balance programming ability with designer qualities [8,11,12]; skills that help students succeed in constantly changing world: "21st century skills" such as problem-solving, critical thinking, creativity, digital literacies and effective team-working [15], in addition to basic programming.

This paper presents two innovative approaches to HCI assessment that focus on 21st-century skills acquisition and responding to the demands of modern world of *prosumerism*. Both case studies were conducted in UK universities, where video creation featured as part of student coursework. We describe here our experience of video as an assessment method, highlighting its benefits and outlining some associated challenges. We conclude with recommendations for curriculum design and an outline of future research directions.

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2 VIDEO FOR TEACHING AND LEARNING

Previous literature on the popularity of MOOCs and flipped classrooms demonstrate the appetite for video in delivering instructional content [1,3]. As access to video-making technologies increases thanks to smartphones and video cameras being now widely available, students not only readily consume video materials but are now increasingly able to produce them at high standard.

Learning by making, grounded on constructionism theory, has been proven highly effective by many studies [4,5,7]. Thus, the introduction of video-making into tertiary curriculums is a logical step [6,14]. While video as a means of instruction in HCI is no longer a novelty, indeed becoming commonplace, and many studies report its benefits [2,9], video as a means of assessment in HCI is still relatively novel, ill-defined and under-researched to date.

Because of its more discursive and multidisciplinary nature, HCI modules can sometimes fit awkwardly within the computer science curriculum which is primarily assessed through objective measures, including structured deliverables, labs and exams as assessment methods. Assessment of HCI learning needs to include subjective criteria (e.g. creativity and aesthetics in design). Also in larger classes, it is critical the assessment scales appropriately without compromising the validity of judgments of how well the learning outcomes have been achieved. Therefore, well-designed marking criteria for such creative assignments as video are critical.

3 CASE STUDIES

In the presented here case studies data collection included videos, and student feedback, as well as the details on the marking criteria.

Case Study 1: Ubiquitous Computing

The first case study is based on a 3rd year undergraduate module on Ubiquitous computing ('Ubicomp') at Newcastle University, UK. The learning objectives of the module are to introduce students to the field of Ubicomp and develop practical skills in building interactions with a prototyping toolkit (Raspberry Pi). In the year 2016/17 the class comprised 48 students (83% male).

As part of module assignments (30% of the total mark) students created two-minute video tutorials based on their practical

exercises with Raspberry Pi and the Grove Pi kit. Students were encouraged to collaborate through the video production process: to film in pairs, share and reuse pre-production materials, however, at the end of semester each of them had to submit 3 individual videos. The videos were to explain how to work with Pi kits in different scenarios, such as how to switch on an LED or to detect proximity. See Figure 1 for screenshots of an example. Overall, 142 video tutorials were submitted for assessment.

Figure 1: Screenshots from tutorial on working with LED and Raspberry Pi, by E. Lovell for 'Ubicomp'.

Case Study 2: Interaction Design

The second case study is based on the Interaction Design module taught at the University of Southampton, UK, a compulsory course for a 2nd year undergraduates in computer science [13]. In 2016/17, 140 students took the course, of which over two thirds were male.

The module is assessed by exam and coursework (50% each). In the coursework, students are required to conduct qualitative research and develop prototypes for Internet of Things devices. The final submission involves a written submission and a four-minute video highlighting the features, functionality, fitness for purpose and justifications for design decisions of the prototype. See Figure 2 for screenshots of an example. In total, working in small groups students authored 27 video submissions.

Figure 2: Screenshots from video demonstration of an air quality monitor prototype, by T. Rowledge, T. Davidson, A. Rann, C. Cripps and X. Voigt-Hill, for 'Interaction Design'.

In both cases assessment criteria were developed carefully for the video components, where marks were weighted towards the quality of the presented technical skills and understanding of required concepts for working with Raspberry Pi ('Ubicomp'), and the fitness for purpose of the developed and presented technology prototypes ('Interaction Design'), rather than the production quality of the video itself. In this way, students with limited video-editing experience were not disadvantaged.

4 BENEFITS OF VIDEO-MAKING

Introduction of video making into the curriculum was successful in both studies. The affordances of video for communication fostered students' creativity while allowing effective demonstration of knowledge and skills. Therefore, we recommend educators to also use video in assessment as its relevance and accessibility is increasing with ubiquity and efficiency of smart phone cameras.

Analysis of a previous cohort (2015/16) to Case Study 1 showed that collaborative video creation helped the students to demonstrate and further develop media literacy skills [10]. Creation of video presentation in Case Study 2 was successful in giving freedom to be creative in the development and presentation of their prototypes, allowing a level-playing field for a wide range of prototype media (e.g. paper, physical, software-generated, or mixtures of these). Although this was challenging for some, many groups produced imaginative and practical prototypes and used the video medium with humour and ingenuity showcasing their prototypes' functionality. Based on this experience, owing to the various roles associated with prototype development and video production, we suggest that curriculum designers approach video as a group task.

In both cases, feedback showed that the majority of students were enthusiastic about video making, with many highlighting their preference to video in this context over written reports and PowerPoint presentations. *"It gave us quite a lot of creative freedom to make something that was quite different"* a student said. *"I think it helped to cement my knowledge"* said another. Moreover, the created videos are valuable for student learning portfolios, and useful for job hunting as evidence of knowledge and specific skills.

5 CHALLENGES OF VIDEO-MAKING

Our experiences highlighted the value of student-authored video as an opportunity for learning through making and as a conduit for demonstration [7]. It is important to ensure that marks are attached to the correctness of the presented concepts and the quality of produced prototypes, rather than to the quality of the video itself. For instance, in Case Study 1, the biggest portion of mark was given for accuracy in explaining the steps required to achieve a certain task working with Raspberry Pi. Similarly, in Case Study 2, the criteria for the quality of the prototype was heavily weighted, and the criteria for the video communication were solely concerned with the effective use of the video medium (e.g. shots framing, pace of storyline), rather than the quality of the production itself.

We argue the distribution of marks in this way is an important consideration for instructors wishing to utilise video as an assessment tool, and this is our main recommendation for curriculum design in HCI courses. Moreover, marking criteria needs to equally assess technical skills and subject knowledge as well as creativity and aesthetics. To be fair (less subjective) in the assessment we need to find a way to quantify creativity and other non-technical characteristics of the produced video artefacts.

Furthermore, undergraduate students may not necessarily know principles of fair use and copyright, which suggest another recommendation for curriculum design: class time should be dedicated to showing good examples of videos and explaining some fair use and copyrights concepts.

6 FUTURE WORK

The use of video as an assessment medium in HCI offers much promise for meaningful student engagement in design and prototype development. Qualitative analysis of the video artefacts is being done to evaluate their technical and artistic quality from various perspectives. We also aim at developing quantifiable characteristics of creativity and visual and audio aesthetics tuned specifically for HCI courses to address the challenge highlighted above regarding design of assessment criteria.

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