Technology Enhanced Learning

Innovation Scheme Case Study

Title of project: Physical Computing Workshop: A Joint Venture Across Campus

School/Department: School of Engineering and Informatics, Department of Informatics / School of Media, Film and Music, Department of Music

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Learning Technologist: Pete Sparkes (main contact) and Anne Hole

c. 1000 words

Project Brief
Outline the key aims and objectives of your project and summarise how this was delivered and/or supported. This project aimed to introduce students from a wide range of disciplines to current research and development in physical computing, which broadly speaking is concerned with the building of interactive physical systems through the use of software and hardware that can sense and respond to the analogue world. This project was organised in two workshop sessions, one in March and another one in June, and facilitated by an interdisciplinary team from Informatics, Product Design and Music. A dedicated Study Direct website was created documenting the content and outcome from both workshop sessions, including student feedback. Furthermore highlight videos for each session have been produced by Pete Sparkes from TEL in cooperation with the project team. The videos provide a glimpse of the activities in the workshops and student engagement that can be used for further dissemination of the project outcome. Session 1 Video: https://matterhorn-presentation.uscs.susx.ac.uk/engage/ui/watch.html?id=88e69fec-a90f-4ab7-8c3a-9bf1f2d164bc Session 2 Video: https://matterhorn-presentation.uscs.susx.ac.uk/engage/ui/watch.html?id=618ec22a-c7c9-4bb4-aae0-da7adcd12a53
Support from TEL
Describe your experience of working with TEL and the support which you received from your assigned learning technologist. The collaboration was very successful. Pete Sparkes supported us along the project and was most involved on the actual workshop days, being there to capture the students feedback and the experiences they had via pictures and videos, leading to two very exciting highlight videos for this project. Pete also supported the set up of the Study Direct website and facilitated the promotion of the second workshop session across campus.
Impact on the student experience and/ or professional practice
Summarise the effect and impact that your project had on the student experience and/or your professional practice. **Effectiveness and impact on student experience:** While the first edition of the workshop in March was engaging a small set of students from Product Design, Informatics, and Music, the second edition of the workshop on June was open for a more varied group of students. The two-step process allowed us to first explore the workshop format and teaching practice, and then improve

it for the second edition. Strategies and content were adjusted based on the students' feedback (collected at the end of the session and afterwards via a questionnaire) and a new group project with new hardware and software components were introduced to ensure variety.

Impact on professional practice: Having the opportunity to work with students in a longer block session proved valuable, especially as initially taught concepts and theories can be immediately put in practice, and trouble shooting can be done in-situ, and ensuring a tangible outcome at the end. Moreover, group work, especially when combining different skillsets (as facilitated in the second workshop session) proved beneficial, as collaborative problem solving is supported.

Evaluation of project outcomes

Evaluate whether your project met the aims and objectives supported by any feedback, comments or statistics to measure the success of your project.

This project successfully achieved the objectives defined at the beginning. This can be measured based on the interest for the sessions (open application process) and the feedback received through short feedback cards, verbal feedback at the end of each session and through a questionnaire after the actual session.

WORKSHOP 1: "Multi-modal interactions with Arduino: *Building Hobots"*

Figure 1: Workshop 1 @ Creativity Zone, Monday 9th March 2015.

Attendees: 19 students (of 21 who expressed interest) attended the 5.5 hour workshop on Monday 9th March from 2pm – 7.30pm. For Interaction Design students this was part of their teaching programme (extended seminar session), the others responded to an open invitation extended to Generative Creativity, Music Tech and Pervasive Computing students. The final group comprised a mix of UG and PG students across Music, Computer Science, HCI and Product Design.

Existing Skills and Experiences: Less than 5 people in the room had used Arduino or any similar platform before; experience of electronics was limited to GCSE and several students had never done any programming at all.

Structure and Learning Approach: Students worked in pairs. The day was structured as shown in the schedule below. The importance of 'tinkering' as an approach to learning was introduced early on and each structured exercise encouraged this approach. This seemed to give students confidence to explore their own ideas in the final session, where they demonstrated their personalized solution to the given Arduino design challenge – building a "Hobot" based on touch and smell interaction.

Outcomes: Every pair achieved the basic design in less than 15minutes; by the end of the session each had extended the main task in a range of interesting ways.

Student Feedback: We collected student feedback through three different channels, (1) through a final open feedback and discussion round at the end of the workshop, (2) anonymised feedback cards at the end of the workshop capturing the good/ bad, confusing features of the workshop and suggestions for improvement, and (3) online survey distributed two days after the workshop.

The feedback was overly enthusiastic, positive and with lots of excitement about such kind of hands-on sessions. Students with no programming background particular appreciated the step-by-step introduction and face-to-face feedback along the whole workshop.

Some feedback from the feedback cards:

> *"It was so amazingly useful. THANK YOU to you all. Introduction was clear to something that is usually daunting and scary."*
>
> *"It was a lot of fun to learn about this. I think it is a simple way to create amazing things."*
>
> *"Really interesting - do more. Could do earlier in term if possible."*

The survey additional revealed the positive effect of the workshop on introducing students to a new topic, overcoming existing assumptions about its difficulties and creating interests in using Arduino even in the future. From 7 responses, 6 students indicated that they would like to participate in a second session of this kind and one said maybe. Especially the opportunity of hands-on experiences and collaborating with students from different disciplines was pointed out as valuable.

Some feedback from the survey after the workshop:

> *"I have always been curious about electronics, and heard about the Arduino micro computer but I have never had the pleasure of using it, I always thought it would be hard to use but as this workshop showed me it is easy to get started."*
>
> *"It was really interesting to see how the product design students had no problem whipping things up physically, making a 'thing' that did something. By contrast as a composer I became more interested in the potential sound qualities of the materials we were working with, and ways of automating the objects as musical instruments."*
>
> *"Very informative experience in an inclusive and comfortable environment."*

Summary & Impact: Overall students gave very positive feedback on the workshop session, acknowledged the interactive and hands on experience for learning and were interested in the follow up activities.

In order to allow students to deepen their knowledge we have set up a Study Direct site where students have access to all sources used in the workshop and beyond to trigger self-learning activities based on this initial contact with Arduino.

As a positive outcome on this first workshop session, 3 of the Interaction Design students were using Arduino for their creative project in Interaction Design 2 due mid of April.

WORKSHOP 2: "Building Drawbots using Arduino-compatible, Wi-Fi enabled micro-controllers"

Figure 2: Workshop 2 @ Digital Humanities Lab, Wednesday 10th June 2015.

Attendees: 13 of the accepted 15 students selected (of 33 who expressed interest) attended the 5.5 hour workshop on Wednesday 10th June from 2pm – 7.30pm. This workshop was not linked to any specific module and open for anyone interested across disciplines. The final group comprised a mix of UG and PG students across Music, Computer Science, Life Science, Theoretical Physics, Information Technology with Business, Electrical Engineering, HCI and Product Design.

Existing Skills and Experiences: One person in each of the four groups had previous experience in physical computing, for instance using Arudino or any similar platform.

Structure and Learning Approach: Students worked in groups of 3 or 4. This time we made sure that each table had a mixed disciplinary set up, which was experienced as a minor drawback in the first session, where we did not enforced people to change their collaborator. The day was structured as shown in the schedule below, extending the time for introducing

Outcomes: Every pair achieved the basic design in less than 15minutes; by the end of the session each had extended the main task in a range of interesting ways.

Student Feedback: We collected student feedback through three different channels, (1) through a final open feedback and discussion round at the end of the workshop, (2) anonymised feedback cards at the end of the workshop capturing the good/ bad, confusing features of the workshop and suggestions for improvement, and (3) online survey distributed some days after the workshop.
Similarly as to the first workshop session, the feedback was overly enthusiastic, positive and with lots of excitement about such kind of hands-on sessions. Students particularly appreciated the interdisciplinary set up of the workshop and the ability to be creative in the way of applying the concepts of physical computing.

Some feedback from the feedback cards:

> *"lots of fun and well explained :)"*
>
> *"had a great time would like to do another"*

The following feedback shows that it is not easy to handle different previous experiences, as the speed of the session could be too slow or fast for individuals:

> *"we were too slow!"*
>
> *"could be slower in places"*

From the survey only 2 more responses were collected (could be because of the start of the holidays time and the absence of most students beyond the date of the workshop). Yet the additional feedback confirms the usefulness of such workshops:

> *"Very good. The demonstrations were helpful in steering us in the right direction with just the right amount of relevant context info provided. It was good to be given time to tinker - learning in a hands-on way suits me. Though our group did try to run before it could walk and we ran into complications. Overall though the workshop was a great experience and I learned a lot."*
>
> *"I would be interested in exploring tangible interfaces for sound and network interaction - site specific reactive 'robots'."*
>
> *"I'd like to reawaken the coder in me... and this is manageable and fun."*

Summary & Impact: Overall students again provided very positive feedback, even via email and in person afterwards to the organisers, encouraging us to continue this kind of activities across campus, as it is really something unique within a students curriculum or extra curriculum activities.

Conclusion

Outline the successes of the project, what you have learnt from the process and any plans for future development/continuation of the project

The TEL innovation scheme enabled us to pilot two dedicated sessions on physical computing with a broad variety of students. It was a demanding and exciting project at the same time. It was an extra activity during regular term time, which is a busy time for both lecturer and students. However, as the feedback above demonstrates, it turned out to be very valuable for both sides.

We were very delighted about the fact that both sessions were well attended and even over-subscribed the second time. We are all motivated to continue this particular topic of teaching, but more importantly foster the way of teaching appreciated by the students: being interdisciplinary, being hands-on in a collaborative environment. Such a teaching environment allows students with varying skillsets to learn from each other in a creative, engaging way, and explore the boundaries of a dedicated group project.