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# Student Engagement, Mobile Technologies, and Changing Curriculum Delivery

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**Abstract:** This paper is a case study describing the roles of students in research implementing mobile technologies in acting, dance, and visual arts classrooms at a creative arts university in Southwest England. Students and staff worked with the researchers implementing mobile technologies in a variety of classroom settings, including demonstration and performance studios. Using notions of community, consumption, exchange, and division of labour from Engstrom's Activity Theory as the basis for our approach, we worked alongside students and staff in active settings, developing and then adapting implementation in a fluid exchange between the members of each classroom community. Students were involved in at least three ways: as classroom participants providing verbal feedback, as classroom participants utilising the tools, and as Student Fellows (SF). The methods for obtaining student feedback ranged from semi-structured verbal feedback (which was recorded on video), feedback obtained while the tools were being used, and post-session observations from the Student Fellows. Class activities were also recorded using a static video camera. The tools included: iPhones, iPads, Android tablets, projection devices (projectors and large-screen TV's), and the virtual learning environment. In this paper we explain the three primary phases of our research, then we examine the various ways in which we engaged students to further develop the implementation of the technologies, and lastly, ways in which we saw development of the delivery of the curriculum.

**Keywords:** mobile technologies, student engagement, activity theory, visual arts, performing arts

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## 1. Background

This paper discusses a project funded by a grant from the Higher Education Funding Council England (HEFCE) to implement mobile technologies in several classrooms in our School of Art & Design (AD), and the School of Music and Performance (MP). This project was driven by earlier research in which the authors engaged with a lecturer in AD who wished to project streaming video while also make recordings of a demonstration lecture (Boehm and Glen, 2017). The two primary aims & objectives for the project were:

- To further prior research by extending the use of mobile digital tools and co-creation to enhance student engagement in performance and demonstration-oriented learning environments.
- To assess the impact of the digital tools identified in our initial work, using action-based research methods, upon student engagement, understanding, and recall.

### 1.1 Mobile technology in Higher Education (HE):

Current research using mobile learning technologies covers a variety of approaches to mobile learning, also known as m-learning. This variety leads to difficulty in defining exactly what m-learning means (Rossing, et al. 2012). Vavuoula, et al (2009) explored the use of a mobile phone service that helped students gather information using inquiry-led learning during a museum visit. Ahmed and Parsons (2013) examined student use of an app in scientific abductive inquiry investigations. Huddy (2017) has been working with various platforms designed specifically to manage mobile device video of dance classes and performances. Use of the iPad in classrooms has been on the rise since its inception in 2010 (Rossing, et al, 2012), and has seen integration across 'multiple epistemological domains' in higher education (HE) because its uses align so well with the constructivist model of education. (Mavri, et al, 2018, Wheat, et al, 2018; Kong, S. C. & Song, Y, 2013). Indeed, Harvey & Smith (2014) report that the iPad is 'the most widely used devices on campus'. Most of the research on mobile technologies that we surveyed refers to the use of personal devices such as Apple's iPad or a mobile phone in the classroom or other educational setting in order to allow the student to engage more deeply with the content of a lesson or subject.

It is in this context, the notion that the use of mobile technologies could help to enhance the student experience in a wide range of classrooms by affording them different opportunities for reflection and engagement, that we constructed our implementation of mobile technologies for this project. As Leijen, et al (2009, p. 169) point out: 'Reflection stimulates students' awareness of their body and movement experiences, which is necessary for

developing high-quality dance skills. . . reflection is essential for students to learn how the audience may perceive their performance or choreographic work.'

## 2. Activity theory and convergent technologies

### 2.1 Theoretical framework

Cultural Historical Activity Theory (CHAT) is a form of Activity Theory developed primarily by Yrjö Engeström (2015). It is built upon the works of Vygotsky and Leontév. CHAT is predicated on the notion that there are contradictions which arise in the functions of any given community, such as a workplace or school. A contradiction is something that becomes evident when there is stress in a community, often because it is encumbered by inefficient working methods. When the members of a community wish to improve upon those contradictions, then they must identify the cultural and historical reasons that they exist in order to improve the current conditions. The role of the researcher in CHAT is to work with the community to identify, and then to develop new tools in order to change the conditions created by the contradictions. A 'tool' is generally a method of working, which could include a literal tool such as a mobile device. CHAT is a flexible framework that adapts methods appropriate to the given study.

There were a few contradictions that led to this study:

- Students in demonstration settings had no access to the demonstrations outside of the classroom because there had been no recordings made of the demonstrations so they were relying solely on memory.
- Performance students were only able to self-assess their performances in real-time, thus inhibiting their ability to provide quality feedback for themselves and to peers.
- Students in making classes were often unable to see the details of a demonstration because there would be too many students crowded around a small workspace.

The overarching purpose of the study was to mediate these situations and to identify where students and staff would take advantage of the affordances offered by mobile technologies to increase their engagement with learning.

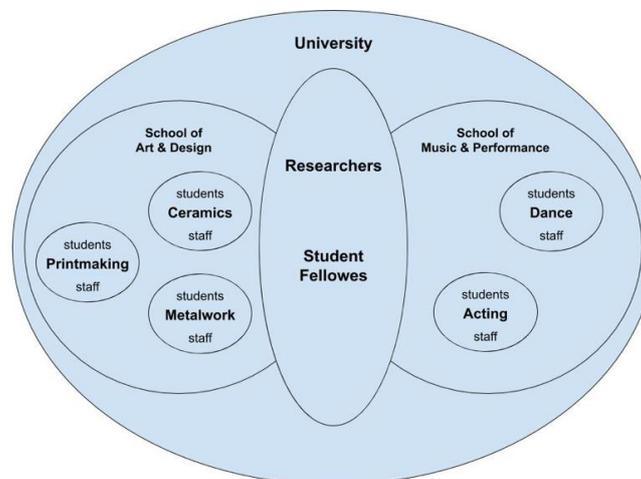
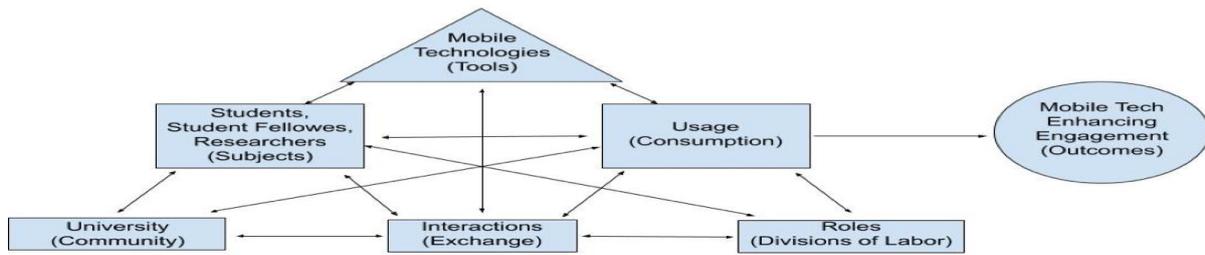


Figure 1: Illustration of the community

The notions of CHAT drawn upon in this paper are that of *community, subjects, tools, object, consumption, exchange, division of labour and outcomes*. In some ways the description of community in this instance is somewhat complex, but is probably best comprehended by the diagram in Figure 1. The members of the community include the university community. The students enrolled in the modules, student fellows, staff, and researchers are the subjects. The tools are the pieces of technology used in the project. Object is the use of mobile technology used to enhance student engagement. Consumption refers to the use of the technologies described above. Exchange will cover the interactions of the members of the community regarding the tools. Discussion of the division of labour will focus on who did what with the technologies. All of these elements draw together to form outcomes (see Figure 2). This case study will serve to illustrate both the explicit and implicit roles students played during the implementation of the mobile technologies in their classrooms.



**Figure 2:** Interrelations of the elements of activity theory

### 3. Method

*Selection of Subjects:* The selection of the student subjects was a result of their enrolment in the chosen modules. The choice of modules was the result of a call for participation by university staff, including technical demonstrators. Staff had to agree to the use of mobile technologies in their classroom, and to work with the researchers, student fellows, and their own students in order to prove or disprove the viability of using those technologies. The student fellows were chosen through another call that specified 2nd-year students who: would serve as research assistants, actively engage with students and staff, and would be responsible for setting up the data collection camera. All participants signed an agreement verifying their willingness to be filmed for the purposes of data collection and possible conference presentations.

*Technology:* While differences in the types of classroom predicated the ways in which the technology was utilised, the fundamental setup was the same for each space: iPads, large screen TVs, and the virtual learning environment via Panopto. The technical demonstration settings used the standard Apple software to record and project classroom activities, while the performance modules used the Coach’s Eye app as a means for recording and assessment.

*Application of the Technology:* Technical demonstrations consist of hand manipulation of materials and tools (such as etching plates, printing presses), hand built and slab constructed ceramics, and metalworking processes and tools that are difficult for everyone in a large group of students to see. In these spaces we projected the real-time images of the activity on a large screen on a mobile stand. The streaming projections were recorded simultaneously. These recordings were then uploaded to our VLE via the Panopto app for reference. The nature of performance necessitates students viewing their performances historically. The recordings, also projected on large screens, were used as a tool for peer and self-evaluation and discussion in class. These were also uploaded to our VLE via Panopto, but were used for further individual and small group evaluation.

*Data Capture:* The data was collected through video recordings, informal and formal interviews, and observation notes. We utilised two approaches to capturing video, a fixed camera and additional mobile devices which were used by the researchers and student fellows. The fixed camera was set to capture as much of each learning space and activity as possible, allowing us to view student activity that we may have not otherwise observed. This camera was purely for data collection and was not to be used as a tool by the classroom students or staff. The mobile devices were used to capture specific moments. This footage was randomly obtained by both the researchers and the student fellows, but was targeted to specific activities, such as students utilising the technologies away from a staff-led activity. At the end of each performance session, the lecturers and researchers would ask the class as a whole for feedback regarding that day’s activities, the feedback sessions being captured on the fixed camera. After each session, the student fellows, staff, and researchers, compared notes about their own observations and then catalogued them in a Google doc. At the end of the project, students, staff, and student fellows were asked for their opinions and observations regarding the use of the technologies in their classrooms.

### 4. The performance students

This group consists of two subsets: actors and dancers. We used mobile technologies and projection to record their in-class performances and then used those recordings for formative assessment. The app used for these sessions is called Coach’s Eye (TechSmith Corporation, 2018). It is designed to analyse athletic performance and features the ability to scrub through a video, to watch the recordings in slow motion, and to mark the video

much as a sports analyst on television would do. The performers worked small groups of two to five students. At the end of term, students used the final recordings for a marked self-assessment. The two lecturers used the tool in different ways, however.

The dance lecturer recorded the small groups and then took each group over to the large-screen television to walk them through an assessment session, working to engage the students in the conversation. After the class, the video footage was then uploaded to our VLE and the students used that stored footage for further self-assessment which they did through journaling. The acting lecturer also recorded the small groups, but at the end of the class session he would choose one group to critique in front of the entire class. He also uploaded the footage for self-assessment to the VLE, but used it for formative assessment during individual tutorials later.

The dancers were uniformly positive about the implementation of mobile technologies in their classes. None of them had previously experienced seeing video of themselves dancing for anything other than a final performance. They said that they found the ability to view their actions in slow motion and to scrub back and forth to be very helpful. They did not find the drawing tools to be very helpful when they used the app without the lecturer, but thought that they were somewhat useful when the lecturer used them.

The actors, on the other hand, were of mixed minds on the usefulness of these tools. Most, like the dancers, expressed that the tools were very helpful and could see themselves using them more. A few did not find the exercise of watching the lecturer assess a group that was not their own to be very helpful. Some expressed ambivalence about the technology, but only after a couple of them voiced their dislike of watching a group that was not their own. Before that, the conversation started with mostly positive affirmations. Interestingly, the most vocal of the naysayers also admitted to having an extremely limited attention span that could not cope with something that she could not see as being directly relevant to her. However, the strength of her personality seemed to drive several people to slightly alter their opinions. That is an interesting insight into how the strength of one personality can affect the notion of effectiveness of an activity. However, in the end most agreed that it was worth pursuing the application of the technology, but perhaps by using it in a more targeted approach. This resolution from the students encouraged the lecturer to want to make adjustments to the implementation of the technology in his curriculum.

In both instances, the students readily embraced giving the technology a shot throughout the process. Neither was there any reticence to use it. When students were asked to use the mobile devices to film other students, there were always volunteers. The only caveat was one student in acting who did not wish to see himself on the large screen. He said that he had no problems viewing his performance on a computer screen, or on a mobile device, but it was seeing a large representation of himself that he could not handle.

Because mobile devices are commonly used by most students, when we put the devices in their own hands they had no problems putting them to use. Indeed, when we gave the devices to the actors to work with while they worked on their own, they got into a fair amount of silliness with them, taking goofy pictures and videos, which they mostly deleted before handing the devices back. "Our generation who have grown up, well throughout our teenage years, with the technology . . . I don't think there's boundaries. . . may have just seen the iPads as more for downtime". Unfortunately, the acting students did not utilise the devices as we thought that they would, using them as tools to assess and refine their performance tasks for that day. As one observed, "I'm not sure it worked so well when they split into little groups with the iPads, they were laying on the floor, I'm not sure how much they engaged with the technology. But on the big screen they were quite engaged". However, we observed the opposite with the dancers. The groups would take the devices to a corner, pull out their notebooks and pens and then write their observations. They were eager to get to the task at hand.

## **5. The visual art students**

The use of mobile technologies in the visual arts was for very different purposes. Whereas the performers were using them as a tool for self-assessment, the point of the technologies in visual arts was twofold: 1) to aid in the presentation of technical demonstrations by enabling detailed instruction to be visible to a wider group of students and 2) to provide the opportunity for students to review the instructions when they were doing their own work outside of the class. The video footage of the demonstrations was uploaded to our VLE and the views were tracked to see if they were being accessed. The technical demonstrations took place in three different classrooms specific to the medium: metalworking, printmaking, and ceramics.

The students were positive about the potential of being able to have the sessions recorded, they thought being able to see the processes in detail on a large screen was exciting. They were positive about having the material available in the VLE. One of the demonstrators was also excited about being able to allow the students to get close up to the techniques and was open to exploring the technology, however they were conscious that the session was being filmed, and felt awkward about language or recognising that the demonstration contained mistakes commenting “ignore that bit” or “we can edit that later”. This uncertainty left the students unclear about the role of technology in their teaching. The hands-on nature of the work, and the opportunity for discussion and peer review within the cohort limited the engagement with recorded materials. Some people found it really useful. Some people, who might have been at the front anyway, so they could see what was going on would say, ‘Oh, I didn’t see the benefit of it.’” The student fellow encouraged some students who had missed some of the demonstrations to use a tablet and review material recorded earlier, they actively engaged with this, talking to each other and pausing, replaying the material as they worked through the task. “People that were, like, more involved in the demonstrations, helping out and things, didn’t feel the need for it because they could recollect things. They didn’t feel the need for it as much as the quieter students at the back.” Students who were less engaged found the recordings useful, “A couple of them (quieter students) were saying that it was helpful”.

The demonstrator was not used to using a live visual aid and, despite an having undertaken a familiarisation session in advance, defaulted to previous instruction techniques such as telling the students to take notes. This created tension for students between watching the demonstrator, viewing the demonstration on the screen, and taking notes. The students were reluctant to film anything, mainly because they had been instructed to take notes. The proximity of the demonstration to the screen changed the way the student viewed the screen, with a bias toward viewing the activity directly if possible. When students used the recording to substitute for missing the original demonstration they were somewhat confused by the recordings because they were missing the contextual information. In sessions designed for small groups of students, due to health and safety constraints of the workshop, the potential benefits of viewing processes via the screen was diminished. The instruction had been designed to enable students to complete the assigned tasks within the session, so the need to reflect and review was minimal. Since the workshops are only open to students when the technicians are present there was little need to review the online material as it was easier to ask the technician. For the later ceramics sessions, we switched from a tablet to an iPhone in a ruggedised case mounted on a GorillaPod. The demonstrator was comfortable grabbing this device with clay covered hands and putting it down close to the workpiece, adjusting the position until the key part of the work was on screen. This demonstrator felt more confident using the technology and directing the students to view the techniques being demonstrated on screen. The students who were in the back were then able to view the process on the screen. Examination of the analytics from our VLE showed very limited engagement with the videos outside of the class sessions.

## **6. The student fellows**

In addition to setting up equipment and filming examples of student interaction with the technologies, the role of the SF was to help to break any possible conceived barriers between the students and the researchers. As one of them said in the post-interview, “I feel like . . . from my perspective. . . the other students would be more willing to speak to another student. . . a fellow student is more approachable.” The SF were quite willing to throw themselves into the processes of using the technology as well as helping the students to use the technology. There were more opportunities for the latter in the Visual Arts classes because student work was individual and they could immediately refer to the demonstration videos as they worked on their pieces. One of the SF assigned to the visual arts classes stated, “A couple of times in the session . . . where they were using playbacks of videos of demonstrations I was able to step in and show them how to use it, or just ask them their opinions if they thought it was useful and working in the space.” In the performance classes, the students were able to access the videos immediately because the iPads were assigned to specific groups and students worked with the footage immediately.

Some of the SF perceived that their participation was also useful for eliciting student feedback. “I think it was good to have someone to interact with the students, ask them questions and prompt them. It was better than having them respond to a questionnaire, you could get a better feel for how they were feeling about it.” We observed that not all of the SF were as willing to engage with the students as much as they were willing to do task-oriented assignments, such as filming specific groups and handling the equipment. Those who did interact

with the students felt more a part of the project: "I felt more a part of the research team. I felt very much involved in the whole process."

SF were helpful with some of the finer points of the filming of the assessment pieces, particularly in performance. For instance, in dance we made adjustments to the filming of the groups by filming into the mirror rather than directly at the groups from the front. This was necessary because if the group spread out too much, or moved out of the range of the iPads, we lost some of the performance. In acting, students filmed the performances using the iPads, but our SF would check on their positioning and suggest moving if they were not getting a good capture.

Insights from the SF will be helpful in the future, and also verified some of our own observations. One of the insights was about training on the kit, which is kind of alluded to in the above paragraph. Because the technology was primarily familiar in daily practice (iPads and iPhones), we elected to not have any training sessions so that we could see how the students would incorporate the technology based upon their own experiences. However, one SF observed, "It might have been helpful to set up getting the students to interact with the technology more (rather than just leaving them to it)." They had similar observations about some of the staff, "I think that it does take a lot of cooperation, willingness, from the staff to gain the most from it. They need to really think it through." This observation made us think that perhaps we could have done a bit more to help the staff with that aspect.

## **7. Discussion**

Our goal to enhance student engagement in performance and demonstration-oriented learning environments through co-creation met with mixed results. Students in AD were significantly less willing to take control of devices and utilise video artefacts than students in the performing community. Comments from the SF provided some insight into this phenomenon: '(Performers) are more used to analysing specific moments . . . that's built into their [performer's] teaching to begin with. . . where they finish a performance and then they all reflect on it together. Whereas with the Art & Design courses it was introducing something completely new.' Unlike in our prior research (Boehm & Glen, 2017), the AD students would not even take the iPad to record demonstrations. However, some did engage with the iPad on a limited basis during work sessions in order to review techniques or procedures. Even fewer of them engaged with the footage outside of sessions. One of the SF in visual art thought the videos might be helpful in the 2nd and 3rd year: 'It might be good to have the videos available in later years to refer back to, after not having been involved with the process. More long-term future use, than immediate.'

We were expecting to have more moments of exchange with students regarding the usage of the technologies, hoping that they would take more agency in the division of labor within the classroom curriculum. Although the actors, as discussed above, had some comments about the way the technology was used, on the whole they were pleased with it. The dancers had little to say about the way that it was employed in their module, although the dance lecturer had some ideas about restructuring the curriculum to better facilitate the student's capabilities to discuss the videos on a deeper level. She decided that in the next iteration she would construct a more apparent ladder beginning with lecturer modelled discussion leading to student-led discussion. Regarding the app, Both actors and dancers found the basic functions of Coach's Eye, (i.e., the playback and scrub features) to be quite useful, but did not see the usefulness of the drawing tools. We were surprised that nobody in either sub-communities reported downloading the app to use independently: '£5 for an app! That's expensive!' The one moment of true agency was when the dancers requested that Coach's Eye be used in their technique module as well. The lecturer liked the idea, and mentioned that she have to give some thought as to how to incorporate it into that curriculum.

These issues appear to be a result, at least in part, of cultural-historical practices. The students were in the first term of Year 1 modules, so any reticence could be a reflection of a lack of a sense of agency in the processes of their own education. It is not out of the question that they are still thinking within a teacher-centred context and not yet comfortable with exercising their own agency, even when asked. Review of the timeline video did reveal key moments where AD and dance students used the technology independent of instruction. In these moments, the students made use of the captured material for self-directed review and reflection, which was not in the scheduled curricular activities of the class. In this way, they were beginning to reshape the delivery of content by taking agency when the class structure provided unscheduled opportunity.

The smaller number of students and space limitations in the metalworking shop, made the mobile technologies unnecessary. The staff member in printmaking did not grasp the possibilities of the technology, so the effectiveness there was limited. The ceramics demonstrator made good use of the technologies, adapting delivery methods to the affordances of the technology as he became more familiar with them. As with the acting and dance lecturers, this demonstrator expressed a desire to continue developing the curriculum to adapt the technologies in a meaningful manner because they felt that the students were benefiting from them.

Further exploration of the application of mobile technologies in some of these settings is clearly warranted. As stated above, three of the staff believe that its use is valid for improving the student experience and helping them to engage deeper into their own understanding. The use of CHAT as a framework for exploration enabled the researchers to gain further understanding of some barriers to creating whole community engagement in the adaptation and consumption of these tools.

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