Using Mobile Technologies to Enhance Learning and Improve Student Engagement in the Dance Studio

Sarah Alexander*
Jeffrey D. Boehm
Neil Glen

Bath Spa University, Bath, UK

* Corresponding Author: s.alexander@bathspa.ac.uk

Abstract

This collaboration between the dance and learning technology departments at Bath Spa University, sought to develop a dance repertoire module with the use of mobile technologies, and to enhance collaborative and discursive opportunities for students. The introduction of mobile technologies into a face-to-face teaching environment initiated a blended model of teaching and learning whereby the technology became a partner to the existing practice. The module was taught within the first year of the BA(Hons) Dance course, with 39 female and three male undergraduate students participating over a two-year period.

The purpose of the project was to apply specialist ICT knowledge and tools into face-to-face teaching spaces, in order to diversify established teaching practices. In light of this purpose, the project design was driven by Cultural Historical Activity Theory (CHAT) whereby historically established working methods are brought to question through a new tool. Here, the mobile application 'Coach's Eye'. Through the collection of tutor observations, student journals and post-project interviews, it was clear that Coach's Eye had facilitated a more democratic environment and greater range of activity. The extent to which the addition of technologically-supported learning improved student engagement and enhanced the learning would require further research utilising data designed for that purpose.

Keywords

Mobile Technologies, Student Engagement, Activity Theory, Dance Repertoire, Tertiary Dance Education

Introduction

This article follows a two-year intervention by dance lecturer Sarah Alexander and learning technologists Jeffrey Boehm and Neil Glen in a dance performance module. It took place at Bath Spa University. The study involved two groups of students who were in the first semester of their first year in the BA (Hons) Dance course in 2017 and 2018. The project sought to enhance student engagement through the use of mobile technology, specifically the iPad app 'Coach's Eye' (2011).

The aim of this intervention, to enhance student learning and engagement, was set out clearly by the learning technologists. From the perspective of the dance lecturer, there was a hope that students would shift towards co-ownership of their learning, reflecting the democratic processes put forward in Butterworth's didactic-democratic model for making or learning about choreography (Butterworth, 2011, 47). There were, however, concerns raised by the dance lecturer about the impact of bringing iPads into the studio, such as an over-reliance on the use of the mediated image as a tool for correction and the possibility that this reliance might lead to superficial learning or inactivity in the studio. Counter to this concern, however, was her interest in exploring technological possibilities that, without collaboration, would be challenging for her to facilitate alone. As the project unfolded it revealed types and levels of student engagement. These findings were documented through class footage, student reflections and staff interviews, and are presented under the themes of *specificity, visual correction and embodiment, improved engagement,* and *autonomy and collaboration.*

The rise of technologically-enhanced learning has occurred largely within the last two decades, whereby digital technologies have somewhat disturbed the spatiotemporal co-presence that forms the default setting of the performing arts teaching space (Wake, 2018, 52). Dania et al posit that dance educators have been late in applying technology to their teaching spaces due to concerns that it may impinge on students' kinesthetic experience, alongside low marketability of newly designed technological applications for dance (2011, 3357). They find, however, that today there are many examples of dance multimedia applications for learning. There is no comprehensive record of the myriad of practices and uses of technology occurring within H.E. dance settings; there are, however, significant pockets of activity that show the prevalence of digital technology within a range of dance studies including choreography, composition, improvisation, dance training, dance multimedia and distance learning.

This project sits within a dance training context in which students are aided, through the use of mobile technology, to become co-creators of their learning. Within Wake's categories, the project fits into a blended model that sees the technologically-supported learning as supplementary, so that 'if the power were to go out, the course could continue, though it might feel less complete' (Wake, 2018, 54). This project innovates in its mirroring of the practices of professional companies in which dancers are required to recreate existing repertoire through the use of video recording and playback.

Project background

The driver for the project came from the learning technologists who had obtained a matched-funding grant from the Higher Education Funding Council England. The purpose of the grant was to explore the use of mobile technologies in classroom, workshop, and performance environments such as acting and dance studios. The funding provided equipment and paid student fellows to provide both technical classroom and research support. The learning technologists' aims and objectives for the project were:

1. 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.
2. To assess the impact of the digital tools identified in [their] initial work, using action-based research methods, upon student engagement, understanding, and recall.

The research framework was Cultural Historical Activity Theory (CHAT), a development of Vygotsky and Leontév's Activity Theory led primarily by Yrjö Engeström (2015). CHAT supposes that contradictions can arise within communities, such as educational institutions, that can cause stresses in the work/learning environment which then result in inefficient working methods. For improvement (or development) to take place, the cultural and historical basis of the tensions must be recognised by the constituents of the community, who can then develop or adapt new tools/approaches to alleviate those tensions. The role of the researcher in CHAT is to participate in the process of recognition and solution development rather than to passively offer an answer based upon theoretical ideas. Engstrom calls this process 'formative intervention' (Engstrom, 2011).

In the 'Forward' to *Activity Theory in Education: Research and Practice* (Gedera and Williams 2016), Engeström writes, 'Cultural-Historical Activity Theory is applied around the world in various disciplines and domains of practice. However, its historical roots since the pioneering work of Vygotsky and Leont'ev are closely intertwined with transformations in education' (vii). The book follows on to a series of eleven chapters

which are studies in education utilising CHAT. These studies include online learning, blended learning, and other approaches to utilising technology in various levels of education. In *Acting with technology: Activity theory and interaction design*, Kaptelinin and Nardi supply us with "A systematic presentation of activity theory, its application to interaction design, and an argument for the development of activity theory as a basis for understanding how people interact with technology" (2006). In it, they propose that activity theory allows us to move "from the computer as the focus of interest to understanding technology as part of the larger scope of human activities" (5). Building upon their work, Murphy and Rodriguez-Mananares (2008) point out that the "lens of AT can provide insights into change in teachers' practices", technological innovation in education, and learners (445). Karasaviddis utilised Activity Theory as a means to research how teachers approach information and communication technologies (Karasaviddis, 2009). He found that teachers cited time and curricular restraints as impediments to the implementation of a proposed technological innovation. Pham and Renshaw (2014) provide an example of CHAT's adaptability in their study of Vietnamese teachers working to meld traditional and contemporary assessment practices in order to introduce formative assessment into their classrooms.

The processes delineated in the CHAT approach necessitate the involvement of all stakeholders in a community, and that researchers and stakeholders work together to find solutions to the issues (what Vygotsky termed as the double bind). CHAT is a flexible and democratic approach to research and social problem solving that is applicable in community, industrial, and educational settings. As already evidenced, CHAT is NOT a restrictive approach, where researchers present a method using control groups, and then make empirical observations about how that method works. Hence, these researchers found it to be beneficial for researching the use of new technologies in performance classrooms, such as the dance classroom.

Pedagogy influencing dance training methods

At the heart of this research was a challenge brought by learning technologists Boehm and Glen to the dance lecturer Alexander with the intention of improving teaching and learning. In order to accomplish this, existing cultural historical training methods in dance were questioned so that the intervention could become focused and meaningful. Questions regarding dance training methods used within the different contexts of the conservatoire versus higher education (HE) environments were pertinent to Alexander, who experienced the

conservatoire training programme as a student. Warburton suggests that we initially inherit our dance teaching practices through our own training experiences (2008, 10). Kimmerle and Cote-Laurence (in Raman, 2009) concur that teachers tend to teach the way they themselves were taught, and Raman states that dance technique training is usually achieved through direct teaching methods that rely on mimicry of the instructor (2009, 76). This notion is supported by Coogan (2018-19) who states that Western-based theatre dance teaching formats tend to be 'imitative and highly regimented' with the body 'treated as an object to be formed through the dictates of the teacher'. Given the many contrasts between conservatoire and non-conservatoire programs -- such as the student demographic, institution ethos, graduate destinations, and the adoption of constructivist pedagogical developments within HE -- the need for a pedagogic shift in teaching methods seemed essential.

Questions such as *who are we training?, what are we training them for?* and *how are these studies relevant to the wider world?* provide regular healthy check points for dance lecturers to consider when planning module content for dance degree courses and, most importantly, ensure that the learners remain at the heart of the course. "As the self-consciousness of contemporary learners has constantly increased, it is not possible for any dance teacher...to apply their own ideas automatically to the bodies and minds of the learners" (Soot and Viskus, 2013, 292) This research suggests that the individuality of the learner should be of paramount consideration while constructing a learning environment. Further, the rise of the individual as central within a learning environment suggests more agency should be given to the individual.

Pedagogy has also shifted in terms of the role of the teacher, coinciding with the advent of the internet. Students can find out anything, anywhere, within a digitally-connected, technologically-mobile world, and so the teacher becomes a guide and co-editor of learning, as opposed to a font of knowledge. Risner sees this as a significant opportunity for innovation in teaching and learning, and talks about the importance of "unlearning" our teaching (2009, 8) so that the relevance of what occurs in the classroom or studio, reflects society at large. The inclusion of up-to-date digital technologies, and the subsequent repositioning that occurred in the relationship between students and lecturers within this research, reflects these important pedagogical shifts.

Huddy (2017) suggests that dance pedagogy benefits from theory based on the broader education arena and that university providers must "challenge notions of success as skills acquisition and technical acuity." (175) This concept is particularly challenging when students' previous dance training has occurred through

private dance schools, rather than through GCSE, A Level or BTEC dance courses, since the emphasis on perfection relating to technique and performance at private dance schools will often be paramount to these students on arrival at the university. Moreover, at Bath Spa University, the practical aspect of the dance course requires an immediate bridging of educational experiences between prior dance classes and the HE environment. This particular module, *Body in Performance 1*, is well placed in the first semester to play a key role in encouraging students to embrace a more holistic approach to dance teaching and learning.

Reflective practice

Key to reflective practice is the agency it gives the individual, effectively asking them to reflect upon what they have done. It is embedded within the university as an important learning strategy, but the question is to what extent it is seen in the dance studio? In dance training specifically, there is often a right and wrong way of moving, such as the footwork in a tendu. Warburton's writing on the vertical domain of learning ballet (2008) points out that ballet training has 'highly structured, rule-based components that are resistant to novelty and where adherence to style is most important'. (2008, 9) In contrast, 'most of the components in postmodern dance practice are susceptible to individual transformation' (ibid). Repertoire teaching and learning may fall neatly into the category of a vertical domain but therefore may benefit from reflective practice activities that offer divergent developments for learners. 'Reflection stimulates students' awareness of their bodies and movement experiences, which is necessary for developing high-quality dance skills' (Leijen et al, 2012, 204). It is important, then, to recognise the regularity and actuality of reflection occurring in the dance studio. The common pattern in the learning of dance repertoire is for the instructor to give demonstrations, instructions and corrections and for the students to replicate the movements. Arguably, this process *is* self-reflective since the students must assess their own bodily movement when practising, but the self-reflection occurs within tight time parameters and is almost always initiated by specific corrections given by the teacher. Some students respond better than others to this method, and it is important to recognise that it is only one way, most particular to performing arts, to invite students to reflect. The time specificity and particularity of this learning process suits the faster-paced, more physically-focused dance class. The important question, however, is whether students are given enough time, resources and opportunities to *fully* reflect on their own practice, and whether the integration of recorded footage would invite further, deeper reflection. Bruner's three modes of cognitive

development; enactive, iconic and symbolic representation (Bruner, 1964), point to the need for variation in approaches to learning. His theory that action (enactive), image (iconic) and language (symbolic) all play a part in cognitive development invites any educator to ponder their own preference for particular modes and to find opportunities to widen these preferences. McLeod notes that 'it is effective when faced with new material to follow a progression from enactive to iconic to symbolic representation' (2019). As already alluded to, there is often a lack of language exchange within dance training methodology, with the onus on the instructor to utilise language but rarely the student. The introduction of video software has been found to increase discussion, through capture, archiving and digital reflection mechanisms (Bannon and Kirk, 2014), where the latter term refers to the learner's ability to '"look/listen again" at their digital artefacts and to reflect on them (ibid, 296). Awareness of habitual methodologies of communication within the studio and how these can be challenged is at the heart of this research.

Mobile technology as a training tool in dance

This study defines 'mobile technologies' as handheld, portable, lightweight devices (Kukulska-Hulme, 2005, 1) that are readily available to students (such as mobile phones, and tablets). The intended use of these devices is to improve technique and performance within dance repertoire through recording and playback. Therefore, supporting research will similarly focus on the use of correctional software that enhances dance training.

There are numerous examples of research projects that sought to utilise video technology in the dance studio as a learning tool (Huddy 2017; Leijen et al. 2009, 2009b; Li, Zhou and Teo 2018; Ostashewski, Reid and Osashewski 2016; Risner and Anderson 2008; Tomczak 2011), with some of these aiming to increase student engagement and reflective skills. Ostashewski, et al. begin their article by stating that 'dance education practices do not readily incorporate educational technology' (2016, 112). Li, et al. report the same findings regarding dance in secondary schools (2018, 183). The question is whether this occurs because of the lack of technical support, time, or resources. Reid et al. (2006, 126) discuss the challenges of preparing and organising digital files prior to interaction with students and the need for the instructor to be familiar with the media. Conversely, Ostashewski et al. (2016) used iPads for demonstration, playback and practice activities and found that creating and collecting video segments was 'quick, and extremely reliable, aspects required of technology

to be useful in classroom application.' (125) They did, however, note that the organisation of the video clips was time-consuming, as did Reid et al. (2006).

The issues of technological proficiency and the time needed to process digital media are recurring themes throughout educational circles. Common barriers include inadequate teacher training in technology, lack of time to prepare for the integration of technology, and not enough technical support (Abrahams 2010; Hechter & Vermette 2013; Hsu, 2016). However, Kopcha (2012) found that a well-developed, long-term mentoring program -- as opposed to short-term training -- helped teachers apply technology as a teaching tool in a more sustained manner. This project was one of mentoring, utilising the learning technologists as mentors.

Research suggests that the use of technology can enhance existing face-to-face studio practice through reinforcement as well as extending learning beyond the studio (Li, Zhou and Teo, 2018). Ostashewski et al. (2016) found it was particularly beneficial to their students to have individual control of video playback, thereby allowing them to work at their own pace and take ownership in order to develop student centered learning. Huddy suggests a number of ways in which technology enhances learning, such as developing reflective practice and digital skills with the use of alternative formats aligned with dance industry trends (2017, 176). Huddy's research exhibited a desire to 'unsettle the traditional role-play and hierarchy that underpins the artistic foundations of the dance industry (ibid, 181), which she sees as prevalent in the dance studio. Through student-led creation, collection and critique of video footage of dance technique exercises, Huddy was able to create a collaborative approach to dance training, thereby fostering a culture shift away from didactic, teacher-directed approaches. (182-183). Huddy's study marked a successful shift of using a digitally enhanced environment to affect student centered approaches to learning in dance.

Leijen et al. (2009b) used video streaming of ballet technique classes to support the three processes of reflection, describing and evaluating experiences, and relating to multiple perspectives (175). They found discrepancies between student awareness of how movement felt versus how it looked after viewing the footage. They also observed that students, when self-evaluating, focused mostly on specific technical elements, such as their take-off and landing in a jump, rather than considering the whole sequence. They assert that this limited understanding could be seen as a shortcoming of the technology.

It is clear from the above examples that technological support is often required to ensure that teachers are able to utilise technology fully. When time and resources are invested into the use of technology as a training tool for dance, there are many positive outcomes. However, the use of technology still remains on the fringes of dance technique training approaches since most educators prefer to focus on live demonstration and recall within a largely didactic teaching environment.

Methodology

Cultural-historical activity theory

In essence, CHAT consists of identifying the issues in a given environment (such as a classroom) and then identifying how and why those issues came to be, followed by the implementation of new approaches. One example could be that of a policy in a workplace, written thirty years prior, which may no longer be relevant, but because it is still active, is hampering efficiency. The recognition of the changes in the workplace community since the implementation of the policy could then lead to the development of new policies that are more relevant to the current day.

The collaborative nature of this project between dance and learning technologists represented a desire of the researchers to extend practice through combined knowledge, skills and application. This cross discipline immersion created a healthy discourse across and among staff and students that encouraged a democratic working environment by incorporating the notions of community, consumption, exchange and division of labour from Engstrom's Activity Theory (Engstrom, 2015) and Bruner's three modes of cognitive development (Bruner, 1964). Together, they informed the structuring of various tasks that aimed to fully utilise the potential of the Coach's Eye app in the dance studio in order to shift from tutor-led to student-led tasks such as peer feedback and self-assessment.

Identification of cultural-historical practices and attendant issues

This process began with discussions among the dance team lecturers and the learning technologists, identifying the aforementioned cultural practices and the issues inherent with them. After the 2017 iteration, armed with student feedback, the personal reflections of the module leader and learning technologists, we identified areas for further development. Alexander then reorganised the curriculum, and the learning

technologists, Boehm and Glen, reorganised the capturing and uploading of the digital media. The 2018 project was then readied for a student fellow from the first year cohort, and eighteen female first year students.

The prospect of implementing change through collaboration with the learning technology team raised some fundamental and important questions regarding the way dance is taught historically, to what extent historical practice informs current practice, and where opportunities might exist to modernise those approaches. Dialogue with other pedagogues regarding these questions helped to inform the first stage of this research, which McNiff describes as "a particular way of looking at your practice to check whether it is as you feel it should be." (2013, 23) Further reflection upon student behaviour within the module was essential in leading to ideas around improving engagement. As McNiff has stated, while reflecting upon your own accountability during activity-based research, "you (must also) recognise that you are always in relation with other people, always situated in a real-life social, political, economic and historical context" (24). For example, Alexander had previously observed that student passivity often increased consistent with a predominance of tutor-led instruction. The challenge, therefore, was to increase student agency so that ownership of the learning shifted from the tutor to the students. The difficulty of this challenge is magnified by the fact that the choice of dance repertoire being presented comes from the canon, a practice that reinforces the hierarchical place of the profession. This practice produces an interesting quandary in respect to developing student agency.

Previous student responses to the learning of repertoire established that the students appreciated their connection with the profession, which they tend to put on a pedestal and thereby place themselves firmly within a hierarchy. Although one may postulate that there is nothing wrong with this behaviour, in order to encourage an understanding of the purpose of action and the necessity for a good fundamental approach to movement, it is necessary to get students to understand that their role is not to wait for knowledge to be bestowed upon them but to actively seek it themselves. Thus, introducing more opportunities for students to discuss, reflect and interact in relation to the repertoire may impact how they understand their place within the profession and how they relate to the core repertoire, the tutor and each other.

The tools

The specific technologies, or tools, to be explored were mobile phones, tablets, and the Coach's Eye app (undated) from Techsmith. The app was designed specifically for helping coaches to work more efficiently

when developing athlete's technical skills by providing targeted visual feedback. The app not only allows the coaches to record an athlete, but also provides sports commentator-like feedback tools. With the app, videos can be viewed in slow motion, which, when used with the scrub tool (a virtual dial that allows the user to scroll back and forth at will) affords the viewer the ability to see the detail of their movements. An instructor can also emphasize points of motion using a freeze frame feature.

Additionally, the university had recently introduced Panopto as an integrated app in the virtual learning environment (VLE). Panopto made for a simple way to upload videos into specific group folders within the VLE. By utilising the folders, the members of each learning group could access their videos for later reflection.

The researchers hoped that the students' engagement with technology would allow them to take their understanding beyond merely learning dance steps to establishing connections between the feel of a movement and what they are actually projecting to the viewer. That immediate goal was coupled with a desire for the students to carry their experiences with technology long term and to continue their development beyond the university. Huddy points to the 'digitally enhanced entertainment, education and employment environment' (Huddy, 2017, 174) for which degree courses must prepare their graduates. Within this context, the researchers were keen to find opportunities to integrate technology into the physical learning environment of the dance studio.

The dance lecturer was keen to challenge her teaching practice by employing these new digital technologies, seeing their use as a way for students to learn and interact with dance repertoire in a multitude of new ways. The collaboration with the learning technologists, inherent within the CHAT approach, offered important technical support, an essential component to advancing the use of technology in the classroom. A part of the role of the student fellows was to provide additional support in the studio by using the iPads to film small group performances, and to upload the videos to Panopto within the VLE. With this additional support, the dance lecturer was able to focus on *how* and *why* she might integrate the new tool.

Application of constructivist principles

Pedagogic enquiry emerges through the application of constructivist principles where the emphasis is on the learner constructing the knowledge for themselves. This approach begins with a model which the student

examines and then applies to the creation of a project. Student-centred, problem-based activities fall under the seven characteristics of constructivist principles:

> experiencing with knowledge, appreciation of multiple perspectives, using realistic contexts, student voice and ownership, social interaction, multiple modes of representation and self awareness in learning.
>
> (Aydogdu and Selanik-Ay, 2016, 295)

Experiencing with knowledge means that a student gets to see an end product explained, so it is modelling by somebody with experience and knowledge. Appreciation of multiple perspectives is a staple of academic inquiry, but in this project's application involves hearing critiques from others. The nature of the project-based dance studio is to put students into a realistic context from the professional world. Student voice and ownership can cover many different approaches, but involves students being able to have input into their projects. Social interaction is just that, interacting with others, rather than working solely in isolation (common in academic settings). Multiple modes of representation can also have many approaches, but in this study involves kinesthetic, oral, written, and visual (through video) modes. Self awareness in learning is the driver to this whole project in that it is intended to help students to become self-sufficient in analysis and self-understanding.

Table 1. Constructivist characteristics applied to the curriculum

Characteristic	Application
experiencing with knowledge	Tutor modelling self-analysis, dance model
appreciation of multiple perspectives	Peer and tutor feedback
using realistic contexts	This is the nature of dance training
student voice and ownership	Peer and self-analysis, creation of dances, selection of sessions for feedback.
social interaction	Peer feedback, collaborative creation
multiple modes of representation	Visual feedback, oral feedback
self awareness in learning	Self-analysis, journals

The module structure utilised these characteristics which were applied to a scaffold framework that shifted incrementally towards student ownership. **Table 1** provides a synopsis of the specific characteristics and their application. This process produced the following sequence (the steps unfolded over a series of class meetings):

- Whole group demonstration by tutor followed by tutor self-critique (students passive)
- Small student group recordings and tutor-led critique (students semi-passive)
- Independent group working time and application of critique using iPad footage (students active)
- Peer to peer recordings and peer critique using replay and slow motion in pairs (students active)
- Self-critique by students watching footage alone and writing corrections into the online journal (students active)

Application of the technology

Four iPads were equipped with the app 'Coach's Eye' (https://www.coachseye.com/) and assigned to fixed groups of four or five students, which meant those students would always work in the same group. Group footage was shot of selected sections of the repertoire showcasing specific aspects of technique as determined by the tutor. During the modelling and prompt sessions, the tutor plugged the iPad into a large screen so that it could be viewed easily by the whole group. The footage was uploaded each week into labelled folders aligned to the student groups in Bath Spa's Blackboard-based virtual learning environment (VLE). Panopto, a video content management add-on, was used to facilitate the organisation and uploading process. This process was initially undertaken by the learning technologists, then by a student fellow, until the lecturer eventually assumed these responsibilities. After discovering how to utilise Panopto, the time required for uploading to Blackboard was reduced to a few minutes at the end of class.

Ethics, data collection and assessment

Each of the students voluntarily signed an ethics approval form that was approved by the university's research committee. The form detailed that any footage shown to the public would only be within the context of research conferences or journals. It also stated that footage was not to be shared outside of their group.

The project was evaluated from the perspectives of all the participants involved. Methods of data collection included:

- Student group interviews and informal feedback

- Data collected in the studio footage by the two cameras
- Data collected by the researchers and student fellows with hand-held devices
- Observation notes from staff and student fellows
- Learning technologists interviews with the dance tutor
- Staff observations of the occasion and duration of mobile device usage from the studio footage
- Dance tutor observations of student reflections in their online journals

In the studio, two cameras were set up to record the behaviour of all participants during the sessions. One camera recorded the whole studio while the other camera focused on one corner of the studio containing a large wall-mounted monitor used by the dance tutor to engage the students in various reflective tasks using Coach's Eye. The visual data was collated by staff in the Media department so that all video footage was melded into a Premiere Pro timeline (Premiere Pro, 2018). This presentation method allowed for simultaneous viewing of all activities occurring during each session. Observation notes and interview recordings were placed into shared Google folders. The researchers then spent several sessions reviewing the classroom videos, observation notes, and interview responses in order to collate and code the findings arising from the data.

Findings

This section will focus upon our findings regarding the effect of using Coach's Eye with the students. In the conclusion, we will review the changes that we made regarding the methods of implementation based upon our own experiences and the review of the student experience. Our examination of the data as described above revealed four primary themes as related to the students: specificity, visual correction and embodiment, improved engagement, autonomy and collaboration.

Specificity

The use of mobile technology in the dance studio has been praised for its specificity. "The personal on-demand nature of video on the iPad allows...dance teachers, to focus on what they determine to be the necessary material at any given time." (Ostashewski et al., 2016, 123) This phenomenon was certainly true of this research, in which the crystallisation of the particular stages of the students' learning journeys was utilised by Alexander within a range of feedback tasks that varied in scope and focus. Coach's Eye provided students with a visualisation of their performance at a particular point in time, and the access to this evidence was on demand and unlimited. These affordances helped students identify what they were doing well and how they could

improve. Ostashewski et al. note that video footage 'lacks characteristics to focus viewer attention on intricate footwork' (124) and that mobile technology allows for greater control over the angle and proximity of the footage. One feature of Coach's Eye is the drawing function where a particular limb or joint can be circled or pointed out with lines or arrows, bringing attention to the need for specific corrections. This tool was utilised by Alexander to try to encourage correct angles of arms and legs. Boehm and Glen observed the students' increased engagement when Alexander used the drawing tool. There was no evidence from the footage or group interviews that students employed the drawing tool when they used the application for themselves. In the post-project student interviews, students said they saw it as a useful teaching tool if they were correcting someone else but not needed when reflecting on their own performance.

The repertoire taught within this module was fast and intricate, requiring excellent movement memory and coordination in order to stay with the tempo of the music. Because of the fast tempo and short length of the sequences, the ability to provide individual feedback to students was a particular challenge to the dance tutor. The slow motion feature of Coach's Eye therefore became extremely useful and was the primary feedback tool. Within this module, one of the aims was to perfect sequences of movement and emulate specific qualities; Coach's Eye offered the clarity needed so students could assess how close they were to the aesthetic requirements. An excerpt from a student journal supports this assertion:

> I find this visual way of learning very useful as it really helps you pick apart each movement due to being able to watch yourself in slow motion and pause yourself. This lets you see things you wouldn't see when you or someone else is performing the phrase at full speed. (Student 1, session 4)

It is clear that Coach's Eye allowed performance analysis, but a question remains regarding the depth and type of analyses. Leijen et al. (2009b) noted how video playback encouraged specific corrections at particular moments within a dance sequence but not an overall sense of the whole phrase. In this research, the breaking down of the movement that is lauded as highly useful and informative by the students in their journals may counteractively have resulted in fragmenting sequences that have shape, phrasing and flow to them. Indeed, one student voiced the difficulty she found in breaking down the movement in greater detail. When asked if the slow motion playback could be seen as unhelpful, the student said that 'sometimes I would look so into the finite detail...and I would stress and stress so much on that, and it was really something you couldn't

see when you were going fast' (Student 2, group interview). The student was struggling to find a helpful balance between critically analysing her performance and letting go of criticality for the sake of dancing the sequence as a whole. Despite this concern, when the students were asked if Coach's Eye hampered their learning, there was a resounding 'no'.

The process of turning dance into written reflection is, in itself, a transformation into a different form, that of text. That does not mean, however, that students' ability to recognise phrasing and flow when dancing the repertoire was subsequently hampered by the analytical process used. The scope of this particular study does not allow for any firm conclusions about the impact of written movement analysis on the subsequent embodiment of a dance sequence, or how Coach's Eye may have impacted on the quality of their written analysis.

Visual correction and embodiment

As mentioned earlier, Alexander was reluctant to use video technology because she was concerned that students would over-analyse and therefore favour the visual aesthetic of the movement above the felt sense, which would potentially lead to a superficial or mechanical replication of the repertoire rather than an embodied performance. With this in mind, when she critiqued students, she was careful to relate the filmed footage back to sensation and image where possible in order to try to forge links between what was viewed during feedback and what was felt when dancing. During these critiques, the captured footage establishes that many of the students embody corrections as they are discussed, therefore transferring the symbolic and iconic information they are receiving into enactive information. In the group evaluative interview conducted at the end of the project, one student stated 'When you see it, it makes it easier to know what it feels like' (Student 3, group interview), a sentiment supported by many others during the group interview. A clear connection between the feeling and viewing of the repertoire indicates a reciprocal relationship between doing and watching that is supportive to the student, thereby refuting the lecturer's initial concerns around superficial responses or the prioritising of the image over the experience.

In Leijen et al.'s study (2009), which used video to enhance student reflection, the process was broken down into three parts, the first of which was to describe an experience. It was observed that 'dance students need to look at their performance experience from a more objective perspective, as though they were actions of

another' (170) and that 'What dance students think or feel about a movement often differs from the actual physical image of the movement' (ibid). Indeed, one student's online journal revealed similar reflections:

> we were introduced to the Coach's Eye app which allows us to really look back at things in detail and slow the footage down. This allowed me to see things within myself that I hadn't even imagined, let alone picked up that I was doing. (Student 4, session 3)

This same student then talks specifically about recognising a problem with her hip alignment, 'Seeing it so clearly for myself first hand really helped as I know how the material feels within my body and I know now to think about (hip alignment) more.' (ibid) It is clear from these and other journal entries that the objectification that occurred through the mediated image assisted students in their observations of their technique and performance within the repertoire -- both how it felt and how it looked. Digital technologies, therefore, provided a place for reflection, enabling students to watch and process recordings from a distance; to explain or express their thoughts on their performance.

Evidence of improved engagement

Because the viewing of the footage was integrated into the lesson plan, more class time was dedicated to feedback and reflection. Alexander observed during her interview (2018) that the studio activity had diversified and that more observation and discussion was evident than in previous years. She also observed that because the feedback process happened in smaller, focused groups, as opposed to the usual scenario of the whole class working on corrections individually and simultaneously, there was evidence of improved effort and clarity.. Another reason for this improvement in engagement could be the specificity that Coach's Eye created. For example, pausing the footage within a relevé in second position, Alexander was able to note the line of the ankle and the ability to hold turn out in the legs, which led to a discussion about the muscle strength and technique needed to achieve this position. Each student could witness the extent to which they were able to find this particular position.

The correction of movement and the repetitions required to improve can sometimes appear to be an arduous experience for some students and can require a fair amount of prompting. Coach's Eye shifted this process into a different space -- the screen – where students appeared more ready to be objective about their performance. With the lived experience now re-presented as 'other', the footage could be corrected, rather than the live body. Alexander noticed that using footage seemed to shift the onus away from her needing to be the

authority on correcting students, thereby converting the process of improving performance into an exchange rather than an instruction. This exchange existed in multiple ways: between the tutor and the students, between the tutor and Coach's Eye, between the students and Coach's Eye, and between the students themselves. Many more of these exchanges could occur at any point in time due to the accessibility and autonomous nature of the iPads.

Autonomy and collaboration

Within tertiary education, students are expected to 'become more autonomous in their learning' (Smith-Autard, 2002, 178). The recorded overview of the dance studio sessions revealed how students independently used the iPads both on their own and as a group, making decisions about what to rewatch and utilising these recordings to help push their performances forward. Much of the video reveals different pockets of activity occurring simultaneously around the studio. Some students might be engaged in self-assessment, peer learning or tutor led discussion while others might be utilising Coach's Eye. In the post-project student interview, students were asked how they found the concurrent mix of learning activities. Opinions differed amongst the students; one student appreciating the time spent on individual correction whilst her group continued to develop their group dance for assessment; another stating that it was stressful to have to leave her group to engage in another activity. Arguably, the student responses may depend on individual levels of confidence in the repertoire, and in the ability to adapt and be flexible to changing modes of delivery. What is evident is that students were required to engage in the repertoire in different ways; collaborative face-to-face work, and technologically-enhanced self assessment being just two examples.

Of great significance are the face-to face interactions that occur when a group of people are working together in the same space. This kind of 'blended' learning environment is recognised by Kukulska-Hulme and Traxler (2005, 26). In Alexander's post-project interview (2018), Glen observed the way in which students would receive feedback from her via the wall mounted studio monitor and then take that footage away with their group and continue to comment and help each other make effective changes. The crucial stage here is the latter one, when students had time to reflect and work on the feedback by interacting with Coach's Eye, since this was the point at which student autonomy and ownership could develop. Many of these findings support

Kukulska-Hulme's proposition that mobile devices support learning that is 'more personal, yet at the same time more connected to the surroundings and with more potential for connected, collaborative activity.' (2005, 3)

Conclusion

This research project was initially aimed at improving student engagement through the use of mobile technologies. What emerged from the research, however, was a learning opportunity for all those involved based on the integration of Coach's Eye acting as a partner to practice for the development of both teaching and learning. Working through the lens of CHAT helped to place the whole process within the scope of the profession while allowing for all participants to have a voice in the way this new tool was employed.

The students engaged well with the application and were able to make specific movement observations that were revealed by the slow-motion feature. Although slow-motion is not a new feature to video, Coach's Eye scroll feature allowed for frame-by-frame playback so students could see every movement in detail. Although this aspect of the technology can be seen as advantageous, it is also possible that analysing the detail could fragment the movement and possibly lead to over thinking. This concern was voiced by one student in the group interview. Counter to this opinion, however, other students described the link between watching and feeling the movement as an important advantage to using the app. It appears there was a symbiosis that helped students to better understand the connections of feeling and movement.

From Alexander's perspective, the pedagogical developments instigated by the project were somewhat unexpected. The project started by questioning the underlying cultural historical conditions of dance training and then led to concrete strategies that diversified teaching and learning in the studio. Her initial concerns about the overuse of screens in the dance class were unfounded since there was no evidence of any drop in physical application. In fact, rather than narrowing the learning to an aesthetically focused analysis, the engagement with mobile technologies created unforeseen avenues for student ownership of their own learning journeys. The studio became a multi-faceted learning environment in which simultaneous learning activities took place and there was a shift away from didactic, authoritative teaching of repertoire towards a more democratic environment. This outcome is particularly significant in relation to the teaching of repertoire within degree courses, as the word repertoire implies professionalism and expertise, potentially making students feel as though they are learning from a 'master'. The iPads helped to reframe the learning in different ways

(collaboration, peer learning, self-reflection) in line with HE learning contexts. This study therefore falls within debates around technique training within HE settings, both how and why we do it. (University of Winchester, 2018)

Through this project, the learning technologists gained greater insight into the barriers and possibilities of using mobile technologies and the design of fine arts and performing arts learning environments. The experiences confirmed Kopcha's (2012) successes with teachers and technologies in mentor-based relationships. The utilisation of Activity Theory as a basis for creating an understanding of cultural-historical practices was essential to the evolution of student and instructor engagement with new practices and enabled the development of useful, independent use of the technology. These developments meant that the technology itself became readily available and easy to use, making it a vehicle through which learning may be enhanced, rather than being the centrepiece of the classroom.

The Covid-19 pandemic of 2020, and still ongoing at the time of writing, has highlighted the need for multifaceted approaches to teaching and learning. In this digital age, dance pedagogy must embrace opportunities to engage with technology, which, in turn, may alter preconceived notions of how we teach dance. The prevalence of technology in the world should be reflected in the dance studio, ensuring learners become digitally-literate. This study has shown that digital literacy within practical dance classes need not take away the focus from the experiential, nor impact on physical intensity. If used well, mobile applications offer the flexibility of feedback needed for diverse groups of learners, potentially increasing levels of output within any given task.

Questions for further research

One of the concerns that arose, however, was that the students in the second cohort did not wish to make the choice to spend the very little money (£5) to own the app themselves, whereas some from the first cohort had purchased it. Their reticence to pay for it was in spite of their effusiveness in their praise of the app for its usefulness and helpfulness. Because one goal of the implementation of this technology was to provide them with an inexpensive and effective means for self-improvement, it begs the question about student motivation in this regard. Is there a cultural shift where we are now expecting highly effective programs to be available for nothing?

An examination of the effectiveness of this approach on the student's written analyses is in order. Although it would be difficult to have a control group and an experimental group in this study, it would be of great interest to explore.

The focus of this module is mostly on technical development, an application the Coach's Eye app has proven to be highly effective in aiding. But how effective can it be in looking at the projection of emotion and energy?

One of the features of the app which we did not explore is the ability to make critiques over the top of the video. Would utilising this feature be an effective use of the tutor's time? Would it be an effective tool for the students to use as part of their reflective journal? Certainly, a CHAT approach to one or both of these implementations would be an effective way to learn the answers to these questions.

This work was supported by funding from Bath Spa University and a **Catalyst Fund Small-Scale Projects in Experimental Innovation Grant from** the Higher Education Funding Council for England.

References

Abrahams, D.A. 2010. "Technology Adoption in Higher Education: A Framework for Identifying and Prioritising Issues and Barriers to Adoption of Instructional Technology." *Journal of Applied Research in Higher Education* 2 (2): 33–49. doi: 10.1108/17581184201000012

Alexander (2018) Post project interview with Sarah Alexander. Available at: https://youtu.be/srXS38gt3EQ

Aydogdu, B. and Selanik-Ay, T. 2016. "Determination of Teacher Characteristics That Support Constructivist Learning Environments." *Eurasian Journal of Educational Research*, 63: 293-310, http://dx.doi.org/10.14689/ejer.2016.63.17

Bannon, F. and Kirk, C. 2014. "Deepening discipline: digital reflection and choreography." *Research in Dance Education*, 15(3): 289–302. doi: 10.1080/14647893.2014.910185.

Bruner, J. S. 1964. "The Course of Cognitive Growth." *American Psychologist*, *19*(1): 1–15. https://doi.org/10.1037/h0044160

Butterworth, J. 2011. *Dance Studies: the basics*. London: Routledge

Coach's Eye, no date, Available at: https://www.coachseye.com/

Dania, A., Hatziharistos, D., Koutsouba, M., Tyrovola, V. 2011. "The use of technology in movement and dance education: Recent practices and future perspectives." *Procedia - Social and Behavioral Sciences*, 15: 3355–3361. doi: 10.1016/j.sbspro.2011.04.299.

Engeström, Y. 2011. "From Design Experiments to Formative Interventions." *Theory and Psychology*, 21(5): 598-628. doi: 10.1177/0959354311419252

Engeström, Y. 2015. *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research* (2nd ed.). Cambridge: Cambridge University Press

Gedera, D.S. and Williams, P.J. (eds.) 2016. *Activity Theory in Education: Research and Practice*. Rotterdam: Sense Publishers

Hechter, R. P. and Vermette, L.A. 2013. "Technology Integration in K-12 Science Classrooms: An Analysis of Barriers and Implications." *Themes in Science & Technology Education*, 6(2): 73-90. Available at: https://www.learntechlib.org/p/148638/.

Hsu, P. 2016. "Examining Current Beliefs, Practices and Barriers About Technology Integration: A Case Study." *Association for Educational Communications & Technology*. doi: 10.1007/s11528-015-0014-3

Huddy, A. 2017. "Digital technology in the tertiary dance technique studio: expanding student engagement through collaborative and co-creative experiences." *Research in Dance Education*, 18(2): 174–189. doi: 10.1080/14647893.2017.1330327.

Kaptelinin, V. & Nardi, B. 2006. *Acting with technology: Activity theory and interaction design*. Cambridge, MA: MIT Press.

Karasavvidis, I. 2009. "Activity Theory as a Conceptual Framework For Understanding Teacher Approaches to Information and Communication Technologies." *Computers & Education*, 53: 436–444. https://doi.org/10.1016/j.compedu.2009.03.003

Kopcha, T. J. 2012. "Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development." *Computers & Education* 59(4):1109–112. doi: 10.1016/j.compedu.2012.05.014

Kukulska-Hulme, A. & Traxler, J., eds. 2005. *Mobile Learning: a handbook for educators and trainers*. London: Routledge

Leijen, Ä., Lam, I.,Wildschut, L., Simons, P.R.J. 2009. "Difficulties Teachers Report about Students' Reflection: Lessons Learned from Dance Education." *Teaching in Higher Education*, 14(3): 315–326. Available at: https://search-ebscohost-com.bathspa.idm.oclc.org/login.aspx?direct=true&db=eric&AN=EJ858145&site=eds-live&scope=site (Accessed: 30 March 2020).

Leijen, Ä., Lam, I.,Wildschut, L., Simons, P.R.J., Admiraal, W. 2009b. "Streaming video to enhance students' reflection in dance education." *Computers and Education*, 52(1): 169 - 176.

Leijen, Ä., Valtna, K., Leijen, D.A.J., and Pedaste, M. 2012 'How to determine the quality of students' reflections?', *Studies in Higher Education*, 37(2): 203–217. doi: 10.1080/03075079.2010.504814.

Li, Z., Zhou, M., and Teo, T. 2018. "Mobile technology in dance education: a case study of three Canadian high school dance programs." *Research in Dance Education*, 19 (2): 183–196. Doi: 10.1080/14647893.2017.1370449.

McLeod, S. A. (2019, July 11). Bruner. Simply psychology: https://www.simplypsychology.org/bruner.html

McNiff, J. 2013. *Action Research*. 3rd ed. Routledge Ltd.

Murphy, E. and Rodriguez-Manzanares, M.A. (2008). "Using Activity Theory And Its Principle Of Contradictions To Guide Research In Educational Technology." *Australasian Journal of Educational Technology*, 24(4), 442-457

Ostashewski, N., Reid, D., and Osashewski, M. 2016. "Utilizing Multimedia Database Access: Teaching Strategies Using the iPad in the Dance Classroom." *Journal of Dance Education*, 16 (4): 122-128. DOI: 10.1080/15290824.2015.1091939

Pham, T.H.T. and Renshaw, P. 2014. "Formative Assessment In Confucian Heritage Culture Classrooms: Activity Theory Analysis Of Tensions, Contradictions And Hybrid Practices." *Assessment and Evaluation in Higher Education*, 40 (1): 45-59. https://doi.org/10.1080/02602938.2014.886325

Premiere Pro. 2018. Adobe.

Raman, T. 2009. "Collaborative Learning in the Dance Technique Class." *Research in Dance Education*, 10(1): 75–87. doi: 10.1080/14647890802697247.

Reid, D., Kervin, L., Vardy, J., and Hindle, C. 2006. "We've got the iPads but where do we start? The story of two grade 4 teachers." *IADIS International Conference Mobile Learning*. Available at: https://www.researchgate.net/profile/Doug_Reid3/publication/268050603_WE'VE_GOT_IPODS_BUT_WHERE_DO_WE_START_THE_STORY_OF_TWO_GRADE_4_TEACHERS/links/5512e9950cf270fd7e33e3c2.pdf

Risner, D. and Anderson, J. 2008. "Digital Dance Literacy: An Integrated Dance Technology Curriculum Pilot Project." *Research in Dance Education*, 9 (2): 113–128. doi: 10.1080/14647890802087787.

Risner, D. 2009. "Challenges and Opportunities for Dance Pedagogy: Critical Social Issues and 'Unlearning' How to Teach." *Congress on Research in Dance Conference Proceedings*, 41(S1), 204-209. doi:10.1017/S2049125500001114

Smith-Autard, J. 2002. *The Art of Dance in Education*, 2nd ed. A. & C. Black

Sööt, A., and Viskus, E.. 2013. "Contemporary Approaches to Dance Pedagogy – The Challenges of the 21st Century." *Procedia – Social and Behavioral Sciences*, 112: 290–299. doi:10.1016/j. Sbspro.2014.01.1167

Tomczak, K. 2011. "Using Interactive Media in Dance Education." *Journal of Dance Education*, 11:4. DOI: 10.1080/15290824.2011.621391

UniofWinchester (2018) Roundtable on Dance Technique and Performance Training. Available at: https://www.youtube.com/watch?v=ojpqq2Y5hxA&feature=youtu.be

Wake, C. 2018. "Two decades of digital pedagogies in the performing arts: a comparative survey of theatre, performance, and dance." *International Journal of Performance Arts & Digital Media*, 14 (1): 52–69. doi:10.1080/14794713.2018.1464097.

Warburton, E. C. 2008. "Beyond Steps: The Need for Pedagogical Knowledge in Dance." *Journal of Dance Education* 8 (1): 7–12. doi: 10.1080/15290824.2008.10387353.

Author Details

Sarah Alexander, MA FHEA
Senior Lecturer in Dance, Bath School of Music & Performing Arts, Bath Spa University, Bath, UK
Corresponding Author: s.alexander@bathspa.ac.uk (https://orcid.org/0000-0002-4334-5055)

Sarah trained at Rambert Dance School, and then at the University of Brighton, where she gained a degree in Dance and Visual Art. Between 2005 and 2012 she worked extensively as a freelance dance practitioner in Brighton, London and the South East, working for organisations such as Rambert Dance Company, Bicycle Ballet and Creative Partnerships. Sarah completed her Masters at Trinity Laban in 2012 where she developed an interest in choreological studies and furthered

her choreographic interest in physical comedy. Her first lectureship was at UCS in Ipswich, where she also co-founded the arts company Co.Here with composer Amy Mallet. The company specialised in creating musical theatre performances in site-specific locations.

Sarah joined the dance department at Bath Spa University in 2014, gaining her FHEA and becoming a Senior Lecturer in 2018. Her teaching specialisms include choreological studies, site-specific choreography, performance skills and professional development planning. She has a particular interest in collaborative opportunities, having worked with music, acting and learning technology colleagues on a number of different projects and performances.

Jeffrey D. Boehm, Ph.D. SFHEA

Senior Lecturer in Music, Bath School of Music & Performing Arts, Bath Spa University, Bath, UK
j.boehm@bathspa.ac.uk

Jeffrey D. Boehm, Ph.D. SFHEA is Senior Lecturer in Music at Bath Spa University, where he conducts Wind Band, Orchestra, Chamber Society and the Opera. He also teaches Music Composition, specialising in composing with technology. He formerly held the position of Learning Technologist for the School of Music and Performing Arts at Bath Spa, where he was able to combine his interests in teaching technologies and performance. Prior to that, he held the position of Professor of Instrumental Music at Bluffton University (Ohio, USA), where he developed the university's first online course, 'Perceiving the Arts'. Boehm also taught at William Penn University (Iowa) and Otterbein University (Ohio). He holds a Ph.D. and M.M in Trumpet Performance from the University of Wisconsin-Madison, and a BME from Otterbein University.

Neil Glen, MA RCA SFHEA

Academic Developer, Bath Spa University, Bath, UK
n.glen@bathspa.ac.uk

Neil is Academic Developer for Bath Spa University, creating, developing and researching technology-enhanced learning experiences, to which he brings a design-led approach.

Neil works across academic and professional service teams at Bath Spa, encouraging cross-disciplinary thinking. He has experience of developing and leading programmes, and modules, at undergraduate and postgraduate level.

Neil has also led several university-wide projects including redesigning the VLE and the design and curation of MediaWall, an architectural scale space for staff and students to collaborate and experiment with large-scale digital media. At the core of Neil's work and research is the relationship between digital and physical learning spaces, and enabling new pedagogies to emerge through co-creativity between students and academics. He co-led 18-month HEFCE (OfS) £130k funded research project exploring the affordances of mobile devices in arts practice and performing arts.

Most recently Neil led the learning space design for a new university campus at Locksbrook Road in Bath, bringing a mobile-first approach to creating technology-enhanced learning for art and design practice.

Neil has previously worked with various academic institutions including leading business development for Northumbria University's outward-facing design research centre and as Senior Lecturer in Interaction Design at the Royal College of Art in London.