Higher Education Academy

TRANSFORMING TEACHING
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Innovative pedagogies series:

Using electronic voting systems in the Arts and Humanities

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Introduction

Electronic solutions enabling the instantaneous processing of audience polls may be encountered in a variety of situations, from university classrooms to popular television game shows. The principle by which they operate is straightforward: firstly, a question is posed, for which a list of possible responses may be provided. Secondly, each member of the cohort is invited to make their choice, whether using a voting handset (often called a 'clicker') or their own mobile device. Thirdly, these responses are sent to a computer, which collates and displays the results instantaneously once the poll is closed (normally by drawing a column chart); alternatively, the graph may be redrawn in real time as the users' votes are received. The method by which different solutions operate differs from technology to technology: bespoke handsets use wireless receivers, mobile devices send the information via either the Internet or SMS messaging, and there are also various online methods by which analogous polls may be conducted. But the pedagogy is essentially the same irrespective of the technology.

Electronic voting systems (EVS) have gained increasing momentum since their introduction to university classrooms in the 1990s, and a substantial pedagogy has evolved around them, fuelled by pioneers including Dufresne *et al.* (1996), Mazur (1997), Hake (1998), and, in the UK, Draper, Cargill, and Cutts (2002) and Boyle and Nicol (2003). Their wide-scale use has tended to crystallise around disciplines such as the STEMM and Business subjects, to the extent that the volume of pedagogical literature that now supports these disciplines is not matched by a comparable body of scholarship in the Arts and Humanities. However, EVS afford a wealth of possibilities for enhancing the types of teaching more distinctive to the Arts and Humanities (see Figure 1), not least in respect of more opinion-based questions to which there may be no definitively right or wrong answer.

FIGURE 1: A MUSIC CLASS UNDERTAKING AN EVS TASK

This account presents aspects of my story in adopting EVS within the less well-documented terrain of Arts and Humanities education. It explores my motivation for starting to use EVS, the development of my teaching activities over time, and their impact on the student learning experience. It outlines several of the many different ways in which EVS have been employed within my classes, the pedagogy and scholarship underpinning my academic practice, and opportunities for combining EVS with other learning technologies. Finally, it offers advice on how the approaches I have used might be taken up by others new to EVS, as well as considering the future potential of some of its recent developments. Each of the slides that illustrate my narrative shows genuine session data; and all of the photographs, with the exception of Figure 2, were taken during actual teaching sessions.

It was in 2008 that I first turned to EVS as a means of enhancing my teaching. As a music lecturer, my classes already made use of a relatively large variety of different teaching methods, some generic (lecture or seminar formats, alternating with full class or group discussions), some discipline-specific (live performance/demonstration, audio and video clips, studying musical scores), others using learning technologies both inside and outside the classroom (PowerPoint, social media, podcasts, flipped teaching, lecture capture, virtual learning environments (VLEs), blogs, wikis, discussion forums, Internet resources, etc.). For this reason, I did not seek to make EVS a feature of every one of my classes, as might more commonly be

the case in the Science subjects: I soon determined that it may not be pedagogically appropriate to all of my teaching, as well as discovering that there are practical considerations, both technological and logistical, associated with its use.

The response system and polling software I have worked with almost exclusively is that developed by Turning Technologies[1], initially using the ResponseCard RF handsets and subsequently the ResponseCard NXT and ResponseWare. The ResponseCard NXT allows users not just to select one of a set of multiple-choice options but also to send short text-based responses, and it includes a LCD panel to display the answer selected by the user and to identify when his or her individual vote has been successfully received. ResponseWare enables students to use their own mobile devices to submit their vote via the Internet (either as a guest participant, or having registered for a Turning Account) rather than requiring a bespoke handset. Turning Technologies' software offers two main approaches to gathering audience responses on Mac or PC: PowerPoint Polling, in which questions are embedded as slides within a Microsoft PowerPoint presentation (see Figure 2); and Anywhere Polling, in which results are shown in real time in a free-standing window, allowing the instructor to poll users while simultaneously working with other multi-tasking applications. As the following narrative shows, my teaching has mainly used PowerPoint Polling.

FIGURE 2: THE AUTHOR, WITH AN EVS SLIDE IN THE BACKGROUND

Innovating in the Arts and Humanities

EVS may be employed in the university classroom for a wide range of different purposes. They can fulfil discipline-specific academic functions such as establishing the level of background knowledge of the class or the extent to which students have assimilated the preparatory study set for the lecture, or to revise concepts previously covered during the teaching. Or they might be used in connection with more generic academic skills including prose style, bibliographic citation, and plagiarism awareness. They could also be deployed to consult students efficiently on logistical questions relating to the delivery of the module, for example, when they would like to meet for tutorial or how they would prefer to receive feedback on an upcoming assessment. Finally, it is a useful tool with which the educational researcher may collect and collate quantitative data.

EVS in Arts and Humanities teaching

Much of the existing pedagogical literature on EVS focuses on the ways in which the technology may support teaching within individual disciplines, and several of the uses cited above have therefore received thorough coverage already (see, for instance, Simpson and Oliver 2007). Certain studies also encompass the potential of EVS to deliver tuition in areas such as writing and grammar (these include Miller 2009 and Marlow 2010), which has more generic application across different subject areas. However, as noted, there presently exists a gap in the literature on EVS in respect of their use specifically in the Arts and Humanities, which this account endeavours to go some way towards addressing. My own academic practice demonstrates the use of EVS in a

[1] See: http://www.turningtechnologies.com/

number of areas in addition to the above, with the following categories being among those particularly well represented:

1. Testing students' observation of an audio or audio-visual extract

A favourite teaching strategy of mine is to play an audio recording, film clip, or music video, telling the students that there will be an EVS exercise on it straight afterwards – but without giving them a steer as to the questions in advance. This encourages them to engage fully with the excerpt, while the EVS questions serve to draw their attention to its distinctive features in preparation for further discussion. In Figure 3, for example, the question endeavours to determine not whether the students correctly identified that the solo in the instrumental break was performed on mouth organ, so much as whether they recognised that it wasn't either guitar or keyboard, those being the two instruments on which such solos would more usually be presented in mainstream popular music.

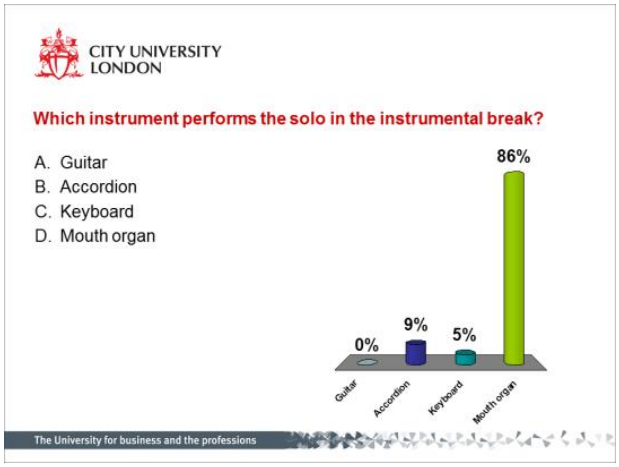

FIGURE 3: TESTING STUDENTS' OBSERVATION VIA EVS

2. Gauging opinion within the class on a contentious point

An initial poll asking students to register their view, individually and anonymously, such as the one in Figure 4, might prompt the lecturer to lead a class discussion in which alternative viewpoints are considered. The same question might then be re-polled to see whether opinion has changed as a consequence of that discussion, and the computer can even overlay both sets of results on the same graph (see Figure 7). Another possibility would be to conduct a similar exercise using either a moment-to-moment slide (see below, Figure 14) or a column chart that the computer redraws in real time as and when the students change the vote they originally submitted. The latter is especially effective with a dual-computer setup in which students always have sight of a second monitor screen, to which the lecturer can switch the main display periodically to review the current poll results (see below, Figure 16).

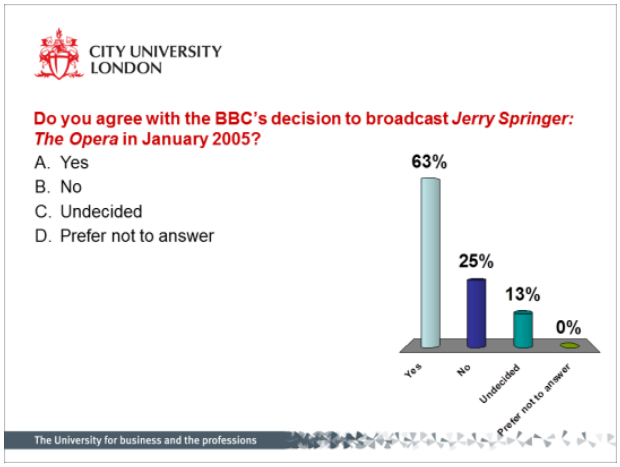

FIGURE 4: USING EVS TO SOLICIT STUDENTS' OPINION

3. Asking subjective questions for which there is more than one equally valid answer

Slides of this nature generate discussion among students almost immediately, because their response will be contingent on the arguments by which they arrive at the answer. It can therefore yield insight into the preoccupations of the students in the class and the directions from which they are approaching the subject. Figure 5 shows a question in which every one of the four available answers might be valid: heavy metal owes much to the Medieval period in terms of its themes and pictorial motifs; to the Baroque and (to a lesser extent) the Classical period for some of its musical materials; and to the Romantic period, from which it inherited the ideologies of virtuosity and the artist as hero.

Advanced functions of EVS

In developing the use of EVS within Arts and Humanities teaching, I have also used a range of its more advanced functions, moving beyond the modest multiple choice question. Although my teaching takes place primarily in Music, many of the approaches I have developed are transferrable to other disciplines within (and indeed beyond) the Arts and Humanities, as well as beyond higher education itself. The advanced EVS functions in question include the following:

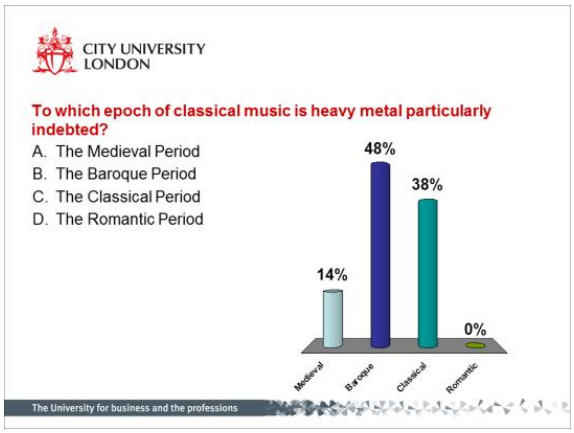

FIGURE 5: AN EVS QUESTION FOR WHICH THERE ARE SEVERAL VALID ANSWERS

- *Likert scales*: using a four, five, or seven-point Likert scale, students register how strongly they agree or disagree with a given statement (Figure 6). In addition to drawing a graph, the computer will instantaneously calculate the mean average once the poll has ended. To extend this task, a re-poll could be subsequently taken, and the results compared, to determine how students' opinions had changed following class discussion (hence Figure 7 shows the culminating point of the learning activity initiated by Figure 6). Or the poll could be kept open, and the graph drawn in real time, to enable students to change their original vote at any moment. The Likert scale function might also be used to solicit feedback from students on the teaching, potentially enabling an informal dry-run of a module evaluation exercise or national student satisfaction survey.

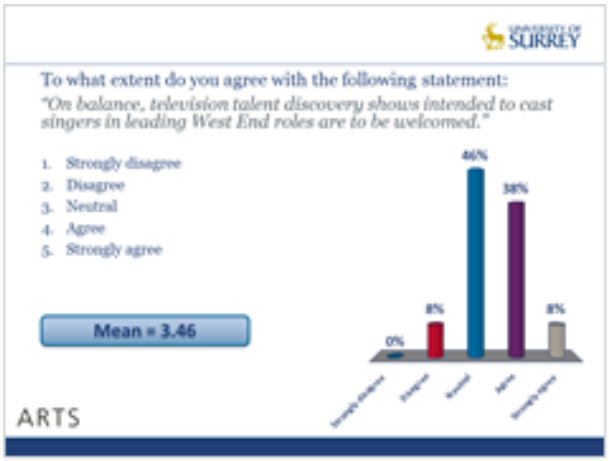

FIGURE 6: A FIVE-POINT LIKERT SCALE

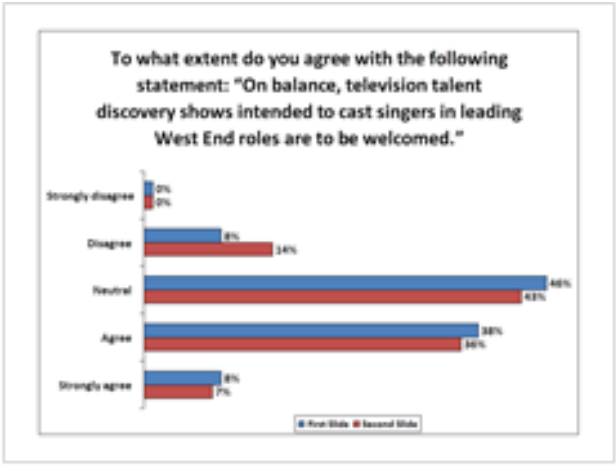

FIGURE 7: OVERLAYING THE RESULTS OF TWO EVS POLLS

- *Multiple responses* and *priority ranking*: students may select more than one of the responses provided (it is even possible to enable them to vote for the same option more than once), up to a specified limit. The purpose of such an exercise may be to enable students to choose more than one equally weighted option simultaneously (as in Figure 8); or it may be used to establish a ranking in which responses are weighted according to the order in which they are keyed, with the first response corresponding to the students' highest preference.

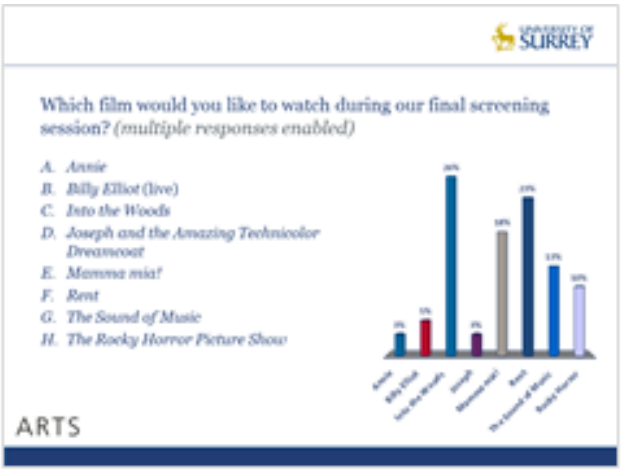

FIGURE 8: AN EVS SLIDE USING MULTIPLE RESPONSES

- *Conditional branching*: the response given by the students governs which slides appear next within the presentation, following rules set up in advance by the lecturer. This function might be used to determine whether the students have sufficiently grasped a concept, proceeding with the slides that either advance that topic or introduce a new one only if the students are ready to move on, and otherwise switching to slides in which the current concept is explored more thoroughly. Or the question might itself ask which topic the students wish to explore (as in Figure 9), or whether they would like to cover it in depth or only briefly – thereby empowering them to guide the direction of the teaching.

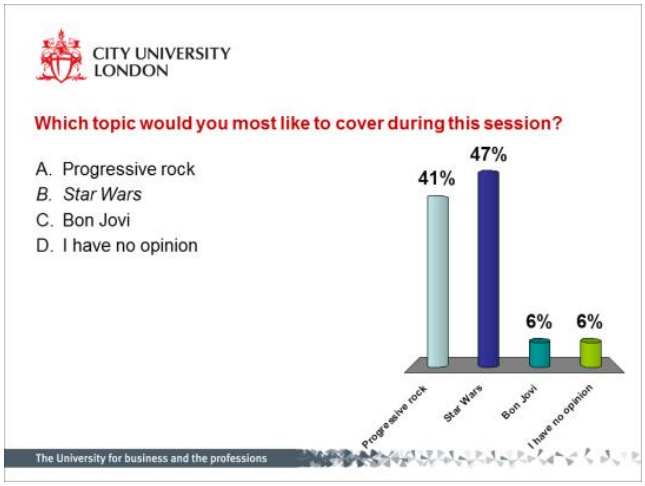

FIGURE 9: CONDITIONAL BRANCHING

- *Demographic comparison*: students' responses to a given question are compared with those to a previous question that sought to establish information about the user of each handset, and charted accordingly. This may be used to identify whether the views of (say) the males and females in the room are significantly at variance with one another. Or, where classes comprise different types of students – such as two different years of the programme being taught simultaneously, or subject majors being taught alongside non-majors – it can provide a helpful means of checking whether the level of knowledge or comprehension between these distinct groups is significantly divergent. Polls of the former category may be conducted to bring conflicts of opinion to the fore and generate discussion: Figure 10, for instance, reveals that more male respondents felt that a particular Spice Girls song projected an overall message of female dependence on men, whereas more females answered that it was the other way around! The latter type of poll, meanwhile, may necessitate a change of approach on the part of the lecturer if the results indicate that the teaching is not supporting certain groups of students.

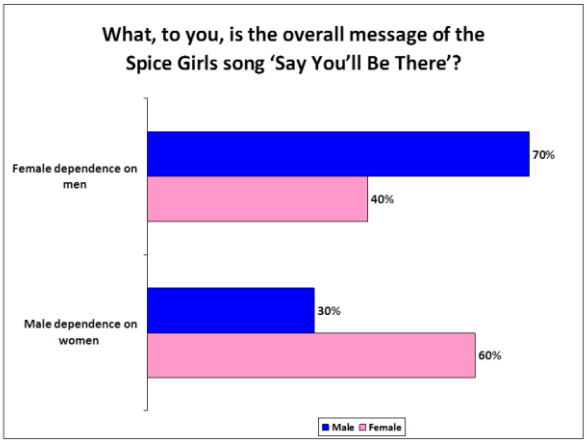

FIGURE 10: DEMOGRAPHIC COMPARISON

- *Game-based learning:* students are awarded points for selecting the correct answer (or, potentially, fewer points for an answer that is partially correct). This function may only be used for questions with demonstrably right or wrong answers, such as that shown in Figure 11. However, it can help students to track their own progress, since league tables may easily be produced using the unique ID printed on the handset or, in the case of mobile devices, either automatically generated or set by the user. (Alternatively, it is possible to register these unique IDs to individuals to create participant lists, enabling the lecturer to trace responses back to a specific student, although

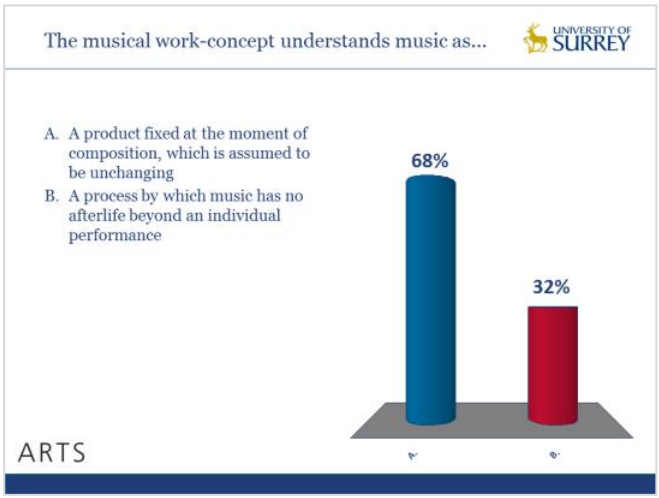

FIGURE 11: AN EVS SLIDE WITH A RIGHT OR WRONG ANSWER, BUT WHICH GOES BEYOND MERE TESTING OF KNOWLEDGE

this would mean that they are not then responding anonymously.) Finally, it can add an unparalleled element of fun to a class, provided it does not result in a learning task that is overly gimmicky or create an environment that is excessively competitive.

- *Team-based learning:* students may be assembled into teams for the purposes of game-based learning. This may be set up in advance using the devices' unique IDs, or undertaken at the moment of the test by means of a slide in which students register for which team they are playing (Figure 12). The latter enables the lecturer to pit the front row against the back row, males against females, or for students to arrange themselves into groups and invent their own team names – provided they can be relied upon to act honestly, since if they register for a team other than their own, they will be able to affect that team's overall performance negatively by deliberately answering questions incorrectly. The computer can produce league tables showing the leading team, the leading individuals, the fastest respondents, the most valuable player within each team, and so forth (one example is given in Figure 13). It is also possible for the number of points accrued by individuals to be proportional to the length of time taken to answer, or for players to wager a percentage of their current points on answering an upcoming question correctly.

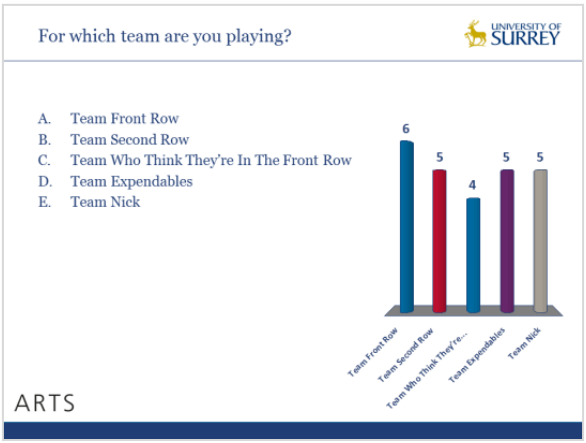

FIGURE 12: DIVIDING STUDENTS INTO TEAMS

FIGURE 13: A GAME-BASED LEARNING LEADERBOARD

- *Moment to moment:* students register their views by voting on a scale from one to five across a given time period, selecting a different number at will as their opinion changes, with the computer calculating the mean average response of the cohort every second and updating the graph in real time. Such an exercise could be undertaken in parallel with watching an audio-visual clip (as in Figure 14, from which the video has been removed for reasons of copyright), or it could chart students' changing opinions during a class discussion; or it may be used to capture their changing emotional response to stimuli such as a music performance. This function is therefore particularly applicable in Arts and Humanities teaching, as well as in the Social Sciences.

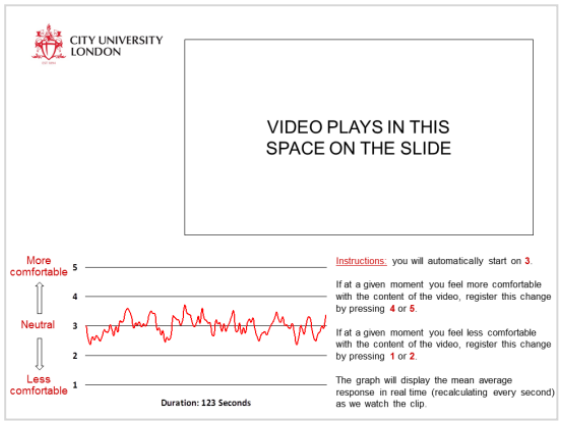

FIGURE 14: MOMENT TO MOMENT

- *Text-based responses:* instead of selecting one or more options from a pre-defined list, students are able to send short text-based responses to the lecturer via those handsets and mobile devices on which text may be entered. These responses may then either be reviewed individually, or the proportion of users who have submitted each unique response calculated by the computer and displayed as for a multiple-choice question. One disadvantage of this approach is that the software will not distinguish between

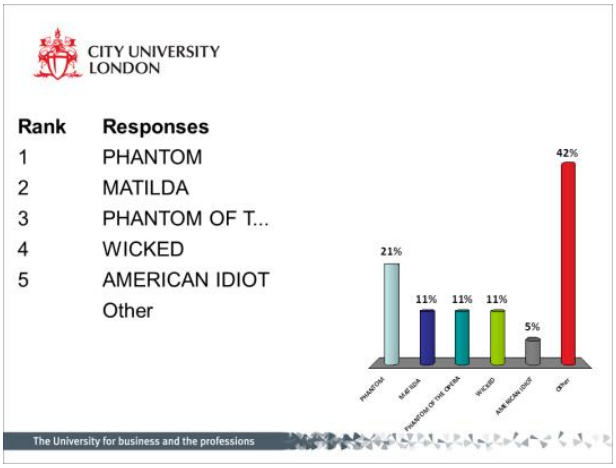

FIGURE 15: EVS USING TEXT-BASED RESPONSES

responses that are notionally identical but differently expressed or spelt. In Figure 15, which shows a text-based task related to my musical theatre teaching, the responses "Phantom" and "Phantom of the Opera" were treated by the computer as two distinct entities, where this was not the students' intention.

Using EVS alongside other learning technologies

My teaching has also sought to combine EVS with other forms of technology-enabled academic practice, not least by making use of the institutional virtual learning environment and other opportunities for blended learning. At its simplest, this endeavour has entailed saving the slides with the results of the in-class polls embedded within them, and uploading them to the VLE after the lecture so that students have access to a permanent record for reference. My more ambitious uses of learning technologies in tandem with EVS are as follows:

- *Lecture capture* to record the discussion that took place in class around a given EVS task, as well as documenting the exact moment at which changes to voting patterns occurred (as shown by a graph drawn in real time) along with the discursive context that prompted them. This resource, comprising a screen capture and a simultaneous video recording of the class, may then be streamed via the VLE after the lecture.
- *Flipped teaching*, for which a lecture-style video introducing the key concepts of the class-based session is released a few days in advance on the VLE. The lecture itself then takes the form of an extended EVS task testing students' comprehension of the material presented in the video plus any associated background reading, thereby maximising the value of the available teaching time by apportioning it to those areas for which the students' responses indicate further elaboration to be most beneficial. This was the pedagogical context of the slide shown above in Figure 11, which receives further discussion below (see also Turning Technologies 2015).
- *Online discussion forums* hosted on the VLE to follow up classroom-based discussion. Particularly in the case of a longer EVS exercise in which students' responses may change mid-discussion as their views evolve, an online forum can enable the students to reflect on the general voting patterns of the class as well as the factors that prompted them to change the way they voted as an individual. Such an exercise may usefully extend both the learning and the discussion beyond the lecture itself.

How this practice evolved

Just under seven years ago, I was finding it increasingly challenging to involve many students in class-based discussion in my teaching of advanced areas such as classical music history. It became apparent that this was not necessarily because the students did not understand the topic, and certainly not because they were unengaged with the subject or uninterested in the teaching. Rather, it was because they did not have sufficient confidence in themselves to speak out within a room full of 20 or more of their peers, even though in most cases they knew one another well. Nor was the disproportionate gender balance in certain music classes, some of which comprised around 90% female students, reflected in the contributions to in-class discussions in which the few male students in the cohort were sometimes those who dominated.

Having witnessed the successful use of EVS in teaching on the MA in Academic Practice programme at my institution, on which I had recently enrolled as a student, I explored whether this technology might provide a solution that would give my teaching a more interactive, fun dimension. It was easy to see its value in

involving all students on an equal footing and enabling them to participate anonymously, while simultaneously endeavouring to instil confidence by providing a means for individuals to assess how their own views and knowledge base compared with the rest of the class. By way of getting started, I sought advice on the technological and pedagogical aspects of EVS and began consulting published studies, of which I found the literature reviews by Fies and Marshall (2006) and Simpson and Oliver (2007) particularly instructive. A couple of days later, I was more than ready to roll out possibly the single most influential enhancement I have ever made to my teaching. I started with an icebreaker question or two, moved on to simple tests of factual knowledge, then progressed to more ambitious learning tasks based around the polling of students' opinions. As my practice developed, initially at City University London and subsequently (from 2013) at the University of Surrey, I came to incorporate still more advanced features of EVS.

As with any change to my teaching, I invited comments from students at the point of delivery in order to hone and enhance my practice, but also to satisfy myself that it did indeed represent a welcome development with a positive effect on their learning experience. (This may, as mentioned, be easily achieved in the classroom by taking a final poll while the students still have the voting technology to hand, although I solicited qualitative comments as well.) The response was overwhelmingly encouraging, with feedback including the following:

> It is an enjoyable activity that does enhance the learning process.
>
> Simple, and easy to use [...] Useful for projecting the thoughts of us (the students) directly and dynamically to be used immediately in a lecture.
>
> Adds variety to the normal lecture routine, allowing us to interact and be a bigger part in our own learning.
>
> It evens out the voices within the group so that those who can be at times slightly overpowering are not able to dominate the group and everyone is able to feel that they can contribute.
>
> It was great to give those people who wouldn't normally contribute, or would hesitate to, a chance to feel confident through the anonymous aspect.
>
> [It] really helped me to remember important parts of the lecture.

There was therefore considerable evidence of impact not just on the students' enjoyment of the teaching, but also, most hearteningly, on the affective dimension of their more self-regulated learning. EVS also fulfilled the originally intended function of providing a mechanism for generating class discussion, as it gave more students the confidence to contribute while lessening the sense in which the room was dominated by a few lone voices (see further, Turning Technologies 2015). One student said of the polls that "I think they focus student discussion well, without people going out [sic] on a big tangent". Although using EVS theoretically means that nobody needs to speak in order to participate, the reality of the classroom can be quite different: the students are typically more, rather than less, vocal!

Feedback on the many subsequent classes and modules in which I have used EVS has been similarly positive. Most recently, an extended EVS poll to capture how opinion changed during the course of a class discussion (Figure 16) was combined with longitudinal reflection on the module's online forum, along the lines outlined above. This activity led one student to comment that:

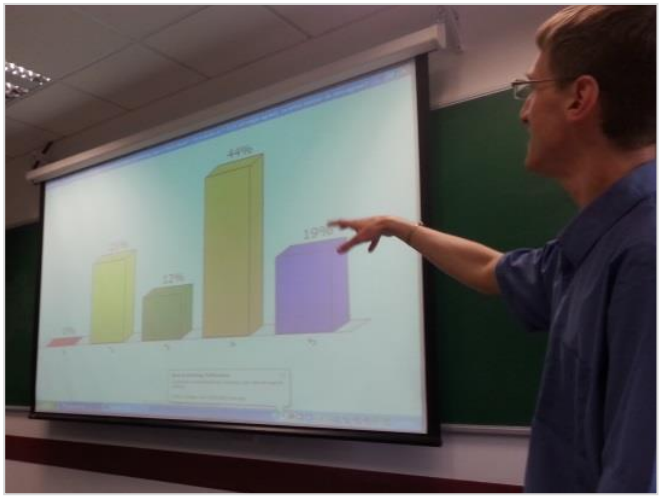

FIGURE 16: AN EXTENDED EVS POLL, USING A *DUAL COMPUTER SETUP*

> I think that everyone made some insightful contributions to [this discussion thread]. Prompted by the in-class voting system, everyone was then able to discuss their reasons for voting the way they did in the lecture (or for changing their mind during the lecture) on the forum.

How this practice is situated theoretically

Articles on EVS run to hundreds of studies yielding at least ten separate literature reviews. However, as noted, the Arts and Humanities are disproportionately under-represented within this scholarship, as revealed by cursory statistical analysis of the discipline-specific studies listed on Bruff's comprehensive bibliography (2014). The subjects cited as most strongly supported by the literature include Physics and Astronomy (31 studies); Health Professions (25, excluding Nursing [8]); Mathematics and Statistics (20); Biological Sciences (19); Psychology (18); Business, Accounting, and Management (14); and Engineering (14). Conversely, only one or two studies are listed for each of subjects such as English, Language Instruction, Philosophy, History, and Sociology. While this scholarship will not reflect the totality of classroom practices, nor is Bruff's bibliography exhaustive (for instance, another article in Sociology appeared earlier in 2015), it does at least provide indications of the disciplines in which the pedagogy on EVS is most developed. This may inadvertently lead to a feeling that the learning technology is not well suited to other subjects.

Four myths about using EVS in the Arts and Humanities dispelled

EVS is only for testing knowledge of basic facts

True, EVS may be used to great effect to deliver multiple choice questions (MCQs) and collate responses within a class. But MCQs can fulfil many functions other than merely testing a student's surface-level learning of concrete facts, as attested by a sizeable pedagogical literature largely separate from that on EVS. Within this body of writing I have found two publications to be particularly insightful. First, Nicol's (2007) study demonstrating how carefully designed MCQ exercises can address the entirety of Nicol and Macfarlane-Dick's (2006) much-cited seven principles of good feedback practice, as well as developing self-regulation of students' learning. Nicol's article crystallises around a series of case studies discussing higher education contexts in which formative assessment is delivered via MCQs (including one in Engineering which uses EVS-based peer instruction), with commentary provided to demonstrate systematically how they address each of the seven principles. Second, the guide produced by the University of Oregon (2014), which shows that MCQs can be constructed not just to test information that is either right or wrong but also to nurture critical thinking. Careful question design can thereby address the higher levels of the cognitive domain of Bloom's taxonomy (1956) in addition to knowledge and understanding, being more pedagogically advantageous in that deep-level learning is thereby cultivated.

Applying this proposition to my own practice by way of example, the question shown in Figure 11 above was devised to test students' ability to engage critically with the *principles* underpinning the musical work-concept, rather than merely expecting them to recognise a textbook-style definition in the form in which it had previously been explained to them. Thus, while the flipped teaching introduced the work-concept by emphasising the ideology of the immutability of the musical work, the EVS question posed during the lecture approached the topic in a subtly reconfigured manner by instead asking whether the work-concept regards music as a process or a product.

EVS is only for the Sciences, not for the Arts and Humanities

MCQs with demonstrably right or wrong answers may be the staple of the natural sciences, and this may represent one major reason why certain other disciplines have traditionally shied away from adopting EVS. However, approaches such as exploring students' views via a simple poll, a Likert scale, or by charting changes of opinion on a moment to moment basis are likely to be better suited to the Arts and Humanities. Moreover, possibilities such as the testing of background or baseline knowledge, the revision of concepts previously studied, and game-based or team-based learning may be applicable within the Arts and

Humanities as well as the Sciences, giving the former disciplines a more varied palette of EVS activities from which to choose.

A related issue is that one of the pedagogies most often associated with EVS is peer instruction (Mazur 1997), which developed within the discipline of Physics and is primarily conducted with learning activities that have definitively right or wrong answers. That notwithstanding, Schell (2013) has provided commentary upon some of my methods of EVS-based teaching in Music, showing how they may be easily adapted for use with peer instruction, as well as with flipped classrooms. According to one Mazur Group member, then, my academic practice in the Arts and Humanities is recognisably close to peer instruction, even though this is not a pedagogy upon which I have explicitly constructed my own.

EVS is only useful for managing large classes

Much of the published literature on EVS is concerned with the use of response technology as a means of managing the challenges of teaching to large classes that may comprise a hundred or more students. This includes pioneering articles published in the disciplines of both History (Cole and Kosc 2010) and Sociology (Mollborn and Hoekstra 2010). However, EVS may also work well with smaller cohorts such as those more typically found in Arts and Humanities disciplines. While a critical mass of responses is important to many learning tasks, the way in which the technology is used pedagogically is more fundamental than the absolute number of students. In my own academic practice, I have employed EVS primarily with classes of 20–40 students (Figure 1) – which already constitutes a comparatively large class for many music degree programmes – but also, less regularly, with smaller discussion groups of five to ten students (Figure 17).

FIGURE 17: USING EVS WITH A VERY SMALL GROUP

EVS involves fundamentally reworking one's entire approach to teaching

Some pedagogical approaches used in connection with EVS seek to revolutionise the learning environment, turning the concept of a traditional lecture on its head (although never seeming to achieve total separation from that mode of teaching). This is indeed the case with peer instruction, although EVS is in no sense restricted to one method alone. A related perspective is given by Beatty (2004), who advocates the following:

> To truly realize the benefits of a CCS [Classroom Communication System], an instructor must rethink her entire instructional model and the role class time plays within it and make CCS use an integral part of an organic whole… She must learn to plan curriculum around questions and deep comprehension, rather than around lecture notes and content coverage. *(Beatty 2004, pp. 3-4, 6)*

However, while EVS may lead some lecturers to make fundamental changes to their approach to teaching, in other contexts it may simply provide a convenient means of breaking up the lecture by including a quick interactive task at a suitable juncture to maintain student attention and add variety without interrupting the overall flow. Whereas Beatty (2004, p. 9) recommends keeping to two to four questions in a 50-minute session and building the entire class around them, in another classroom, a similar number of slides might provide material for only a brief intermission if their intention is to test students' background knowledge, to revise the ground just covered in the lecture, or to collate opinions by way of introducing a new topic. The governing factor is not the number of slides involved (although experience has shown that more than six in quick succession becomes tiresome) so much as the nature of the questions they embody and the pedagogy that underpins them.

How others might adapt or adopt this practice

Recently I have used EVS to solicit staff views at internal learning and teaching development symposium that I facilitated (Figure 18). This has had the felicitous side-effect of bringing the technology to the attention of colleagues who have subsequently employed it in cognate Arts and Humanities disciplines such as Theatre Studies and Film Studies. It has proven exceptionally easy to train colleagues as instructors: around 5–1five to ten minutes of demonstration and explanation, plus sharing a slide or two to get them started, may be all that is required. Here follows some practical advice for the Arts and Humanities lecturer considering the use of EVS in their teaching, drawn from my years of experience.

FIGURE 18: EVS TO HAND DURING A STAFF LEARNING AND TEACHING DEVELOPMENT SYMPOSIUM

Top tips for adopting EVS in Arts and Humanities teaching

Essentially, the adoption of EVS requires only that the lecturer devise a few effective questions related to their specific topic, mindful of the learning outcomes for the class and its associated module. It may be wise to start by using the basic EVS functions only, perhaps consulting literature on the design of MCQs for guidance.

This will ensure that both teacher and students are comfortable with the principles of the system and that there are no unforeseen technological or logistical issues (see below). Over time, the lecturer may wish to become more ambitious by integrating some of the more advanced features of EVS into their teaching as appropriate.

The tips that follow are not exclusive to the Arts and Humanities (or even necessarily to higher education), but have been written mindful of why the use of EVS in these disciplines may be distinctive in terms of the teaching approaches that may be encountered.

There are two ways to incorporate EVS within a class: either an EVS task may be added to an existing, pre-written lecture, or a new lecture is written while embedding EVS within it. The former necessitates removing part of the lecture to make room for the use of EVS, allocating time to distribution of the handsets, instructing students as to the nature of the task, and discussing the results of a poll after it has been run. It can be a useful way of developing pre-existing teaching without merely going back over well-worn ground, as well as a safer option for the lecturer turning to EVS for the first time. The latter, meanwhile, requires less material to be generated elsewhere in the lecture, to take account of the time needed for the EVS task. In terms of preparation, it is perhaps the more time-efficient of the two although it is also the one that requires greater forward planning. Crucially in the Arts and Humanities, in which the overall direction of the lecture may not be immediately apparent and the teaching may not be based on the transmission of baseline knowledge, this is not a decision that needs to be taken at the outset. I have found that sometimes when writing a new lecture, only partway through does it emerge that there is sufficient opportunity to warrant inclusion of an EVS task of some form or other.

Time needs to be invested up front in learning to use the system and deploying it effectively within the teaching. This is the case whichever of the above methods for writing EVS into the class is adopted, but it pays dividends in the long run since the teaching becomes a response to student interaction – quite rightly in respect of the Arts and Humanities, in which it is important to mediate between conflicting views – rather than merely a transmissive lecture in which information flows in a single direction only. In general, an EVS task requires less preparation in advance on the lecturer's part, but a greater level of spontaneous response to the outcomes of the learning activities run during the class itself. The prospect of needing to react quickly

and articulately to poll results that may be unanticipated is a daunting one, but by the nature of their discipline, the Arts and Humanities lecturer may actually be better equipped to manage the demands of contingent teaching than those in other subject areas.

It may be helpful to adapt existing slides that already adhere to the lecturer's house style, rather than attempting to construct every one anew. By copy-pasting and customising the text of existing slides, I can create new slides in the same format very quickly if needed, even moments before class, even without the need to recall exactly how I produced the slide in the first place. (It has also proven fruitful to share such slides with colleagues new to EVS by way of getting them started.) This is particularly important to the lecturer in the Arts and Humanities, in which a wider variety of different types of slides (such as Likert scales and moment to moment slides) are more likely to be used, beyond the standard MCQ-style slide that may be the foundation of more fact-based lectures in other disciplines.

It is also useful to have a couple of generic slides permanently to hand during the lecture. These may either be hidden slides embedded within the presentation, or located at the very beginning of the slideshow where they may be easily retrieved. The two I have used most frequently are a multiple-choice slide with two responses, "yes" and "no"; and a five-point Likert scale ranging from "strongly disagree" to "strongly agree", pre-programmed to calculate the mean average of the responses. Having these slides available enables me to switch to them should the need emerge during a lecture discussion, or even to create a new slide quickly mid-class as described above. This may take a mere matter of seconds, and it can be especially valuable in Arts and Humanities teaching in which discussion might well raise opinions or explore lines of enquiry that the lecturer has not been able to anticipate.

A dual computer set-up may be used for convenience, if the classroom projector can accommodate more than one video feed in the room. In my own teaching, for instance, I use the classroom's resident computer concurrently with my own laptop, switching the projector display between the two as necessary (see Figure 16). Such a setup is of particular advantage for Arts and Humanities teaching, which might involve a complex combination of slides, EVS tasks, editable documents, audio/video clips, websites, and so forth, all of which require a computer to execute. These resources can be split across two machines rather than endeavouring to use a single computer to fulfil every function, which necessitates the lecturer continually flipping between different windows and can be distracting to the students.

As with any pedagogical approach, EVS may not be appropriate for every lecture. This is perhaps more true in the Arts and Humanities than in the STEMM and business subjects in which EVS may be more consistently employed, primarily for its potential to test factual or baseline knowledge throughout the module. While I am keen to champion the use of EVS across the disciplines, at the same time I would not recommend contriving to use it if it simply does not fit the teaching, as such attempts can be perceived negatively by the students (on this point see, for example, Zhu 2007). There is no need to use EVS during class every week: indeed, it will add more variety to Arts and Humanities teaching if it brings something distinctive to the learning environment rather than merely becoming the norm.

Top tips for minimising technological and logistical problems

In my experience, one of the reasons most often encountered as to why Arts and Humanities lecturers are not more keen to adopt EVS concerns the technological and logistical problems it can create: setting up the learning activity in advance; ensuring that the technology works correctly in the lecture room; acquiring and distributing a sufficient number of handsets; explaining to the students how to submit their responses; endeavouring to avoid technological failure during the running of the EVS task itself; and collecting the handsets back in again after class. Everybody has a tale to tell about the day the classroom's resident computer crashed and they had to resort to asking students to raise their hands and counting up the votes manually. Equally well, those who have used EVS extensively will have many positive stories about how it has greatly enhanced both their classes and the learning that took place within them.

As with any form of technology-enhanced learning, there is inevitably a risk of equipment failure or other logistical problems being encountered. Although manufacturers such as Turning Technologies offer comprehensive user support via their website, technical support available from within the educational institution itself may be more variable. However, the pedagogical benefits of a successfully deployed EVS activity usually outweigh the technological risks, which can be minimised by careful contingency planning. To supplement the more pedagogically oriented advice on EVS given above, then, here are a few additional tips more specifically geared to its technological aspects.

If there is a chance that the handsets may not be set to the correct wireless channel, that being used for the session will need to be clearly identified (for instance, by adding this information to the master slide template or writing it up on a separate board or flipchart), together with instructions on how to set the handset accordingly. Likewise, if using students' own mobile devices, the unique session ID will need to be similarly identified so that the users all know which session to join, and can recover in the event of a momentary loss of Wi-Fi.

It surely goes without saying, but the technology does need always to have been tested in advance. Each slide can be tested using either simulated data or a small number of handsets; and the technology may be tested again, briefly, in the classroom immediately prior to the lecture, or even during the learning activity itself by means of a 'warm up' slide. The latter might also provide an opportunity to ensure that the handsets are set to the correct channel. Testing the slides is particularly important when using advanced features such as conditional branching, to ensure that this has been set up correctly.

On more than one occasion, the dual computer set-up discussed above has saved a class in which an EVS task has unexpectedly been interrupted. When one computer has crashed, I have simply switched the USB receiver between the two devices, found my place in the slideshow on the backup machine, and carried on. This has enabled me to continue with the presentation relatively uninterrupted, while simultaneously rebooting the primary computer.

The most inclusive EVS tasks will be those that use a system in which votes may be submitted either by students' own mobile devices or by bespoke handsets, whether singly or in combination. This avoids the danger that students are excluded from participating if they do not own a mobile device or have not brought theirs to class. It also provides a contingency plan in case of problems with the Wi-Fi connection in the lecture room. In my experience, there have been some classes in which many or all students have wanted to use the voting handsets, but others in which most have preferred to use their own mobile devices. (If they are able to use both, or have more than one mobile device to hand, they may need to be reminded only to submit one vote.) In teaching to larger classes, asking students in advance to bring their mobile devices to the lecture will mean that fewer handsets will need to be distributed, thereby saving time.

Related to the above, it would be prudent for lecturers always to have some kind of backup plan in case the technology does not work as expected. It can be demoralising to the teacher who has invested time in preparing a technology-enhanced lecture if an EVS task does not come to fruition, and may dash students' expectations. However, extensive attempts to recover from technological failure can soak up valuable time in a lecture and may lead students to become disengaged as well as being embarrassing for the instructor.

Conclusion

Although the basic principles of EVS may be relatively simple, as a learning technology it offers a vast array of possibilities yielding great potential. Going forward, university teaching in different disciplines may endeavour to capitalise still further on the pedagogical benefits of the student-centred approach of EVS, the immediacy of its feedback loop, and particularly the more recent development of engaging students using their own, more familiar, mobile devices as an alternative to bespoke handsets. In addition to the possibilities outlined above, future initiatives in the performing arts disciplines may seek to place EVS at the heart of

creative practice, not least given the advent of the field of practice as research. For example, EVS may readily enable audience responses to form the basis of a spontaneously created or semi-improvised piece of music, dance, or theatre, or one that otherwise involves audience participation, an approach whose historical precedents extend at least as far back as Ayn Rand's play *Night of January 16th* (*Woman on Trial*) in the 1930s.

Reciprocally, teaching in the STEMM and business disciplines may benefit from greater engagement with the EVS practices that are currently evolving in the Arts and Humanities. These include moving beyond MCQs that merely test knowledge and understanding to those that access the higher levels of Bloom's taxonomy (1956), as well as embracing opinion-based questions for which there may be no definitively correct answer or for which students' responses might legitimately change as class discussion unfolds. Specific pedagogies such as peer instruction and game-based learning continue to present additional possibilities; a natural extension of the latter, provided the classroom can be adequately monitored, is the use of EVS for summative computer-graded assessment. The approach advocated by Nicol (2007, pp. 60-3) of tasking the students themselves to create MCQs, thereby giving them greater ownership of their own learning, yields another pedagogy whose future development and deployment using EVS may be advantageous.

The above narrative is based on the academic practice of a single lecturer, and hence it is limited to the approaches best suited to my individual pedagogical style and to teaching in my disciplinary area. For instance, I have mainly used EVS with slides embedded in PowerPoint rather than with the previously mentioned Anywhere Polling, although expert users of the latter have confirmed to me that it would be able to support any of the learning activities I have devised. Nor have I ever adopted a third approach available within Turning Technologies' response system, Self-Paced Polling, in which students input a series of answers in their own time via the handsets (a self-paced mode for the students' own mobile devices is presently under development) before submitting them all at once. While I have alluded above to the use in my teaching of the possibilities for the ResponseCard NXT handsets (as well as the more recent QT Device) to send short text responses, space has not permitted extensive consideration of this function, via which messages may even be back-channelled between instructor and user. Neither have I discussed the potential for EVS questions to involve the students' making a selection from a series of images rather than a text-based list.

Future extension of the use of EVS in higher education teaching may seek to take greater advantage of opportunities for combining it with emerging technological innovations and associated academic practices. Turning Technologies' response system is currently being developed with a view to increased integration with different VLEs, including the automatic generation of participant lists. Many further opportunities are presented by the release in July 2015 of TurningPoint Cloud, which operates using a secure cloud-based interface to manage data tied to both student and instructor Turning Accounts. This stands to revolutionise the way that EVS is used on university campuses as it enables information such as participant lists to be shared across computers resident in different classrooms, while continuing to allow lecturers to use PowerPoint Polling or Anywhere Polling and students to engage via a combination of ResponseWare and voting handsets. EVS has consistently asserted itself across the past two decades as a powerful, valuable, and effective tool in the lecturer's repertory, and in remaining at the forefront of changing trends both pedagogical and technological, it yields much promise for the future of student learning as well.

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