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Conference paper

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Abstract

LSE100 is a new course for LSE undergraduate students. It was piloted in 2009/10 with a cohort of 400 first year students and it will become compulsory for all first year students in the academic year 2010/11. 'LSE100 The LSE Course: Understanding the causes of things' looks at broad, current questions and issues across the social sciences. Topics include what caused the financial crisis, can we eradicate poverty and how we should manage climate change.

Elements of the course have been designed to integrate technology alongside more traditional teaching practices of lectures and classes. It uses Moodle to provide students and teachers with a range of online resources and support. Other technologies used in this course, to supplement the routine automated lecture capture, are PRS, audio feedback and text messaging.

This paper presents an evaluation of results from the pilot year and explores students' attitudes towards the use of a range of technologies in teaching and learning. The data was collected through a series of focus groups, one to one interviews and surveys to examine how students view technologies and the impact that they have had on their learning. Research from UCL (Rowlands et al, 2008) suggests that undergraduate students might have different attributes to earlier generations and have different approaches to learning. This paper will explore whether LSE students might be considered a 'Google generation' or display any characteristics that suggest they might be 'digital natives' (Prensky, 2001) in their approach to new technologies.

One of the key learning objectives of the course is to equip students with information skills and other transferrable skills which will benefit them both in the rest of their time at LSE and afterwards in their careers. Online resources to support essay writing and to teach students to find, manage and evaluate information have been developed by staff in the Centre for Learning Technology (CLT) and the LSE100 course team. These resources, including an essay writing tutorial which helps student to understand what plagiarism is and how to avoid it, will be demonstrated in this session.

1. Introduction

This paper presents research in progress to evaluate the pilot year of a new core course for first year undergraduate students at The London School of Economics and Political Science (LSE). It explores students' attitudes towards the use of a range of technologies in this course to support their learning. The data is being collected through a series of focus groups, individual interviews and surveys to examine how students view technologies and the impact that they have had on their learning.

Recent research (Jones et al, 2010) suggests that current undergraduates might have different attributes to earlier generations in relation to their use of technology, but we should be cautious about viewing them as a homogeneous group. This paper will explore LSE undergraduates' approach to new technologies and whether concepts such as the 'digital native' (Prensky, 2001) are useful in understanding our student group.

2. Background to LSE

Founded in 1894, LSE is one of the foremost social science universities in the world, ranked alongside Harvard, UC Berkeley and Stanford. It is a specialist university with an international intake: LSE's reach extends from its central London campus to around the world. The School has a cosmopolitan student body, with around 9,000 students from 140 countries. The 3,000 staff are similarly international, with about 45 per cent drawn from outside the UK. From the 9000 students studying at LSE, approximately 4000 are undergraduates. The annual cohort is approximately 1300 students who study a range of disciplines in the social sciences including: accounting, anthropology, sociology, law, economics, finance, management, social policy, social psychology, philosophy, mathematics, international history, international relations, government, geography and environment and economic history. The full range of undergraduate degrees is available on the LSE website (LSE, 2010).

Although students are largely full time and campus based, LSE has made increasing use of learning technologies to provide blended learning support, starting with the adoption of a VLE in 1999. Support and training is provided by the Centre for Learning Technology (CLT), a specialist team that includes learning technologists, media specialists, a library and copyright expert and a systems administrator. CLT helps academic staff to use a range of technologies in their teaching where appropriate, including Personal Response Systems (PRS), lecture recording (Echo360), online assessment and assignment submission, etc. There are also a large number of digital resources made available to students from Moodle including full text readings, lecture notes, handouts and other course materials. Some lecturers use the online forums to support student learning, however the decision to use any technology is voluntary and while the School has provided funding and support to teachers, they are not compelled to use Moodle or any other technology for teaching. The growth in Moodle at LSE has been significant since 2007 when there were approximately 450 courses using the VLE. Despite its use being at the discretion of the teacher, there are now more than 1300 active courses in Moodle, of which one third are undergraduate courses and two thirds postgraduate. Students log into Moodle daily to access their course materials with over 5,000 unique logins to the site on a typical day.

3. LSE 100 The LSE Course: Understanding the causes of things

'LSE100 The LSE Course: Understanding the causes of things' was launched in January 2010 to a cohort of 400 undergraduate students who signed up on a voluntary basis to be part of the pilot. Following withdrawals during the term, by June 2010 there were 286 students registered. From 2010/11, the course will be compulsory for all incoming LSE undergraduates. The pilot recruited students from all academic departments across LSE.

3.1 Background to the course

In 2008, LSE set up a "Teaching Task Force" to promote excellence in teaching. The initiative was, in part, a response to student concerns about teaching quality – as reflected in the national NUS Student Survey. But it was also motivated by other concerns including the skewed incentives between research and teaching and the increasing specialisation of degree programmes. The recommendations of the Task Force, all of which are being implemented, include a shift to smaller class sizes, standardisation of office hours and compulsory teacher training.

The most radical recommendation of the Task Force emerged from a subcommittee that was set up to examine possible reforms to the undergraduate curriculum. The subcommittee recommended that a new core course be developed "To introduce first year students to different modes of social scientific reasoning and critical analysis by means of extended engagements with substantive topics of public concern and intellectual debate."

3.2 Course structure

LSE100 is a two term course (20 weeks in total), offered in the second term of students' first year, starting in January and the first term of their second year. The decision to run the course across two academic years was taken largely to avoid overloading first year students and to allow them to settle in to LSE in the first term of their first year. The course is divided into six topic modules, which each run for three weeks. Weekly two-hour lectures, given by lecturers drawn from a range of departments across the School, are complemented by one-hour classes, with a maximum of 12 students, taught by highly trained teachers.

3.3 Course curriculum

LSE100 explores some of the big questions in the social sciences such as:
- How should we manage climate change?
- Does culture matter?
- Can we make poverty history?
- Why are great events so difficult to predict?
- What caused the financial crisis?

The two overarching aims of the course – to introduce students to the fundamental elements of social scientific thinking and to strengthen their critical research and communication skills – are reflected in a set of learning outcomes that fall under three headings: methodological skills, information skills and communication skills. Further details about the course curriculum are available at: lse.ac.uk/LSE100

4. Methodology of evaluation

The paper describes ongoing research to gather feedback from students on the pilot of LSE100 in 2009/10 and presents indicative findings from this work. The data has been collected using a variety of methods and further evaluation will be presented at ECEL. These feedback methods used to date have included:
- LSE100 Staff: Student Liaison Committee
- Two LSE100 Teaching Quality Assurance Surveys
- Quick polls conducted in Moodle
- Personal Response System (PRS) responses from students
- Usage statistics from Moodle
- Student focus groups (5 groups with a total of 30 students)
- Exit interviews conducted with each student who chose to withdraw from the course.

While this is not the central focus of this paper, feedback has also been collected from staff involved in LSE100 this year, including lecturers and class teachers, using interviews and focus groups.

5. Use of technologies in undergraduate teaching

In its aims, its scale and its scope, LSE100 faces challenges that are without precedent at LSE. From 2010/11, LSE100 will have around 1300 students, drawn from 37 different undergraduate degree programmes, taught by a set of lecturers and class teachers drawn from some 15 different departments. The pedagogic strategy developed for the course recognised that these challenges could best be met by an ambitious use of learning technologies alongside traditional lectures and classes. These technologies include:

- The VLE (Moodle) – to ensure timely delivery of learning resources to all 1300 students, and also to support personalised, self-paced learning and skill development;
- Personal Response Systems (PRS) – to promote active learning in (large) lectures by stimulating student engagement and enabling agile (contingent) teaching;
- SMS tools and email (both integrated with the VLE) – to support the use of 'muddy points' in large lectures (allowing students, in the last few minutes of the lecture, to submit, by text or email, any points they found unclear);
- Automated lecture capture (using the Echo360 system) – to enhance the value of lectures to students from diverse academic and cultural backgrounds (and students with English as a second language);

- Audio feedback provided to students via Moodle – to increase the quality of feedback on formatively assessed work (using Wimba Voice Tools);
- Use of delicious (http://delicious.com) to provide students with links to relevant websites;
- Use of short video interviews (including 'vox pops') available in Moodle and on the public website;
- An online tutorial developed in Moodle, using the activity called 'the lesson' and various other resources to support skills development such as essay writing and information skills.

There is a wide variety of evidence that suggests technology enhanced learning is beneficial for undergraduates and helps with issues such as student engagement, retention and access to resources. Other tangible benefits of e-learning include: cost savings and greater resource efficiency, it helps with student recruitment it helps develop skills and employability, helps manage student achievement, in addition to helping with inclusion, widening participation and social equality (JISC InfoNet, 2009). Previous research has explored how undergraduates approach new technologies, drawing on first year students' experiences at five English universities (Jones et al, 2010). The paper critiques concepts such as the 'Net Generation' and 'Digital Native' providing an overview of the key literature. The study concurs with earlier work in Australia (Kennedy, 2008) and the USA (Kvavik, 2005) to argue that these generational concepts are an oversimplification and to view current undergraduates as a homogenous group that are comfortable with technology and similar in their approach to studying, is inaccurate. Research in the UK (Rowlands *et al*, 2008; Margaryan and Littlejohn, 2009) supports the idea that technology is not radically changing students' study patterns. As Jones et al (2010, p. 731) state:

> "Far from our research revealing a single generation of students we find a complex picture of minorities, most of whom engage in a wide range of technology uses with high frequency but who do not show a strong impulse towards the kind of participation and generational homogeneity predicted by Net generation or Digital Native inspired literature."

Many of these studies are based on large student populations, collecting data through surveys. Our research used a small population of LSE undergraduates, and collected mainly qualitative data. It is hoped that our research might contribute towards this debate.

As noted above, the use of new technologies in LSE100 was motivated by their ability to:
- promote active learning
- increase student engagement across a diverse student cohort
- provide feedback on learning
- support skill development, and
- cater for different learning styles, by offering this support and material in a variety of formats.

Although the lecture-class structure is relatively traditional, in terms of there being weekly lectures (2 hours in duration) supported by classes led by teaching fellows and graduate class teachers, the classes are highly interactive, using innovative formats and a student-centred approach.

6. The use of technologies in LSE100

The following section provides a brief description of the technologies used in LSE100 during the pilot phase from January until June 2010. The paper focuses on the use of Moodle, audio feedback and PRS.

6.1 Moodle and online tutorial

The use of Moodle is very popular with students at LSE who like the ease of access to resources and the flexibility it offers them to study at a time and place of their choice. In addition to a front facing Moodle LSE100 home area course (accessible to all students) students taking the pilot course also had access to another two courses:
- a course area for the Lent Term module resources
- an information skills course.

Work was undertaken by CLT , the Teaching and Learning Centre (TLC) and the Library to develop a range of information skills materials for LSE100. Research suggests that embedding skills training

into the curriculum helps develop students' critical thinking skills (Duron et al, 2006; Webb & Powis, 2004). The majority of these resources were presented in the Information Skills course, including an online tutorial built using Moodle's lesson activity. The tutorial was designed to support students in the process of essay writing and the opening screenshot is presented in Figure 1. It provides information in branched format, so students can choose to follow different routes through the tutorial depending on their skills level. Students are encouraged to complete a quiz before accessing the tutorial to identify where they might need further help. The tutorial includes information about:

- Planning an essay;
- Using your reading list and finding material in the library;
- Searching for additional resources – including evaluating information on the internet;
- Citing and referencing and preparing your bibliography;
- Writing specific parts of the essay such as the introduction and conclusion.

Figure 1: The essay writing tutorial in Moodle
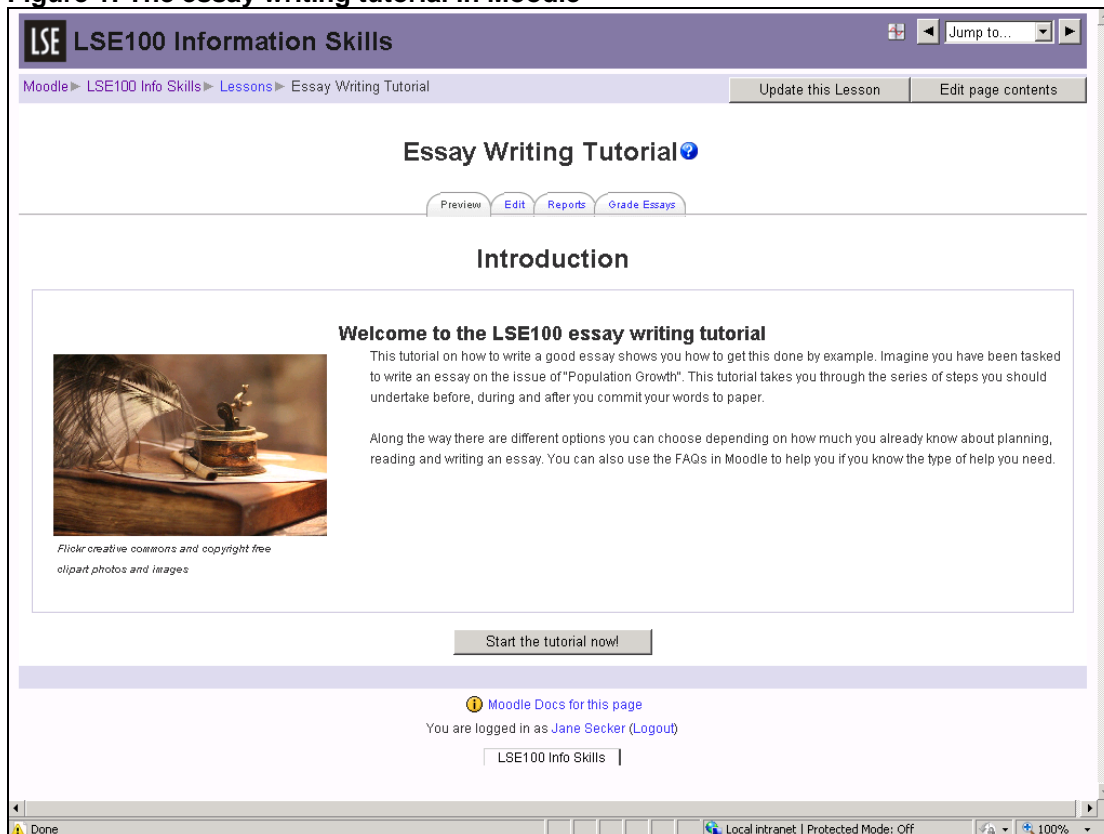
6.2 Audio feedback

Audio feedback was piloted as part of LSE100, as LSE students expressed concerns about the lack of feedback they received on their written formative work. Audio feedback, where a tutor can record a short audio file (mp3) for students to play, either in addition to, or in the place of written comments was considered useful for a number of reasons, including:

- the ability to provide feedback quickly while giving students more detailed comments than in written form, and
- the ability to use tone to emphasise points and make feedback more meaningful and personal.

The audio feedback was recorded using Wimba Voice tools and embedded in Moodle. Students were able to download or play the recordings and received notifications by e-mail when the feedback was available. Two pieces of audio feedback on their written work were provided to students in Lent Term 2010.

6.3 Personal Response Systems (PRS)

All LSE100 lectures were given in a large lecture theatre to accommodate groups of up to 200 students at any one time. In the future LSE100 lectures will be delivered to groups of up to 800 students where maintaining student engagement is critical. The lecture ran twice per week to allow all students to attend and to avoid timetable clashes with other core undergraduate courses. Lecturers were encouraged to use the PRS to promote active learning in their session and almost all lecturers used it at least once during their lecture. Most staff needed fairly minimal support to use PRS, attending one training session and having ad-hoc help and support as required. The PRS software needed to be installed in PowerPoint, but as the lectures all took place in one lecture theatre this needed to be done once. Staff from CLT were on hand to troubleshoot, for example if the lecturer needed to reset a question, however the need for technical assistance proved to be minimal.

7. Findings

The following are indicative results from the evaluation and analysis completed to date with students, concentrating on Moodle, the online tutorial, audio feedback and PRS.

7.1 Use of Moodle and online tutorial

Moodle produces detailed activity reports which enabled student behaviour to be tracked. Findings from the reports for the Information Skills course were of particular interest to the researchers as were the reports for the essay writing tutorial. Activity reports tracking student usage of various elements of the Information Skills course is shown in Figure 2. While, page views do not necessarily mean active and deep engagement, therefore the logs were analysed to see which pages in the tutorial were viewed and if students worked through it entirely. Students across LSE100 spent an average of 29 minutes accessing the tutorial and their average score in the quiz was 61%.

Figure 2: Usage of resources in LSE100 Information Skills Moodle course

Resource in Moodle	Times accessed
Essay writing tutorial	1668
Citing and referencing resources	1230
Diagnostic test (test your information skills)	389
Avoiding plagiarism	188
Search strategies to help you find resources	163
Managing and organising information	152
A guide to quality sources	142

The results above show the second most popular resource were the citing and referencing materials, suggesting students needed help and advice in this area. This is to be expected on a course which has a diverse mix of students from both qualitative and quantitative degrees: many accounting or economics students, for example, would not be familiar with essay writing skills. Further analysis is being undertaken to observe any patterns of use related to student nationality / domicile, gender and their home department; for example, early indications show that the highest use of the essay writing support materials was from students from the Department of Mathematics.

The focus groups also provided feedback on the essay writing tutorial, with one student explaining how they used it as a point of reference for when they had queries. Another student explained how the tutorial taught them to use delicious:

> "When I wrote my essay I had a problem with information overload, so I went on Moodle thing where they had the information skills … they had this link for this thing that you could download for your browser that keeps all your references and stuff and it's really good, so I think I've learnt something."

Another student found the quiz helpful stating:

> "Moodle had a quiz on information skills, that was really useful, especially when it asked, for a particular piece of information would you use Google, that was really nice about the course".

However in the focus group another student seemed unaware of the tutorial and that they had not been encouraged to use it by their teacher.

At the end of June 2010 the team undertook further analysis of the Moodle statistics to try to understand how the online resources might impact on learning. Student grades on the assessed essay set in the summer term were analysed to investigate:

- if a student who accessed Moodle and the essay writing tutorial frequently was more likely to get a merit or distinction mark
- if a student who accessed Moodle and the essay writing tutorial infrequently was more likely to fail the course or just pass
- If a students nationality or home department might make them more or less likely to access Moodle and the essay writing tutorial.

The analysis is based on the 213 out of 286 registered students on the course at the end of Lent Term 2010, who completed the assessed essay (see Figure 3).

Figure 3: Moodle usage effect on marks

Moodle usage	Distinction	Merit	Pass	Fail
Number of students who viewed the Essay writing tutorial	22	41	40	1
Marks at this grade	40	88	84	1
% of those at this grade who viewed the tutorial	55.00%	46.60%	47.60%	100.00%
Avg Number of views of Essay writing tutorial pages	11.23	6.78	4.875	4.0
Avg Number of views of Information skills section pages	23.4	16.9	12.9	5.0
Avg Number of views of Essay writing tutorial pages	11.23	6.78	4.875	4.0
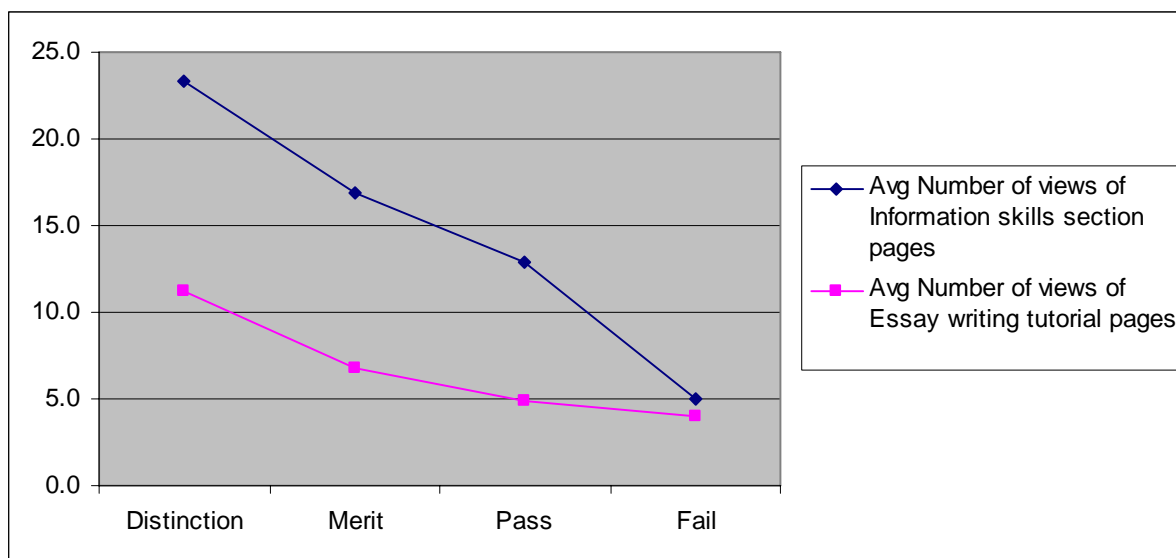
The results above show that students who received higher marks accessed the Information skills section pages (including the Essay writing tutorial) more often compared to those with lower marks

7.2 Use of Audio Feedback

Audio files were well used by students with 200 students accessing the files 498 times up until August 2010. Of these students 41 % accessed the file once, 25% listened to it twice, 14% listened to it three times and 23% accessed the audio file between 4-17 times.

Student opinions of audio feedback were collected using online polls in Moodle and through focus groups. Their opinions were varied although the response rate to the poll was low, with only 14

students completing it. Students were asked to state whether they agreed with the following statement:

"Having audio feedback and written comments is much better than written comments alone"

Agreed or strongly agreed	5
Tend to agree	3
No opinion	4
Tend to disagree	-
Disagreed or strongly disagreed	2

Other polls asked students about accessibility and quality of the audio and both were generally positive, although again the number of responses was low.

Meanwhile focus group evidence was more illuminating and generally students felt audio feedback was useful, more personal than written feedback and could be valuable if you could not arrange to meet your tutor. A student commented that their tutor elaborated more in the audio feedback and this student took notes while listening to the feedback. Another student did not realise where the feedback was located while a third student stated that audio feedback was no more valuable than written feedback. This student believed their teacher had written the feedback beforehand and was simply reading it out. It is worth noting that students participating the focus groups had different teachers and this may account for their differing experiences of audio feedback. It is also worth noting that all teachers were new to providing audio feedback and were encouraged to make notes before they made their recording.

7.3 Use of PRS

Student feedback on the use of PRS in lectures is generally positive, however it is difficult to ascertain if the technology had a significant impact on student learning. In the highest instance 94%of students attending the lecture used the PRS, while the lowest recorded usage was 41%.

In focus groups students commented that they liked the instant results and the fact that teachers were interested in their views. They also said PRS made them more engaged and they liked to see other students views. However some students stopped bringing their handsets with them to lectures as the term progressed for both practical and pedagogical reasons. The logistics of issuing the PRS handsets caused concern to some students. Students were issued a handset from the Library and it was added to their library record as a loan– 72% of students initially obtained a handset. However, some students were worried they might lose the handset. Others felt it was an extra thing to remember to bring to lecture. From a pedagogical perspective students commented that the type of questions used in class made them less inclined to bring the handset along. Many lecturers used opinion based questions and while this kept students alert during the lecture, they believed that fact based questions would be more useful for their learning.

The PRS responses were stored after the lecture and the results demonstrate that student opinions changed as a result of their learning, see for example Figure 4 which shows the shift of student opinions on climate change during one lecture. It could also be argued that the feedback the lecturer received from using PRS helped them to adjust their lecture, which may in turn improve student learning.

Figure 4: Student opinions before and after the lecture as recorded using PRS
Before the lecture   *After the lecture*

8
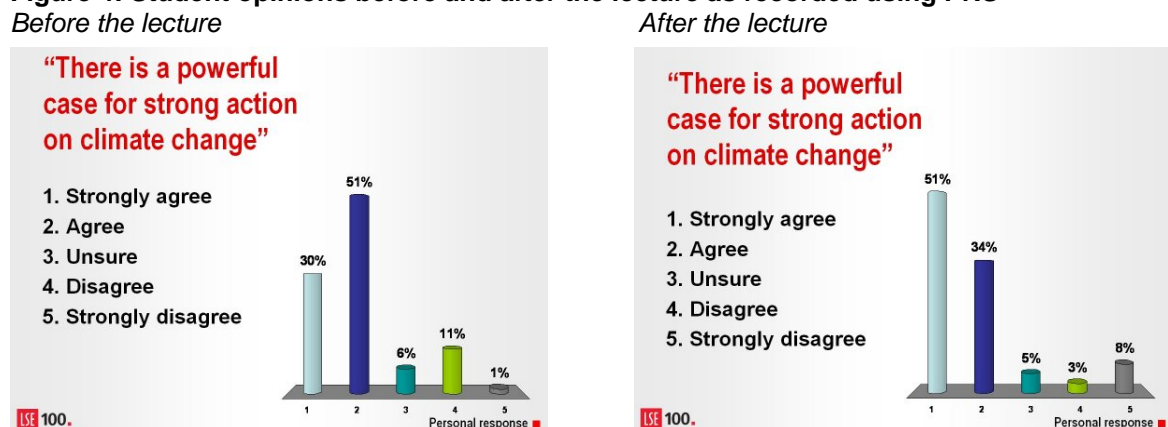
Overall PRS has a number of clear benefits emerging from this first pilot term for engaging students and motivating them and the above evidence suggests that it promotes active learning in large lecture theatres. There was however clear evidence that good question design is essential to maximise the impact.

7.4 Other technologies

Further work is being undertaken to analyse the data related to students' evaluation of other technologies used in LSE100. These technologies include:

- SMS texting
- Automated lecture capture
- Social bookmarking using delicious
- Video material provided in Moodle

Indicative results suggest that technologies such as automated lecture recording and the 'Vox pop' videos available on the website are very popular with students. The SSLC recorded that students were pleased that the lectures are recorded and available on Moodle. Focus groups and exit interviews indicated that students saw the lecture capture as a very useful resource on the Moodle site but agreed that it was never as good as seeing the lecture in person. There is some evidence to suggest technologies such as SMS texting were less valuable for students, who felt if they had a question they would prefer to ask this in class, rather than send a text. However, in general students felt the lectures were clear enough, so they did not need to ask questions and the availability of this technology was useful. However other students were positive of the ability to text 'muddy points' as one said: "Muddy point idea very good, tried it on Moodle and think it should be brought into other courses". Another said: "Didn't use Muddy points but thought they were a great idea, lectures clear so not needed."

8. Impact on student learning

Given that LSE100 was a pilot, and unlike other courses at LSE, the impact of technology on student learning is difficult to measure objectively. LSE100 is a new course, so unfortunately the student grades cannot be compared to a previous cohort. In addition, LSE100 grades students using fail/pass/merit/distinction which is not a standard marking scheme used at LSE.

Nevertheless our evaluation suggests that Moodle has become an important way that students structure their learning, so they access core readings and be directed to help and support when they need it. Moodle usage indicates that information skills resources were used most heavily when assignments were due. By analysing the Moodle statistics and correlating this with the students' grade, the findings suggest that (of those students who made use of Moodle) those who got a distinction had used the essay writing tutorial more extensively than students who got lower grades.

Our research also suggests that audio feedback is a valuable learning tool but its impact on learning is related to how the teacher uses the technology. Audio feedback provides the opportunity for highly personal and detailed feedback which many students appreciate. Corresponding evaluation work with the teachers who prepared the audio feedback has been undertaken, and while this suggests that some teachers might need more support and training about giving audio feedback, others clearly felt it saved them time and enabled them to give more personal feedback to students.

Finally PRS technology is particularly difficult to assess in terms of how it impacts on student learning. PRS technology can be a valuable tool for the teacher in a large lecture theatre, as they are able to focus on issues that students find particularly challenging. They can also use PRS to check student understanding of a topic at the outset of a lecture and then at the end. Students also reported that PRS kept them more alert in the lecture, suggesting that it was encouraging active learning. However, the nature of the questions which were often opinion based and the relatively few number of times that it was used in each lecture, led some students to stop bringing their handsets to LSE100 lectures.

9. Conclusions and next steps

LSE100 is an ambitious initiative: it faces challenges in terms of its aims, scale and scope. The pedagogic strategy developed to meet these challenges seeks to integrate a range of learning technologies alongside traditional teaching practices of lectures and classes. LSE100 is also an

opportunity to demonstrate LSE's commitment to high quality undergraduate teaching and to use technology to support and enhance learning. The pilot has also allowed the course team to experiment with a range of technologies and indicative findings suggest that technology should remain an integral part of this course and is viewed positively by students. Technologies of greatest benefit to students at this stage seem to be Moodle, lecture capture and PRS. Technologies such as audio feedback and texting require further evaluation during the next academic year.

The use of a range of new technologies in LSE100 and the results from the student evaluation raise a number of issues for LSE. One issue is that using technologies such as PRS and lecture capture in a core undergraduate course has been seen by some staff as raising student expectations. A range of teaching methods are used across different academic departments in the School and the use of any technology, including Moodle, is a decision for individual teachers. However, some academic staff have expressed concerns that LSE100 heightens student expectations and 'raises the bar', so that they also need to consider using these technologies.

The use of technologies in an extensive way has also led to other issues and concerns: one specific issue relating to data protection was raised by the course team, who wanted to use Moodle statistics to monitor student participation and responses by department. This led the School to review the data protection statement for all students, to ensure this was explicit and to develop 'Terms and conditions of use' for Moodle.

A third issue related to the use of new technologies was the associated costs and the teacher training that was required. PRS handsets needed to be purchased in sufficient number to allow each student to have a handset for the duration of the course. Lecturers needed to be trained to use the software required to create and carefully design PRS questions, Teachers attended a short training course on how to create audio feedback files..

Finally, while the lessons learnt from the pilot are highly valuable for going forward with LSE100, the course team is aware that there may be differences next year when the course is rolled out to all first year undergraduates. Students on the pilot volunteered to take the course, so may be more receptive to the aims and innovations of the course. Next year's cohort will take LSE100 in addition to all their other courses. This causes two issues: namely, the cohort size will rise to 1300, which has implications on issues such as timetabling, finding suitable teaching rooms, training additional class teachers. It also has issues in terms of making it ensuring that the technologies are scalable.

Finally, this paper also questions whether LSE100 students might display any 'generational' differences in terms of their learning and their familiarity with technology. Early findings suggest there is little to distinguish this cohort from other groups of students at LSE or other UK universities; their need for information and study skills support is key. However, students volunteered to be part of the pilot, so the cohort might display differences in subsequent years. Our research suggests that LSE undergraduates are not wedded to technology, regarding most technologies as less valuable than face to face contact. They use Moodle for convenience and to structure their learning, but were aware when lecturers 'used technology for technologies sake.' LSE students want to learn at a place and time convenient to them, however they pay high fees to study full time. Consequently they rate face to face contact with teaching staff highly. More detailed evaluation will under undertaken, but our research suggest that learning technologies are beneficial to student learning but they must be embedded in the course, easy to access, and used by well trained staff in order to be successful.

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