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Live Lecture Streaming for Distributed Learning

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Live Lecture Streaming for Distributed Learning

Abstract

Live Lecture Streaming (LLS) is becoming increasingly popular in Higher Education Institutions (HEI) across the globe. It is clear from the research that LLS is becoming an approach to delivering distributed learning driven by cost, demand and cohort size. Our study, comprising of data collection and one-to-one interviews, captured the perceptions of students that directly experienced LLS in two large undergraduate (UG) modules. There is overwhelming student demand for LLS on all UG modules. It is, however, still not the predominant mode through which students want to engage.

LLS is valued as a revision tool for assessment as the student can 're-experience' the lecture to some degree. It provides flexibility for those who have to support their income which will be an ongoing argument as a result of the tuition fees cap lifting. Unexpected issues from LLS arose like demotivation created by the fragmenting of the cohort, and dissatisfaction with the lecturer's interaction with LLS participants during the lecture.

The dual-nature of LLS requires a modification of lecture style to leverage the strengths of both face-to-face and online channels. With such a culturally diverse global audience, affordances are required to ensure that lecturers become more effective communicators and that meaning is not distorted through the medium of delivery.

1. Introduction

LLS involves the broadcasting of a lecture over the internet at the same time as it is being delivered in the traditional lecture theatre. It enables learners to be remote from the physical space in which the lecture is delivered, yet access it in real-time. This approach differs to streaming video which is the streaming of a pre-recorded video artefact to a capable device. LLS technology produces synchronous and asynchronous learning experiences. Students have indicated that access to both modes is preferred (Moridani, 2007).

2. Background and Context

Kingston University's Faculty of Computing Information Systems and Mathematics (CISM) had an inbound cohort of over 430 students for the 2010/11 academic year. No lecture theatre on campus had the necessary seating for such a large cohort.

Four possible options were investigated with the goal of mitigating the capacity issue:

Double Teaching: Deemed unsuitable and undesirable as a long term solution. This is due to the academic and administrative resource overheads, and likely confusion for the students.

Recorded Video Clips: Considered as an option due to the faculty deploying a similar solution on other modules. It is very resource intensive and asynchronous only unless supported via real-time communication. If a lecture was recorded and uploaded, there is a delay between the lecture happening and the video becoming available. Videos would need to be updated regularly.

Video Conferencing: Considered a possibility but deemed unsuitable due to equipment constraints. More flexible conferencing technology proved difficult to implement reliably in differing lecture environments. Elegant solutions are possible but the faculty lacked expertise and components of the solution were not cheap.

Live Lecture Streaming: Very flexible solution but not internally supported by the technical team in CISM. Cheaper than video conferencing and easier to deploy across lecture environments. Automatically produces a video clip. Limited understanding of LLS, and little to no experience within the faculty and wider institution.

The practical long term solutions all involved the use of technology. Further investigation into the technology driven options resulted in the decision to trial the use of LLS on two core undergraduate modules. LLS was chosen to be deployed on the IT Toolbox modules covering the full academic year as these were led by one of the key stakeholders in the LLS initiative. The modules teach core ICT principles in the context of modern technology and the ubiquitous nature of computing.

The faculty were keen to implement an LLS in a way that was flexible enough to be deployed into various lecture theatres, cost effective and could be operated by regular staff as opposed to specialised technicians. An LLS kit was put together comprising of a laptop, specialised streaming software, webcam, high definition camcorder, portable audio mixer, network router, wireless microphones and receiver. A number of Live Video Streaming networks were investigated and Livestream was chosen as the content delivery network for LLS. The overarching vision for implementing LLS was to enhance the faculty ability to reach, teach and re-use. LLS would be part of a broader strategy to move away from a typical distributed passive learning (DPL) environment and toward a distributed interactive learning (DIL) environment (Khalifa and Lam, 2002).

3. Delivering LLS and collecting Feedback

The approach to delivering lectures to the first year cohort involved splitting the group across two lecture theatres and providing a presence online. The 'hub' was the lecture theatre in which the academic conducted the lecture. The second 'breakout' lecture theatre projected a feed of the lecture via the Livestream website with a teaching assistant present to manage and facilitate (Karal *et al*, 2010). Learners online and in the second lecture theatre could interact with the 'hub' using Twitter as a communication channel. This is known as a backchannel and has been shown to enhance engagement and support interaction in large groups (Ebner, 2009; Aagard *et al*, 2010). The recorded lecture would automatically become available online after the event for those who were unable to attend plus for review and revision purposes.

LLS was delivered over the first and second semester of the 2010/11 academic year. Both semesters were run from the same 'hub' and 'breakout' lecture theatres. The lectures for both semesters were streamed online via the Livestream channel, 'Kingston Lectures'. Student helpers from the faculty resource pool were employed to facilitate the 'breakout' theatre and operate the streaming equipment.

Data was collected from various sources including: a survey in which over 50 students responded; 10 face-to-face interviews in the field; data from students' personal data portfolios (PDP); and through Livestream's channel analytics. The survey consisted of eight questions and data was collected over a two month period from the end of March 2011 until the middle of May 2011. Interviews in the field comprised of open questions leaving the student greater scope to share their views. Data gathered from PDP activities was in the form of commentary on the students blogs or their PDP documents.

4. Views and Experiences of LLS

Unpacking the results from the various data collection activities provided useful insights; some expected, and some very surprising. To streamline dissemination of findings they are presented around the three key aspects of the faculty vision for LLS in reverse order. Each aspect will open with a student comment gained from data collection.

Re-use

"... saw video to revise for weekly activity task, which was helpful even though write notes things go quick and may not get every single point. So video helped on recapping and to fill in notes I missed in the lecture."

"The information given in the lectures at times could be difficult to take in not because it's hard or I'm slow or anything like that only because some of the material is new to me."

– Student comment on the ability to watch the lecture again.

The reusability aspect of LLS stems from the ability of live streaming services to create a recorded version of the lecture for later access. From the data collected, 20% of students used LLS purely for revision purposes and 40% chose to watch the lecture on a different day to when it was broadcast. Through the lecture recording, the student is able to re-experience the lecture to some degree as a result of re-use (Zender *et al*, 2009).

Channel analytics from the Livestream service produce considerable evidence to support reuse. For example, over the academic year the number of unique accesses to the Livestream IT Toolbox online videos in the UK totalled 9836. Converted into a weekly average it results in 447 unique accesses to the IT Toolbox 'stream' or videos. It is unlikely that almost all students watched the lecture while it was broadcast or subsequently once it was available online, and the monitoring features within Livestream support this. It is more likely that students re-watched the videos for review or revision.

Teach

Student interaction and re-enforcement of learning:

"... ask the people watching some questions. When someone asks a question say it back before the answer. (sic)"

Student engagement through participation in their learning strategies

"Another major improvement which could somehow be implomented [sic] is audience participation."

The ability for the 'breakout' lecture theatre and online viewers to interact with the lecture 'hub' provided unique opportunities to conduct activities and bring the three disparate audiences together. Survey data showed a near even split, 43% watching online and 57% in the lecture theatre, in terms of preferred mode of attendance. This split is more or less maintained in a question asking about the value of LLS over the actual lecture indicating that those who fully engaged with LLS were as satisfied as learners who valued the face-to-face experience (Abdous and Yoshimura, 2010). Observation of lectures and channel analytics highlighted that attendance patterns for face-to-face and LLS varied based on the particular lecturer and topic being covered, something that Wang *et al*, (2010) had previously recorded. Colleagues jokingly termed this the 'Briggs effect' as that particular academic's lectures were well attended.

While delivering the lecture using LLS while technically successful it came under criticism by a number of learners in terms of quality of interaction. In the survey a question asking the students to rank the quality of four components of LLS, lecturer interaction with students was ranked as its worst feature. A number of survey respondents were critical of the lack of interaction between the lecturer and online viewers.

It is clear that there are a number of areas in which the faculty can improve the cohesiveness of the LLS experience. Indeed, there is nothing to fundamentally prevent the students perceiving that any

of the three modes for engaging with the lecture are of equal quality (Buhagiar and Potter, 2010; Abdous and Yoshimura, 2010).

A number of factors compounded to diminish the overall experience of students participating on an LLS module. While the notion of 'stage fright' (Scott, 2007) was considered as LLS was something new for the lecture team, they were experienced in lecturing and facilitation as well as having been involved in creating pre-recorded video clips for other modules. It is not possible to attribute 'stage fright' as a factor affecting the teaching side of the LLS experience without further research. The negative perception of the teaching as a result of low interaction is likely attributed to the inability of the lecturer to manage the lecture in the traditional space and the interaction with the two points of LLS delivery. The inability of the lecturer to effectively communicate and interact via twitter could be a result of having to juggle the technological, social, access and assessment challenges of using a backchannel such as Twitter in a lecture (Aagard, 2010). Perhaps then, the broader issue is the current inability for lecturers to leverage the strengths and affordances of the various media they use to deliver lectures (Preston and Phillips, 2010). This can also be evidenced, in general, by the poor use of presentation tools such as PowerPoint (Isseks, 2011) where the tool is used in a context similar to the overhead projector or as an information dump.

Another interesting concern raised as a result of implementing LLS was from a student who felt that attendance in the lecture showed lower capabilities of the students. This was clearly demotivating for the student concerned and other comments also related to the impact of the class dynamic as a result of fragmentation caused by LLS (Shelley, 2009). This could speculatively be a result of LLS participants being disconnected from the lecturing experience with the perception being that they are more confident and capable students.

Reach

Student learning strategies

"Broadcasting lectures was really good as some people like me learn better at home where they don't get distracted by other students or people that need to spend a lot of time and money travelling could just watch it online."

"I need to work to survive and I can fit [Live Streaming] Lecture into my work schedule"

Delivering the IT Toolbox modules using LLS provided flexibility for learners in terms of location and time as lectures were delivered live online and then as a recorded video clip afterward. In the current financial climate, a number of students found this approach particularly useful as they either saved on travel expenses or were able to work and watch later. From the survey data collected, 47% of respondents indicated a preference for watching online.

CISM's desire to reach proved unexpectedly successful as it was found there were international participants that viewed content on the Livestream channel. It was not possible to determine whether any of the international viewers saw any lectures live. Viewers from 33 countries accessed content on the channel, with the largest viewer populations coming from India, Greece, North America and Malaysia. Such a culturally diverse audience, spanning 3 continents some consideration needs to be given to sensitivities and contextual needs (Magjuka *et al*, 2010).

5. Conclusions and future work

This first attempt at implementing LLS within CISM has broadened the faculty understanding of delivering distributed learning from the lecture theatre and synchronously online. There is much scope for improving the approach to LLS delivery.

From our research we found that the lecturer will need to adapt their lecture style to engage both the face-to-face and remote learner groups. Presentations will need to become richer in the transmission of knowledge (Kinchin *et al.* 2008; Kinchin and Cabot, 2007) and in terms of effective communication of key messages (Reynolds, 2009). Interaction between the lecturer and LLS participants might be improved by employing small scale active learning interventions throughout the lecture (Dyson, 2008). Research has shown that active learning can be successfully embedded into presentations and videos (Giers and Kreiner, 2009; Lee and Sharma, 2008). The lecture approach used in the IT Toolbox modules will be revised to incorporate effective presentation and active learning methods. More effective use of the Twitter backchannel is required in order to link the lecturer activities in the theatre with learners who are in the breakout room or participating online. With such a distributed environment both spatially and temporally, greater understanding is needed of the impact of space and place (Harrison and Dourish, 1996) in the provision of LLS. Lecturers will need to have a stronger awareness of cultural issues in teaching as the LLS audience (in this instance) is international. It is up to the academic to reduce the uncertainty in communication and support the construction of shared meaning by finding the cultural commonality in the elements of their lectures (Cronjé, 2011).

Issues raised by students regarding pressure and motivation as a result of LLS are significant and require further research. The pressures that students experience are not isolated and the use of LLS may be adding or compounding them. Conversely, from data collection, there were students experiencing financial pressure that found LLS helped by giving them flexibility. Attitudes and concerns from academic staff need to be more thoroughly investigated and factored in to the LLS implementation process.

The authors will continue to investigate the wide reaching effects of LLS and welcome support. LLS has proven to be a very disruptive technology but not because of its ability to realise the 'reach, teach and re-use' goal CISM had intended. It has created a set of filters that can allow us to examine the role of the lecturer and the lecture in an interconnected, international teaching and learning environment.

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