The Value of Capture: Practitioner notes

What is already known about this topic

- Lecture Capture technologies are becoming commonplace in UK HEIs
- Lecture capture systems are often integrated with timetabling systems and VLEs to automate the recording and distribution of recorded lectures
- Student satisfaction levels with the availability of recorded lectures is high
- Studies have shown little or no positive impact on student attainment as a result of recorded lectures

What this paper adds

- An evaluation of alternative use of capture technologies in a non-traditional discipline-specific pilot study (i.e. not recording lectures)
- Presentation of a theoretical Model of Capture Value

Implications for practice and/or policy

- Recommends a shift in focus away from passive capture-all approaches to the use of capture technologies and towards more integrated discipline-specific use
- Application of the Capture Value model to inform institutional strategy and investment for post-pilot rollout of capture technologies

Statements on potential conflicts of interest

- The author is unaware of any potential conflicts of interest

Statements on Open Data and Ethics

- After publication the article will be included in the University of Wolverhampton open access repository.
- All data has been anonymised

The Value of Capture: taking an alternative approach to using lecture capture technologies for increased impact on student learning and engagement

Abstract

Lecture Capture technologies are becoming widespread in UK Higher Education with many institutions adopting a capture-all approach. Installations of capture devices in all teaching rooms and lecture theatres, scheduled recordings through integration with timetabling and automated distribution through virtual learning environments, are swiftly becoming the norm. Capturing lectures has been shown to have a positive impact on student satisfaction, but numerous studies have shown little or no positive impact on student attainment as a result of capturing lectures. This article explores an alternative approach to the use of capture technologies in a pilot study at the University of Wolverhampton. The output of the pilot evaluation is a theoretical model recommending a shift in focus away from the conventional use of the technology for capturing lectures. It advocates a move towards the purposeful use of capture technologies to create content which adds value to student learning and increases engagement, which may ultimately lead to a positive impact on student attainment. The findings have implications for policy and practice around the use of capture technologies. Future work is described in the context of the project findings.

What are capture technologies? Definition and terminology

Capture Technologies are a combination of software and hardware that will record any combination of audio, video, presentation slides, or a computer screen and package them together into one piece of media that can be viewed online, at any time, from any place and on any device.

Capture technologies are commonly referred to as 'Lecture Capture', as the technology originated as a means of simplifying the process of recording lectures. Captured lectures remain the most typical use of these technologies in most institutions; however, for the purposes of the University of Wolverhampton pilot the term 'capture' rather than 'lecture capture' was used. This was to reflect the variety of ways the technology was being utilised. The following terms are used throughout this article:

Capture System: the system used to create and distribute recorded and live-streamed video content. In this pilot project the capture system was 'Panopto'.

Capture Technologies: the capture system (Panopto) plus all devices associated with the capture process including computers, cameras, microphones and mobile devices.

Captured Content: any learning content created and distributed using the capture system. Students may access captured content directly from Panopto or through the virtual learning environment (VLE). The most typical type of captured content is recorded or live-streamed lectures; however, there are a number of alternative approaches for which capture technologies could be utilised.

Flipped classroom: where information typically delivered by lectures is pre-recorded and viewed by students in advance, providing an opportunity for group work, application of knowledge or discussion during face-to-face sessions

Demonstrations: pre-recorded demonstrations of skills or activities that can be viewed by students in advance of study time in a laboratory, workshop, computer lab or other practical learning environment.

Supplementary materials: additional learning materials created on an ad-hoc basis to enhance the standard curriculum or support extended learning opportunities such as short clips commenting on relevant news stories.

Assessment unpacking: a sub-category of supplementary learning materials where the academic takes questions about the assessment brief from students anonymously and then records a response for the whole cohort

Capture on-location: a sub-category of supplementary learning materials where content is captured in significant off-campus locations, such as examples from the workplace or fieldwork.

Brief summary of capture technologies literature

Much of the published research into the use of capture technologies in higher education has focussed on the use and impact of recorded lectures. Studies have linked lecture capture with increased student satisfaction (Franklin, Gibson, Samuel, Teeter & Clarkson, 2011; Missildine, Fountain, Summers & Gosselin, 2013). Students also perceive that viewing captured lectures helps their overall learning (Danielson, Preast, Bender & Hassall, 2013); however, numerous studies have shown little or no positive impact on student attainment (Bos, Groeneveld, van Bruggen, & Brand-Gruwel, 2015; Franklin et al., 2011; Leadbeater, Shuttleworth, Couperthwaite, & Nightingale, 2013; Marchand, Pearson, & Albon, 2014; Franklin et al, 2011; Yoon & Sneddon, 2011), with some reporting a detrimental impact on academic performance resulting from the availability of recorded lectures (Johnston, Massa & Burne, 2013).

An alternative use of capture technologies is to facilitate a flipped classroom approach to course delivery (Bergmann & Sams, 2012). The flipped classroom approach involves using pre-recorded captured content for information delivery that is watched by students in advance, to prepare for more active learning in the

face-to-face setting. Studies have shown that flipping the classroom can improve student performance (Baepler, Walker & Driessen, 2014), although it does not always lead to more satisfied students (Missildine et al., 2013).

Whatever the approach, the literature suggests that we can expect students to adapt their use of the captured content available to them depending on their individual learning needs, using search and navigation tools to find chunks of content that they perceive as relevant or important (Karnad, 2013). We can also expect the impact on student learning to be greater when staff deliberately incorporate their captured materials into their overall educational approach (Marchand et al., 2014). This may not be the case in institutions where attempts to ease concerns about the impact of capture technologies on academic workload have led to the popularisation of integration with timetabling systems and VLEs to automate the recording and distribution process. While this makes the act of capturing live teaching sessions extremely simple, it can also encourage a passive approach to capturing content on behalf of academic staff and lower the impact on student learning.

Introduction and context

In 2014, the University of Wolverhampton opened the award winning, state-of-the-art science centre: the Rosalind Franklin Building (RFB). The defining feature of the building is that it has been designed by the Faculty of Science & Engineering without any traditional teaching spaces. There are no classrooms, no lecture theatres, no front-of-the-class, no podiums and no projectors. The vision for the learning spaces in the building has been for five floors of high-end industry standard laboratories to facilitate active participation in practical science.

The design of the building has been influenced by flipped classroom pedagogy (Bergmann & Sams, 2012). All information delivery such as demonstrations of skills, techniques and experiments is delivered by video. Viewing pre-recorded demonstrations enables students to prepare, reflect and review in advance of their practical sessions in the laboratories.

A cloud-hosted instance of Panopto has been established to facilitate the capture, distribution and archiving of video materials to support the teaching and learning activities in RFB. Three recording stations have been installed in the building, selecting hardware which is suitable for a wet laboratory environment including touch screen interfaces and a variety of high definition audio and video capture devices.

A small-scale closed pilot project ran during Semester 2 of the 2014/15 academic year with recording taking place between February and May 2015. Pilot participants were limited to students and staff in RFB.

A secondary installation was also installed in the Millennium City (MC) Lecture Theatre, to provide data on the use of capture technologies in a more traditional context.

System usage data

By the end of the pilot, just over 100 hours of content had been captured by pilot participants with over 1000 hours of viewing by students. Use of the Panopto software differed depending on the location in which it had been used. In RFB the use was predominately through the capture of practical science demonstrations whereas in MC it was used for making recordings of live lectures. The software had also been used by academic staff on their own computers and personal devices to capture a range of different types of content such as module introductions, support for assessments and other supplementary materials.

When the usage figures for the captured content were examined at the end of the pilot, they revealed a large variance in the amount of captured content viewed by students between different subject areas. Typical consumption ratios between the number of hours recorded and the number of hours viewed for captured lectures is between two and four hours of viewing for each hour recorded (Panopto, 2015). At the University of Wolverhampton, the average consumption ratio (i.e. hours recorded : hours viewed) was 1:29 and for science subjects using the RFB it was significantly more. A sample of the data is included in Figure 1, which provides a comparison between subject areas who captured lectures only and those who used the system for demonstrations and supplementary materials instead of or in addition to captured lectures.

School / Department	Sessions captured	Hours captured	Number of views	Hours viewed	Consumption ratio
Biomedical Science & Physiology	40	28.39	11,269	2,287	1:80
Biology, Chemistry & Forensics	3	0.34	2294	168.96	1:497
Mathematics & Computing	22	18.62	821	48.8	1:2.6
Business	12	14	71	0.62	1:0.04

Figure 1. **Consumption ratios = Hours recorded: Hours viewed.**

Maths & Computing and Business were only using the capture system in the MC Lecture Theatre. Neither of these subject areas used the system for capturing content outside the lecture theatre environment. The consumption ratio in these subject areas is in line with or below typical average consumption ratios for lecture capture.

In Biomedical Science & Physiology and Biology, the capture system was used: in the MC Lecture Theatre; for demonstrations in the RFB; for supplementary learning materials; assessment unpacking and group feedback. There were higher than average consumption ratios in this subject area.

In Biology, Chemistry & Forensics, only supplementary learning materials were created. These display the highest consumption ratios of all subject areas.

The flipped classroom approach required by users of the RFB goes some way to explaining the higher than average consumption ratios; however, closer inspection of individual captures reveals that supplementary materials are the highest viewed by students.

Evaluating the pilot

There is a significant amount of published literature evaluating the implementation of capture technologies in higher education institutions. Drawing on the available literature, evaluation surveys were designed for staff and student participants in the pilot. Given the unusual consumption ratios observed in

certain subject areas, it was intended that these surveys would help to determine whether participants at the University of Wolverhampton were experiencing captured content differently to other institutions where the technologies are used more traditionally for capturing lectures. The survey comprised the following features:

- Separate evaluations surveys were developed for staff and students
- Both surveys were delivered online
- Both surveys were designed to collect responses anonymously
- Where possible, the surveys included parallel questions to facilitate comparison of staff and student perspectives
- The questions were categorised into five themes that addressed the project outcomes.

The post-pilot evaluation surveys were circulated to staff and student participants in May 2015. The surveys were sent during the assessment and marking period for Semester 2, which may have had an impact on response rates. It was not possible to send out the surveys earlier, owing to institutional restrictions on surveying students at particular points in the academic year.

Staff were invited to complete the survey by direct email and included all academics who were eligible to take part in the pilot project from the RFB and MC Lecture Theatre; this included staff from the School of Biomedical Science & Physiology; School of Chemistry Biology & Forensic Science; School of Pharmacy; School of Mathematics & Computer Science; and the University of Wolverhampton Business School. Out of 62 eligible staff, 13 responses to the survey were received. The small number of staff respondents makes it difficult to make generalisations about the preferences of the academic population.

Students were also contacted by direct email. An email list was generated from the capture system to target all students who had logged in to the system to engage with the captured content. Invitations were also delivered to students on modules participating in the pilot through the VLE. This would reach students who had chosen not to engage with the captured content and would help to evaluate anticipated future usage or identify any barriers to engagement. Out of 650 students contacted 111 responses were received to the survey. It is worth noting that a significant proportion of the students participating in the pilot were from a large core module with 400 students. The module tutor for this module experimented widely with the use of the capture system, using it to: live stream lectures; encouraging students to attend virtually; record and archive weekly lectures; record practical science demonstrations; and capture a range of supplementary materials.

In summary, the evaluation survey revealed that students believed all types of captured content were helpful to their learning, with the pre-recorded demonstrations of practical science most popular type of

content. This conflicts with the capture system analytics which identify supplementary materials as the most viewed type of content. It is worth noting that not all types of captured content were available to all students, which has an impact on the number of students who indicated that they 'did not access' a particular type of content; for example, only one participating module made lectures available via live streaming.
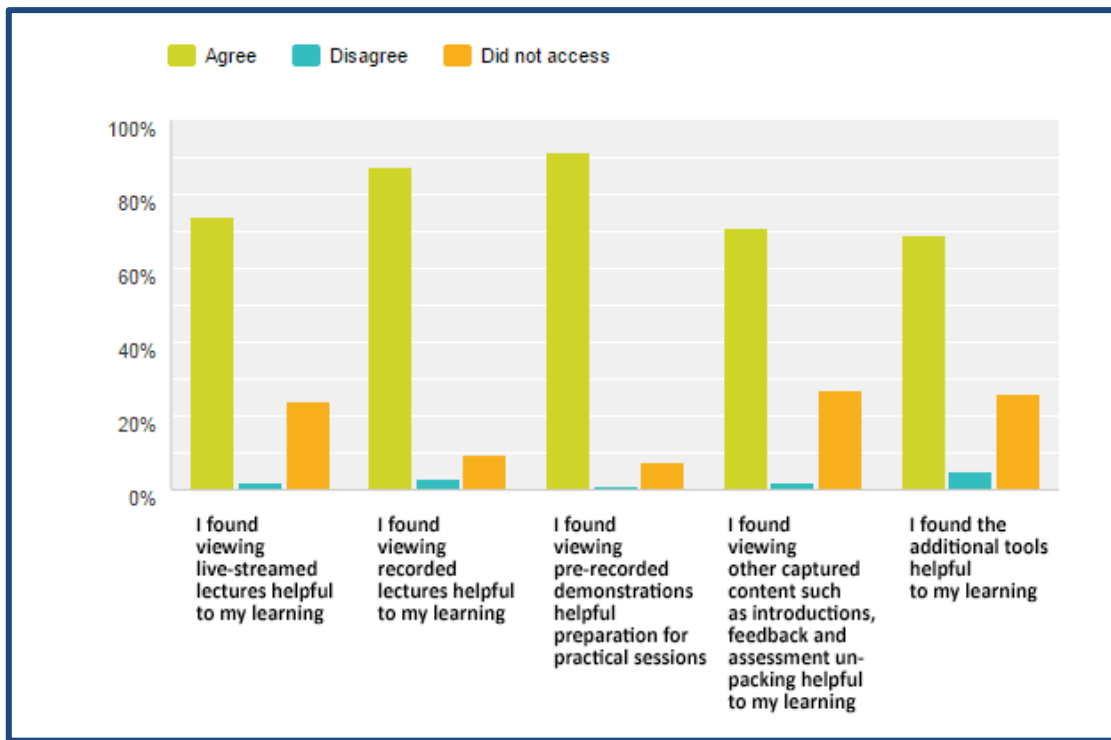

Figure 2. Student perceptions on the helpfulness of different types of captured content

Student responses to the survey indicate they will adapt the way they used the content depending on their perceived learning need. The responses demonstrate that students value the flexibility and playback control provided by captured materials and that students are claiming enhanced levels of concentration, improved understanding, and increased confidence in their own learning. Typical comments from level 4 science students completing the evaluation survey included:

"It helped me learn the necessary skills to know before a practical"

"Pre-recorded demonstrations are very useful to me as I can see and better understand methods before I carry them out in practical sessions"

"[Capture technologies] helped very much! Confidence levels in practicals are very high!"

100% of students who completed the survey want to see the University continue with capture technologies.

Staff members responding to the survey claimed that the capture system was easy to use. This claim is further evidenced by the small numbers of support calls placed to the IT Service Desk during the pilot.

Academic staff say they would like to make more use of the technology in the future. The main barrier to greater engagement during the pilot period indicated by the survey responses was workload and lack of available time to capture new materials; however, there was agreement among respondents that creating and using captured content would ultimately save time.

Anecdotally, staff in the practical science subjects reported greater levels of engagement from students, who were more prepared and independent during practical sessions. Staff found that the new way of working required a shift in their focus during face-to-face sessions, so that rather than concentrating on the 'how to' of scientific techniques they were able to facilitate deeper learning experiences with students by focussing on 'why'.

From an operational perspective, it was interesting to note that academic staff felt that being able to have capture software available on their own computers and devices would be most important to their future academic practice – more important than installations of capture technology in classrooms and lecture theatres. This suggests that staff thinking around applying the technologies to their future academic practice may be leaning towards the creation of specific supplementary materials (the type of content with the highest consumption ratios during the pilot) rather than the capture and archiving of live learning sessions and events.
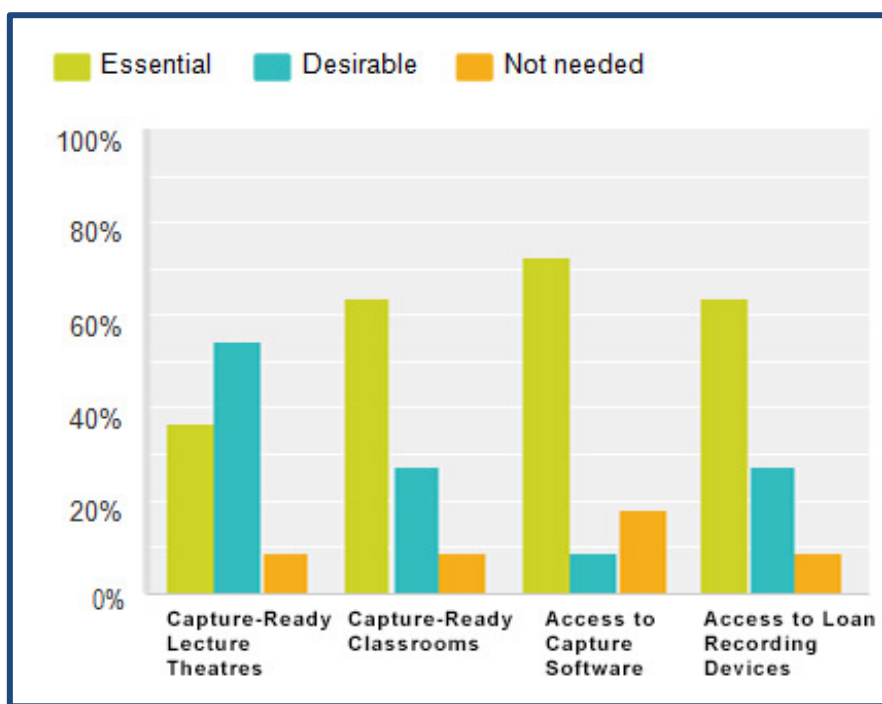

Figure 3 - Academic perceptions of how capture technologies would be most important to their future academic practice.

Discussion: Capture Value Model

Based on the findings from the available literature and the evaluation of this pilot, a visual representation of the volume of recorded material verses the value to student learning has been produced. The following discussion describes how the theoretical model positions various approaches to the use of capture technologies against the axes of value and volume.
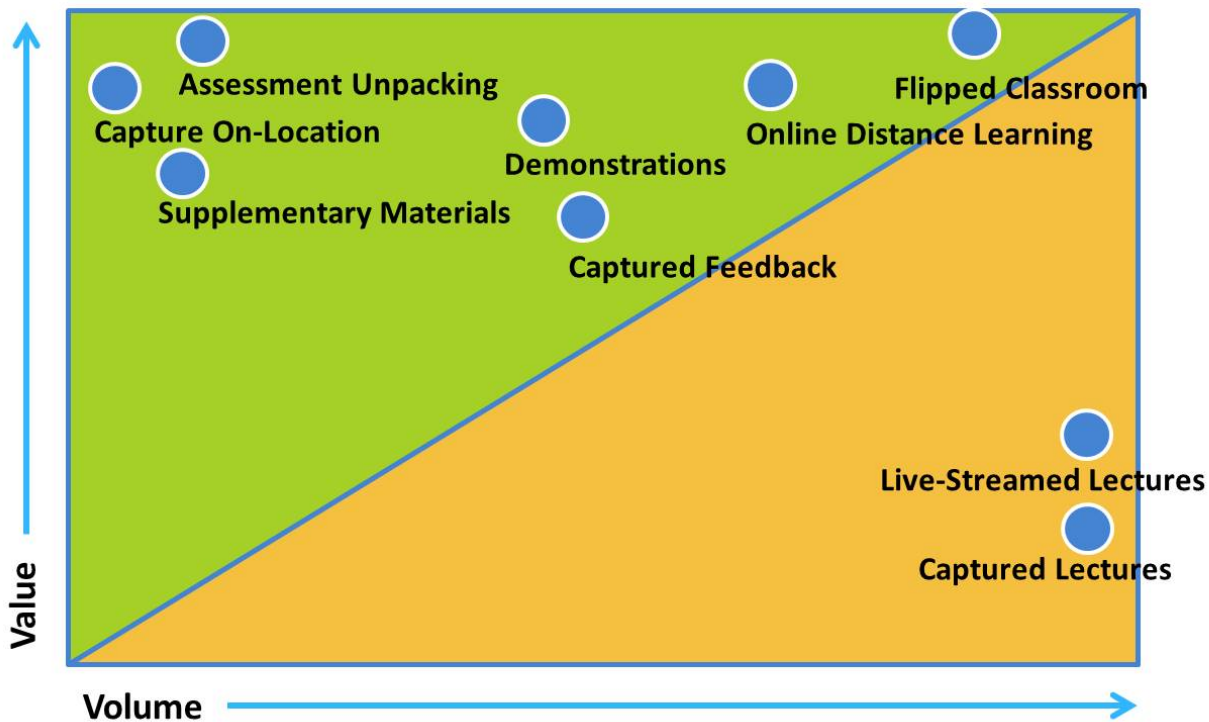

Figure 4 - The Capture Value Model

We know that students will adapt their use of captured content depending on their learning needs and so their consumption of a particular piece of content (i.e. how many hours were viewed in relation to the number of hours recorded) reflects the perceived importance or helpfulness of the content to the learning process. This provides an indicator of the student-perceived value of different types of captured content. The evaluation of the pilot activity found that consumption ratios were highest for supplementary materials, including assessment unpacking and feedback. The volume of recorded hours required to support an approach such as assessment unpacking would be very low; however, this piece of content is likely to be of interest and relevance to all students and is likely to be viewed at least once by most students. In contrast, the consumption of recorded lectures is likely to be limited to a small percentage of the student cohort using whole recordings to catch up on missed sessions or small chunks of recordings for revision. The volume of recorded hours to support the recorded lectures approach would be very high.

It is also known from existing research that the impact on student learning is greater when academic staff deliberately incorporate their captured materials into the curriculum design (Marchand et al., 2014). The

evaluation of the pilot activity suggests there is a relationship between the purposeful use of capture technologies to provide the types of content that support and enhance the curriculum and higher levels of consumption of the content by students. Therefore, the overall value of a piece of captured content is influenced by the value-added provided by staff. Assessment unpacking exemplifies the purposeful and deliberate use of capture technologies as part of an overall educational approach. Research has shown that better understanding of assessment processes and expectations can have a positive impact on retention, progression and attainment (Thomas, 2012), which further adds to the value of this type of content. If we consider recorded lectures in comparison, where the recording and distribution of recordings is automated through integration with timetabling systems and VLEs, the process for academic staff can become passive and they may be unlikely to deliberately incorporate this type of captured content into the curriculum design. Student satisfaction with the availability of lecture recordings is likely to be high, but an improvement in attainment would not be expected.

In addition to the volume of recorded hours required to facilitate a particular approach to the use of capture technologies it may also be appropriate to acknowledge the impact on the workload of academic staff in terms of volume. Available time has been cited as a barrier to greater engagement with the technologies, and the production of preparatory and supplementary materials will require an extra investment of time in addition to the scheduled learning and teaching time that academic staff already have with students for lectures, tutorials and practical sessions. Some approaches may ultimately save time for academics, such as in the creation of preparatory materials like pre-recorded practical demonstrations, which can be used in place of repeating the same demonstration to multiple small groups within a cohort and re-used for subsequent cohorts; however, it may also be the case that the workload involved in creating supplementary materials such as group feedback may have a different impact on individual members of staff. For a member of academic staff who is confident and experienced in recording materials, it may only take a few minutes to create a small piece of captured feedback. For another who may be less confident with the technology or feel less comfortable in front of the camera it may take a significant amount of preparation time or several attempts at recording to achieve the same result.

If workload allocations are considered as a measure of volume, the position of the various approaches to the use of capture may move to higher points along the volume axis depending on the individual academic and whether the captured content was reusable for multiple groups or subsequent cohorts. The value of the material in terms of student-perceived value and value-added by staff would, however, remain unchanged.

At the time of writing it is not possible to say whether alternative approaches to capture technology lead to increased student attainment; however, the evaluation of the pilot at the University of Wolverhampton

provides an indication that more purposeful use of capture technologies to support and extend student learning leads to greater engagement with the types of captured content that are likely to have a positive impact on student attainment.

Conclusion

Considering what is known about the use of capture technologies and their impact on student learning, the Capture Value Model recommends a shift in focus away from the current trend for passive capture-all institutional approaches, towards more deliberate integration into overall educational approaches. It is not necessarily an argument against lecture capture, but rather a model to encourage academics and decision makers to be more purposeful and innovative in the implementation and use of these technologies in supporting teaching and learning. It is known that students respond positively to captured materials and that these technologies are perceived as helpful to student learning, but it is also known that this does not always translate to improved attainment. As the higher education economy continues to change, it may be important for institutions to balance student expectation and demand with pedagogically-appropriate application of technologies to support and enhance learning.

By using the Capture Value Model to inform institutional strategy and strategic investment for post-pilot roll-out of capture technologies, there is potential to have a significant impact on the student learning experience. At the University of Wolverhampton, the focus of the future roll out will include working with discipline areas to consider this model alongside current and emerging academic practice and how this might be applied or adapted to enhance student learning in disciplinary contexts.

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