



Office of the VP Academic and University Affairs

# Lecture Capture in Higher Education

Research surrounding the common concerns, benefits and trends in  
the use of lecture capture technology and recommendations for  
consideration at UBC

Prepared by |  
Kiran Mahal, Vice President Academic and University Affairs  
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## **1 Introduction**

This report provides an overview of the benefits and concerns from the student and faculty perspective regarding the use of lecture capture technology from research conducted at other institutions utilizing this technology. This document also explores innovative uses of lecture capture technology and provides some potential areas to explore at UBC. In addition to exploring the uses at other institutions, this report provides recommendations to address the implementation of this technology at UBC.

## **2 Background on Lecture Capture**

Lecture capture is a term used to describe any suite of technology used to capture audio or video of lecture activities to be made available for future use. Over the past decade the use of this technology has evolved from simple audio recordings to use of software that captures PowerPoint, all on screen activities and even overhead cameras. There has been extensive research conducted relating to the perceptions and realities surrounding the use of lecture capture technology in traditional classroom settings as well as in distance education. Many innovative uses have been developed and implemented with successful results. This report provides a summary of some of the research surrounding the use of lecture capture technology and the benefits to students and the institution. Among students there is strong support for making lecture audio and video available online. Many instructors at UBC have begun to experiment with methods of lecture capture, specifically introducing podcasts of lectures, and faculty specific pilots have been run of lecture capture software. The challenges on an institutional level arise from communicating to instructors the value added for students and the classroom experience. This technology has the potential to make positive changes in the online learning environment and in the resources that the institution makes available for students, changes that have already been demonstrated at institutions around the world with strong research data to support results.

## **3 Student Rationale for Use**

Numerous studies have shown support for the statement that student feel lecture capture technology is a positive academic resource. In surveys of students conducted through studies, the top reasons for student usage of the recordings were identified as the following, with little variation between students who were already using the online resources and those who were not already using the materials:<sup>1</sup>

- To catch up on classes that the students were unable to attend
- To allow the student to study at a time that suits them
- To use the recordings as an exam revision tool
- To tailor learning to the students specific learning needs that make it difficult to take notes during in class lectures

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<sup>1</sup> Engstrand, S., and Hall, S., "The use of streamed lecture recordings: patterns of use, student experience and effects on learning outcomes," *Practitioner Research in Higher Education*, 5, no. 1 (2011): 9-15

A study conducted around the academic perceptions of lecture capture technology asked instructors who self-selected to utilize the technology to identify their perceived benefits to students. The main benefits identified were: equity, revision purposes, and ability to listen to different streams.<sup>2</sup> The same instructors identified potential concerns as low attendance, expectations and pressure from students, minimal benefits to the lecturer, and substitute for engagement.

## 4 Common Concerns Surrounding Lecture Capture

There are some common concerns throughout institutions of higher education and the academic community surrounding the use of lecture capture technology. There has been extensive research focused on the academic perceptions of the use of lecture capture and individual research has been conducted to address whether many of these concerns hold in reality. Common hesitations from instructors regarding the usage of lecture capture technology touched on perceptions about the reliability of technology, the level of engagement with students, and technology as a pedagogical tool specifically relating to how suitable the technology is for different curricula<sup>3</sup>. The most pervasive of concerns include the apprehension that recorded lectures will replace the in-classroom environment, the technology will result in a decrease in class attendance, and that the technology itself is not accommodating of all lecturing styles.<sup>4</sup>

### 4.1 In-Class Environment

There has been much hesitation on the side of faculty around whether increased use of lecture capture technology may lead to a replacement of the in-class environment. Many of the conclusions that have arisen from research around this area have shown that recorded lectures serve as a supplement to enhance the face to face learning experience rather than replace it.<sup>5</sup> Students themselves identified that there are many benefits to the in class experience that are lost through online recordings.<sup>6</sup> Students participating in research studies agreed that attending in person lectures are a “better learning experience” and that recorded lectures alone are not “ideal for learning”.<sup>7</sup> It has also been noted that it is important for instructors to communicate to students that online recordings are not meant to replace the in-class setting.<sup>8</sup>

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<sup>2</sup> Chang, S., “Academic perceptions of the use of Lectopia: a university of Melbourne example,” *Australasian Society for Computers in Learning in Tertiary Education* (2007), <http://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf> (accessed August 9, 2012).

<sup>3</sup> *Ibid*

<sup>4</sup> *Ibid*

<sup>5</sup> Davis, S.J., Connolly, A., and Linfield, E., “Lecture capture: making the most of face to face learning,” *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13.

<sup>6</sup> *Ibid*

<sup>7</sup> Barokas, J., Ketterl, M., and Brooks, C., “Lecture capture: student perceptions, expectations, and behaviours,” *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, (2010): 424-431.

<sup>8</sup> Davis, S.J., Connolly, A., and Linfield, E., “Lecture capture: making the most of face to face learning,” *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13

In addition to apprehension around “replacing the classroom environment” another noted concern has been the potential decrease in engagement from students with the fear that if lectures are available online it may deter students from fully focusing in class. In studies conducted on this area, instructors did not actually note any decrease in the engagement level of their students as a result of the lecture capture technology.<sup>9</sup>

## 4.2 Student Attendance

Multiple research studies have shown that the use of lecture capture technology does not have an impact on class attendance by students.<sup>10,11,12</sup> Studies have shown that students mainly use lecture recordings as study aids to prepare for exams rather than as substitutes for lecture attendance.<sup>13,14,15</sup> Most students utilize recorded lectures in the place of the in-person classroom experience only when they miss a class<sup>16</sup>. Lecture capture technology is marketed in many institutions as a supplementary resource to in-person lectures rather than as a replacement.<sup>17</sup>

## 4.3 Accommodating Different Lecture Styles

While some lecturing styles which are more interactive may not translate as effectively in a video format, it is important to note that the purpose of lecture capture in these cases is not to replace the in-person lecture but rather to provide a supplemental resource for students. The engagement will come from the classroom environment where the benefits of a live lecture are realized. The online recordings will tend to serve as a tool to review missed points or revise concepts.

Larger courses are more focused on content delivery than engagement by design, making them ideal candidates for lecture capture. Since there are fewer opportunities for students to have

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<sup>9</sup> Chang, S., “Academic perceptions of the use of Lectopia: a university of Melbourne example,” *Australasian Society for Computers in Learning in Tertiary Education* (2007), <http://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf> (accessed August 9, 2012).

<sup>10</sup> Copley, J., “Audio and video podcasts of lectures for campus-based students: production and evaluation of student use,” *Innovations in Education and Technology International*, 44, no. 4 (2007): 387-399. Hew, 2009

<sup>11</sup> White, B.T., “Analysis of students’ downloading of online audio lecture recordings in a large biology lecture course,” *Journal of College Science Teaching*, 38, no. 3 (2009): 23-27.

<sup>12</sup> Hew, K., “Use of audio podcast in K-12 and higher education: a review of research topics and methodologies,” *Education Technology Research and Development*, 57: 333-357.

<sup>13</sup> *Ibid*

<sup>14</sup> Copley, J., “Audio and video podcasts of lectures for campus-based students: production and evaluation of student use,” *Innovations in Education and Technology International*, 44, no. 4 (2007): 387-399. Hew, 2009

<sup>15</sup> White, B.T., “Analysis of students’ downloading of online audio lecture recordings in a large biology lecture course,” *Journal of College Science Teaching*, 38, no. 3 (2009): 23-27.

<sup>16</sup> Engstrand, S., and Hall, S., “The use of streamed lecture recordings: patterns of use, student experience and effects on learning outcomes,” *Practitioner Research in Higher Education*, 5, no. 1 (2011): 9-15

<sup>17</sup> Chang, S., “Academic perceptions of the use of Lectopia: a university of Melbourne example,” *Australasian Society for Computers in Learning in Tertiary Education* (2007), <http://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf> (accessed August 9, 2012).

discussions or have their questions addressed in lectures, this technology can provide added value. It can also relieve some of the stress placed on TA's or instructors in larger courses, by having them spend less time repeating what was presented during a course and more time delving into the substantive issues.

#### **4.4 Technology Itself**

While there can be challenges associated with using lecture capture technology from a first user and end user perspective, these challenges can easily be identified and overcome through selecting the right software for the institutions. The market for lecture capture software has expanded greatly in recent years with possibilities to have additional customization to pre-prepared software that is tailored to the needs of any given institution.

### **5 Benefits of Lecture Capture Technology**

#### **5.1 Student Specific**

##### **5.1.1 Accommodating Different Learning Styles**

One key advantage of lecture capture technology for students is that it is a flexible supplement to in-person lectures that caters to different learning styles.<sup>18</sup> The current model of lecturing puts all students under one mould of learning. With lecture capture, students are able to review, listen and work through lectures at their own pace, and benefit from better understanding their own learning style. This is especially beneficial to first and second year students who are new to the post-secondary environment and are still developing their study skills for a new academic setting.

Providing students with an opportunity to review recordings of lectures allows students to use in-class lecture time to engage with the materials being presented, rather than attempt to take notes, listen, and work through problems presented. Current methods of having students solve problems during class time is great for direct content review but plays to the advantage of students who are able to pick up information easily in a direct lecture environment. Lecture capture allows students to work through questions and problems in a setting that is less time sensitive, by pausing and resuming the recording during problem based sections.

##### **5.1.2 Accessibility**

Making recorded lectures available online allows for a more accessible learning environment, especially for students with disabilities and international students.<sup>19,20,21</sup> This technology

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<sup>18</sup> Balfour, J.A.D., "Audio recordings of lectures as an e-learning resource," *Built Environment Education Annual Conference 2006* referenced in Davis, S.J., Connolly, A., and Linfield, E., "Lecture capture: making the most of face to face learning," *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13, 6.

<sup>19</sup> *Ibid.*

allows students to access lectures if they have missed class due to personal, medical, or any other reasons. International students benefit from this technology as it allows them to become accustomed to the institution's way of instruction in a self-directed manner. This is something that will become increasingly important as the institution works to increase the population of international students on campus who will be required to adjust to a new teaching and learning style.

This technology also greatly benefits students with disabilities. Many lecture capture tools provide the ability for instructors to caption lectures that can be valuable to students with learning disabilities who currently rely on student note takers in their lectures. This in turn would help UBC Access and Diversity better meet the needs of this population of students.

### **5.1.3 Enhanced Educational Experience**

Lecture capture technology enhances the student learning experience by providing students with the opportunity to easily review lecture content. Many types of lecture capture software have the ability to index points in lectures, including captured PowerPoints, making it easy for students to track content and identify concepts that they would like to review in detail. Studies that track student behaviours with lecture capture have shown that students tend to use recorded lectures to recap examples worked through in lecture as well as to apply in-class examples to new questions while studying.<sup>22</sup> Providing students with an opportunity to review recordings of lectures allows students to use in-class lecture time to engage with the materials being presented rather than attempt to take notes, listen, and work through problems presented.

### **5.1.4 Enhanced Performance**

While this is not a main motivator behind implementing lecture capture, research has demonstrated a positive correlation between student assessment performance and the availability of recorded lectures online.<sup>23,24</sup> Studies have shown, through both student survey results and weighted data collected on student performance, that lecture capture technology has a positive impact on student performance as indicated by better performance on exams

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<sup>20</sup> Chang, S., "Academic perceptions of the use of Lectopia: a university of Melbourne example," *Australasian Society for Computers in Learning in Tertiary Education* (2007), <http://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf> (accessed August 9, 2012).

<sup>21</sup> Barokas, J., Ketterl, M., and Brooks, C., "Lecture capture: student perceptions, expectations, and Behaviours," *World Conference on e-learning in Corporate, Government, Healthcare, and Higher Education* (2010), [http://www.informatik.uni-osnabrueck.de/papers\\_pdf/2010\\_02.pdf](http://www.informatik.uni-osnabrueck.de/papers_pdf/2010_02.pdf) (accessed August 9, 2012).

<sup>22</sup> Davis, S.J., Connolly, A., and Linfield, E., "Lecture capture: making the most of face to face learning," *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13

<sup>23</sup> Akiyama, H., Teramoto, A., & Kozono, K., "Educational effect of online lecture using streaming technology," *Electronics and Communications in Japan*, 91, no. 3 (2008): 37-44.

<sup>24</sup> Wieling, M.B., and Hofman, W.H.A., "The impact of online video lecture recordings and automated feedback on student performance," *Computers & Education*, 54, no. 4 (2010): 992-998.

and higher overall course grades.<sup>25,26</sup> In one study, students who used recorded lectures as a study aid scored on average 15% higher on a second course midterm<sup>27</sup> (adjusted for first midterm scores). This enhanced level of performance may be a result of academic resources being better reflective of the current generation of students learning style and ultimately being a better fit for students than traditional methods.<sup>28,29</sup>

## 5.2 Faculty Specific

### 5.2.1 Engaged Classroom Setting

The use of lecture capture technology has the potential to create a more engaging and interactive classroom environment. By allowing students to review concepts and problems outside of class, classroom time can be better used to engage in discussions and cover more complex topics that are then available for students to revise as needed.<sup>30</sup>

### 5.2.2 Tracking Student Usage

Lecture capture applications have the ability to index lectures and track both general and specific student usage, meaning that instructors can identify the parts of their lectures that have received the most views. This allows instructors to determine which aspects of their lectures are most popular or identify topics that appear to need more clarification or emphasis. This provides concurrent feedback to instructors in a simple, accurate and direct manner.

### 5.2.3 Professional Development

On a broader level, this technology can be used in many ways to aid in the professional development of faculty. Not only can instructors review their own lectures to identify areas for improvement, they can view the lectures of other faculty to help improve their own teaching techniques as well as to help facilitate peer reviews of teaching. There is a significant amount of potential that can be tapped into for faculty professional development as well as new faculty training purposes.

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<sup>25</sup> Wieling, M.B., and Hofman, W.H.A., "The impact of online video lecture recordings and automated feedback on student performance," *Computers & Education*, 54, no. 4 (2010): 992-998.

<sup>26</sup> Cramer, K.M., Collins, K.R., Snider, D., and Fawcett, G., "The virtual lecture hall: utilization, effectiveness and student perceptions," *British Journal of Education Technology*, 38, no. 1 (2007): 106-115.

<sup>27</sup> *Ibid.*

<sup>28</sup> Skene, J., Cluett, L., and Hogan, J., "Engaging Gen Y students at university: what web tools do they have, how do they use them and what do they want?" *First Year in Higher Education Conference* (2007), [http://www.fyhe.com.au/past\\_papers/papers07/final\\_papers/pdfs/2b.pdf](http://www.fyhe.com.au/past_papers/papers07/final_papers/pdfs/2b.pdf) (access August 10, 2012).

<sup>29</sup> Davis, S.J., Connolly, A., and Linfield, E., "Lecture capture: making the most of face to face learning," *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13

<sup>30</sup> Balfour, J.A.D., "Audio recordings of lectures as an e-learning resource," *Built Environment Education Annual Conference 2006* referenced in Davis, S.J., Connolly, A., and Linfield, E., "Lecture capture: making the most of face to face learning," *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4, no. 2 (2009): 4-13, 6.

## 6 Innovative Uses of Lecture Capture Technology

### 6.1 Online Course Development

Institutions have used this technology to add depth to the online learning experience. The most significant examples of this show the technology used in formal and informal learning initiatives. One such example has been through online university settings, specifically the example shown in a popular TED talk by Peter Norvig in which he discussed the manner in which he and his co-instructor, Sebastian Thrun, utilized video recordings to enhance an online educational learning experience for over 100,000 students worldwide enrolled in an artificial intelligence course at Stanford.<sup>31</sup> Another significant example is the Khan Academy, which has delivered over 178 million lessons online to date.<sup>32</sup> Institutions around the world have made use of technology like lecture capture to join in a movement towards open access learning through the creation of online universities. From non-profit ventures such as the Khan Academy to university ventures such as MITx (which has now combined with Harvard and the University of California-Berkeley to create edX).<sup>33,34</sup>

Adapting the type of engaging environment displayed in these online universities and educational initiatives in distance education may work to make the distance education learning experience more attractive to students. This is especially true for students who prefer the freedom of distance education but would still like the structure of a semi-classroom experience. Although more statistics surrounding student perceptions of distance education at UBC would be necessary in order to fully support these assertions, there are grounds for further exploration of this use.

### 6.2 Lecture Repository

Recorded lectures can also be made available on an institution wide database or repository to make them readily available and accessible. Institutions such as Simon Fraser University make recorded lectures available to all students to review at any time requiring institutional login credentials to access.<sup>35</sup> This enables students to access lectures for courses they have not yet taken in order to get ahead, review concepts from other courses to help them through their current course work or to explore the content of potential courses before registration.

### 6.3 Online Tutorials

Lecture capture technology can also be used to record basic tutorials to be made available to students in an online repository similar to a lecture repository. This tool can be especially useful for reviewing basic concepts in courses such as mathematics, in which students may enter the course

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<sup>31</sup> TED ideas worth spreading, "Peter Norvig: The 100,000- student classroom," [http://www.ted.com/talks/peter\\_norvig\\_the\\_100\\_000\\_student\\_classroom.html](http://www.ted.com/talks/peter_norvig_the_100_000_student_classroom.html) (accessed August 10, 2012).

<sup>32</sup> Khan Academy, <http://www.khanacademy.org/> (accessed August 12, 2012).

<sup>33</sup> MITx, MIT's new online learning initiative, <http://mitx.mit.edu/> (accessed August 12, 2012).

<sup>34</sup> edX, <https://www.edx.org/> (accessed August 12, 2012).

<sup>35</sup> Simon Fraser University, "Digital Lecture Domain," [http://cgi.sfu.ca/~lectures/pub\\_html/cgi-bin/index.php](http://cgi.sfu.ca/~lectures/pub_html/cgi-bin/index.php) (accessed August 12, 2012).

with a unique knowledge base due to prior education. This again flags an important application for first year students who may come from secondary schools which emphasize different components of a given course curriculum. The same holds true for international students.

With students having the ability to access these core concepts through video tutorials online, there may be a significant decrease in the high volume and wait times experienced in open tutorial sessions, specifically for 100 level courses. In addition to the benefits of a repository, there are also the added benefits of having lectures available for TA's to access at any time to better inform their work in assisting students enrolled in their course.

## **7 Copyright and Privacy Considerations**

Many institutions restrict access to lecture recordings solely to students enrolled in the course. This ensures that access and dissemination of the content is controlled. However, there are a number of copyright issues that must be considered when recording and making recordings available to students. The following information regarding copyright and lecture capture was obtained from communication with the UBC Copyright Office.

In instances when instructors include copyrighted materials in their lectures, lecture capture of this material is also considered to be a form of copying. As such, in order to make this material available in recorded form, the instructor must obtain permission for the capture and distribution of this material. If permission is not obtained, these elements must be excluded from the recording. Under UBC Policy #88 faculty retain ownership of works they create through teaching and research.<sup>36</sup> Instructors may grant permission to the university to distribute their lecture capture materials through an agreement waiver with UBC. It should also be noted that with the passing of the recent Bill C-11, which expands the fair dealing exemptions to include education, there may be impacts on the copyright considerations associated with lecture capture.

Another aspect that must be considered in the implementation of this technology is the privacy of instructors and students. Students should have the opportunity to ensure that they are not included in audio or video recordings if they do not feel comfortable doing so. There are general waivers and restricted no recording seating that would need to be put in place to address these issues in addition to potential editing of videos.

## **8 Lecture Capture at UBC**

There is solid work being done at UBC with the Lecture Capture Working Group to identify the key principles that should be addressed in the selection, implementation and use of the technology. From the perspective of students, there is an essential role to be played by the academic community in understanding the need for this technology and working to utilize it in a manner that is beneficial to the learning experience of students. The AMS is confident that this technology can act as a positive resource at UBC, but there needs to be significant buy in from the faculty side of the

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<sup>36</sup> <http://universitycounsel.ubc.ca/files/2010/08/policy88.pdf>

institution. We also understand that faculty acceptance will come from increased understanding of the importance of the technology, its pedagogical benefits and the manner in which students feel it can be best utilized. The AMS is willing to work with the university around communication with instructors as well as facilitating and providing suggestions for innovative uses of this technology.

The project as it stands was intended to conduct an environmental scan, research potential approaches and software options, and provide recommendations to the university on next steps relating to lecture capture at UBC.<sup>37</sup> Thus far, the working group has established a set of criteria and needs that the software option should fulfil and has conducted demo sessions for the shortlisted technologies. This will result in a recommendation to the institution from the working group of the best software fit for UBC. Although these demos have been conducted, there has not yet been an institutional commitment to purchasing, installing, and utilizing the software.

## 9 Conclusion and Recommendations

With a generation of students accustomed to the internet and by extension having information available at their fingertips, employing lecture capture technology on a wider scale makes sense. Enhancing the classroom environment in this manner would encourage students to listen and absorb information in class and supplement their notes and learning through online mediums available outside of class. Lecture capture adds an interactive and empowering component to education that enables students to take ownership of how they use their time both inside and outside of lectures. Students have already caught on to the benefits of lecture capture themselves. In large lecture halls, it is easy to spots rows of student recording lectures using their iPhone or mp3 devices. It is up to the university to facilitate the capturing of lectures in a manner that is accessible to all students and is within the guidelines of privacy and copyright obligations.

There is strong research to back that this technology has been identified by students as a positive resource. Based on the numerous educational experience and institutional benefits that lecture capture has been shown to provide to students, the AMS recommends that:

- The university commit to purchasing, installing, and utilizing the appropriate lecture capture software, as recommended by the UBC Lecture Capture Working Group;
- The university work towards communicating the benefits of lecture capture, for both faculty and students, to the academic community and work towards negating the concerns and misconceptions associated with lecture capture in the academic community;
- The university explore innovative ways to use lecture capture technology to enhance the student learning experience, beyond simply live lecture recording;
- The university develop ways to integrate interactive experiences through audio and video technology into distance education courses.

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<sup>37</sup> <http://blogs.ubc.ca/lecturecapture/project-plan/>