EDUCATION FOR CHEMICAL ENGINEERS xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Education for Chemical Engineers

journal homepage: www.elsevier.com/locate/ece

Understanding student use of resources in "rich-media" courses

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ARTICLE INFO

Article history:
Received 7 May 2017
Received in revised form 2 July 2017
Accepted 8 July 2017
Available online xxx

Keywords:
Rich-media
Chemical engineering
Student engagement

Q3

ABSTRACT

There is a current trend in course development to increase the number of "rich-media" items available to students; these include items like key-concept videos, interactive activities and quizzes, and even captures of the full lectures. It is therefore important to understand which of these resources students use and gain value from so that we can target the best resources for student learning.

This paper looks at several courses taught in the School of Chemical Engineering and Analytical Science at The University of Manchester to several year groups; including lecture based courses, distance learning courses, and non-lecture based activities; that contain "rich-media" resources. The use of these items by students is examined; including number of uses, time of use, and local retention. The student opinion on the items and how they felt has affected their learning is also analysed. This allows results to be presented on the most useful types of resource for students providing information for future development.

1. Introduction

In recent years the number of "rich-media" resources in engineering education has increased. This is likely due to the improvement of technical possibilities (for example, recording software and automatic lecture capture systems), improvement of distribution options (YouTube, tablets and, virtual learning environments), and demand from increasing student expectations. Therefore, engineering higher education has moved from the situation where using rich-media to support teaching was rare to one where it is becoming more common place, with an increasing number of institutions bringing in recorded lecture capture.

Current research emphasises that video lectures can provide important benefits to students (Giannakos et al., 2015) as video lectures offer students the ability to review the lecture at their own pace. They also allow students who miss the live lecture to have the opportunity to catch up on the material. This is especially useful for content-heavy disciplines such as chemical engineering, where significant amounts of detailed information may be presented during each live lecture. Fernandez et al. (2009) also comment that providing students with access to recorded lectures allows universities to engage with students who study by different learning methods and often increases students' motivation and sense of interaction with the lecturers. Q4

Despite this, research into how students use rich-media resources, and which type of these resources are most used by the students is still largely limited, many studies focus on student opinion of the material and attendance. Case studies on the use of rich-media in higher education have been presented across a range of subjects including business, psychology, and engineering. The rich-media material considered in these studies is also in a variety of formats including audio-only podcasts, enhanced podcasts, video segments, or full lecture capture. It is also important when examining the use of rich-media resources to consider also the pedagogy as well as the preference of the students and the purpose of the resource;

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http://dx.doi.org/10.1016/j.ece.2017.07.002
1749-7728/

this is mentioned in Van Zanten et al. (2012) with their 3Ps and has been recently extended by Saunders and Hutt (2015) to include a fourth P of the performance of the students.

The discussion in this paper focuses on the approach where rich-media resources are used to accompany traditional teaching methods, i.e. lectures and tutorials, rather than replace these traditional methods, e.g. MOOCs. This discussion has arisen to address a small number of students not engaging with rich-media material either because they are unwilling or unable; similar to Kazlauskas and Robinson (2012) who saw up to a fifth of students in a cohort not engaging. In this approach rich-media materials supplemented the existing course; allowing students either the opportunity to re-engage with already presented lecture content and/or to access supplementary course content (Saunders and Hutt, 2015). This of course means that pedagogical decisions are essentially limited to the material content and format.

The aims of rich-media materials vary considerably; including assignment preparation (Belton, 2016; Copley, 2007; Parson et al., 2009; Sutton-Brady et al., 2009), revision materials (Copley, 2007; Davis et al., 2009; Pearce and Scutter, 2010; Van Zanten et al., 2012), improving understanding (Bongey et al., 2006; Leadbeater et al., 2013; Parson et al., 2009; Pearce and Scutter, 2010; Van Zanten et al., 2012) and, lecture capture (Davis et al., 2009; Leadbeater et al., 2013; Parson et al., 2009; Pearce and Scutter, 2010); as did student use of the materials. To fulfil these aims rich-media materials have been created involved pod-casting (both audio and video), the use of narrated PowerPoint slides, short video segments, and lecture capture (either audio only or video plus audio).

There is still little documented evidence as to how effectively students are actually using these technologies, e.g. is student learning improved. Guertin et al. (2007) even commented that students who claim they want the material may not even use it; however, this may have been due to many students not knowing they could retrieve the recordings.

Recording lectures is thought of by many to enable students to skip lectures, though there seems little documented evidence either way. This is maybe due to the fact that although recorded lectures allow students to “attend” a lecture whenever they want, the material still takes the same time as the original lecture, and does not allow the students to interact with the lecturer. Holbrook and Dupont (2009) found no significant correlation between declining attendance and the ability to access recorded lectures. Pursel and Fang (2012) reviewed a large number of articles and found that there was no discernible link between provision of lecture captured materials and declining attendance from both self-reporting studies and from actual attendance data. Franklin et al. (2011) actually reported a small increase in attendance in those modules that provided captured lectures. They also commented that students will miss lectures with or without the provision of lecture capture and that their decision is based on previous experience of the lecturer’s style or their own personal learning method.

It is clear that rich-media material has become part of the expectation in higher education teaching and that there are examples of material designed that students like. However, there are gaps in our understanding of how students use these materials and comparison of the different styles of material available. Therefore, this study uses a combination of data to address the following questions:

- How do students interact with rich-media resources?
- Which type of rich-media resources do students use the most?
- Do students like rich-media resources?
- Does rich-media use effect exam results?
- Do people who don’t attend the lecture use the rich-media resources more?
- Can we create rich-media to replace some taught content?

The results presented here provide information on how students use rich-media resources and what type of rich-media resources should be developed further for students.

2. Method

This study examined student use of the rich-media material provided in two, simultaneously taught, third year undergraduate and MSc Chemical Engineering lecture based units and an undergraduate laboratory based unit delivered at The University of Manchester, UK. The first lecture based unit was “Advanced Engineering Separations” (AES) and the second unit was “Catalytic Reaction Engineering” (CRE) both delivered between September 2015 and January 2016 (Semester 1). Both modules were delivered to a cohort of 202 third year undergraduate students and 26 MSc students, and consisted of weekly lectures. The majority of the students within the class were aged between 20 and 25. The laboratory based unit was the first year core chemical engineering labs (LABS) delivered between September 2015 and May 2016 (Semester 1 and 2). LABS was delivered to a cohort of 285 first year undergraduate students, with majority of the students aged between 18 and 21.

The undergraduate students were familiar with the use of full recorded lectures as around 85% (higher in first and second year units) of the Chemical Engineering units delivered at The University of Manchester are automatically recorded. Approximately 42% of the undergraduate students and 96% of the MSc students were international students.

The rich-media material provided for these modules consisted of six different types:

1. Full lecture podcasts that were recorded automatically. The podcasts captured sound from the lecture theatre microphone and video from the lecture theatre projection system (power point presentations). These recordings were edited to remove pauses for breaks and tutorial sessions. Each was made available to students the day after the lecture was delivered via the university VLE (Blackboard). AES consisted of 10 of these at an average of 47 min in length.
2. Tutorial solution videos. These were worked tutorial solutions with voice-over audio explaining each step, they consisted of a mixture of hand-written recordings and the use of power point with excel depending on how the question needing to be solved. They were made available within the unit VLE at the end of the week the material was taught. AES consisted of 7 of these at an average of 11.4 min in length.
3. Key-concept videos. These videos were short and each examined one concept associated within the module in a focused manner, and were selected based on topics the students had struggled with in previous years. They were made available within the module VLE at the start of the week the material was taught. The videos were produced as