

On-Demand Lecturers in a Medication Calculation Course in the Bachelor's Degree in Nursing Program: A Quantitative Study

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Abstract. On-demand lectures are a common learning tool at institutions around the world and are highly valued by students. However, less is known about how this digital resource is implemented in students' strategies of learning. Exploring the students' user log data for on-demand lectures would be a valuable contribution to the research in this area. *Aim:* The aim of this study is to identify nursing students' use of on-demand lectures in a medication calculation course by exploring the students' user logs. *Design:* The study has a descriptive, quantitative design. All data were collected from a Mediasite server log. The 22 on-demand lectures covered all relevant medication calculation topics and lasted an average of 7.5 minutes. The on-demand lectures were presented as supplemental tools to traditional learning methods. A total of 48 students used the on-demand lectures and were included in the study. *Results:* The average watching time for each lesson was 2 minutes and 18 seconds less than the full length of the lecture. The average number of views per lecture was 24.6, ranging from 2 to 53. The average number of students watching each lecture was 15, ranging from 2 to 29. The active user group (students using the on-demand lectures more than once, n=27) spent on average 1 hour and 38 minutes on the lectures spread over 4.1 days. *Discussion/Conclusion:* The results show that most of the students spent a significant amount of time using the on-demand lectures. The diversity in use of the on-demand lectures suggests that students select topics based on their individual needs. This option of tailoring content to individual needs is clearly one of the benefits of on-demand lectures. Based on the students' selective use of the on-demand lectures, we assume that these lectures do not replace, but rather supplement, traditional lectures.

Keywords: On-demand lectures; nursing students; quantitative design; medication calculation; e-learning.

Introduction

The traditional lecture on campus is the most frequently used pedagogical tool in higher education. This might be explained by its benefits, such as its potential to convey complex information to large student groups, to set topics in appropriate contexts and to provoke and engage the students (Brown & Mangoue, 2001; Exley & Dennick, 2011). However, an increasing focus on digital learning has welcomed a wide range of new learning tools and provided the traditional lecture with new possibilities, such as the on-demand lecture. An on-demand lecture is a recorded lecture or sets of lectures that can be created in an educational setting with an audience or in a studio. Viewers are able to access remotely the lecture in real time or later on. Most often, on-demand lectures are used in addition to traditional on-campus lectures (Karnad, 2013).

The use of on-demand lectures in higher education is a common practice around the world, and the lectures are highly appreciated of on-campus students as well as distance learners (Hanegahn, 2016, Woo et al., 2008; Brittain et al., 2006; Veeramani & Bradley, 2008; Gosper et al., 2008). On-demand lectures offer a learner-centred approach, as they provide increased control for students who may view lectures at their own pace, time and place (Baecker, Moore, & Zijdemans, 2003; Traphagan, Kuscera, & Kishi, 2010). Students report that on-demand lectures have a positive influence on their learning and exam results, causing them to feel less anxious about the course (Traphagan et al., 2010; Williams & Fardon, 2007; Gosper et al., 2008) and providing them with greater flexibility (Phillips et al., 2010; Cooner, 2010). Students report using the on-demand lectures for various of purposes, including as a substitute for live lectures, for exam preparation and for repetition of difficult material (Gorissen et al., 2012). Students with physical or learning disabilities may find on-demand lectures especially useful as a way to manage the pressure of note taking in class, or as a way to manage difficulties in attending class due to disabilities (Williams, 2006).

Although educators seem to be in agreement that on-demand lectures are a valuable learning tool, less is known about how students use this tool in their learning processes. More insight in relation to the use of e-learning tools in higher education is needed (Pani et al., 2015). Previous research regarding on-demand lectures has mainly focused on students' opinions; this research indicates that more objective data is needed in this field (Gorissen et al., 2012).

Examining students' user log data for on-demand lectures could provide valuable information to help educators develop digital programs with optimal pedagogical outcomes. Hence, the aim of this study is to identify nursing students' use of on-demand lectures in a medication calculation course by exploring the students' user logs.

Methods

Design and sample

The current study has a descriptive, quantitative design. All students in their first semester of pursuing a bachelor's degree in nursing at a Norwegian university were invited to participate in the study. Of the 172 students enrolled in the medication calculation course, 72 agreed to participate. Of these, 48 students used the on-demand lectures and were included in the study. All data were collected from the Mediasite server log.

The medication calculation course

The traditional medication calculation course consisted of five classroom lectures (given in two sessions of 45 minutes), five supervised case case-based sessions (two hours for each session) and a textbook used with the syllabus for the course.

The on-demand lectures were presented as supplemental tools to traditional learning methods. The 22 on-demand lectures covered all relevant medication calculation topics (Table 1) and lasted an average of 7.5 minutes each. The on-demand lectures did not contain any student feedback; no communication platforms and no instructions for use were provided. The on-demand lectures were made available to the students from the start of the course until the day of the final exam, a period of 6 weeks.

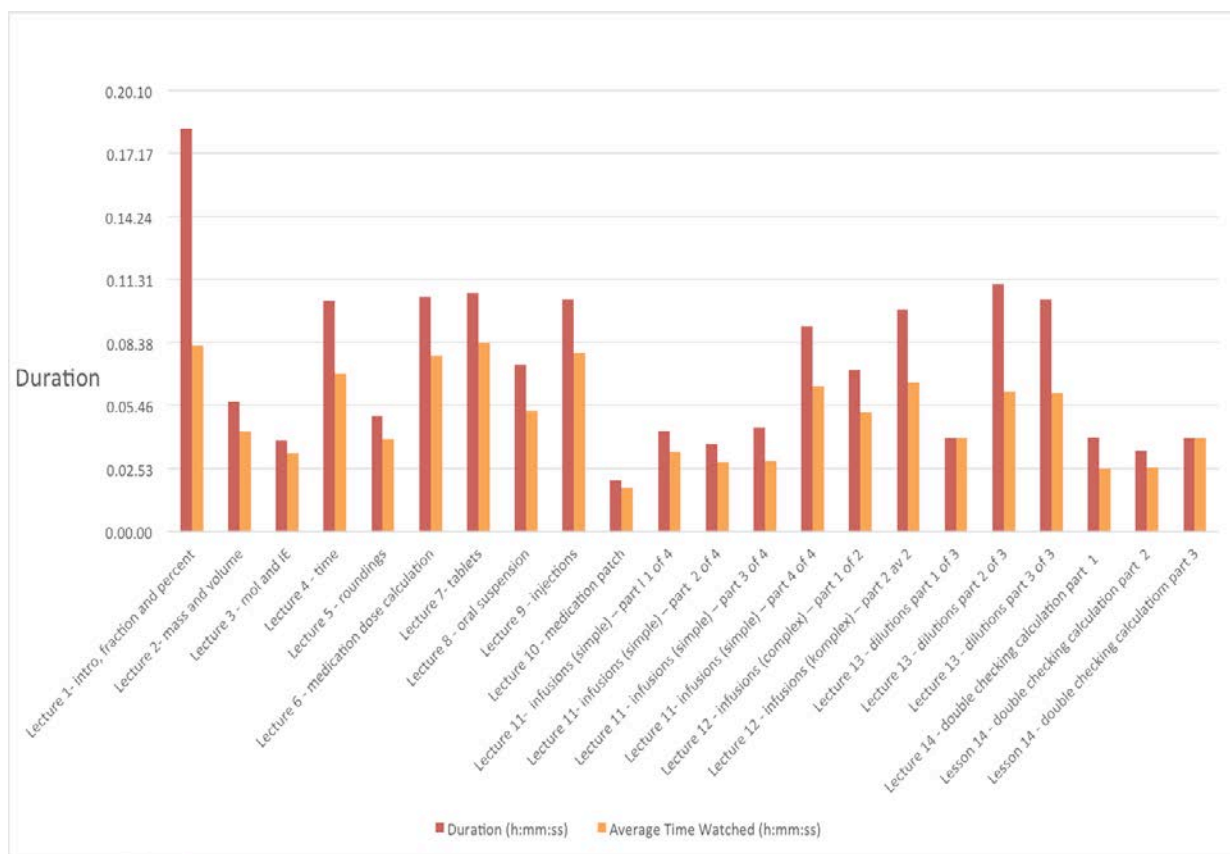
Table 1. An overview of the on-demand lectures.

On-demand lectures (n=22)	The medication calculation topics (n=14)
1	Intro, fraction and percent
2	Mass and volume
3	Mol and IE
4	Time
5	Rounding
6	Medication dosages calculation
7	Tablets
8	Oral suspension
9	Injections
10	Medication patch
11	Infusions (simple) part 1
12	part 2
13	part 3
14	part 4
15	Infusions (complex) part 1
16	part 2
17	Dilutions part 1
18	part 2
19	part 3
20	Double-checking calculations part 1
21	part 2
22	part 3

Results

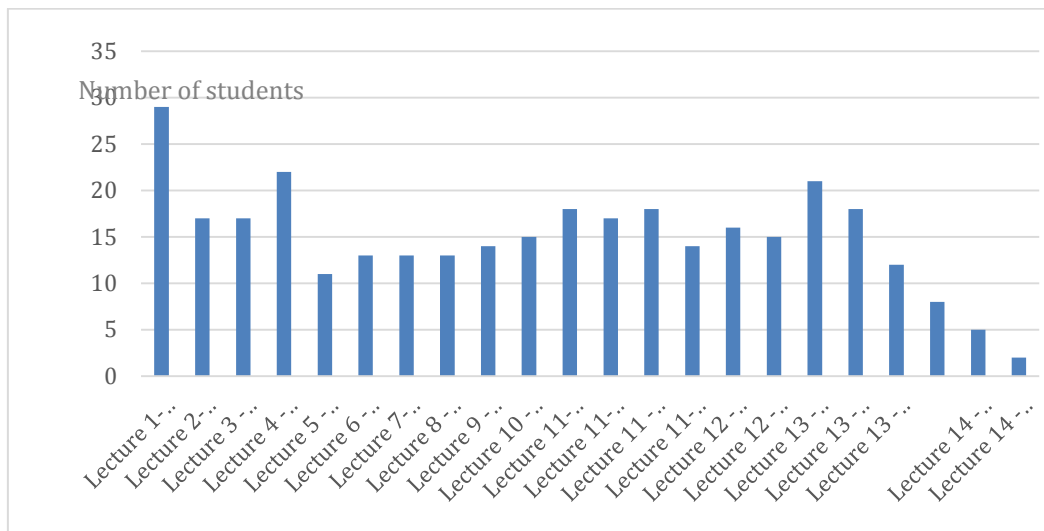
The results show that the students did not see all lectures in their full length. Each lecture was watched for an average of 5 minutes and 18 seconds (average time of lectures was 7 minutes and 30 seconds). Figure 1 shows the duration of each lecture and the average time the students watched.

Figure 1. Duration of lectures and average time each lecture was watched.



Further, the results reveal a variation in the choice of lectures. The largest number of students who watched the same lecture was 29, and the smallest number was two (Figure 2). By calculating the average number of students watching the same lecture, we found that 15 students (31%) watched the same lecture (Figure 2). The average number of total views per lecture was 24.6, ranging from 2 to 53. The lectures about fraction and percent (lecture 1), time (lecture 4) and dilution, part one (lecture 11), were watched by the most students, whereas the lectures about double-checking calculations (lecture 14, parts 1-3) were watched the least (Figure 2).

Figure 2. Number of students watching each lecture.



The average time students spent watching on-demand lectures was 1 hour and 3 minutes over 2.8 days. When excluding students who logged in once only, we found that 27 students (56%) used the on-demand lectures more thoroughly (more than once). This group was characterized as *active users*. This active user group of students spent, on average, 1 hour and 38 minutes on the lectures spread over 4.1 days.

Discussion

The aim of this study was to identify the students' use of on-demand lectures in the context of a medication calculation course for nursing students. To be able to develop educational programs with optimal pedagogical outcomes, it is essential to understand how this e-learning tool is implemented in students' processes of learning. Previous research within this area is scarce and has mainly focused on students' overall opinions of on-demand lectures (Williams & Fardon, 2007; Gosper et al., 2008; Gorissen et al., 2012 Phillips et al., 2010; Cooner, 2010). Additional insight can be gained by examining the actual use as recorded in students' logs.

An important observation in this study is the students' diverse use of the on-demand lectures. The results showed a significant variation in choice of lectures, wherein an average of 15 out of 48 students watched the same lecture (31%). The largest number of students watching the same lecture was 29 (60%). However, these 29 watched the first lesson, which also contained introductory material. The diverse use may indicate that students selected medication calculation topics based on their individual needs. The perception of what appears difficult will vary among students, and in live lectures for large student groups, the possibility of meeting individual needs is limited.

Our findings indicate that one benefit of on-demand lectures is that students can choose topics based on their needs and thereby tailor their study efforts to fit their strengths and weaknesses. For many reasons, increased focus on tailoring in teaching will benefit students. Health research has shown that tailored education programs provide successful outcomes, including increased information recall, perceived relevance of teaching material and change of behaviour (Noar et al., 2007; van der Meulen et al., 2008; Rimer et al., 1999). Also, in a recent study of students in higher education, the use of computer-tailored student support was associated with better grades in physics (Huberth et al., 2015).

To identify how much time students spent with on-demand lectures, we separated low users (n=21) from active users (n=27). We assumed that some students might just be curious and log into the Mediasite platform without actively using the learning material. When excluding students that used the on-demand lectures only once, we found that *active users* spent 1 hour and 38 minutes on the lectures spread over 4.1 days. Determining whether this is a significant amount of time is not straightforward, as this study did not measure how much time students spent on other learning activities in this course. However, based on the fact that no instruction for use was given and that the on-demand lectures included no student feedback, one could argue that the students spent quite a lot of time using this learning tool. We must also bear in mind that the students were in an early phase of their studies and did not have access to such learning tools previously in their nursing studies. It is possible that the students' use patterns could change in later stages of their studies. Studies concerning changes in the use of digital learning tools among students could be an interesting topic for further research.

We found that students did not see all of the lessons in their full lengths, but watched parts of them. Average watching time for each lesson was 2 minutes and 18 seconds less than the full length of the lecture (the average length of lectures was 7 minutes and 30 seconds). This suggests that students search for specific materials in parts of the lecture. Previous research into students' use of on-demand lectures reveals that students consider watching full-length lectures as time-consuming; therefore, they adopt a more strategic learning approach focusing on the concepts they experience as difficult (van Zanten et al., 2012). The ability to search for and review only relevant parts and the ability to repeat difficult material is an important benefit of on-demand lectures (Gorissen et al., 2012). For the medication calculation course explored in this study, where case-based exercises and calculations are an important part of student self-studies, this flexibility is clearly a benefit.

Although the on-demand lectures in this study were provided as a whole course, the students seemed not to use it this way. Based on the students' selective use of the on-demand lectures, and despite the lack of measurements of attendance to the on-campus lectures, we assume that on-demand lectures do not replace but rather supplement traditional on-campus lectures. This is in line with previous research in which students' preferred live on-campus lectures over recorded on-demand lectures (Schreiber et al., 2010). Students found

recorded lectures to be 'less engaging' and 'easy to put off' (Schreiber et al., 2010). Instead of using on-demand lectures as a replacement for live lectures, students view the two as complementary; preferring a blended format consisting of on-demand lectures, live lectures and course materials (Yeung et al, 2016, Karnad, 2013).

Limitations

This study aimed to identify students' use of on-demand lectures in the context of a medication calculation course for student nurses. Many student nurses struggle with math calculation and problem-solving skills, and failure rates are especially high for this topic (McMullan et al., 2010, Jukes & Gilchrist, 2006; Brown, 2002; Keers et al., 2013). This might impact the use of the on-demand lectures, as students might spend much effort on this course. Future research should include on-demand lectures on different topics in nursing education and include a larger sample of students. Further, including qualitative data in the form of interviews with students could provide more depth to our results.

Conclusion and implication

The results in this study show that most of the students spent a significant amount of time using the on-demand lectures. The diversity in the nature of their use indicates that students selected topics based on their individual needs. This option of tailoring content to individual needs is clearly one of the benefits of on-demand lectures. Based on the students' selective use of the on-demand lectures, we assume that these lectures did not replace, but were used to supplement, traditional lectures.

This study adds a valuable contribution to the understanding of how digital tools are implemented in students' learning strategies. This insight might be useful when designing educational programs with optimal pedagogical outcomes.

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