Interactive Digital Learning in a University Lecture Room

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Abstract

This article examines modern methods for higher education digital pedagogy in a lecture room. Over the last ten years, technology has changed lecturing in many different ways. Most of the students entering the university are in their twenties and therefore are seen as experienced in, and capable of, utilizing modern tools for communication. The research data for this paper was drawn up from two university courses which utilized several digital tools alongside other traditional lecture room teaching methods. The essential purpose of this paper is to increase understanding of students' habits and needs concerning digital media use during the lectures. Course teachers have numerous ways to engage the students in the lecture situation, and during the course. Although educational technology is available, with low costs for mobile devices and Internet browser environments, the traditional face-to-face discussions are still relevant. Learning goals should define the expectations which are placed on the different tools. Course teachers should also be reminded that tool registration, as well as trial tests, are time-consuming. In addition, their operation in a teaching situation might require robust guidance or teaching assistants. This paper especially examines five tools for lecture/course activation - image wall, web-based voting, small group discussions, project blogs and online video.

According to the results, students can be extremely active users of digital tools and media in some fields and yet uninterested in other uses of digital resources. 28 out of 30 respondents had a mobile device with them, but less than half felt the device was suitable and natural for lecture activities. Even if the students have a mobile device while attending the lecture room, a majority of them find teacher-guided digital activities laborious and extraneous. 26 respondents would participate in the lectures whether or not the recordings are available. All university students may need technical support, for discussions, and with enthusiasm for the use of educational technology, regardless of their age or whether they own a mobile device. Learning cannot be outsourced to discussion forums or blog platforms, but they can serve as excellent resources for learning community communication and as support for the learning process.

Keywords

Digital media, Interactive tools, Digital Natives, Mobile Learning

1. Introduction

This article examines modern methods for interaction and learning in the lecture room. Today, wireless networks and mobile devices have become commonplace, and the educational environment relies on digital technology in many ways. In addition, an increasing number of student groups emphasize active self-guided participation. At the same time, the current views of learning and diverse teaching methods affect the needs for reflecting on and re-organizing the lecture situation. Educational organizations which own technology-driven teaching systems, such as e-learning environments and media servers, also set high expectations for the exploitation of such tools. These tools enable time- and place-independent learning for the student, and a teacher is able to disseminate the course material over the network. There are tools that are freely available for discussion, voting, blogging, quizzing and visualizing ideas. In addition, guides for harnessing information and communication technologies for educational purposes are available on numerous blog sites and discussion forums. However, even state-of-the-art facilities do not change the pedagogy alone. First, we need to comprehend how the students are able and willing to use these new technologies.

The fundamentals for this paper are two-fold. Firstly, as current learning theories emphasise, there is a need to support a student's active participation in lectures. Today's easy-to-use and readily accessible technology offers

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the tools for an expanded range of learning activities during class time (Roehl et al 2013). These tools not only enable peer-collaboration and participation for mutual meaning making, but also can play an important role for engaged learning in lectures. Secondly, in the digital technology-driven ecosystem we can also draw direct connections with the student's attitudes towards, and abilities in learning technology. This article also approaches the question of how today's students in higher education, most of them born in 1980 or after and growing up alongside digital communications, use educational technology in general. Much of the discussion is developed from concepts such as Digital Natives or Google Generation. These refer to the youngest age groups, who are thought to be the masters of modern communication tools (Pretsky 2001; Rowlands et al 2008). In addition, the Social Media systems launched during the last ten years, present the ideas such as collaborated production and shared learning experience even more visible as before.

The purpose of this article is to understand the key points when planning digital media enhanced interactivity for lecture situations. How do the students experience the use of activation methods? What kind of maintenance, time-management and pedagogical aims influence the activation methods? The use of education technology is associated with novelty, and expectations of improved learning outcomes. Meanwhile, the lecture situation still has an important role in the academic tradition. Perhaps the lecture is also one of the few chances where the students are able to meet their teacher face to face during the academic term. On the other hand, many teachers have experience of students who do not participate in the lecture situation, with discussion initiated and questions always asked by the same two or three boldest students of the large group (Mayer et al. 2009).

Over the last ten years, technology has changed lecturing in many different ways. First, audio-visual facilities and media servers enable a lecture to be recorded, and therefor to be streamed in real time (Gorissen et al. 2012). If there is no compulsory need for their presence at a lecture, students may not see attendance as particularly necessary and will study via the online video instead. Another aspect that has changed in lectures relates to mobile technology and wireless networks. Laptop computers, tablet computers and smart phones are suitable for searching for extra information on a lecture topic as well as commenting on the lecture online.

2. Traditional learning for the masses

Teaching through lecturing has a long tradition that traces back to the medieval schools and to the public lectures of Ancient Greece. For example, in the Middle Ages, books were rare and reading aloud was common (Manguel 1996). Sheely (2006) states that even the spread of printing did not affect the importance of lectures as a teaching tool. Friesen (2010), however, points out that university lectures are rarely based purely on oral expression, and that they usually contain visual and textual communication, as well as references to other media. Laurillard (2002) suggests that in lecture mode the teacher is able to control events, which substantiates the strong foothold that lecturing has in teaching. The educational experts agree that smaller, less than 40 student classes are friendlier for the learning (McKeachie 1980).

Having larger and larger groups of students puts increasing pressure on universities to offer e-learning techniques and so-called mass lectures or a combination of these. Especially the Basic Studies in University's degree programs tend to be popular in terms of participants. For example, the average number of registered students in Basic Studies courses of Information Science and Interactive Media degree program was over 130 students. The main teaching method was a weekly lecture lasting 90-150 minutes. The lecture was recorded and published online afterwards, and attendance at the lecture was not compulsory.

3. Are there Digital Natives?

In 2001 Mark Pretsky released a much-debated article about Digital Natives, according to which young people born after 1980 are seen not only as advanced users of communication technology, but as a group whose entire existence depends on the widespread use of digital technology. Although Pretsky's article has been criticised on several occasions for being too general and lacking in facts, the concept of Digital Natives exists in many pedagogical texts and handbooks which deal with education. Selwyn (2009) remarked on the importance of non-technological sources that children and young people may draw upon to meet their information needs, such as social networks with friends and peers, wider networks of family and community contacts, and mass media sources. Jones and Shao (2011) examined a large sample of past Digital Natives studies carried out around the world, and hardly anything supported the view that people born after 1980 have significantly different

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technology-driven learning strategies as compared to previous generations. Rowlands et al. (2008) mentioned that people born after the year 1993 could be called the Google generation, characterized by rapid and extensive, but superficial and short-term, retrieval of information. Alas, one of the main defects in educational discourse is to talk about young students as a unified group of digital communication experts.

Although the concept of Digital Natives is generally rejected by current research and public debate, these views still affect the academic community in many ways. And yet, we have to take into consideration the rapid development of digital media and e-learning facilities. It can be argued that the use of computer software and seeking Internet-based information (see, e.g. Savolainen 2011) is on solid ground with current students, as computer-based systems and the Internet are continuously strengthened in support of studies, and of society in general. This gives the teacher opportunities to consider and experiment with digital interactivity, as long as the cohort of younger students will not be expected automatically to have extensive knowledge or experience of digital tools and media.

4. The learner as an active content creator

The traditional stereotype of lectures, where uncontested information is transferred to a group of students, stands in opposition to many current views on learning. For example, cognitive constructivist learning approaches see the learner as an individual, whose prior knowledge, personal motivation factors, active knowledge construction practices and perceptions are relevant. Students' individual starting points, methods of understanding and accepting things, as well as their ability to set learning goals could be at least as significant factors in the teaching plan as the actual content of the subjects taught. Personalizing learning, among other things, is seen as a way to help students in their own learning and to prevent interruptions. As information and communication technology advances, it is justified to think that the learner's social community and networks play a vital role in many different learning situations. For example, Lev Vygotsky (1980) presents the idea of the zone of proximal development model, which means the extent to which the learner is able to perform assignments above his or her skill level, while receiving help from a more experienced person. For example, computer learning software and network applications may act as a way to receive support in learning situations. When learning more and more advanced tasks with support, this can be called scaffolding (Sillman & Wilkinson, 1994). Active learning in the classroom can be seen to consist of instructional tools that support student engagement and participation in the learning process. According to Prince (2004), the promotion of active learning improves learning outcomes in general. Also, collaborative and cooperative learning is important to enable progress; however, individual responsibility should not be absent.

In the early 2000's, the development of online communication brought to light the concept of shared content. George Siemens (2005) suggested that cognitive constructivist approaches to learning are not enough to examine the learning process in the networked environment. In the connectivistic approach, the teacher's role is to facilitate the active participation of the networked activity of learners. This involves:1) aggregation, accessing the resources to read, watch, or play; 2) relating, after reading, watching, or listening to some content; 3) creation, learners might create something of their own; and 4) sharing. This participation in activities is seen to be vital to learning (Kop 2011). Although connectivism has received much criticism, in particular on the grounds that it does not meet the conditions of learning theory (see. e.g. Kop & Hill 2008) it provides an interesting perspective on an era of digital information and social media, where the learners are in connection with each other via various types of digital supported networks. Connected Learning is a recent learning approach which examines the roles of shared content, collaboration and open networks which play an important role in peer group learning (Ito et al. 2013). The learning group shares a common understanding of the goals of learning, and learning is done together.

5. Interaction experiments in a lecture

Data was collected from two courses of the Information Studies and Interactive Media degree program, which took place in the spring of 2016.
The first part was collected from the basic studies course, which enrolled 160 students, and the second part was collected from the course of intermediate studies, which enrolled 87 students. Both of these courses lasted 7 weeks and the main method of teaching was a weekly 1.5 - 2.5 hours lecture session. The lectures did not have compulsory attendance, although participation was recommended in the first lecture. 120 students completed the

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basic studies course and about 70 of them arrived at the lecture room on a weekly basis. For the intermediate studies, 68 students completed the course and about 45 students were present in the classroom every week.

In both of the courses, the teachers used face-to-face and digital methods to activate the students. The course material and assignments were delivered via the Moodle e-learning environment in which the students also filled in a feedback questionnaire to evaluate the teaching methods. The basic course students did not fill in the actual survey. However, the teachers were able observe the suitability and popularity of the tools: for example, participation rates and the amount of produced content. At the early stage of the research the means of activation were categorized by content and administratively, but attention was paid in particular to qualitative characteristics, such as how the tools support the learning process and at what stage of the course the tools should be put to use. All of the lectures were recorded on the university's media server and published for students on Moodle the day after the lecture. The use of digital methods was grounded, among other things, on remarks from previous semesters, when teachers noted that most of the students had mobile devices such as a tablet PC. Course topics linked in many ways to online communications and the digital culture, so it was as expected, that at least some of the students have some leisure-time activity and interest in information and communication technology.

Table 1. Activity methods in two university courses.

Instructional Tool	Location and Purpose of Course	Pedagogical Goal
Padlet - Image & Text Wall	Used in every lecture as a background channel.	Collaborating in mutual communication, encouraging students to present their thoughts in public.
Pollsnack & Moodle - Web-based Voting	In the middle of the course as feedback channel, and also at a particular lecture when voting.	Increasing student activity to participate in the course design and offering a channel for class's opinion.
Small Group Discussions	Used in 3 lectures alongside Padlet questions, usually integrated with break in the middle of the lecture.	Encouraging the student to peer discussion and emphasizing the importance of one's own opinion.
Project Blogs	Used as a documentation platform for project work process in the intermediate studies course	Supporting students' metacognitive skills by offering a platform for reflection on their learning process.

5.1 Image walls as back channel

A Padlet wall (padlet.com) was utilized as a background channel in every lecture. Padlet is a web-based text or photo wall, where the user is able to add comments, photos or, for example, GIF animations. At the beginning of the lecture, the lecturer gave a Padlet address to the students and added a title or general questions to the wall. At the midpoint or at the end of the lecture the lecturer displayed the Padlet wall on a video screen and the students discussed the issues or answers to questions. Participation with the Padlet wall varied per lecture. The maximum number of messages was 48 posts and the smallest 9 posts during the lecture. The lecture topics probably affected their popularity, as the most popular topics were closer to students' lives.

It should be kept in mind that any single student of a small group is able send all of the Padlet wall postings, because the sender information is not automatically included in the messages. Discussion or detailed questions were quite rare on the Padlet wall. After the lecture, the lecturer took a screenshot of the Padlet and placed it on the Moodle. A clearly defined question generated mostly text messages, while the general title inspired the students to a forum-type conversation, and often with fun based snapshots, image macros, drawings or GIF animations (Figure 1).

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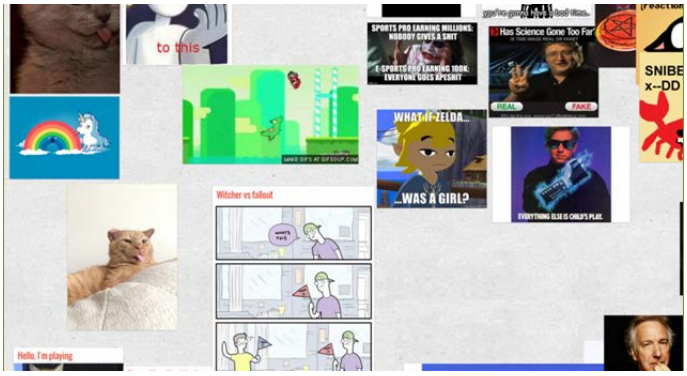

Figure 1. Screenshot of a lecture Padlet session.

5.2 Voting and polling

Ninety basic course students took part in a Moodle-based survey of 20 multiple choice questions that related to a specific lecture topic. Moodle's feedback tool allows the implementation of a full survey with different kinds of choices. The use of Moodle questionnaires during the course was supported by the fact that students were automatically enrolled on the course platform and the login was based on the user's academic ID. In addition, the e-learning platform is managed by the university, which is linked to proper information security and the rules of the university. For example, the student may answer the Moodle question only once and the results are stored for later use. Student views collected for this article were also collected with the Moodle feedback tool. Pollsnack.com was also tested for voting. Intermediate course students voted for the best infographic poster in the lecture hall and the results were collected with the tool. The situation was associated with physical activity, as the students went to the front of the lecture hall to evaluate the posters. After the lecture, the tools were linked to the poster images and to the Moodle. That enabled voting for the students who did not participate the lecture.

Arranging a vote or poll can provide the conditions to enhance the learning experience in a lecture situation. Before mobile technology and online voting applications, researchers obtained good results by using voting systems (Group Response System) to increase interaction (Cutts et al 2004; Draper & Smith 2004). Query methods seem to be relevant to increasing comprehension, and to the emergence of thought patterns. When the lecturer, for example, initializes a topic and asks for a group view of the matter, discussion after voting has been found to be useful in terms of learning (Mayer et al. 2009). It should be noted that the lecturer can arrange a vote without the digital technology - for example, by providing green and red patches for yes-no answers. However, there are plenty of network applications and the results of the votes are saved automatically to sites for later review.

5.3 Partial and Small Group Discussions

Various small group discussions represent the traditional way of student activation during the lectures. The lecturer presents the question and instructions which can be discussed with your partner for about 5-10 minutes, after which general discussion will follow. In the two university courses mentioned above, small group discussions were used in many ways. In the lecture hall the discussions proceeded very variably, and, particularly during general discussion, students had difficulties in articulating the core points of discussion from their small group.

For some students it may be difficult to share his of her thoughts with the audience in the whole lecture hall. Students were also encouraged to discuss and comment on other external lectures. One of the tasks that the students found challenging was discussion on the scientific articles in Moodle discussion forums. It was also a challenging for the teachers, as verification of a student's personal contribution was difficult to recognize among several dozen messages.

5.4 Blogs Project diaries

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The WordPress platform that was hosted by the university was also tested for the courses. Small groups of students who had shared exercises received their own blog site, addressed to at least two members of the group responsible for blogging. This was in order that the blog should not be overlooked if the only editor would be laid off from the team, due to illness or some other reason. Blogs were used on a trial basis, and teachers thought that the blogs could be used as project logs and discussion forums as well as learning diaries.

The blogs caused significant workload, even before the start of the course. The teachers needed to know how many blog pages there should be on the course and what kind of user rights to the content was needed. In addition, the use of a blog, for example updating and linking, had to be done within the clear guidelines. The teachers could make only approximate estimates of how familiar the world of blogging was for the students, and how they related to the fact that the blog was in the public domain. During the semester, it became clear that the students did not find the blogs useful for learning. It was mentioned several times in course feedback that the students found blogs unnecessary in terms of learning and the interaction platforms. It seems that the use of blogs requires careful instructions and objectives for the course.

5.5 Teacher's many tools

The cost, or accessibility, of educational technology is hardly a great issue for use if it is for a university course. Most of the tools need only a normal web browser, and they operate in a mobile environment in many different situations, often free of charge. However, the challenge in adapting tools for a teaching situation can be the educational content and - the situation in terms of finding an appropriate teaching concept.

Tools used in two university courses were divided administratively into three categories:

1 Maintained by the university (such as Moodle, online video server, WordPress blog)
2 Free of cost services (such as Prezi, Timeglider, Pollsnack)
3 No pre-registration (such as Padlet [when writing], Jottit, Todaysmeet)

Learning goals should define the expectations which are placed on the different tools. Course teachers should also be reminded that tool registration, as well as trial tests, are time-consuming. In addition, their operation in a teaching situation might require robust guidance or teaching assistants. For example, the administrative duties, such as installing the application, or a revision of regulations requires extra effort. Although there are plenty of browser-based tools available, there are hardly no arguments for switching tools from one week to the next in a single course unless they are intended to be tested together with a student group. For example, there are plenty of tools such as the Padlet, but their display and usage logic vary.

6. Surprising feedback from the students

Students completed the Moodle-based survey in which they were asked questions about the pedagogical approaches and tools used in the intermediate course. Thirty students of Intermediate Studies course answered the questionnaire. Although the concept of a Digital Native is criticized by many scholars, it was nonetheless a surprise that even the students in digital media fields experienced the use of mobile devices in the lecture hall as laborious and extraneous. Mobile devices were common in the lecture situation. 28 respondents had a device with them, but less than half felt the device was suitable and natural for lecture activities. Technical problems were in the minority, because 2/3 of the negative respondents did not want to use their mobile device for non-technical reasons.

Different lecture activation means were supported evenly. The Padlet wall was marginally the most popular form of activation, but there was also support for traditional methods such as teacher-guided small group discussion and general discussion. It was a little surprising that the physical lecture hall experience was most preferred by only two respondents. One reason for the relatively large participation in the lectures may relate to the contents of the recordings. 26 respondents would participate in the lectures whether or not the recordings are available. Perhaps the recorded lecture's rhythm and duration would not attract students to study if they were only dependent on the recordings. Attending the lectures is probably more natural and allows participation, such as asking questions. It is possible that Internet video services such as YouTube (youtube.com) or Vimeo (vimeo.com) also raise expectations for fluent video expression. Some of the respondents suggested videos of a few minutes' length about limited topics. The production of a condensed, high quality lecture recording is likely

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to be easier to implement at home, and in an office or studio space. In this case, the lecturer can focus solely on the contents of the lecture, storytelling and presentation.

About a quarter of the respondents saw the lecture recordings as a reason for their absence from the lecture hall. It can therefore be assumed that these students are not participating in the lectures, because the recordings were available, but otherwise would likely to attend on a lecture session. Lecture recordings can be seen also as support material where to return when doing weekly exercises or rehearsing tasks. According to the survey, the shared content was seen unfamiliar in a training assignment. For example, week exercises that were returned as visible for other students were experienced negative. The most common reason for this was that there was uncertainty about the own performance.

7. Reflection

Especially in the university's basic studies course, the group sizes are large. The popularity of the course is one of the key reasons, because all the enrolled students are automatically accepted into the course. A large group of students can be difficult to inspire in the discussions, and it is difficult to assess whether the students have actually understood their topic. While smaller class sizes remain high on both students' and teachers' preferences, large group lectures are still an important element in university education. It is difficult to develop a replacement for mass lectures, unless the teaching is completely transformed into a distance learning format. However, mere web-based learning can reduce the adherence of students to the university community, if students find the learning experience irrelevant. This research was based on the observation that students still appreciate lectures, even if the lecture recordings would be available online. The university maintains several teaching applications such as media servers, and e-learning environments that provide safe platform student exercises. Padlet-service types of image or discussion walls serve as a channel for a lecture in the background, especially when there is not time for discussion or if it fails because of students' shyness. Opinions act as a stimulus for the learning process, and the lecturer can organize feedback about relevant background factors. The key is what kind of goals are set for the use of the activation technology. The lecture can be carried out with a web-based backchannel, such as a Padlet-up wall, Todaysmeet-chat service or perhaps even a Twitter hashtag, but what if there are no messages? This can be compared to a situation where the lecturer asks questions, but no hands go up. In the activation method, targets are loosely set, in this case only by offering the channels for participation. It is clear that empty photo walls and chat fields do not encourage lecturers to continue using the application, even if the service platform would require only a little effort and would be inexpensive or free for the educational institution. The credibility of the technology experiment might experience setbacks in the eyes of the students, if there are no peers to try out the service.

The concept of Digital Natives is not supported in this paper. In 2014, about 80 % of degree program students were born after 1980, and about half of them were born after 1990. Although almost all of the respondents possessed a mobile device, fewer than half felt that its use was natural as a lecture participation tool. It seems that the current degree program students strongly approve of technology. However, this does not mean that the students would be interested in participating in the lecture activities with web-based applications. As Kupiainen (2011) has noted, digital culture has the potential for creativity and user-friendliness, but features not only one generation. When dealing with digital learning, the teacher should take into account the preparation and testing procedures, depending upon the application, such as blogs (see Section 5.5.). If we use an app that does not require registration, it can be introduced on a whim, when switching the light on in the lecture hall. However, to deliver relevant issues or even current news headlines relating to the lecture can increase participation, regardless of the medium. In the future, it would be possible to ask students how they use mobile devices in formal and informal contexts. This matter can also form a significant relationship with learning orientation and information practices. If a student is interested in the subject matter more widely, he is likely to follow other students' conversations in online learning environments. Sheely (2006) points out that technological change does not start with a clean slate, but it is always associated with previous habits and established technological models.

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