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Enhancing Lecture Interaction through Live SMS

Abstract

A consistent challenge with lectures to large audiences is the extent to which the lecturer can develop interaction with the audience. Obtaining answers to the lecturer's questions or stimulating questions from the audience during the lecture may be hampered by the fact that the lecturer and the audience are not able to hear speakers in the audience clearly. This article reports on an experimental design to test the feasibility of allowing live SMS messaging as a means to stimulate interaction during large lectures. The context concerned lectures on academic writing in bachelor's programmes in business and economics. Each lecture attracted about 500 students. The students were invited to send text messages to a dedicated phone line connected to a computer, which, at chosen intervals, displayed messages for everyone to see. The set-up allowed the lecturer to switch instantly from slides to the message display. Messages could be easily transferred to an Excel file for subsequent processing if necessary. Results showed that students did not use the opportunity as frequently as expected, and most messages were not relevant to the topics of the lectures. In this article, explanations for these outcomes are discussed, and recommendations for further implementation are presented. Using a new technology, even a pervasive one like SMS messaging, in a lecture entails modifications to the design, delivery and content of the lecture itself.

1. Introduction

In this article I report an experiment in which a technology that almost all students use, SMS text-messaging, was employed live during a lecture to 500 students. My aim was to test the feasibility of using such a technology to enhance interaction.

The lecture is one of the cornerstones of instruction in higher education, although it is probably rarely the only instructional method used. As a means of instruction, the lecture is dominantly under teacher control and student participation is usually limited (Brown/Atkins 1988). With limited student participation, lectures may be seen as a rather ineffective means of student learning, if measured by how much students recall after the lecture or as a means to stimulate thinking (see for example Bligh 1998). Butler (1992), for instance, found that the traditional didactic lecture, which she defines as "the continuous exposition by one person for approximately 50 minutes to a largely passive recipient audience" (p. 11), was the "least effective learning method" (p. 20) as perceived by the students. Similarly, van Berkel and Schmidt (2005) also found that the quality of the lecture, as perceived by students, was not related to the time students spent on study, or to achievement, or to intrinsic interest in the subject matter. However, they did find a relationship between lecture quality and the problems studied, and perceived relevance of the subject studied. The authors infer that lectures can help students organize their study efforts and place their knowledge in a broader perspective (p. 56). Notwithstanding the effectiveness or ineffectiveness of lectures, they remain "here to stay" (Butler 1992).

Due to the pervasiveness of lectures, lecturers may be given advice to use techniques to make their lectures more effective, for instance by providing overviews and summaries, by distributing handouts and readings in advance, by inviting questions and comments, by getting the students to discuss and reflect in pairs or small groups on issues during the lecture, by building in repetition,

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and by linking prior knowledge to the new information in the present lecture. Lecturers too are encouraged to pay careful attention to the design and use of visual support, especially computer presentations (e.g., Bartsch/Cobern 2003). In an investigation of the effects of 'interactive windows', i.e., discussions and problem-solving exercises, during lectures, Huxham (2005) reports a small effect on recall and learning as measured on subsequent tests compared with lectures without such 'windows'.

In universities in non-English-speaking countries which have, at least partly, adopted English as the medium of educational instruction (see Wächter/Maiworm 2008), the challenge of communicating effectively through lectures has been well documented by Klaassen (2001). She studied non-English-native-speaking teachers who were lecturing in English at Delft University of Technology. She concluded that, to improve communication with students, it would be more beneficial to train lecturers to use what she called "effective lecturing behaviour" (pp. 36-40) than to train them in better language skills. In a study by Airey/Linder (2006), Swedish students report that they are much less willing to ask and answer questions when the medium of instruction is English rather than Swedish, and that they attribute the success of a lecture to work they have done both before and afterwards. The researchers also conclude that students report that they need more support than if the lecture had been in Swedish. Hellekjaer (this issue) reports that, compared to lectures in their mother tongue, "a considerable number" of both Norwegian and German students have difficulties in comprehending lectures in English. He concludes that there is a need to improve lecture quality.

Among the recommendations of several researchers (e.g. Airey/Linder 2006; Klaassen 2001; Vinke 1995) to improve the effectiveness of lectures is to increase the degree of interaction between teachers and students. This entails, for example, providing the opportunity for students to discuss and to ask questions. However, the effectiveness of questions and discussion techniques, and indeed many other interactive behaviours, may be limited by the size of the audience. In a lecture with relatively few students, say less than 50, most teachers will find it relatively easy to engage the students. In lectures to a large number of students, say 400 or more, many issues arise that hinder the effectiveness of interaction. For instance, the teacher may have difficulty hearing the students' questions and comments and may not be able to answer appropriately. The students may therefore see little point in asking. With respect to discussions, even pair or small group activities during the large lecture can be hampered by distractions or the lecturer's too rapid decision to end the discussions because they seem to take too long or seem, to the lecturer, to be off-topic. Furthermore, keeping the students' attention in large lectures, especially in English-medium lectures outside the Anglo-Saxon world, may also be a challenge as the lecturer may find it hard to keep the students motivated. Finally, less extroverted students may be unwilling to speak publicly in large lectures, despite having valuable contributions. This unwillingness may increase in a context where the teaching is not in the students' mother tongue. Large lectures may simply exacerbate these issues.

One means to increase interaction during large lectures could be to employ a technology that almost all students use, SMS text-messaging, and the aim of the present study was to investigate the feasibility of using live SMS technology during a large lecture. I had regularly observed students texting presumably private messages during lectures, and my observations gave rise to the question whether and how the technology could be used for learning. The aim thus originated in a teacher-centred experience. I was interested in investigating whether the technology would be a useful enhancement to lecture interaction, specifically eliciting student questions and comments.

The context concerns four lectures on academic writing for first-year bachelor's students at a Dutch university. The context involves English-medium instruction where only a handful of the students are likely to be native speakers of English. The training in academic writing, of which the lectures are only a part, forms part of the content and language integrated learning in two separate bachelor's degree programmes, International Business and Economics. Within each programme, students take a number of courses each year, and the academic writing training is linked to papers

that the students have to write for their respective courses in the first year. Approximately 500 students may attend each of these lectures.

My motivation behind trying to enhance the interactivity lay in my experiences from previous years where students would send e-mails towards the end of the course, about matters that they did not grasp from the lectures. Such matters could concern as much the logistics of the course as the structure and business or economics content of the specific academic paper, which were handled explicitly in the lectures. The e-mails would be sent despite all the slides being available on the electronic learning environment, and handling the e-mails had been costly in time. I believed that offering another mechanism for interaction at the time of the lecture could help to reduce logistics and content structure problems later. The rationale behind using SMS technology was that it could enable many students to ask questions or make remarks simultaneously, whereas they would not be able to do so orally during the lecture to the same extent. I also expected that I would spend less time handling questions in the weeks after the lecture, since at least some questions would now be sent live during the lecture. In this article I report the experimental set-up and its implementation.

2. Experiences with SMS text-messaging in lectures

Mobile phones are ubiquitous among students, and most lecturers will have witnessed students texting messages to friends during lectures. In recent years there has been a growth in research and technical studies investigating the use of text-messaging in education. For example, studies have reported the development of an SMS text messaging system for a university student administration system (Richardson/Lenarcic 2007, Richardson et al. 2008). In psychology, SMS has been used to run novel experiments (Reimers/Stewart 2009). A number of researchers in computer science have experimented with using SMS technology as a means of stimulating interaction during lectures (Elliman 2006, Bär et al. 2007, Tokarz/Jedrychowski 2008). In particular, Bär and colleagues were concerned with interaction in large lectures, i.e., 600 students or more. In their study, they designed a framework *TVRemote* for feedback and interaction, including quizzes, decision polls, and evaluation. Part of the framework also involved live text-messaging. In a poll, their first-year computer science students reported their reluctance to ask questions in a large auditorium: the barrier to asking questions would be lowered if they could ask anonymously. Elliman (2006) had similar concerns with large groups. He designed software to enable students to answer simple quizzes via SMS messages, as well as give ratings of aspects of clarity (of parts of the lecture) and ask detailed open questions. The software enables the messages to be displayed either so that the lecturer can decide whether a response is necessary and in what way, or at the side of the lecture theatre to reduce distraction. The software requires students to set their phone and create a profile for lectures. Elliman comments that students should perhaps have to register their phones beforehand to exclude undesirable messaging. The present study reports a similar situation to Elliman's, but avoids the need to devise special software as many lecturers may not easily have access to software programmers.

3. Academic writing training

The study I report here was undertaken in the School of Business and Economics (SBE) at Maastricht University, the Netherlands, and was conducted in the context of academic writing training in two bachelor's programmes, i.e. International Business, and Economics. The SBE is almost totally English-medium, and attracts more than half of its students from outside the Netherlands and the academic staff come from a wide range of countries. Writing training is integrated in two first-year courses, Economics and Business (in the International Business programme) and Microeconomics (in the Economics programme). Both courses run concurrently and each attracts more than 500 students each year.

Briefly, the writing training in each course comprises two lectures and four smaller group tutorials with about 15-17 students each (for a more detailed description of the training, see Lawrence/Zegers 2005). For the writing training component in each course students are required to write two short assignments (500 words each) and one long one (roughly 2000 words). Each content course coordinator, not the academic writing trainers, determines the topics of the assignments. In each course, one writing lecture takes place at the beginning of the respective course, and a second one after three weeks. In the first lecture I cover topics such as the logistics of the training, details about possible sources of information for the long assignment and its submission, the content of short assignments, and the writing process in general. The second lecture covers, among other things, discussion of content of the long assignment, citing and referencing, and plagiarism. I aim to make both lectures interactive, by including a series of short tasks and opportunities to raise questions. The interactivity itself causes some problems. It raises the noise level in the lecture theatre, and can delay the shift to the next topic of the lecture. Despite all the lecture slides being available in categorized form on the electronic learning environment, one consequence noted in previous years has been that many students failed to grasp key content or logistics information at the time of the lecture, and then sent me, the lecturer, large numbers of e-mails in the last few days before the submission of the long assignment. This frequently meant that responses could not be delivered in time.

To improve this situation, a number of small changes were made to the training for the year 2009–2010. For example, the SBE established a dedicated e-mail address for the academic writing component in each course. This enabled another teacher to assist in responding to e-mails if the need should arise. However, this would not address the issue of interactive response during the lecture, especially from students who might be more reluctant to speak in front of a large group. For this reason live SMS text messaging was introduced as an experiment.

4.   Experimental set-up

Initially, my intention was to use Ozeki messaging software (Ozeki Ltd., Budapest, Hungary). This software (http://www.ozeki.hu/) allows the user to receive and send text messages and display received messages on a computer screen. However, installing the software and getting it to function efficiently proved problematic. A second possibility was to use local software developed by our in-house IT department, which had been used to display text messages during social events. Both systems had extensive add-on features that were not necessary and both seemed to demand a support person who would manage the incoming messages via a laptop. This was considered unnecessarily complex. A local test using Nokia PC Suite (http://europe.nokia.com/) allowed messages to be sent to a dedicated mobile phone connected by phone-to-PC data cable, and display the messages on screen. The phone number was not used for any other purpose, so the risk of receiving extraneous messages was negligible. The messages could then be shown via a data projector on a large screen. The Nokia PC Suite also enabled easy transfer of all messages into an Excel file for storage and any subsequent processing.

Following the short test, the set-up in the lecture theatre was as follows. The lecture theatre contained a presentation console fully equipped with computer, DVD and CD players, vizualizer, as well as a laptop connection. The management screen on the console allowed easy and rapid switching between the equipment. The lecture slides were delivered via USB stick in the computer, the texts for the interactive exercises were presented via the vizualizer, and the laptop (Lenovo T61) was connected to the system. The dedicated mobile phone was connected via the data cable to the laptop and the Messages icon on the Nokia PC Suite was opened (see figure 1). The total set-up time was about 15 minutes, including checking all the web links necessary for the lecture (economics and business, and EU Competition sites respectively).

Figure 1. Nokia PC Suite, messages screen (partial view)

At the beginning of the lecture I introduced the students to the possibility to send live SMS messages at any time during the lecture, and mentioned various issues about which they might have questions. The dedicated phone number was then announced. However, the test had revealed that sender telephone numbers would be visible, even in the case of concealed numbers. In practice, it was evident that some concealed numbers did in fact remain partially concealed. Nevertheless, the possibility of identifying concealed numbers had an impact on privacy. It was important to stress initially that all messages would be treated as public information. Due warning was therefore given to the students, including indicating that the messages would be stored and processed later with, if necessary, responses being posted on the electronic learning environment. I expected the warning to forestall any offensive or disrespectful messages. It was stressed that no reply text messages would be sent to the senders. Since I expected a large number of messages, I also stressed that not all messages would necessarily be handled, and that the phone line was only open during the lecture. The phone number was regularly repeated at the top of the slides during the lecture.

Although the phone was in silent mode, interference with the other equipment caused a slight buzzing sound each time a message was sent. However, this was not disturbing. At regular moments, after each part of the lecture, I switched from the computer to the laptop to display the Nokia PC Suite messages on the large projection screen. Issues arising were then discussed on the spot with the audience.

At the end of the lecture, all the messages were downloaded into an Excel file and stored, and all messages in the PC Suite (and phone) were deleted. The system was then ready for the next lecture in the second course.

5.   Outcome of the experiment

In the first lecture, in the Economics and Business course, within a few seconds of announcing the possibility to send messages, students started sending messages. The slight buzz, which was accidentally enhanced by a nearby microphone, caused a ripple of laughter, which unfortunately set a light-hearted tone for the students during the lecture. Some jokey messages were expected. However, it was surprising how many of the first messages were irrelevant. Displaying them on the large screen produced predictable humorous results. Despite this, the experiment continued, although later during the lecture when I saw on the laptop that there were no relevant messages, I ceased to display them. Figure 2 shows an extract of the Excel file of the stored messages of the first lecture. It is clear that the students did not take the opportunity to use the SMS facility seriously. Moreover, it does not seem that these senders, with perhaps one exception, were paying attention to the lecture.

Surprisingly, perhaps, far fewer messages were received during this lecture than had been expected. In the first hour, 25 messages were received, of which only four were related to academic writing and the content of the lecture. In the second hour only four messages were received, three of which were relevant.

The paucity and the frequent irrelevance of the messages may be partly due to the novelty, and partly due to the kind of purposes that students aged about 18 or 19 usually use SMS's for: social contacts with friends. In addition, some students may have taken misguided delight in seeing their 'humorous' words on the large screen. It may also be due to the lecture itself. This was the first lecture and much of the first part was dealing with logistics, including details about where to get information for the long assignment, and explaining the writing process. It thus tended to be fairly one-way, with little interactivity, whereas the interactivity tended to occur more in the second half, when details of the short assignments were discussed. Thus, it seemed that for the first-year students, focus on immediate demands (the first short assignment) was uppermost. Focus on more distant assignments (the long assignment) was not within their current time-span.

2009.10.29 16:02	Hey bob!!!
2009.10.29 16:09	Whadup?
2009.10.29 16:10	I need wilkinson shavers
2009.10.29 16:10	When do we cut the crap and start with what we need to know?
2009.10.29 16:11	What is the content of the experiment then?
2009.10.29 16:12	Nice posh accent, bob.
2009.10.29 16:12	Hello
2009.10.29 16:12	I love that blond girl in the middle
2009.10.29 16:13	I like the way you talk!
2009.10.29 16:13	The English rules, love the accent, the humour, the bands. Shame of the weather and food
2009.10.29 16:14	I love ur British accent, bob! Call me!

Figure 2. SMS messages received in the first 15 minutes of the first lecture (phone numbers not shown)

This experience led to adjustments to the parallel lecture for the other course Microeconomics, in particular reducing the discussion of the logistics, and bringing in interactive tasks right at the beginning. However, the outcome was similar: only 18 messages received, of which only one was relevant. The conclusion to be drawn is that, while technologically live SMS messaging was feasible, it did not enhance the value of the communication during the lecture – unless one considers rather childish messaging an indication of interactivity.

However, the experiment was repeated during the second writing lecture for each course. During the Economics and Business lecture, 21 messages were received, of which thirteen were relevant, one of which was sent three times (see Figure 3), and two of the non-relevant ones were sent twice. During the Microeconomics lecture, 24 messages were sent, with only eight being relevant. What was noticeable on this occasion was that the messages were not registered in the Nokia PC Suite in time order of receipt.

2009.11.20 13:38	Who can I ask to check whether my topic for the main paper is suitable?
2009.11.20 14:10	How do we know whether we passed the short papers?
2009.11.20 14:04	How do we know if our subject is accurate or not?
2009.11.20 15:03	Are we supposed to set up our own topic-meaning we Can analyze anything connected to game theory?How do we know that the topic we chose to analyze is sufficient for us to pass the main writing assignment?
2009.11.20 13:58	How do we whether we passed the short papers?
2009.11.20 14:49	Is quoting wikipedia without using it as a reference plagiarism
2009.11.20 14:16	Who can I ask to check whether my topic for the main paper is suitable?
2009.11.20 14:07	Does the main paper has to do something about economics or could it be about a cardgame for example?
2009.11.20 14:00	Is the main paper graded, or judged pass/faill?
2009.11.20 14:59	How are we supposed to quote the pricewaterhousecoopers article for the second paper?
2009.11.20 14:20	How do we know whether we passed the short papers?
2009.11.20 13:43	How do we choose the topic for our main paper?
2009.11.20 14:16	Bob could you give some more topic examples?

Figure 3. The relevant messages received during the second Economics and Business writing lecture

Finally, one of the expectations was that the number of e-mail messages sent during the course would decrease. In 2008–09 a total of 1064 student e-mail messages were handled. This number includes both the initial message from the student and the response sent. In 2009–2010, the total was 627. This may look like a distinct saving, although the 2008–09 figures were inflated by a collapse of electronic assignments submissions service on the day the students had to submit their long assignment in one of the courses. Students sent 249 e-mails about this within half-an-hour, although none required an individual response.

6.   Discussion

It is clear that this experiment in live SMS messaging during a lecture did not meet expectations. In total during eight hours of lectures, 92 messages were sent, of which only 29 were relevant (31.5%). It is enlightening to speculate on the reasons that this should have occurred, especially when many lecturers no doubt witness students regularly sending text messages during lectures.

The first reason may indeed lie in the novelty of SMS messaging. Students are used to hearing requests for mobile phones to be switched off during lectures and classes, and so may need more time to adapt to a situation in which they can send messages. They are probably more used to using the medium to send messages to friends, not for educational purposes. This may explain the light-hearted messages generally sent in this experiment. A second reason may be due to the technology itself. Most of the students were not Dutch, which means they were sending messages via a Dutch provider to a non-Dutch provider and back to a Dutch provider. In most cases this would involve increased costs, something which could have deterred many students. Elliman (2006) discusses the issue of costs, which he had expected to act as a deterrent, but in his UK-based setting it did not seem to be so. Students were willing to send five SMS's during a lecture. However, a time delay was also noticeable. Although a student with a local phone provider can send a text message within a few seconds, a student with a foreign provider in Germany or Belgium or further away would find the routing could take much longer. Indeed, an hour after the last lecture, the dedicated phone line was still open, and I discovered that several messages had arrived up to half-an-hour late.

More importantly, the low number of relevant messages may have much to do with the nature of the lectures themselves. The lectures were largely informative, and all the slides were available online. Students could therefore look at them later, and perhaps questions would arise only

later when the phone line was not in use. Moreover, the interactive components in the lectures concerned the characteristics of academic writing, brainstorming about the topics for the assignments, exercises on what plagiarism is or is not, among other things. None of these was set up in a way that easily lent to SMS messaging. For many of them, the discussions remained in small groups, or answers were given quickest by simple show of hands, which is faster than texting.

A further, related issue is that the lectures occurred early in the students' university careers. At this stage they may have had little conception of what the academic writing entailed, or more specifically of what challenges they may encounter in the particular writing assignments. Hence, many students may not have known what sort of questions they could ask, or what comments might be relevant. Some may also have been deterred by having messages displayed that could reveal weak language skills. Many other aspects of the functioning of the School of Business and Economics, and of the university as a whole, would still be very new and perhaps daunting. On the other hand, language accuracy did not seem to deter many of those who did text. Nevertheless, SMS messaging as set up in these lectures may not have been the answer for students who were reluctant to speak in front of a large audience, especially a large audience comprising largely unknown peers.

Finally, the procedure adopted may have acted as a deterrent. Students did not know in advance that they would be entitled to send text messages during the lecture; they were only informed at the beginning of the lecture. Hence, students may not have wished to devote cognitive resources to composing a message, while at the same time trying to pay attention to the lecture or what their fellow students may be saying during the interactive moments. However, if students had viewed the slides before the lecture and had known the phone number, they may then have had time to compose messages without interrupting attention during the lecture. This could be especially the case in English-medium education, as both Klaassen (2001) and Airey (2009) have reported. Moreover, the opportunity to send text-messages was presented as an experiment, which, for me, was one of technical feasibility intended to identify the 'proof of concept'. Since some students had already participated in economics experiments, they may actually have expected a different kind of experiment: one texted, "What is the content of the experiment then?"

The relative lack of success of a live SMS messaging facility during an English-medium lecture does not mean that the facility cannot be used more effectively. It would be useful to let students know in advance that the facility exists, including informing the students about the phone number. Similarly, it would be valuable to allow students to continue to send messages for some time after the end of the lecture, since they may realize they have questions only after reviewing the slides afterwards. In the case of consecutive lectures for different courses, it would entail the need for separate dedicated phone numbers.

More importantly, the introduction of a new technology, even if a pervasive one such as SMS text messaging, impacts on the design and delivery of the instructional content. In the experiment reported here, the lectures were designed and delivered largely in the same way as they had been the previous year, although the writing assignments themselves were new, as were some of the interactive discussions. However, it would be advisable to change the nature and organization of the lectures so that they are less informative and more question-raising and thought-stimulating. Furthermore, it would be useful to build in time to allow text-messaging in response to specific activities or components. Since it takes only a few moments to save the Nokia PC Suite file into an Excel file, it would not take long to hide the senders' phone numbers to make responses displayed truly anonymous. Perhaps explaining this in advance to the students should stimulate more response. Moreover, messages could be elicited according to a pre-arranged schedule, with for example logistics questions at the beginning or even beforehand, and then messages on the successive topics, even if some overlap does occur. Even without devising any software (discussed in Elliman 2006), it would be possible to introduce simple quizzes. For example, students could be asked to respond with a simple number (1-5 or 1-9). In Excel these can easily be computed as

means, or displayed as histograms. The results could be posted on the electronic learning environment subsequently.

7.   Conclusions

For English-medium education in a Dutch context with a majority of students who are non-Dutch, implementing live SMS text messaging may enhance the interactivity of large lectures. However, sufficient time needs to be allowed between asking for student reactions and the moment responses are received, especially from students with non-Dutch phones. It remains uncertain to what extent cost may deter non-Dutch users. If non-Dutch users respond to a quiz in far fewer numbers than Dutch users, then the outcome may not represent the true opinion of the large group. On the other hand, it remains unknown whether the current system would be able to handle several hundred messages all being received within a few minutes. For this, further experimentation is recommended. Such experiments need to be carefully and systematically designed to identify and control for the situational factors that may influence the willingness of students to use SMS text-messaging during lectures.

Finally, the current system has not been designed to stimulate the development of content learning and language learning. The use of quizzes with simple responses (single figure or short one-to-three word answers) may play a role here. There may also be scope for building in competitive elements. It would be interesting to investigate whether the technique turns out to be more useful in the content lectures at the School of Business and Economics. That, however, would depend on the willingness of the lecturers to try it, which would mean an end to the characteristic message "Please switch off your mobile phones."

Acknowledgements

References

Airey, John 2009: *Science, Language and Literacy. Case Studies of Learning in Swedish University Physics.* Uppsala: Uppsala Universitet.

Airey, John/Linder, Cedric 2006: Language and the experience of learning university physics in Sweden. In *European Journal of Physics* 27, 3, 553-560.

Bär, Henning/Mühlhäuser, Max/Tews, Eric/Rößling, Guido 2007: Interaction during lectures using mobile phones [online]. http://www.editlib.org/d/20667/proceeding_20667.pdf (accessed 20 February 2010).

Bartsch, Robert A./Cobern, Kristi M. 2003: Effectiveness of PowerPoint presentations in lectures. In *Computers and Education* 41, 77-86.

Bligh, Donald 1998: *What's the Use of Lectures?* (5th ed.). London: Intellect.

Brown, George/Atkins, Madeleine 1988: *Effective Teaching in Higher Education*. London: Methuen.

Butler, Jennifer A. 1992: Use of teaching methods within the lecture format. In *Medical Teacher* 14, 1, 11-25.

Elliman, Dave G. 2006: A system to support interactive teaching in the lecture theatre. Technical report [online]. http://www.ics.heacademy.ac.uk/resources/rlos/elliman/FeedbackProj.pdf (accessed 25 October 2009).

Hellekjær, Glenn Ole 2010 [this issue]: Lecture comprehension in Norwegian and German English-medium higher education.

Huxham, Mark 2005: Learning in lectures. In *Active Learning in Higher Education* 6,1, 17-31.

Klaassen, Renate 2001: *The International University Curriculum: Challenges in English-Medium Engineering Education*. Delft: Delft University of Technology.

Lawrence, Clive/Zegers, Vera 2005: Teaching academic writing in 12 hours. Can it be done? Proceedings of the 3rd EATAW Conference, Athens [online]. http://eataw2005.hau.gr/ (accessed 10 January 2006).

Reimers, Stian/Stewart, Niel 2009: *Using SMS text messaging for teaching and data collection in the behavioral sciences.* In *Behavior Research Methods* 41, 3, 675-681.

Richardson, Jean/Lenarcic, John 2007: E-inclusion through text messaging: The emergence of an administrative ecology within a university student population via the use of a mobile academic information delivery system. Proceedings of 20th Bled eConference "eMergence: Merging and Emerging Technologies, Processes, and Institutions". AISeL, 675-683 [online]. http://aisel.aisnet.org/bled2007/12 (accessed 20 February 2010).

Richardson, Jean/Lenarcic, John/Wilkins, Linda 2008: Trigger: Bi-directional interaction via text messaging in a Web 2.0 student administration system. Proceedings ASCILITE, Melbourne, 791-799 [online]. http://www.ascilite.org.au/conferences/melbourne08/procs/richardson.pdf (accessed 20 February 2010).

Tokarz, Krzysztof/Jedrychowski, Piotr 2008: Using XML messages in communication between elements of the eLearning system. In *International Journal of Education and Information Technologies* 2,2, 149-156.

Van Berkel, Henk/Schmidt, Henk 2005: On the additional value of lectures in a problem-based curriculum. In *Education for Health* 18, 1, 45-61.

Vinke, Diane A. 1995: English as the Medium of Instruction in Dutch Engineering Education. Delft: Delft University of Technology.

Wächter, Bernd/Maiworm Friedhelm 2008: *English-taught Programmes in European Higher Education. The Picture in 2007*. Bonn: Lemmens. (ACA Papers on International Cooperation in Education).