Usage and effects of a lecture recording system on study behaviours of preclinical medical students in Thailand

C. Iramaneerat, P. Udompap, P. Bangchang, S. Thongtan & C. Jaruthamsopon

Abstract

Background: Many medical schools provide a lecture recording system (LRS) to allow students to view or review lectures on demand. The investigators examined how many students used an LRS and whether there is any difference in students' study behaviours between subjects with and without an LRS.

Methods: The investigators conducted a survey among third-year preclinical medical students in a large medical school in Thailand. The questionnaire contained three parts: (1) demographic data, (2) students' use of LRS and (3) study behaviours of students—using a modified version of the Study Behaviours Inventory (SBI-HS), to compare subjects with and without an LRS.

Results: We received 101 completed questionnaires (33% response rate). Ninety-five percent of survey respondents used the LRS, with 51% using the LRS less than 2 hours per day and 49% more than 2 hours per day. When combining scores from all items, there was no significant difference in students' overall study behaviours between subjects with and without an LRS, $t(85) = -0.77$, $p = 0.44$. However, nine individual items showed significant differences between subjects, with eight of nine showing better study behaviours for subjects with an LRS than those without an LRS.

Conclusion: Many preclinical students used an LRS regularly. The presence of an LRS was not associated with significant changes in students' study behaviours.

Keywords: lecture recording; study behaviours; medical students; preclinical study.

Faculty of Medicine, Siriraj Hospital, Mahidol University

Correspondence
Cherdsak Iramaneerat, M.D., MHPE, Ph.D.
Division of General Surgery, Department of Surgery
Siamindra Building, Siriraj Hospital
2 Wanglang Road
Bangkoknoi, Bangkok 10700
Thailand
Tel: +662 4198005, +662 4198006
Fax: +662 4121370
Email: cherdsak.ira@mahidol.ac.th or CherdsakIramaneerat@gmail.com

ISSN 1442-1100

Introduction

In Thailand, medical students spend 6 years in a medical school to get an MD degree. During this period, the medical curriculum is divided into three major sections, including a premedical year (first year), preclinical years (second and third years) and clinical years (fourth to sixth years). Many students struggle to make lifestyle adjustments and adapt their study habits in order to learn a large amount of information in many difficult subjects during preclinical years. One method that many medical schools provide to help medical students cope with this stressful study environment is a lecture recording system (LRS). A lecture recording system is a computer network system that keeps records of the lecture sessions. A student can login to the system to review the lecture sessions in his or her own free time. An LRS should assist students' learning according to a cognitive information processing theory (Atkinson & Shiffrin, 1968, 1971); repeating information is a rehearsal that helps move information from working memory to long-term memory (Driscoll, 2005).

Previous studies have revealed variable usage of LRSs, but largely positive attitudes towards LRSs amongst users. Bacro, Gebregziabher and Fitzharris (2010) have shown that there was considerable variability in the use of LRSs among medical students. They observed that 30% of students did not use the system at all, while 41% of students rarely used it. Among the students who used the system, 74% of students considered the system to be very useful, while about 6% considered it unnecessary. Engstrand and Hall (2011) reported a positive response rate of 65% from students who used an LRS, with all students surveyed who had not used an LRS claiming that they would be interested in such a resource. McElroy and Blount (2006) conducted a survey that revealed that most students (76%) thought that the LRS was an important learning experience. Another survey revealed 95% of students agreed that an LRS was useful, especially for the review of difficult parts of the lecture and for examination preparation (Soong, Chan, Cheers, & Hu, 2006). Providing an LRS in an undergraduate mathematics class was shown to improve students' overall class experience and students' perceived performance (Cascaval, Fogler, Abrams, & Durham, 2008). Students who more frequently accessed the LRS tended to have better final grades, especially among those students who classified themselves as auditory learners (Bacro, Gebregziabher, & Ariail, 2013). Cardall, Krupat and Ulrich (2008) reported that most students employed video acceleration (watching at faster than real time) to save time, and the ability to accelerate the recorded lectures was the most important reason reported for using LRS. Nieder and Borges (2012) revealed that LRS usage increased before scheduled tests and major examinations, and there was significant correlation between LRS use and examination scores. Nevertheless, some faculty members expressed concerns about the negative influence of LRSs, linking LRSs to decreased class attendance (Gupta & Saks, 2013; Massingham & Herrington, 2006; Williams & Fardon, 2007), poor time management practices and poorer academic performance (Johnston, Massa, & Burne, 2013; McNulty et al., 2009)

Existing literature on LRSs revealed mixed perceptions about the benefits and drawbacks of LRSs. Despite concerns by many researchers about the impact of the LRS on study

ISSN 1442-1100

behaviours, there have not been any studies that compare students' study behaviours between classes or subjects that provide an LRS with those that do not provide an LRS. Furthermore, existing studies on LRSs were carried out mostly in the western countries, which might not represent the uses of LRSs in Asian countries. In this study, the investigators examine whether the presence of an LRS was associated with any changes in studying behaviours among third-year preclinical medical students in Thailand. We focused on third-year medical students because the third year is the period that the medical curriculum is crowded with a lot of subjects delivered in lecture format. Thus, it is the year that an LRS should have the greatest impact on students. Our objectives were to evaluate the amount of time students spent watching videotaped lectures on an LRS and to examine the difference in students' studying behaviours in the subjects that provided an LRS compared with those that did not.

The investigators examined how many students used an LRS and whether there is any significant difference in students' study behaviours between subjects that provided an LRS, and those that did not. We explored whether the presence of an LRS was associated with changes in students' learning strategies and skills using a study behaviour inventory (the SBI-HS), which had been developed based on basic principles of learning psychology and had been demonstrated to correlate with academic achievement scores (Bliss & Mueller, 1986; Bliss & Vinay, 2004). We asked students to indicate how they learn in the subjects that had an LRS as compared with subjects that did not have one.

Methods

The investigators conducted a study at a public medical school in Bangkok, which enrolled about 300 students per year. The third-year curriculum at this school covered many medical and social science subjects, including pathology, pathophysiology, medical genetics, microbiology, immunology, parasitology, clinical pathology, pharmacology, applied preclinical knowledge, preventive and social medicine, life and social skills, critical review of Thai society and an elective. Among these subjects, some have provided an LRS so students can access the recorded lecture on demand; others have not provided an LRS. All students studied subjects in both learning environments that have an LRS and environments without an LRS. The LRS at this medical school contained synchronous recording of slides shown on the screen along with audio of the lecturer teaching the content on the slides. These video clips were uploaded to the e-learning website of the school, where students can access them using their student identification number and password via an intranet system.

Although the quality of the LRS at this school was good, students were not allowed to use the LRS as a replacement for attending the live lecture sessions. It was the policy of the university that students must attend over 80% of the classes in each subject in order to qualify to take the final examination. Thus, the main purpose of the LRS for students in this setting was to reinforce what they had learned in class.

The investigators administered a survey to medical students at the end of their third year. The questionnaire was divided into three parts: (1) demographic data (age, gender,

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GPA—grade point average), (2) students' use of LRS and (3) studying behaviours in subjects with and without an LRS.

The investigators evaluated the use of the LRS not only by asking students whether they used the system but also by checking the login data from the server computer.

The investigators assessed study behaviours of students using a modified version of The Study Behavior Inventory (high school form) (SBI-HS). The SBI-HS had been validated to be a valid and reliable instrument for assessing academic preparation strategies among college and university students, with Cronbach's alpha of 0.88 (Bliss & Mueller, 1986; Bliss & Vinay, 2004). With the permission of the instrument's developer, the investigators developed a modified Thai language version of the instrument to be used in a Thai medical school. The modified instrument was given to a group of preclinical medical students at the studied school to check for the applicability in their study setting. The input from this pilot group of students was used to improve the instrument prior to the survey. This Thai SBI-HS was composed of 44 statements, each addressed one study behaviour. For each statement, students were asked to give frequency ratings of that behaviour, one for the subjects with an LRS and another for the subjects without an LRS. There were four levels of frequency ratings provided: (1) rarely or never, (2) sometimes, (3) often or usually and (4) almost always. Among the 44 statements on the Thai SBI-HS, some indicate good study behaviours, while others indicate poor study behaviours. The mix of good and poor study behaviours was chosen to avoid response sets from students. The investigators reversed the ratings on statements of poor study behaviours before data analysis so that high numbers indicate good behaviours. Examples of items on the Thai SBI-HS are provided in the Appendix.

The whole set of questionnaires comprised a four-page survey, which could be completed within 15–20 minutes. The investigators distributed the questionnaires to a whole class of 302 medical students at the end of their third-year curriculum. The survey was anonymous, with no identifying information on the returned questionnaires. The students could freely choose to participate on voluntary basis with no undue pressure. Students were instructed to give completed questionnaires to one of four student representatives, who passed the collected questionnaires to the investigators later. All data were entered into a computer and statistical analyses were carried out with SPSS (SPSS Inc., 2002) under the assumption of a Type I error rate of 0.05. The research protocol and the questionnaire were approved by the institutional review board of the medical school where the study took place.

Results

Of the 302 questionnaires distributed, 101 were returned (33% response rate). Respondents included 39 men, 55 women and 7 people who did not answer this demographic question. Most of the respondents were 21 years old (59%), followed by 20 years old (25%), 22 years old (13%) and 19 years old (3%). Their mean grade point average was 3.41 (with A = 4, B = 3, C = 2, D = 1 and F = 0). The demographic characteristics of respondents were consistent with the demographic data of the whole class. Ninety-five percent of survey respondents (93 out of 98 responding students) used

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the LRS. Three students did not indicate whether they used the LRS. The investigators also checked the usage of the LRS from the login data on the computer server. The login data for the previous 2 academic years revealed that the LRS usage rate was between 88 and 98%. The amount of time that students spent on the LRS is summarised in Table 1.

Table 1
The Amount of Time (Hours Per Day) That Students Spent Reviewing Lectures on a Lecture Recording System

Amount of time per day (hours)	Frequency (percent of valid data)
less than 1 hr	18 (19.6%)
1–2 hr	29 (31.5%)
2–3 hr	30 (32.6%)
3–4 hr	9 (9.8%)
more than 4 hr	6 (6.5%)
No response	9

We also checked whether there was any gender difference in LRS use. We found that the distribution of LRS usage by the number of hours did not differ by gender, $\chi^2(4, N = 92) = 1.85$, $p = 0.76$.

The modified Thai SBI-HS was found to be a reliable instrument in assessing medical students' studying behaviours. After reversing the numerical responses for 26 items so that all 44 items had the higher scores indicating better study behaviour, the scores were internally consistent with a Cronbach's alpha of 0.83 and 0.76 for subjects with and without an LRS, respectively (based on data from 87 fully completed questionnaires).

To evaluate whether the study behaviours of medical students differed for the subjects with and without an LRS, we carried out a paired-sample t-test comparing the Thai SBI-HS scores in subjects with an LRS versus subjects without an LRS. Our analysis revealed that there was no statistically significant difference between the two sets of SBI-HS scores, $t(85) = -0.77$, $p = 0.44$. The SBI-HS scores from subjects with an LRS had a mean of 125, with a standard deviation of 12.65. The SBI-HS scores from subjects without an LRS had a mean of 124, with a standard deviation of 14.47. We also checked whether SBI-HS scores were different between male and female students. Our analysis revealed that there was no statistically significant difference in SBI-HS scores between the two genders, both for subjects with an LRS and those without an LRS, $t(79) = -0.09$, $p = 0.93$ and $t(79) = -0.48$, $p = 0.64$, respectively.

The investigators then evaluated each behaviour statement. Because ratings of individual questions were on an ordinal scale (1 = rarely or never to 4 = almost always) and because the data was not normally distributed, Wilcoxon signed ranks tests were used to compare ratings from subjects with an LRS and without an LRS. We identified nine study behaviours that showed significant differences, as summarised in Table 2.

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Table 2
Statements From a Thai SBI-HS That Showed Significant Difference in Study Behaviours Between Subjects With and Without an LRS

Study behaviours	Mean/Median (+)		Subjects with better behaviours	Wilcoxon test						Effect size
				Negative ranks		Positive ranks				
	Subjects with an LRS	Subjects without an LRS		Mean ranks	Sum of ranks	Mean ranks	Sum of ranks	z	p	r
I try to use what I learn in one subject to help me in other subjects.	2.68/3	2.58/3	LRS	4.50	4.50	5.06	40.50	-2.31	0.021	0.24
I copy drawings and tables that the teacher puts on the board during class.	2.72/3	2.51/2	LRS	10.59	116.50	17.69	318.50	-2.24	0.025	0.23
When I fall behind in my schoolwork, I make up assignments without the teacher having to mention it to me.	3.07/3	2.85/3	LRS	7.00	21.00	11.12	189.00	-3.25	0.001	0.33
(-) I have to go over written materials several times. The words don't have much meaning the first time I go over them.	2.51/3	2.34/2	LRS	11.33	34.00	9.75	156.00	-2.64	0.008	0.27
I try to connect things I learn in each class with the things I learned in the class on previous days.	2.71/3	2.53/2	LRS	5.00	5.00	7.69	100.00	-3.08	0.002	0.31
I plan the answers to essay questions in my mind before I start writing them.	2.36/2	2.43/2	no LRS	3.00	15.00	0.00	0.00	-2.12	0.034	0.21
When I prepare for a test, I study the material in logical order.	3.31/3	3.2/3	LRS	0.00	0.00	4.50	36.00	-2.64	0.008	0.27
(-) I am careless with spelling and grammar when answering essay questions.	2.97/3	2.91/3	LRS	0.00	0.00	3.50	21.00	-2.45	0.014	0.25
(-) Worry about how well I will do interferes with my studying and my test performance.	2.93/3	2.85/3	LRS	0.00	0.00	3.50	21.00	-2.33	0.020	0.24

Note: (-): The statements of negative study behaviours.
(+): The ratings from statements of negative behaviours were reversed from students' raw data to make high ratings indicate good behaviour.

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Pearson product-moment correlation coefficients were also computed to assess the relationship between medical students' grade point average and their study behaviours, both in subjects with and without an LRS. There were significant correlations between students' grade point average and their study behaviours in subjects with an LRS ($r = 0.33$, $n = 76$, $p < 0.01$) and those without an LRS ($r = 0.36$, $n = 76$, $p < 0.01$). That is, students with good study behaviours tended to get good grades.

Discussion

A lecture recording system (LRS) is an institutional resource provided to assist students' learning by using information and communication technology (ICT). Some teachers have noted that students complain about information overload (Sutherland & Badger, 2004). However, there are also studies showing that if students believe that the technology helps their learning, they are more likely to embrace it (Dunkin, 1999; McElroy & Blount, 2006). Understanding how students respond to ICT is an important step for academic institutions to develop a good plan for how to utilise these technologies to provide effective learning for students (McElroy & Blount, 2006). The investigators carried out this study in order to gain insights into how medical students interact with such resources.

Our data showed that 73% of medical students who responded to the survey used the LRS for at least 1 hour per day. Interestingly, 7% of students reported using the LRS more than 4 hours per day. This can be considered both good and bad news. The good news is that this technology is considered useful among students, making it a good institutional investment. The bad news is that some students used them excessively, which would consume too much of their time. On the other hand, 18 students (20%) indicated that they used the LRS less than 1 hour per day. These 18 students include the five students who did not use the LRS at all. Thus, some students did not see the value of the LRS.

Relying on the questionnaire data to determine how many students use the LRS might be prone to bias, due to the unreturned questionnaires. The investigators also checked the usage of the LRS by evaluating the login data from the server. The login data from the last 2 academic years revealed an LRS usage rate of between 88 and 98%, which gave an average LRS usage rate of 93%. This is close to the 95% indicated by the returned questionnaires, providing evidence for the representativeness of the survey participants.

The comparison of SBI-HS scores between subjects with an LRS and those without an LRS showed no statistical difference in total scores, suggesting that the availability of an LRS was not associated with the changes in study behaviours among medical students. However, when looking at individual item scores, we noticed significant differences in scores for nine study behaviours (Table 2). The descriptions of these nine behaviours suggested that the availability of an LRS was generally associated with good study behaviours. Eight out of nine study behaviours showed better scores on subjects with an LRS. Providing an LRS to students seemed to help students to follow teachers' lectures more easily, link content between subjects better, prepare better for tests and

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lessen their test anxiety. The only aspect of study behaviours that rated higher for subjects without an LRS was making a plan before writing answers to essay questions. It might be possible that the availability of an LRS system resulted in students becoming less skilful in writing. Having an LRS may make note-taking less important during lectures, thus students probably had less practice writing and did not realise the importance of developing a plan before writing. However, this small difference might be simply "random noise" in the data. Another explanation for the differences in study behaviours between subjects with an LRS and those without one would be the difference in the nature of the subject content. Because the study was conducted in a natural setting with no control over which subjects would allow video recording, the complexity and amount of content taught in subjects with and without an LRS could be different.

The significant correlation between the students' SBI-HS scores and GPA helps support the validity of the instrument in evaluating students' study behaviours. This finding emphasised the importance of good study behaviours based on the principles of learning psychology. Good study behaviours are associated with good learning outcomes.

There are some limitations to the generalisability of the findings from this study. Firstly, there was a response rate of only 33%. This is not uncommon for a survey with no strategy to enforce students to respond. Although the demographic data of respondents is quite similar to the demographic data of the whole class, we could not rule out selection bias on the data we analysed. It might be possible that students who did not use an LRS did not want to return the questionnaire. Secondly, this study was conducted in only one medical school in the capital city of the country. The association between the presence of an LRS and students' behaviours in another medical school situated in a different area with different class sizes or a different cultural context may yield different findings. Finally, this study relied on students' self-reporting their behaviours. The investigators did not conduct any field observation to verify the accuracy of these responses. Although we see no motive for students to intentionally provide inaccurate information about their study behaviours, there may be instances where students forgot what they had done a few months before responding to the questionnaire. Therefore, the interpretation of results has to be made with caution.

Conclusion

The findings from this study suggested that an LRS is a system that helps medical students cope with their preclinical study. Most of the participating students used the system regularly. The presence of an LRS was not associated with changes in students' study behaviours. However, an LRS could have negative influences on a limited type of study behaviour, such as lack of writing practice. Furthermore, some students reported using an LRS excessively to the extent that one might suspect that these students might skip the live classroom to spend time with an LRS for some subjects. This concurred with the findings from prior studies that showed significant numbers of students using an LRS as a replacement for live lectures (Cardall, Krupat, & Ulrich, 2008; Gupta & Saks, 2013). A future direction for exploration of the impact of LRSs on students might be to look at learning outcomes. Investigators could examine the test scores of students to see how an LRS actually impacts students' learning.

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Appendix

Examples of Items on the Thai SBI-HS

A. Statements suggesting good study behaviours

- I complete and turn in my homework on time.
- I try to use what I learn in one subject to help me in other subjects.
- I copy drawings and tables that the teacher puts on the board during class.
- I keep my work in school up-to-date by doing my work regularly every day.
- When I am having trouble in a subject, I try to meet with the teacher to talk over the problem.

B. Statements suggesting poor study behaviours

- My time is unwisely distributed; I spend too much time on some things and not enough on others.
- I find it hard to finish work by an assigned time. The work I turn in is often incomplete, poorly done and handed in late.
- My teacher criticises my written reports as being hastily written or poorly organised.
- I don't plan my study time very well.
- I find it hard to think clearly when I am faced with a test. Because of this problem, I do poorly on tests.

ISSN 1442-1100