

CHALLENGES IN TEACHING LARGE CLASSES ON A FUNDAMENTALS  
OF INFORMATION TECHNOLOGY COURSE WITH A BLENDED LEARNING  
ENVIRONMENT

ความท้าทายของการสอนชั้นเรียนขนาดใหญ่ในรายวิชาความรู้พื้นฐานด้าน  
เทคโนโลยีสารสนเทศในสิ่งแวดล้อมของการเรียนแบบผสมผสาน

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บทคัดย่อ

การจัดการชั้นเรียนขนาดใหญ่ยังเป็นประเด็นวิจัยที่น่าสนใจ โดยเฉพาะการจัดการเรียนการสอนในรายวิชาพื้นฐานสำหรับนักศึกษาชั้นปีที่ 1 ที่เพิ่งเข้ามาศึกษาในมหาวิทยาลัย งานวิจัยนี้มีวัตถุประสงค์เพื่อ (1) วิเคราะห์ความพึงพอใจของกิจกรรมการเรียนการสอนในรายวิชาความรู้พื้นฐานด้านเทคโนโลยีสารสนเทศ ในสิ่งแวดล้อมการเรียนแบบผสมผสาน (2) ศึกษาปัญหาการเรียนการสอนในชั้นเรียนขนาดใหญ่ในรายวิชานี้ (3) นำเสนอวิธีการแก้ปัญหาเพื่อปรับปรุงการเรียนการสอนในชั้นเรียนขนาดใหญ่ตามความคิดเห็นของนักศึกษาในชั้นเรียนนี้ ข้อมูลที่ใช้ในการวิเคราะห์รวบรวมจาก 2 แหล่งข้อมูลคือ (1) คะแนนการสอบกลางภาคและปลายภาค (2) แบบสอบถาม ซึ่งทำการสำรวจก่อนสอบปลายภาค นักศึกษาจำนวน 120 คนให้ความร่วมมือในการตอบแบบสอบถามเพื่อแสดงความคิดเห็นเกี่ยวกับการเรียนการสอนในชั้นเรียนขนาดใหญ่สำหรับรายวิชาความรู้พื้นฐานด้านเทคโนโลยีสารสนเทศ ผลการตอบแบบสอบถามถูกวิเคราะห์ทั้งในเชิงปริมาณและคุณภาพ ระดับความพึงพอใจในกิจกรรมการเรียนรู้อยู่จัดกลุ่มและคำนวณเป็นค่าร้อยละ ความคิดเห็นของนักศึกษาต่อปัญหาและข้อเสนอแนะในการแก้ปัญหาได้รับการวิเคราะห์ในเชิงคุณภาพ ผลของการวิจัยพบว่านักศึกษาส่วนใหญ่พึงพอใจกับกิจกรรมที่เกี่ยวข้องกับเทคโนโลยี เช่น การปฏิบัติการในห้องคอมพิวเตอร์ ปัญหาหลักของชั้นเรียนขนาดใหญ่คือเสียงดัง ซึ่งเกิดจากจำนวนนักศึกษาที่มากทำให้ไม่สามารถระบุคนที่พูดเสียงดังได้ และความเข้าใจผิดทางด้านวัฒนธรรม นักศึกษาเสนอวิธีการแก้ปัญหาในชั้นเรียนขนาดใหญ่โดยการเพิ่มการโต้ตอบระหว่างผู้เรียนและผู้สอน เพิ่มการเรียนแบบไม่เป็นทางการ กระตุ้นการเข้าชั้นเรียน ลดสถานะการไม่เปิดเผยตัวตนของผู้เรียน และจัดกลุ่มเรียนตามความสามารถของผู้เรียน

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Abstract

The effective management of large classes is continually discussed amongst researchers in higher education. Teaching large classes is a challenge, especially in introductory courses for first year undergraduates who are new to the university environment. The objectives of this research were (1) to analyse students' satisfaction with the activities used in a Fundamentals of Information Technology course with a blended learning environment; (2) to study the problems in teaching large classes in this course; and (3) to find out how to improve learning and teaching in large classes using the student opinions gathered in this research. Data were collected using two sources: (1) students' scores from the mid-term and final examinations, and (2) an anonymous survey conducted before the final examination. 120 students were surveyed about learning and teaching matters in the introductory course. The questionnaires were quantitatively and qualitatively analysed. Percentage analysis was done to group the

levels of satisfaction regarding activities in this course. Students' reflections on large class problems, and suggestions to improve learning and teaching, were qualitatively analysed. The results indicate that most students were satisfied with activities involving technology integration, such as computer labs. The main problem with large classes in Thailand is loud noise, caused by factors of anonymity and culture. The solutions to improving learning and teaching in large classes are: increasing student-teacher interaction; adding more informal study; encouraging more class attendance; reducing anonymity; and grouping students based on their abilities.

**Keywords:** Large Classes; Blended Learning; Fundamentals of Information Technology; Teaching and Learning

## 1. INTRODUCTION

The main advantage of teaching large classes for educational institutes is the reduction of teacher costs. However, large classes are not easy to manage, due to the large number of students, their diverse backgrounds, the lack of class interaction, etc. In a traditional class, the teacher gives a lecture, and students take notes. This is not an effective learning and teaching strategy. Greyling et.al. [1] suggested that good learning and teaching methods are relevant to a pleasant studying environment, student motivation and engagement, and class interaction. In general, people assume that, the smaller the class, the more students learn. However, the findings of a study by Haddad [2] reported that the quality of teaching is the most important factor that influences student performance, not class size. The more students are involved in class activities, the better the learning outcome.

Many researchers in higher education have tried to investigate these problems in order to improve teaching and learning in large classes, especially introductory courses for first year undergraduates who are new to the university environment [3][4]. The teacher plays a vital role in welcoming and encouraging students during their first term of university life, besides giving knowledge. A variety of teaching techniques are applied in large classes, including blended learning, collaborative learning, and virtual teamwork. The objectives of previous researches were to encourage student engagement, to integrate technology in learning and teaching activities, and to reduce costs as a result of the limited number of instructors [8][9][10]. However, with a large number of students, teaching methods are limited to such techniques as using essays quizzes and individual presentations. The following tips can be used for teaching large classes:

- Get to know each other more; create a positive relationship between the teacher and the students, and promote a friendly learning environment [1][11]
- Increase student involvement; use a variety of learning styles which enable active learning with technology integration [2][5]
- Listen to students' comments; provide a channel for students to criticize the teaching methods used in order to identify opportunities to improve teaching strategies [2][11]

## 2. RESEARCH QUESTIONS

The objectives of this research were: (1) to analyse students' satisfaction with the activities used in a Fundamentals of Information Technology course with a blended learning environment; (2) to study the problems in teaching large classes in this course; and (3) to find out how to improve learning and teaching in large classes using the student opinions gathered in this research. According to the above research objectives, the following research questions guided this study:

1. What are the levels of students' satisfaction regarding the activities used in the Fundamentals of Information Technology course with a blended learning environment?
2. What are the problems in teaching large classes in this course?
3. How can learning and teaching in large classes be improved, based on the student opinions?

### 3. METHODOLOGY

Data were collected using two sources: (1) students' scores from the mid-term and final examinations, and (2) an anonymous survey, conducted before the final examination. 120 students were required to fill in a questionnaire. The survey was designed to detect students' expectations of this course, course activity satisfaction, the problems encountered, and suggestions to improve learning and teaching in large classes.

#### 3.1 Course organization

The Fundamentals of Information Technology course is a compulsory introductory course for the entire first year undergraduate student. The purposes of this course are to give the students a basic understanding of computer technology and to illustrate the use of information technology in the real world, to ensure that they have the most current information available to assist their study of today's technology. The course links students to computers, and helps them to feel comfortable using, and talking about, computers and other components of information technology. Students learn about the most important information technology topics and concepts, including computer hardware, software, management information systems, the Internet, e-commerce, ethical issues in computing, etc. They study this course for 12 weeks/1 trimester (lecture: 3 hours/week, computer lab: 2 hours/week). 1,393 students (311 males and 1,082 females, with an age range of 18-20 years old), from 30 majors, are grouped into 6 groups (around 200-250 students/group) for lectures, and 14 groups (less than 100 students in each group) for the computer labs. Five lecturers and four computer lab teaching assistants manage these large classes.

#### 3.2 Managing a Class with a Blended Learning Environment

Torrisi-Steele and Drew [12] defined blended learning as the "use of technology with face to face teaching". Therefore, teaching methods, such as lectures (with PowerPoint slides), computer labs, and online submitted assignments, were designed for this course. Lecturing is not automatically an ineffective method of teaching, but most students cannot listen effectively for the duration of a long lecture. In addition, to obtain improved learning outcomes, students should be involved in class activities. A variety of learning styles with/without technology integration are applied to large classes, including:

- Discussion (e.g., potential exam questions, or debates on relevant topics),
- Questions/answers or votes,
- Demonstrations of technology, and
- Watching relevant movies or videos.

On occasion, stories and anecdotes about university are told to new undergraduate students, in order to create a friendly learning atmosphere, and to give them respite from study. A computer center visit is arranged in order to show students technologies used in the university. In a large lecture hall (comprising 300 seats), students are seated far from the board located at the front of the room. Students submit computer lab assignments online via the Moodle e-learning system. They can see their marks via the online registration system (run by the Center for Educational Services: CES). The CES web site is used

to communicate important information to all students in the university, such as posting changes in timetables and making announcements. Additionally, students can be communicated with via SMS.

Before the end of this course, an anonymous survey is conducted to collect student opinion, in order to improve learning and teaching in large classes with a blended learning environment. Additionally, there is an online questionnaire, where students can express their opinions about each course throughout term time.

### **3.3 Grading and Exams**

In terms of grading, the mid-term and final examinations count for 35% each, and lab assignments count for 30%. There are no marks for class attendance. Multiple choice questions (MCQs) are applied in the mid-term and final examinations instead of essays due to the large number of students. The marking process is expedited by use of OMR (Optical Mark Reader) technology, which also reduces grading errors. Davis [13] suggested that MCQs can be used to measure both basic knowledge and complex concepts. However, most of the questions used here are designed to measure the students' understanding required in order to meet the course objectives for first year undergraduates.

## **4. RESULTS AND DISCUSSION**

### **4.1 Student Performance**

The average mid-term mark of the 1,393 students was 53.41 out of 100 (SD 13.30, min 22, max 94). It was unsurprising that the student who received the maximum mark was from the Medical program, with 94 out of 100. Students who receive marks of more than, or equal to, 40 out of 100 are predicted to pass this course. 1,183 students got marks of more than or equal to 40, and most of these were from the Medical, Medical Technology, Pharmacology, and Physical Therapy programs. However, 210 students got marks of less than 40 (and might possibly fail the course), and most of these students were from the Regional Studies and Animal Production Technology programs. Both the Medical and Regional Studies programs were taught by the same teacher, using the same teaching methods. This result supports the study by Hancock [14], which concluded that class size has no impact on student performance. If we compare the marks of male and female students, around 14% of male student, and around 15% of female students, were failing marks; there is not much of a difference between them, and, therefore, gender was not an important factor in the successful study of information technology, agreeing with the results of Lau and Yuen [15].

After the mid-term examination, 17 out of the 1,393 students were forced to drop out early. The final exam was held in the following 6 weeks of the trimester (12 weeks/term). The average final examination mark of the 1,376 students was 50.74 out of 100 (SD 14.86, min 19, max 95). Due to the increased difficulty of this stage of the course, around 23% of the students (320 out of 1,376 students) got marks of less than 40 out of 100 (predicted failures), which was higher than the mid-term fail rate of approximately 8%.

## 4.2 Students' perceptions

**Table 1** Students' expectations of this course

Student expectation	No. of comments	%
Obtain knowledge of information technology	39	32.50
Fully understand technology, which might be useful for their future career	28	23.33
Achieve an "A" grade	22	18.33
Update their knowledge of information technology	12	10.00
Just pass the exam	10	8.33
Understand the course	9	7.50

Before the end of this course, 120 students were required to complete a questionnaire. The questionnaires were quantitatively and qualitatively analyzed. Percentage analysis was done to group the levels of satisfaction regarding activities in this course. Students' reflections on large class problems, and suggestions to improve learning and teaching, were qualitatively analyzed. This section discusses students' opinions about learning and teaching matters on this large introductory course with a blended learning environment. Table 1 shows the students' expectations of this course, itemized in terms of highest to lowest percentages. The results suggest that most students (32.50%) were interested in knowing about computer technology. 23.33% of students preferred to learn about computer technology in order to apply it to their daily activities and future careers. 18.33% of students preferred to study hard to get an "A" grade. However, 8.33% of students preferred just to pass the exam, as this course was not their major. 10% of students wanted to update their knowledge about new technology for their own interests. 7.50% of students preferred to just understand the course. The following is a student's quote:

*"I only want to learn the course content and pass the exam. I don't really care about the course otherwise."*

### *Question 1: what are the levels of students' satisfaction with activities in this course?*

**Table 2** Levels of satisfaction regarding activities in this course

Class Activities (N=120)	Technology Integrated	Negative (%)	Positive (%)
Lectures (with PowerPoint slides)	√	10.00	90.00
Computer labs	√	4.17	95.83
Online-submitted assignments (via the Moodle e-learning system)	√	7.50	92.50
Class discussion	-	23.33	76.67
Questions/answers or votes	-	28.33	71.67
Demonstration of technology	√	10.83	89.17
Watching of relevant movies or videos	√	4.17	95.83
Computer center visiting	√	9.17	90.83
Expression of students' opinions about this course via online questionnaire (given throughout term time)	√	39.17	60.83

Student satisfaction with activities in this course was assessed by use of five-point Likert scales, with scores ranging from 1 to 5 (the least satisfaction to most satisfaction with class activities), as shown in Table 2. The scale values were categorized via the following: 3-5 was positive, and 1-2 was negative. The following percentages were calculated from the groups of positive/negative values. The results in Table 2 show that most students were satisfied with the activities in this course, especially those activities

featuring technology integration. The most popular activities (positive = 95.83%) were computer labs and watching relevant movies or videos, as per the comment below:

*“I like to learn in computer labs more than listening to the lectures. When learning about technology, we should use real technology. We can learn how to use software in the computer labs.”*

*“I like watching videos. I can understand the content easier through video, and it’s very fun. For example, the Phishing song shows the variety of e-commerce fraud crimes possible through animation and music.”*

The least favorite activity was the expression of students’ opinions about this course via online questionnaires given throughout term time (positive = 60.83%), because some students did not like to participate in criticizing the learning and teaching methods used in this course. It should be noted that there were two activities which did not feature integrated technology: class discussion (negative = 23.33%) and questions/answers or votes (negative = 28.33%). Students reported problems with the above issues, as per the following:

*“I like group discussion, but with the big number of students in the same room, it is too noisy. Some students in my group talked about something else. Only a few students discussed the assigned topic.”*

*“I hesitate to raise my hand to answer the questions. I prefer to discuss in a group, with the group representative giving those answers to the teacher.”*

## Question 2: what are the problems of a large class?

**Table 3** Number of comments about large class problems from students

Problems	No. of comments	%
Too noisy, cannot concentrate on study	82	77.36
Too many students in the class; no discipline	9	8.49
Don't understand the lecture, and don't want to ask questions in class	5	4.72
Less class interaction	4	3.77
Lack of motivation in study	3	2.83
Formal study	2	1.89
Want to learn about more advanced computer technology	1	0.94

Many students like large classes, as they have a chance to make new friends from different majors, and they feel more comfortable in their anonymity when studying in a big lecture hall. However, a large class environment is impersonal, has less class interaction, and creates a high potential for distractions [16][17]. Results from the questionnaire indicated that the main problem in large classes was loud noise (see Table 3). This is a major problem in Thai education, as students think it is acceptable to talk in class (see student’s quote below). After being assured of anonymity, a large number of students stated that they do not hesitate to chat or do other activities in class. Mulryan-Kyne [18] suggested that anonymity in large classes caused less motivation in learning and class attendance.

*“Other students are talking to each other and my friend is talking to me. I feel it is alright to talk as well.”*

8.49% of students thought there were too many other students in the class who were not sufficiently disciplined. Some students arrived late, and used mobile phones in class. 4.72% of students did not want to ask questions in large classes when they did not understand aspects, such as technical terms. No one wanted to draw attention to themselves in a big lecture hall, and they found it embarrassing to ask questions in front of their classmates. They preferred to ask questions in private, such as after class. This is consistent with the study of Andersson and Rox [19], who reported that students would not dare to discuss their problems in a large class, and felt more comfortable asking questions in smaller classes. 3.77% of students thought there was less class interaction and less discussion. This was also reported by Preston and Shackelford [20], whose result showed that teachers may not receive adequate feedback/response from students in large classes, reducing classroom interaction. 2.83% of students had no motivation to study on this course, and got bored of the class, as they did not see the benefits of this course to their future career (as it was not their major). There was only 1 comment about content difficulty level; the student wanted to learn about more advanced technology.

**Question 3: what are your suggestions to improve learning and teaching in large classes?**

There is no comprehensive single solution to the problem of managing large classes, as different universities in different countries have different cultures. The students questioned in this research suggested solutions to improve learning and teaching in large classes, and to solve the problems identified, by:

- **Increasing student-teacher interaction:** The students suggested that different learning styles, such as online or face-to-face discussion, should be increased to encourage active learning (see student's quote below). Online forums and debates are required to increase interaction [19][1][20]. The Schreyer Institute for Teaching Excellence [22] suggested that there are ways of participating other than speaking in class, such as emailing the teacher to ask questions, or sharing a personal experience related to the topic online (e.g., via Facebook).

*"I like when the teacher asks us questions, especially questions from the previous year's exam. So, we will get some idea of what the example questions look like... In addition, we should have a chance to discuss with friends, or to ask questions to lecturers, online, to find out the best answers."*

- **Formal study:** Regarding formal lectures and informal computer lab sessions, students felt that a gap existed between themselves and the teachers, but that they could talk informally with their teaching assistants in the computer lab. Teachers should make themselves easily accessible to students, and have a positive attitude towards them, in order to foster a good teaching situation [23]. Humor and jokes can be used to gain student attention and to create a positive relationship with them [6], for example, by linking study examples to jokes or movies to make students remember the relevant examples more easily. The students suggested that, to allow them to be sufficiently entertained in order to work well, they wanted to be told jokes and view amusing related videos, as per the following student's quote.

*"I think the lecture should involve more fun, such as funny videos and jokes about computer viruses... So, we probably like to talk more with the lecturer... less stress in class and better understanding about computer viruses."*



- **Class attendance:** Some students had no motivation to come to class, or arrived late. Some students suggested that marks for class attendance should count for grading, and that regular quizzes might help (see student's quote below). The internet-based Kahoot! game is a good tool for online quizzes and game-based learning [7]. A large group of students can play Kahoot! via their mobile devices, which makes the quiz more fun. Other students proposed that adding a variety of entertaining activities to lectures, such as demos, video clips, music, and computer games, might encourage greater attendance in class; this is also suggested by the Schreyer Institute for Teaching Excellence [22].

*"I would like to come to class, but my friends said that it's too hot today to walk to the class and that there are no marks for class attendance. So, we decided to stay in the dormitory to do something else, but if we had a quiz- I would definitely show up..."*

- **Anonymity:** Large class sizes provide anonymity to individual students, who do not hesitate to make noise or play computer games on their laptop computers while in them [21]. Students suggested that, to prevent students chatting to each other too often and disrupting the learning process, observable relationships should be separated as much as possible. Other students recommended the use of an assigned seating chart. UNESCO [11] suggested that students should be involved in setting class rules- what is and is not acceptable behavior, and what form of punishments should be applied when these rules are infringed.

*"I think a seating map would help the lecturer more efficiently identify students who disrupt the class..."*

- **Diverse background of the students:** According to the questionnaire results, 54 out of 120 students thought they had a neutral (1-5 scale) level of background knowledge in computer technology, and 7 out of 120 students thought they had a strong one. As there was a varied range of student backgrounds and abilities (e.g., prior learning experiences and background knowledge, technology aptitude, etc.), this course should be redesigned. A placement test should be set in order to classify student ability. The main purpose of this curriculum change would be not to discourage advanced students from future study; these advanced students would not need to learn what they already know (they could skip the first half of the chapters used in the Fundamentals of Information Technology course), and could choose to learn another course about information technology which is more of a challenge for them.

Moreover, the first day of class is very important in creating positive student feeling about a course. Teachers should start the class on time and introduce themselves, including a partial summary of their backgrounds and personal information (e.g., showing their Facebook pages); this makes students feel more comfortable in class [16].

## 5. CONCLUSION

In this paper, teaching and learning in large classes in an introductory course with a blended learning environment were described. The students' satisfaction with class activities, and some of the problems that result from large class teaching, were reported. The results from this study indicated that the main problem with large classes in Thailand is loud noise, caused by factors of anonymity and culture (for instance, some Thai students think it is acceptable to talk in class). Blended learning environments enhance student learning. Continuously improving teaching strategies by focusing on technology



integrated learning will make for good learning outcomes. Additionally, the teaching guidelines for large classes noted in this article can be useful in the teaching of smaller classes.

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