The Importance of Secondary Data in Online Teaching -
A Quantitative Evaluation and Comparative Analysis For Online Class Performance

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ABSTRACT
The Department of Engineering and Natural Sciences at Østfold University College has offered and lectured an online course for university and college teachers for motivating their engagement for online teaching of their own courses. This course has been conducted twice in Østfold College of Norway and once in Shijiazhuang University of Economics, China, for selected groups of university and college teachers. The current study has analyzed the database from these courses and undertaken a comparative analysis between course participant groups, respectively for Norwegian teachers and Chinese colleagues. The methodology issue is discussed and the importance of using secondary data is addressed in this article. The analysis illustrated the significant differences in online performance between Norwegian teachers and their Chinese colleagues.

KEYWORDS: Online teaching, class performance, database analysis

INTRODUCTION
Online teaching becomes a new course delivery form for many universities and colleges. The development in internet and web technology provides a wider opening and variation [3] for delivery of different courses online. There is no doubt about the future prospective for online teaching [1,4], and its implementing for other areas such as consequence to the organization development[5].

The Department of Engineering and Natural Sciences at Østfold University College in Norway has been actively using online teaching since 1998 as an alternative course delivery form. This practice has opened the course availability for external students and flexible teaching forms. Through this practice, our college online teachers have also received interesting experience and good benefits for their own competence in developing and teaching courses online.

The college department leaders also foresee the need of spreading and sharing this experience with other college teachers, so that more teachers would be engaged to adapt their courses online. As a result, an online course in "online teaching" was developed and the course is primarily targeting for university and college teachers for motivating their interests and engagement for online teaching and adapting of their own courses online.

The course had been conducted twice in Norway and once in China. The responses and feedback are positive from participants in both countries. However, course instructors have different experience and challenges for conducting this course for Norwegian participants and their Chinese colleagues. The current study will study these differences and challenges by analyzing the secondary data from the course database.

THE STRUCTURE AND CONTENT OF THE COURSE
The course is focusing on the introduction level so the structure of the course was rather simple and the content was relatively basic. The course structure is divided as the following sections:

1. Welcome and introduction by course instructors
2. Getting familiar with courseware and basic program functions.
3. Make your personal profile and present yourself online.
4. What is an online classroom? What difference it makes compared with a traditional classroom?
5. How shall an online teacher prepare and give an online course?
6. How shall an online teacher evaluate his/her online students?

The courseware is LearningSpace (LS) for these 3 course conducting. It is a Lotus Domino based online courseware. Like other web based online courseware, it has advantages, limits and usage specifications which attract for certain types of courses. Our philosophy is not focusing on the selection of courseware, but general issues and challenges for online teaching, though we had to use LS to communicate each other online.

To giving readers an idea how this courseware works in reality, there is a demonstration on real course situations, illustrated by figure 1 and figure 2. These two figures were

copied from the course virtual classroom, in a page of syllabus and a page of classroom discussions, respectively.

Figure 1: An example of course syllabus.

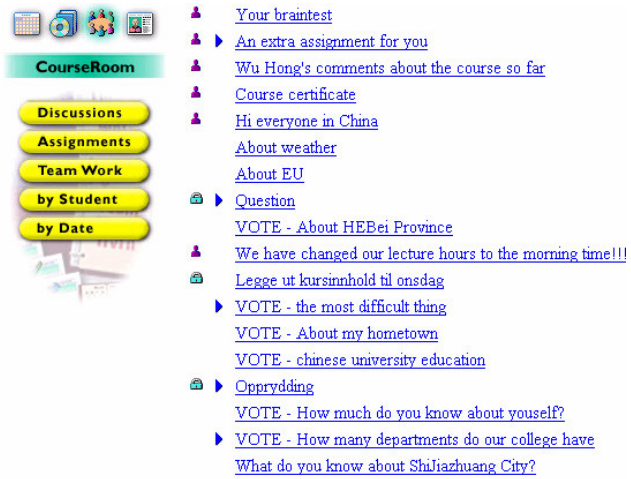

Figure 2: An example of class discussions.

Our using LS experiences showed that LS is a good instrument to instruct and follow up a process of learning and teaching activities for the class/students in a web based online classroom. LS have a good organization to systematize a teacher's feedback/evaluations, and it is easy to summarize the class, group or student's activities by LS databases.

PRACTICAL CONDUCTING FOR THE COURSE

The course was conducted twice in Norway, mainly for teachers of Østfold University College teachers. There were 8 college teachers in the first conducting and 21 college participants in the second conducting. The course was given in Norwegian and there was no directly face-to face gathering throughout the course. The course was lasting 3 weeks intensively for each conducting and the estimated working loading was 60 hours in total for each conducting. After successful conducting twice in Norway, the course is ready for expansion for the external target groups. Shijiazhuang University of Economics was defined as the first target group for this international expansion, partly because there is cooperating potential between two countries in education, and partly because "online teaching" is a new, but rapid developing area for China.

Shijiazhuang University of Economics is situated in Shijiazhuang, Hebei province in the People's Republic of China. The university is one of the major province-governed universities. The university has been appointed as a station for remote education in Shijiazhuang area, authorized by the Education Ministry in China. The university leadership wished to accelerate the development in remote education and reinforce its staff competence in this area. Our online course in "online teaching" was well suited for their needs.

The course was conducted once at Shijiazhuang University of Economics, as a pilot project in cooperation between Shijiazhuang University of Economics and Østfold University College. There were 33 university teachers participated in the course. The course syllabus and lecture material was given in English, but there was directly face-to-face 2 hours consultation in Chinese for each day during the course. There was lasting one week intensively and the estimated working loading was 20 hours in total.

THE FUNCTIONS AND IMPORTANCE OF SECONDARY DATA IN EVALUATION OF ONLINE TEACHING

One of basic questions for teaching activities is effectiveness and its measurement. Traditionally, we have different forms of evaluations for effectiveness measurement, which applies both for students and teachers. For example, we require our students to complete their a relevant assignments after each chapter in order to check their understanding and ability to implementing for the content of that chapter. By the end of lecture term, our student will evaluate their teacher's performance through a survey questionnaire.

A practical dilemma for such an evaluation form is the response rate. As an university college teacher, we all are probably familiar with problems of response rate, both in terms of gathering student assignment delivery during a course and collecting teacher evaluation questionnaire by the end of a course. The only solution we usually have to come up, is to define these assignments and evaluations as a student's duties, so in a way, force them to complete these tasks.

Online course offers a great advantage in data collection and reliability of information sources, compared with a traditional classroom situation. During an online course process, every online activity will be recorded and registered in the course database, so that it will be easy documentation to track back. In a way, this is a kind of secondary data collection. However, it will be as much up-

dated as the primary data collection since the primary class activity for an online course is defined as document transferring.

Before we initiate the online course data collection, we probably need to define some measurable parameters for an online course. We can define an online class performance in the following ways:

1. An activity is a document or message transferred by a course participant, either by an online teacher, an online student or by an online student group.

2. An active day is a day when document or message transferring has been recorded in an online classroom.

3. An active student is an online student whom, not only participate in and read an online course's documents or messages, but also has sent a document or message to his/her online classmates or teachers.

We can image a similar situation for these definitions in a traditional classroom. An activity will then be any communication in a class, such as lecturing a topic, writing a note or an equation on the blackboard, or raising a question for teacher or classmates, etc.

In a traditional classroom, these activities will be formulated in different ways, as oral, virtual, or two-way communication. On contrast, these activities can only be formulated or recorded in a documentation format. This kind of format will offer the great advantage in data collection and substantial reliability for information sources since every activity in a virtual classroom online must be recorded and saved by the computer. They will be restored in the course database and it is easy to retrieve them for analysis.

DATA COLLECTION FROM THE COURSE DATABASE

The data from the course database were collected and used for the statistical surveys and a comparative analysis. Table I shows a summary of class activity level when the course was conducted in Norway by November 2000 (NO1), April 2001 (NO2), and in China by June 2001 (CH3).

The following definitions are used to classify the data:

- *Student number:*
  Total number of participants registered at the beginning of the course
- *Active students:*
  An online student whom, not only participate in and read an online course's documents or messages, but also has sent a document or message to his/her online classmates or teachers throughout the course.
- *Active days:*
  A day when document or message transferring has been recorded in an online classroom.
- *Total documents:*
  Number of documents transferred totally during the course
- *Student documents:*
  Number of documents transferred by students totally during the course
- *Average documents each student:*
  Student documents/active students
- *Average documents each active day:*
  Total documents/active days
- *Total discussion documents*
  Number of leading topics or questions, initiated by teachers or students
- *Open documents:*
  Number of documents that everyone in the class can see
- *Percentage for open documents:*
  Open documents/total documents
- *Teacher documents:*
  Number of documents transferred by teachers or instructors
- *Open teacher documents:*
  Number of documents sent by teachers that everyone in the class can see
- *Percentage for teacher documents:*
  Teacher documents/total documents

TABLE I
Online Class Performance Activities

Course ID	NO1	NO2	CH3
Course duration	2 weeks [*]	3 weeks	1 week
Course taught in	Norwegian	Norwegian	English
Participants are	Norwegians	Norwegians	Chinese
Active Period	2000/11/8 - 2000/11/24	2001/3/16 - 2001/4/10	2001/6/16- 2001/6/26
Student number	8	21	33
Active students	6	15	22
Active days	12	21	7
Total documents	137	361	148
Student documents	84	237	121
Average documents each student	14	15	5
Average documents each active day	11	17	17
Total discussion documents	42	144	45
Open documents	94	63	36
Percentage for open documents	68.6%	17.5%	24.3%
Teacher documents	53	124	27
Open teacher documents	37	89	10
Percentage for teacher documents	38.7%	34.3%	18.2%

[*] The course database for this conducting provides only data for first 2 weeks though the course was lasted 3 weeks.

One should be aware of the terminology "student" in the definition and table above represents actually the course participants, whom are university and university college

teachers.

DATA INTERPRETATION AND ANALYSIS

By observing different numbers from table I, there will be possible to compare the different participant groups. A detailed comparative analysis of data information is summarized as the follows:

Student number may represent to some extent the interests and willingness to learn things about online teaching. Our statistics showed the participant number was modest for NO1 course (8), well expanded for NO2 (21), but enormous large for CH3 course (33).

Active students may represent however, the real number of course participants actively engaged throughout the course. This number may give a more accurate picture of course performance and individual engagement in the course. The numbers for this aspect are 6 for NO1, 21 for NO2 and 22 for CH3.

Average documents each student: It is a measurement that reflects how active an online student will be engaged in the course. There are 14, 15, 5 documents in average from each student throughout the course for NO1, NO2 and CH3 respectively. However, taking the adjustment of course duration, we may notice the fact that averagely documents are very close each other. NO1 seemed to have highest average document as the number 14 was collected on 2 weeks duration only.

One possible explanation for this phenomenon may correlate with modest number of active participants, which was only 6 and the online course offers more space for each individual of these 6 people, especially when they probably feel more privilege to be a small group.

Total discussion documents: It is a measurement that reflects the number of discussion or question related documents. We can use this measurement to indicate the level of discussions in online class. There are 42, 144 and 45 topics or questions for NO1, NO2 and CH3. Definitely very large number for NO2, and very few for CH3, while number for NO1 is in average, if we taking the adjustment of number of participants.

Open documents: This is a measurement on number of documents that displayed in front of the whole online class. The LS courseware (Lotus LearningSpace Forum) has both an open and a private function for document transferring. An online student is able to send a document in open function, so the whole class can read it, or in private function, so only a teacher can read it.

The percentage of open documents was very high for NO1 (68.6%), modest for CH3 (24.3%) while very low for NO2 (17.5%). The extremely low rate for NO2 course was due to the course arrangement which many assignments were required to delivery through the private functions in courseware.

Teacher documents: A good online class should be proactive from students, so a teacher needs not to question so much. This phenomenon could be measured though the number of teacher documents, the fewer, the better. The comparative measurement could be illustrated by percentage for teacher documents.

However, there is an issue of balancing between the number of teacher documents and the number of total documents. That is: How large percentage of teacher documents would be reasonable for being not too many teacher documents, so the students are becoming passive, nor too few teacher documents, so the students are losing contact with their teachers.

Looking at the percentage of teacher documents, the Norwegian course conducting has higher percentages NO1 (38.7%) and NO2 (34.3%), than the Chinese course conducting CH3 (18.2%). In reality, it seemed to be well-balanced percentage rate for Norwegian course conducting on line, since the communication between participants and course instructors occurred in both ways. On the other hand, 18.2% teacher documents for Chinese course conducting seemed to be a too low rate. This conclusion was confirmed by analyzing the Chinese course data which shows many questions from participants were remaining unanswered, which again, indicates the communication occurred only in one way.

THE DIFFERENT ONLINE CLASS PERFORMANCE BETWEEN NORWEGIAN AND CHINESE COURSE PARTICIPANTS

By a closed analysis to the Chinese course data, one would discover that a large part of these unanswered questions were sourced from a simple class exercise, as a part of getting familiar with courseware at the beginning of the course. The different between the Norwegian class performance and the Chinese class performance, is that Norwegian participants did this exercise completely while the Chinese participants did the same exercise halfway.

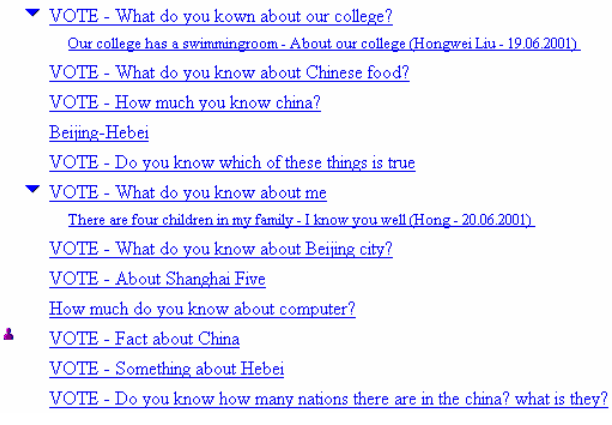

Figure 3: A part of the first class exercise for the Chinese participants.

Figure 3 displays a part of the first class exercise for Chinese course conducting. The participants were told to create a VOTE question by their own choice for the whole class, which they did as we can see. However, they should also answer other VOTE questions as well, which only few did (only two answered other VOTE questions as we can see from the figure 3). As a result, the majority part of participants did only halfway of this exercise.

The Norwegian course participants, on the other hand, did the same exercise, but in a complete way. Figure 4 displays a part of the first class exercise for one Norwegian course (NO2) conducting. As we can see, the participants did not only create a VOTE question by their own for the class, but also did answer other VOTE questions as well.

Figure 4: A part of the first class exercise for the Norwegian (NO2) participants.

For this exercise and comparing these two groups of course participants, one can easily conclude that the Norwegian participants did completely what they were told, but many Chinese participants did only halfway for what they were told. Why?

There were a number of different conditions for these groups and their course conducting. Table II summarized on these differences in their respective course conducting:

TABLE II
Teaching and Student Conditions for Online Class

Course ID	NO1	NO2	CH3
Course duration	2 weeks [*]	3 weeks	1 week
Course taught in	Norwegian	Norwegian	English
Participants are	Norwegians	Norwegians	Chinese
Face-to-face consult	No	No	2 hr. Chinese
Student number	8	21	33
Active students	6	15	22

[*] The course database for this conducting provides only data for first 2 weeks though the course was lasted 3 weeks.

It is easy to notice the advantages and limits for both course conducting. The difference in course duration did certain matter for class performance for the long term, but did not affect the comparison between Norwegian and Chinese groups for the first class exercise, since the exercise already occurred at the first course days for both cases. However, there are other different parameters that affect these two groups of participants separately in their online class performance.

The Norwegian course participants were taught in Norwegian, their mother tongue. They were also fewer in one class, so they would have more space for questioning and answers from instructors. The disadvantages they might have were no face-to-face consultation hours throughout the course. In compensation, they would be received technical support from the course instructors through telephone conversations.

The Chinese course participants had 2 hours face-to-face consultation in Chinese for each course day. This however, seemed to be the only advantage they had. The course syllabus and writing messages in the online class were all in English, a foreign, but also a very different language for many of them. Beside, they had 33 participants in total and 22 active students, which made huge pressure and demands for course instructors in their consultation work.

A large part of consultation work in China was spent the issue of getting familiar with courseware. Even a simple button could be difficulty to understand because the participants were not so familiar with English. One observation that course instructor noticed, was that whose whom are computer and English teachers, did usually well in their course progress.

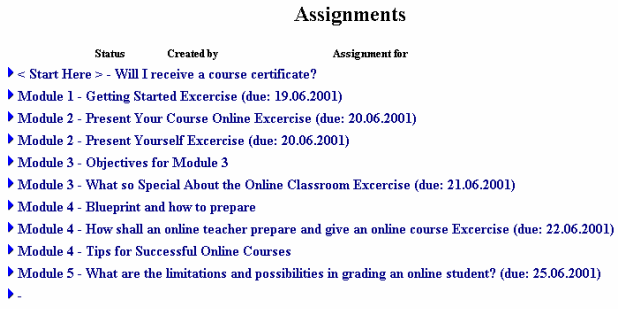

Figure 5: An overview of class assignments for the Chinese (CH3) participants.

Figure 5 illustrated an overview of class assignments for the Chinese (CH3) participants. By examining this picture closely, one would discover that a problem of duplex assignment delivery, which indicated through module 2, 3 and 4. The fact beyond this phenomenon was a fact that indicate participants did not make delivery into the correct fold in the virtual online classroom, so the same document

was recorded twice (duplex) or many times (multiplex), unnecessarily. Again, this fact illustrated the difficulties which the Chinese course participants experienced during their course practice.

TABLE III
Online Assignment Survey for
Norwegian (NO2) and Chinese (CH3) participants

Course ID	NO2	Delivery	CH3	Delivery
Student ID [**]	AF	7	TL	1
	AG	5	WY	5
	AB	5	XD	4
	AR	7	YT	8
	BR	8	ZL	8
	DN	4	CW	5
	KR	2	HL	2
	MF	5	LJ	12
	ME	5	LZ	4
	ML	2	ND	3
	RA	1	NL	5
	RS	9	PJ	1
	TH	8	QD	1
	TL	7	SW	1
Total delivery	NO2	75	CH3	60

[**] For the privacy reason, all participant names are faked.

Table III displayed the same problem from another aspect, namely an online assignment survey for NO2 and CH3 participants in their numbers of assignment delivery for individuals.

For the Norwegian course participants, they were recommended least 5 deliveries of total 8 assignments throughout the course, which is minimum requirement for them. This means they needed in total 14 (participants) x5 (deliveries) = 70 deliveries, which was quite close to their total delivery 75 in reality. From the survey, it was noticed that 4 out 14 participants did not reach this requirement. One had 9 deliveries which indicate a duplex assignment delivery.

For these 14 Chinese course participants, they were recommended to accomplishing the first 2 deliveries of total 6 assignments. This means they needed in total 14 (participants) x 2 (deliveries) = 28 deliveries, which was far less than their total delivery 60 in the reality. From the survey, it was easily to notice that many were had more than 2, even more than 6 deliveries, which indicate a problem of duplex or multiplex assignment delivery.

The analysis above also indicates a reliability issue for the data survey from the Chinese course conducting. By so large number of duplex and multiplex documents, it has to affect the real number of total documents.

CONCLUSIONS AND FURTHER SUGGESTIONS

Combining with field observations, the secondary data from an online course could be a powerful indicator to disclose the online class performance.

Compared with Norwegian and Chinese online course conducting, the Norwegian participants seemed to be more active for each individuals and their class performance seemed to be more accurate and effective.

Analyzing the course conditions and online environments, one could easily notice that the Norwegian participants had a great advantage in course language because the course was conducted by their mother tongue. They also had fewer numbers of participants for each course, compared with their Chinese colleagues. In a way, they were able to received individual consultation for their questions and exercises.

Face-to-face consultation hours seemed to be the great advantage for the Chinese course participants. However, this advantage is very much personality based. It could be a great advantage for extrovert persons, but also unavoidable limitation for introvert persons. After all, only one course instructor with 2 hours face-to-face consultation seemed to be too little resource input for a class of 33 participants.

The course duration is also an importance issue, though our analysis on course statistics did not cover this issue. Our experience for Norwegian and Chinese course conducting indicates the first few days, or even first two weeks of course conducting are crucial period for participants.

Almost every participant would experience a phase of frustration, barricade and difficulties at the beginning of the course. The terminology was new, the screen pictures were hard to be oriented, the appropriate buttons were difficult to find, and there were too many instructions to read. For this phase, it is very important for a course instructor to communicate with course participants, not only solve their faced technical problems, but also encourage them to continue the course, and back them up psychologically.

It is therefore essential to plan a course's duration sufficient so that every participant had enough time to come over their most critical phase. Our previous experience indicates the fact that a participant's withdraw and disconnection from an online course usually occurred 3 days or one week after the course starting. Their withdraw action usually connected with one or two specific problems they faced, but did not receive the appropriate consultation or they did not get though.

Online teaching is a new aspect and modern approach for many university and college teachers. Many are still not familiar with this new aspect and getting comfortable with this modern approach. Usually there are two major online difficulties with many university and college teachers. Fear of new technology and unrealistic expectation for the new technology. In reality, these two categories are usually

combined each other. A person, who is not familiar with technology or a new courseware, often has unrealistic expectation for new technology or a new courseware.

Many are afraid of technology because they think it is complicated and difficult to learn in details. In stead of learning new details, they tend to be looking for a perfect solution and hope a new technology appearance will take care of everything automatically. Certainly, these people will be disappointed after few course days when they discover the courseware did not match their unrealistic wishes.

We know there is no such perfect solution and automatic assistance for everything. One has to learn some basic ABC functions of new technology or a courseware in order to use them. It is therefore important to clarify these aspects for potential online participants before they are learning any new courseware. However, the importance of technical support and IT management shall not be ignoring [2].

Back to course conditions and online environments, it will be important for an online course instructor to address the necessity of few elements for course conducting:

1. The course language is the first priority for the participants. It is very important for course participants to use their own language or the one they feel mostly comfortable for.

2. The size of an online class is the second, but important issue for successful conducting of an online course. A class size of 15-20 participants will be ideal for two course instructors, possible but stressful for one instructor. Over 30 participants with one instructor will definitely create a stressful situation and also limit effectiveness of course conducting. A small class size will provide much space for participants to question their instructors, but also much freedom for them to be active in an online class.

3. Consultation is essential for participants to continue the course, especially when they faced the unsolved problems. It is important to provide the participants such support both technically and psychologically, especially first few course days.

4. Course duration must be sufficient that participants would have enough time to digest new information from the course and come over the barricade at the beginning. It is reasonable to suggest 2 or 3 weeks as a minimum course duration that one requires to reach effectiveness of course conducting.

Online teaching is a relatively new arena for many scholars and researchers. The discussions on course conditions and environments are also relatively new topics and many elements are not defined or settled yet. The more online teaching experience we collected and summarizes, the more elements we will be able to discover and settle, the better online course conditions and environments we will be able to create for our future online course participants.

ACKNOWLEDGMENTS

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The course was conducted twice at Østfold University College in Norway by November 2000, April 2001, and once at Shijiazhuang University of Economics, in Hebei, China by June 2001.

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