

Previewing Design to Engage Students in E-Learning: A Design Experiment of a Blended Undergraduate Course

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Abstract: - A teacher may engage students in learning through previewing. This is easily said than done. Typically, previewing is lack of enforcement and prompt feedback for students. Though much literature on previewing does exist for traditional classroom teaching, previewing design in e-learning environment has been largely neglected in the literature. To bridge this knowledge gap, we report our preliminary findings of a design experiment involving alternative instructional methods and designs applicable in the e-learning context. The effects of previewing on engaging and then improving student learning are mixed but encouraged. Implications for future studies and the decisions of incorporating these designs into instructional methods in blended e-learning are also discussed.

Key-Words: - Previewing, On-line testing, Blended e-learning, Instructional-design theory

1 Introduction

The Internet-based learning platforms spread widely and swiftly across almost every campus. The growing awareness of effective and meaningful teaching and learning plus the recent developments in learning technologies has led to the adoption of powerful learning strategies and learning design. The predominant view of situated cognition in e-learning and its associated pedagogies such as distributed learning, open learning, learning communities, communities of practice, and knowledge building communities were all under heavy experimentation [16]. Education professionals have thus experienced tremendous pressures toward the transformation in instructional theory and practice.

We attempted to provide students a high quality learning environment to engage students in deep learning. Specifically, we adopted problem-based learning and self-regulated learning in our blended e-learning course design. This design is consistent with the idea of engaged learning which suggests learning activities should occur in a group context that are project-based and have an outside (authentic) focus [14]. To add more value to the grand design of

engaged learning, the present study explores the effects of an innovative design of previewing in the context of e-learning.

Over the past few decades a considerable number of studies have dealt with the design of previewing in classroom teaching. Strange though, previewing design in e-learning environment has been largely neglected in the literature, only a few attempts have so far been made at this issue. In this regard, we first describe a previewing design applicable in e-learning contexts. This previewing design is simple and easy and may provide teachers with a better understanding of how students learn. Then, we analyzed the learning strategy students adopted in previewing and levels of engagement induced in a blended e-learning course. We hypothesized that students' learning approach adopted in previewing may be related to their associated learning performance.

2 Literature Review

2.1 Previewing Design

Over the past few decades the studies for previewing design in classroom teaching have been widely

investigated. To name but a few, Cheney mentioned previewing is the first step a student can take to improve reading comprehension [10]. Bean and Ericson advised a text preview strategy that an introductory passage is introduced first to provide a framework for comprehending the associated content of textbook [19].

In alignment with the predominant mindset or culture of teaching and learning led by taking examinations, Chan applied previewing to an examination-guided teaching model in a diagnostic radiology curriculum [20]. Chan's previewing design was by previewing test, and he believed in this way can help students catch some key points and connect to the following problem-based learning activities. The results of Chan's study showed that most of the students under study agreed that the previewing examination was helpful.

There has been a dramatic proliferation of research concerned with the instructional design of e-learning for the past few years. The instructors and researchers notice that engaging student in deep approach to learning is critical for quality performance of online learners. However, this is easily said than done. In this regard, previewing as a way to engage students in learning in the past studies is typically lack of enforcement and prompt feedback for students. Though much literature on previewing does exist for traditional classroom teaching, previewing design to meet specific needs of e-learning has been largely neglected in the literature.

2.2 Deep Approach to Learning

Since Marton and Saljo's original phenomenographic research [4][5], a considerable amount of investigation into learning approaches used by students in higher education has been considered important because of the qualitatively different learning outcomes identified for students who use differing approaches to learning. Marton and Saljo identified two major approaches adopted by the students they studied, which they labeled the deep approach and the surface approach.

Deep approaches are characterised by an intention to understand the material being studied. High quality learning outcomes, including the development of analytic skills, are expected with the use of deep approaches to learning [1]. Surface approaches, on the other hand, are seen as being motivated by the learner's desire to meet minimum requirements with minimum effort.

So far, the research of learning approaches adopted by students in previewing is rare. In this paper we using two terms, "mastery strategy" and "coping strategy" to label the learning strategies

adopted by students in previewing. The concepts of the two major learning strategies are similar to the deep approach and the surface approach respectively and they will be explained in a later section.

2.3 Engagement Theory

Many researchers have described engagement as a multidimensional phenomenon. For example, Mosenthal stated, "engagement is grounded in the cognitive and affective systems of learners and readers" [17]. Several authors also have noted that engagement has an interpersonal component; interactions with instructors and other learners can be an important part of the classroom experience [2] [3] [7] [9]. For example, Guthrie and Anderson stated, "Social interaction patterns in the classroom can amplify or constrict students' intrinsic motivations, their use of self-regulated strategies, and their attainment of deep conceptual knowledge".

According to Handelsman et al, students need to be engaged in their course work in order for effective learning to occur [14]. This is particularly true in the context of e-learning, where students are required to be responsible for their own learning. Kinzie supported this assertion and argued that intrinsic and continuing motivation are important components in computer-based instruction [12]. Similarly, Malone suggested challenge, fantasy, and curiosity as cores of intrinsically motivating computer-based instruction [18]. Reinhart found that the learner's self-efficacy and task difficulty affects his motivation to learn via the Web [8]. Keller posited that learner support is important for motivating learners in Web-based instruction [6].

In terms of the design principles to induce students' engagement in deep learning, Handelsman et al. posits three primary means: (1) an emphasis on collaborative efforts, (2) project-based assignments, and (3) non-academic focus. It is suggested that these three methods result in learning that is creative, meaningful, and authentic [14]. They derived a valid and reliable measure of college student engagement in particular courses. Exploratory factor analysis revealed four dimensions of college student engagement that were distinct and reliable: skills engagement, participation/interaction engagement, emotional engagement, and performance engagement.

To conclude, previewing design in e-learning seems to be largely neglected in the literature. It is still not very clear at present about how to advise a previewing design in the context of e-learning and how to evaluate the effects of it. In this regard, we

explored some possible ways in design and evaluation of previewing.

3 A Design Experiment of Previewing

3.1 Course Setting

To know better about the effects of previewing on learning, we chose an undergraduate course titled "Introduction to Management Information Systems" as our target for multi-rounded design research on quality teaching and learning. The participants in the present study consisted of two classes of 105 students at National Chengchi University in Taiwan, enrolled in September 2006.

This course consists of four learning modules. Each module was designed based on sound principles of problem-based learning and self-regulated learning. Learning modules were delivered progressively from least self-directed to most self-directed, mapped to Gibbons' staged model of self-directed learning [13]. We labeled the first two modules the phase one study in which the previewing design is via online tutoring and testing. The last two modules are called the phase two study in which the previewing design is via cooperative learning. The course website was based on Moodle platform.

3.2 Baseline Design of Previewing via On-line Tutoring and Testing

We expected that some form of previewing may help students improve their comprehension of textbook and be ready for participating in the following problem-based learning activities (see Fig.1). In this regard, previewing may also play a key role to induce students' initiation of self-regulated learning cycles, as appeared in the bottom half of Figure 1. To meet these requirements, we developed courseware of on-line tutoring and asked students to pass the associated on-line tests before they come to the class.

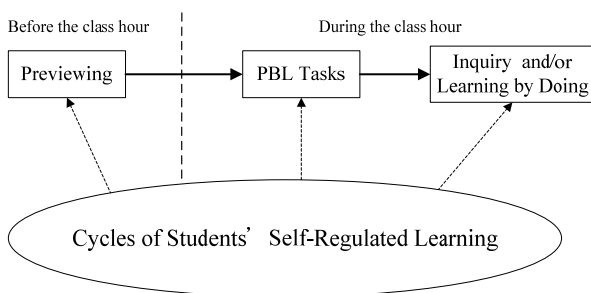


Fig.1 The Learning Cycle and Previewing Design

We implemented our previewing designs by the lesson module in Moodle. Moodle is a course management system (CMS), it is a free, open source

software package designed using sound pedagogical principles to help educators create effective online learning communities [15]. Such a previewing lesson may consist of a series of web pages that presents information and multi-choice questions. Usually, each page in a lesson is short, includes audio lecture and ends with one or a few questions about the material on that page. Depending upon the student's answer, the student is taken to different page.

The development of such course materials certainly cost us plenty of time and efforts, and it may become a burden for teachers involving e-learning teaching. Taking account of limited times and resources available for most of teachers, we advised a way of previewing design simple and easy. It may work even for those teachers equipped with only limited experiences in e-learning and minimum of computing skills. We applied the Microsoft PowerPoint, Moodle lesson module, and a screen capturing and sound recording tool called PowerCam together as development tools to create our previewing materials.

Underneath this design, we attempted to create learning impasses [11] to inform students a gap may exist between their current knowledge states and desired knowledge states. Once such a cognitive disequilibrium has been stimulated, a student may be motivated to learn and thus explore the relevant content in the textbook.

3.3 Modifications of Baseline Previewing Design

In this study we propose two different methods of previewing design. In the first half of the semester, previewing was deployed through on-line tutoring and testing to engage students in studying the textbook material before they come to class. Students may take on-line tests more than once to reach a minimum score of 70 as required. In-class activities were mainly used for more of exploration of the textbook and small team collaboration in completing PBL tasks. The effects of this previewing design are positive but mixed.

In the second half of the semester, to raise the level of engagement even higher and involve more students in deep approach to learning, we changed previewing practices into cooperative learning and modified our previewing design accordingly. Before coming to class, students had to prepare the assigned partitions of textbook material. In class, they had to teach in teams to help each other to learn better. At this second phase, on-line tutoring and on-line tests were separated. On-line tutoring was optional and on-line tests were delivered at the end of the learning module as achievement tests. The effects of this

modification of previewing design are positive and encouraging.

4 The Exploratory Study

4.1 Major Hypothesis

Knowing about students' level of engagement earlier might be useful when teachers need to deal with individual students and design engaged learning experiences. According to the literature review and our past teaching experiences, we tend to believe that previewing designs proposed as above are positively associated with students' levels of engagement in learning activities. This main hypothesis is based on the following assumptions:

Assumption 1. Students facing challenges underneath previewing may respond quite differently.

Assumption 2. The previewing strategy that a student adopts will be associated with the level of his engagement in the following learning activities.

To know better about this complex phenomenon, we further classify the previewing strategy deployed by students into coping strategy and mastery strategy. The mastery strategy means students who intend to understand in-depth the previewing materials being studied. The coping strategy means students who only desire to meet minimum requirements with minimum effort in a previewing. We thus proposed that students who employ a mastery strategy in previewing involve themselves more in the following learning activities.

4.2 Measures

4.2.1 Previewing Strategies

According to actions of re-taking the previewing, time to (re-)take the previewing, and patterns of previewing scores resulted, we classified the previewing strategy students adopted in the first two learning modules into mastery strategy and coping strategy.

The students adopting mastery strategy are those with previewing scores higher than 70 and the longest time of previewing is more than the average time of previewing. The students adopting coping strategy are those with previewing scores less than 70 and the longest time of previewing is less than the average time of previewing. There are some students falling in between the criteria of mastery and coping strategies, which won't be discussed here because of limited space available.

4.2.2 Levels of Engagement in Learning

We took the average of each student's browsing counts and achievement score in a learning module as a substitute of one's engagement in that module. We measured each student's level of engagement in learning module one and learning module two respectively.

4.3 Data Sources and Analysis Methods

The main source of engagement data are the activity logs page generated by Moodle. In addition, we refer to students' reports, assignments, and the teachers' observation in the class. More, we collected interview data. The system logs of learning activities were recorded by Moodle which provide progress reports of students' learning for the instructor. Interview with students were conducted at mid-term and last week of the semester. We divided students of each class into three distinct groups according to their learning performances so far, and then randomly chose two students from each group for the interview. These data were coded into learning patterns emerged in the study and contrasted along the semester timeline. We reported our analysis of results based on part of this data set to support our premises proposed in this study.

5 Effects of Previewing on Student Learning

5.1 Results of Phase One Study

According to the system logs and the criteria we mentioned in section 4.2, in module one 23 students can be grouped into category of mastery strategy, and 21 students as that of coping strategy group. And in module two there are 15 students grouped into category of mastery strategy, and 20 students as that of coping strategy group.

Independent-samples tests were conducted. To explore the previewing strategy adopted by students is positively associated with student engagement. Table.1 shows the test result in learning module one and learning module two, respectively. In learning module one, the previewing did not help engage students in the learning activities (p-value is 0.156), and in module two, the previewing successfully engage students in the following learning activities (p-value is 0.013).

Table.1 Independent-Samples Test:
The Improvement of Student Engagement

Mod.	Group.	N	M	S.D.	F	t	df	p
One	Mast.	23	15.57	4.40	0.02	1.44	42	0.156
	Cop.	21	13.69	4.19				
Two	Mast.	15	31.87	5.72	4.48	2.64	31	0.013*
	Cop.	20	24.90	9.77				

Note. * $p < .05$
Mod.= Learning Module; Mast.=Mastery Strategy;
Cop.=Coping Strategy.

5.2 Results of Phase Two Study

The purpose of on-line test in phase two study is not for previewing, but for an achievement test. The scores of the test in phase two are far lower than those of in the phase one. Possibly that is because these tests are taken on site and are not allowed to look into textbooks and cannot retake. Although the test scores are far lower than those in phase I, however, most of the interviewed students reported favorable and enjoyable experiences in the way of cooperative learning. Students indicated that cooperative learning is more effective in connecting concepts and knowledge of the textbook with the following PBL activities.

Previewing in ways of cooperative learning does provide a good chance for students to associate the textbook with following learning activities, and students became more aware of the knowledge gap existed between them. More, previewing may help students monitoring their progress in learning and accelerate in climbing the learning curve.

6 Discussion

The purposes of our previewing designs are to assist students in improving their comprehension of textbook and engaging them in the following problem-based learning tasks. In this pilot study, we explore two possible ways of previewing design in an e-learning course, i.e. on-line tutoring and testing for the phase one study, and cooperating learning for the phase two study. According to the test results of phase one study, the effects of the previewng strategies adopted by the students on the engagement of the following learning activities were mixed but encouraged.

We noticed an interesting phenomenon during the teaching process of the first learning module. The course policy asserted that retaking the test is allowed and guessing the answer is encouraged. Although these are truely the case happened, however, students have chosen to do so for reasons beyond a professor

can imagine. Firstly, we found that quite a large amount of students strived for a much higher score (closer to 100) than the minimum requirement of 70 (we counted score of over 70 as the same as that of 100). Secondly, while taking the on-line test, many students applied a short-cut tactic by reading the correct answer and then going back to the last browsed page to re-take the test question. With this tactic or without, we found that a large portion of students just took the test without even having a look at the textbook. We would characterize this reality as that this type of surface approach to e-learning is just a reflection of students' learning behaviors happened all the time in the real world. Witnessed these unsatisfactory results, the teacher openly discussed with the students and asked for a change in previewing. In module two, the inappropriate previewing behaviors were improved. May be this is one of the possible explanation for the mixed results as indicated in the phase one study.

In addition, we interviewed two students in the mastery group, two students in the coping group, and two students of those in between at the end of the phase one study. According to the result of interview, we found that the strength of leaning impasses which created to link textbooks and following learning activities was not enough. This drove us to consider alternative way to design previewing.

In the phase two study, we changed design of previewing to cooperative learning to better motivate studnets in deep approach to learning. Further, on-line testing is more of an achievement test. Although the average of test scores in this phase was far lower than that of the phase one, students revealed in the interview that more satisfactory results of learning were experienced.

7 Conclusions

In this paper we addressed several previewing designs in a blended e-learning course and then explored the relationship between previewing strategy students adopted and engagement in learning. The results of phase one study were mixed but generally positive. More, the findings of the following phase two study were mostly encouraged. Such results may be useful for those instructors responsible for planning and designing an e-learning course. For the future studies, we will continue to improve our previewing design and examine the influences of our previewing design on students' deep approach to learning.

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