

Applying adult learning principles in teaching a challenging course

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ABSTRACT

Web Application Development is a challenging course with rich contents covered in a short time. In this paper, we discuss the author's efforts in helping students learn effectively and complete this course successfully. We discuss five most relevant adult learning principles and link the teaching strategies used by the author with the corresponding principles.

Keywords

Web Application Development, course characteristics, students, adult learning principles, teaching strategies

1. INTRODUCTION

Web Application Development is a third year undergraduate course. The course components include developing web-based client-server applications, and interacting with online database. While having the server-side emphasis, the course covers both client-side and server-side scripting.

The course is run for 13 weeks. Each week takes two sessions: the first is theory; the second is practical. The author has been teaching the course for three semesters. During the teaching, the author persistently finds that the course is challenging and the students are well motivated. Appropriate delivery methods will help students to take the challenge and gain more from the course. This paper discusses the author's efforts on this.

Acknowledging the complexity of the teaching-learning relationship and analyzing its characteristics for a course are helpful for enhancing the proficiency and effectiveness of teachers and students (Fenstermacher and Richardson, 2000, P12). In analyzing current Web Application Development courses at the tertiary

level, we sum up the characteristics of the course, which are helpful for us to develop more appropriate delivery methods.

In recent decades, there has been a considerable research about the needs of the learner and the effective teaching practices that are required to meet these learner needs (Clark, 1986, Knox, 1986, Mezirow, 1983, Lieb, 2002). These are usually called adult learning principles. Learning is facilitated when instructors comply with the principles. This paper links the author's teaching practices with these principles.

The rest of the paper covers these sections: the characteristics of Web Application Development course; the students; the selected adult learning principles and the teaching strategies; conclusion.

2. THE CHARACTERISTICS OF WEB APPLICATION DEVELOPMENT COURSE

A number of Web Application Development related course descriptions have been found on the Internet (Chao, 2002, Ellis, 2003, Giftos, 2002, Lefkowitz, 2002). These are carefully studied and their characteristics are discussed in the following subsections.

2.1. Rich contents for a short time

It is argued that there is a great deal of applicable technology and it is not possible to include all web technology in a particular course, nor is it desirable (Yang and Grove, 2002). However, to successfully implement a typical non-complicated Web application,

a student must master a minimal set of techniques, and it is rich. And also by using at least two comparative server-side technologies, the course provides the students a broader picture of Web-based development and strengthens the students' understanding of the underlying concepts and Web-based architecture (Yang and Grove, 2002). Usually these courses are run for 9-14 teaching weeks and they cover a wide range of concepts and technology.

2.2. Programming nature

By looking at the available course schedules, we found that at least three typical Web programming languages are covered in each of the courses. And each course gives at least one programming assignment, which requires client-side scripting, server-side scripting and accessing database. This makes the course featured with all the challenges of a programming course, which includes problem solving, abstraction, deduction, comprehension, reading, writing, creativity, composition and understanding of the business sector.

2.3. Multiple disciplines

Web Application Development requires pre-existing knowledge from multiple disciplines, which includes database design and implementation; system analysis, design and implementation; and graphical user interface design and implementation. The course continues to enhance the knowledge. This causes difficulty for students to retain the learning materials. And it requires instructors to reinforce the course knowledge frequently.

2.4. Changing quickly

The technologies used to develop Web applications are continually changing. Not only are new tools being developed continuously, but also the existing tools are being upgraded, enhanced, and modified. As a result, a Web-based development course must be revised continuously and the course itself becomes obsolete quickly (Yang and Grove, 2002). These changes make the course challenging even for student with good pre-existing knowledge.

3. THE STUDENTS

The students in this course usually have a wide range of diversities, but they have one thing in common, i.e. they are all well motivated. Take the student group from the second semester of 2002 as an example. In this group, there were female (33%) and male (67%). The most of them were young. Ethnically, there were 5 nationalities and 5 different native languages. Culture

not only shapes the thinking process, it also defines modes of communicating and receiving information, so students' experiences with multiple languages and cultures influence their learning. In terms of pre-knowledge, some of them had just finished a basic programming course, while a couple of students had self-learned a lot of Web Application Development concepts. These students were quite excited about the new technology. They expected that the course would prepare them for industry projects or bring them more employment opportunities.

4. THE SELECTED ADULT LEARNING PRINCIPLES AND THE TEACHING STRATEGIES

In this section, we select five most relevant adult learning principles. We discuss why they are relevant to our course. For each of the principles, the corresponding teaching strategies used by the author are described and discussed.

4.1. There is a positive learning environment

Adults learn best in a safe and secure social environment in which they can test new ideas and ways of doing things without threat to their self-esteem (Clark, 1986). A positive learning environment will motivate students, increase student opportunities to learn, help students learn and maintain appropriate behavior, promote student self-responsibility, and foster accountability. In our course, students from different social groups are brought together into the same classroom. This might make them feel strange and uncomfortable. A positive learning environment is particularly important to these students.

A number of efforts have been made on creating a positive learning environment, for example, using an orientation section in the first lecture. In each first lecture, the lecturer does self-introducing first. Then the students are paired up to talk. Finally each student introduces the partner to the whole class. This can shorten the distance between the students and the lecturer. It would start good interpersonal relations in our diverse group. This will not only lay the foundation for a working relationship, but also encourage student participation and stimulate student interest.

Another strategy is to promote learner independence/responsibility. Given the students have a number of diversities on this course; a single approach is obviously not sufficient. The students are often given

options. All the lecture notes and exercises are published in advance, so the students have an opportunity to decide whether they need to come to a particular session. In the exercises and assignments, the students have the option to add their own features and to choose their own scripts. The purpose of these options is to let the students benefit the most from their most favoured approaches and not waste time on something not very helpful to them. This forms a part of a positive learning environment.

4.2. Learners participate actively

People learn best when they work actively in ways such as trying out techniques, talking about ideas, presenting information in their own words (Unitec, 1996). The activities in active learning also include discussion, practice and problem solving (Knox, 1986). Ramsden (1992, p. 101) indicates these kinds of method permit a degree of student control over learning and can accommodate individual differences in preferred ways of reaching understanding.

To help the students learn more contents in a limited time, we have used teaching strategies that facilitate active learning. The common one is to encourage class discussion. Another one is to let students learn certain new techniques by doing it in the practical sessions. Some “how-to” techniques are sequence of actions, for example, how to make a “datagrid” editable. Explaining these steps in a lecture would result in very poor understanding and retention. We give the students a sequence of instructions to follow in the practical sessions. The lecturer guides them while they are doing these. At this moment, because the students are doing it and are thinking actively, they accept the lecturer’s idea easily and understand deeply, thus learning is efficient and effective.

The students will participate actively when they are interested and enjoy what they are doing. Making assignments relevant to students’ lives is a way to stimulate student interests. Given the students are young and male majority, cars are interesting and relevant to their lives. In one of the assignments, we asked them to develop an online car purchase order system. This made the students very excited. As a result, they did a lot of extra work and gained more from the assignment.

4.3. Feedback is provided and used

Because of the linguistic diversity, communication between the students and the author becomes a key issue. Providing feedback is an effective

communication method. According to Zemke, R., and Zemke, S. (1984), the learner is dependent on the instructor for confirming feedback on skill practice. Adult learners need positive, instant feedback on their progress. This provides encouragement and direction.

The author frequently gives students feedback on their assignments, exercises and class discussions. For example, the students have an option to demonstrate their assignment to the lecturer. During the demo, the author constantly gives the students feedback on how to improve their work. By means of the feedback, the students can clarify, verify and confirm the concepts learned from lectures.

4.4. Correct learning behavior is reinforced

Reinforcement should be part of the teaching-learning process to ensure correct behavior. Instructors need to use it on a frequent and regular basis in the teaching process to help the student retain what they have learned (Lieb, 2002). Due to the multiple disciplines and the rich contents of Web Application Development, reinforcement is particularly important for this course.

In each practical session, we let the students practice the concepts they’ve just learned from the theory session in the same week. So the concepts are reinforced quickly and regularly. Sequential exercises are used, i.e. each exercise is based on the previous week’s exercise. This allows the concepts covered by the previous exercises to be reviewed and reinforced. The students are given answers for each exercise. The answers are given after one week. This will allow students to put in enough of their own efforts. The answers reinforce the correct learning behaviors.

The sequential exercises provide an ongoing basis case study. Having a consistent case study throughout the course provides students a familiar context in which new techniques can be practiced on, and it helps to illustrate how various techniques are integrated (Yang and Grove, 2002). The case study also serves as an example for the assignments. When all the exercises are completed, a nice Web site is created. This will increase the students’ confidence and interest.

4.5. There are multiple examples of concepts and principles

The learning style diversity in our group requires variety of teaching methods. Zemke, R., and Zemke, S. (1984) indicates that a concept needs to be “anchored” or explained from more than one value set. It is always easier to explain things the way we understand them, but when we teach a particularly



diverse group of students we must learn to explain things in other ways. It's important for a lecturer belonging to a particular ethnical group learn to explain things in the ways preferred by the students from other ethnical groups. Multiple examples are helpful on this.

The author often gives multiple examples. This allows the students learn the concept in a comparative way. It facilitates critical thinking and deeper understanding. In the assignments, students are asked to implement the same application twice, one in ASP and another in ColdFusion. In the second assignment, the students are asked to include a paragraph to critically reflect on the two tools. This helps the students with different learning styles achieve the same level of understanding.

5. CONCLUSION

Web Application Development is a challenging course with rich contents covered in a short time. We have described the author's teaching strategies in helping the students take the challenge and gain more from the course. These strategies comply with the selected adult learning principles, so learning should be facilitated.

The students' reaction can be observed partially from their evaluation sheets. For the group of the second semester of 2002, there is only one incomplete in the course. In the evaluation sheets, 40% students absolutely agreed that the lecturer was well organized and well prepared, 27% strongly agreed, and 33% agreed. 13% students absolutely agreed that the lecturer was enthusiastic with a responsive and interactive style of teaching, 53% strongly agreed, and 34% agreed. 13% students absolutely agreed that the lecturer had encouraged their learning and study, 53% strongly agreed, and 27% agreed. There is no disagreement on these items.

In general, the results of author's teaching practices are positive, although there still is room for improvement. Due to the diversities of the students, we don't expect all the students gain the same amount from the course; but each student gains the most from the course within their own capability.

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