Contemporary teaching approaches and their application in the teaching of *Fundamentals of Multimedia Technology*

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Abstract

This paper discusses several contemporary teaching approaches and their applications in the teaching of the course *Fundamentals of Multimedia Technology*. A brief introduction to *Fundamentals of Multimedia Technology* is presented and the advantages of different teaching methods are analysed. A specific example on how problem based learning can be adopted in the teaching of *Fundamentals of Multimedia Technology* is discussed.

*Fundamentals of Multimedia Technology and its current teaching methods*

Today digital multimedia technology is widely used in various aspects of society, such as: entertainment; education; industry; commerce; trading; government office work; transportation; and communication.

*Fundamentals of Multimedia Technology* (FMT) is a fourth-year course for students in non-computer science degrees. It has 32 teaching hours in total, with twenty hours for lectures and sixteen hours for practical activities. The goal of this unit is to let the students understand the basic principle of multimedia information processing and master the processing methods of audio, image, animation and video.

The course is divided into five parts: audio; image; video; multimedia storage; and multimedia network. Two two-hour lectures were given for each part, covering the principles and applications. Each part also had one or two practical activities. In each lecture, many demonstrations were provided to make them more interesting. When I explained why the audio in a production is important, for example, I presented two segments of video with and without audio and students immediately saw the difference. In the practical sessions, students are given many small practical projects, such as: authorising an audio program for a literary column for a broadcasting station; or composing two photos which I called ‘travel around the world’ because one of the photos must be about a country outside China. In the activity of image processing, students are required to do two exercises chosen from a textbook. Many of these exercises were very challenging for the students. After the students have finished their tasks, they report on what they had completed emphasizing those things that they thought they would never have been able to achieve.

After I was introduced to many teaching and learning approaches at The University of Sydney, I think that there are many things which can be done to further enhance students’ abilities, such as skills in communication, research and lifelong learning.

What students want to learn and what is the best way they learn

When we begin a course, students often ask the question – what is it about? That means students do want to know something more about the course and are eager to learn the knowledge. After that, they have another question – how to do it. That means students want to have the ability to do things. Certainly this ability is not in isolation and includes the abilities of communication, research, data collecting, analysing, problem solving and so on.
Now, as a teacher, what should we teach students, and how should we teach them? Certainly, we should teach them knowledge and skills. That’s not a problem. The problem is how we teach them. Traditionally, we give them lectures, experiments, assignments and consultations and finally an examination, usually a closed-book examination. All these things are designed by the teacher. If somebody does not wish to learn something, you cannot teach her/him anything. If somebody really wants to learn something, however, she/he will learn it anyway (King, 2005).

Certainly there are different teaching methods for different people. So our responsibility is to provide some knowledge and appropriate methods for the students to learn, and provide opportunities for the students to enhance their abilities which are useful in the future.

From the point of view of student-centred teaching, we are guided by what is best for the students. Making decisions regarding content organisation and teaching approaches is largely determined by the students’ needs. Even assessment may be influenced or determined by the students. Students are the centre and the teacher acts as a coach and facilitator. In many respects, the goal of this type of teaching is the development of the students’ cognitive abilities (Lara, 2005).

Student-centred teaching leads to ‘better retention, better transfer of knowledge to other situations, better motivation for further learning, and better problem solving abilities. Active participation by students helps them construct a better framework from which to generalise their knowledge’ (Lara, 2005).

Guided by the concept of student-centred teaching, there are several better teaching approaches or tools for us to adopt, such as case study, concept mapping and problem based learning.

**Several contemporary teaching approaches**

In this section, I will introduce the contemporary teaching approaches of case studies, concept mapping and problem based learning, describing each, explaining how it works and identifying its strengths.

**Case studies**

In case studies you first tell students a real story about the way scientific problems have been solved in the past, or are being solved at present, or have not yet been fully solved, such as AIDS, SARS, the Mars probes. These will make the case studies more powerful. Then the teacher asks students some specific questions related to the curriculum.

When we were children, almost all of us liked to hear a story. Even now, stories can make the learning experience more interesting. A story can make students passionate and motivated. Real stories can help students recognise the real world and know how the world runs. Case studies shift students away from passive absorption to active construction. The questions can stimulate students to think more deeply. It can help students to shift from surface learning to deep learning. This approach can foster in students the following skills: analytical; classification; application; summarising; scientific judgement; and critical thinking skills.

A case study approach can be combined with lectures. It will make the lecture more interesting, more attractive, and more challenging.

**Concept mapping**

Concept mapping is a technique used for representing knowledge graphically. It consists of nodes and links. Nodes represent related concepts within a topic. Links represent the relationship between concepts. Figure 1 is a model of a concept map (King, 2005).

![Figure 1. Model of concept map](image)

Concept mapping can be used to construct a complex concept structure step by step, from simple to complex. This will allow students to think freely about the topic. Through the concept map, they can see the concepts and their relationships. Concept maps can help students to clarify what they understand and what they do not understand.

Concept mapping is often combined with lectures, a PBL approach and other teaching approaches.

**Problem based learning (PBL)**

Problem based learning is an instructional method that challenges students to ‘learn to learn’ (Duch, 2004).

In PBL, the teacher first provides an ill-structured problem. Then the teacher helps students to analyse the knowledge they should learn for solving the problem. Usually a concept map is drawn. During the following weeks, the teacher can give several lectures, arrange several laboratory sessions and tutorials to transfer the necessary knowledge and answer questions raised by students as they work on solving the problem.

During the process of problem solving, students work in small groups. They must identify what they know, and more importantly what they do not know for the problem. They must go beyond the textbook and classroom activities...
to pursue knowledge and information from other resources. They must make a plan, assign tasks to members of the group, collect information and data, and analyse the data. They must also communicate, discuss and then finally come to a conclusion.

The problem should engage students’ curiosity, and give students more challenges. These can increase students’ interest and motivation to learn science and encourage more active learning. The teacher’s role is supportive, but not directive. Through the process of problem solving, students can practice many lifelong learning skills, such as: information access; data collection and evaluation; analysis; scientific judgement; cooperation; application; and problem solving skills.

During the process of problem solving, students have not only caught a ‘fish’, but have also learnt ‘how to fish’. It is a good way to foster the abilities of survival and lifelong learning.

**Application of PBL in the teaching of Fundamentals of Multimedia Technology**

In the previous section, I have discussed several contemporary teaching approaches. Now I will give an example, the application of PBL in teaching Fundamentals of Multimedia Technology.

PBL is widely used in disciplines such as medicine, physics, chemistry. In my opinion, the process of problem solving is the best process of learning. However, there are few examples in the discipline of computer science. Computer science is a practical science.

An example of a problem that could be used in the course of Fundamentals of Multimedia Technology follows.

As we come into the 21st century, most universities want to be the leading university of its type in the world. Our university is no exception. Besides the quality of teaching and research, we should also advertise ourselves. Here is a problem for you to solve. You work in groups of five to create a series of materials to advertise our university. These materials should include CD-ROMs, DVD, posters and a web site. The information should include the history, teaching, research, people, scenes and so on. The media forms should include audio, video, image and text.

For this problem, students should know how to process audio, video and images and how to combine them systematically. For publishing the materials through CD-ROM or DVD, students should know about multimedia storage. For publishing on the Internet, students should know about network multimedia. Thus we can easily draw a concept map. A simple concept map of this topic is shown in Figure 2. We could add more details and make it more comprehensive.

Whilst working on the problem students should communicate with many other people for data collecting. They should analyse the data collected. They should have the ability to process various media. They should have the ability of summarising the process and then giving conclusions. In short, many skills will be developed; skills they will need in the future.

![Figure 2. Basic concept map of multimedia technology](image)

For each topic, I will give students two two-hour lectures, and arrange laboratories of two to four hours. Besides these, I wish to give students two one-hour tutorials. In these tutorials I will communicate and discuss the current issues with students.

At the end of term, I will organise a presentation meeting. Each student should give a ten-minute presentation to introduce his/her work, and demonstrate his/her production, and then everyone can share their opinions, and assess whether the product is good or not. Based on their presentations and demonstrations, I will make a final assessment of the students. I have already used part of this method in another of the courses I teach, and this worked well.

**Conclusion**

In science teaching and learning, we can have several different theories: behaviourist; developmentalist; constructivist; lifelong learning; student-centred learning; and so on. To some extent, they are all right. Each has its strengths. We can also have many different approaches, including case studies and PBL. Each approach also has its advantages. A single approach may not be suitable for every course, every topic and all the content. In my opinion, our teaching responsibility is to make the content and process more interesting and more attractive, and we can combine different approaches to help develop the students’ various skills. Whichever approach we use, at the end we should teach students knowledge and more importantly, the skills for survival. We should constantly keep this in mind.

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References


