Application of microlectures in teaching visual basic programming

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ABSTRACT: A computer programming course is generally taught through a traditional teaching method that may prove to be less stimulating for students, making it difficult to achieve an ideal teaching effect. Using only case teaching methods is not very practical for freshmen facing a computer language for the first time. However, by applying a combination of microlectures and case teaching in teaching a course, such as Visual Basic Programming, students' interest can be captured, their creativity promoted and their practical ability improved. At the same time, their knowledge of the subject can be strengthened.

INTRODUCTION

Visual Basic Programming is a required computer basic course for non-computer majors, and is part of what is referred to in China as a *1 + X* course curriculum system. The purpose of this course is to cultivate and improve college students' computer application ability and basic skills, using visual development tools to solve practical problems. However, many college students think that this subject is in decline and there is no need to learn it or to have an interest in learning it.

As an educator, there is a need to reflect on what has caused the student to think that way. It is also appropriate to consider how to improve the teaching of the subject and to change the students' understanding of the course.

The use of microlectures in teaching Visual Basic Programming is introduced in this article. This aims to effect a change, from the traditional teaching mode to a new teaching model, based on case teaching. In this new teaching mode, microlectures are auxiliary to the teaching. It is hoped this will solve the problem of students' negative attitude, increase their interest in the course and improve their practical ability. The author's endeavours to research and address the above problem are the subject of this article.

THE MICROLECTURE AND TRADITIONAL TEACHING METHODS

The Microlecture

The concept of the microlecture was first introduced in the autumn of 2008 by David Penrose, who is also known as the *one-minute professor*. David Penrose is an advanced teaching designer and college on-line service manager at the University College of San Juan, New Mexico, USA. The core idea is to require teachers to closely link teaching content and teaching targets to create *more focus on the learning experience*.

A microlecture generally lasts between 30 minutes and one hour, with a clear, single teaching goal, to create an effective learning situation for students, who must be provided with sufficient resources. Great importance is attached to the creation of specific teaching activities designed by teachers. For a specific problem or teaching activity, teachers make use of their own teaching experience and skills, which they may demonstrate through the use of video. Because the length of the video generally is no more than five minutes, it is known as a *micro video* [1].

At the heart of the microlecture concept is practical teaching with a constructivist approach facilitated by on-line or mobile learning. Its main characteristics are a focus on problem-solving, being easy to use and flexible. Both in the

classroom and after class, students conveniently can review and learn by using cell phones, computers and other mobile devices [2].

Disadvantages of Traditional Teaching of Visual Basic Programming

Single Way of Teaching

The traditional teaching method for Visual Basic Programming is to first explain the theory, then, analyse the structure of a sample and use illustrative examples. This teaching method is relatively dry, and does not arouse the interest of students. Furthermore, students do not know how to use the knowledge to solve practical problems. There is no effort to guide students to solve practical problems and, hence, the student's practical ability is not cultivated.

Teaching Cases have no Practical Significance

Many case studies in teaching Visual Basic Programming have nothing to do with the students' real lives, which reduces their interest and motivation. With the development of the information society, the contemporary college students' environment is filled with new, high tech elements. Asking the students to learn with the original teaching cases can lead to them thinking that visual basic is obsolete and of no actual use. Hence, they may think the Visual Basic Programming course is obsolete and be a candidate for being eliminated.

Fixed Teaching Environment

The traditional way of teaching Visual Basic Programming is either in a multimedia classroom or in the computer laboratory. Hence, nothing can be done without the computer and students also cannot learn without a computer.

It was found that the above features seriously affected the teaching of Visual Basic Programming. In order to improve the students' education, teaching, and their interest in the Visual Basic Programming course, a combination of case teaching and microlectures were introduced.

TEACHING THAT GIVES PRIORITY TO CASE TEACHING WITH AUXILIARY MICROLECTURES

Case Selection

In order to solve the problems with traditional teaching, the teacher should focus on selecting cases that are closely related to students' daily lives and popular trends in society. Attention should be given to the following items:

- First of all, the teaching content of the case study must be in accord with the teaching goals. It should be easy to understand and be accepted by students. Common examples that could be used include the implementation of a counter, a notepad or a timer.

- Second, the selection of teaching cases should consider the students' abilities and knowledge. Cases should be of moderate difficulty, so that students have the ability to complete them, albeit perhaps requiring extra self-study to explore the case. This should cultivate their self-confidence and enhance their desire to learn while, at the same time, cultivating independent study and practical ability.

- Finally, the selection of the teaching case should consider case extensibility. Starting with an initial introductory case, consider gradual extensions so that learning becomes a step-by-step process. Students should better have the ability to keep up with the progress of the teaching which, in turn, yields a better teaching result. Also, in setting cases, consider that students can work out of class to review their progress.

The Development of Microlectures

Teaching Visual Basic Programming involves many case studies, not all of which require a microlecture. So, when deciding which cases require a microlecture, one could be guided by the following two principles:

1. Develop microlectures for case studies that are of high teaching importance, e.g. new concepts are introduced or of great difficulty, where extra instruction would be beneficial. Make the microlecture intuitive, with good use of images.
2. Develop microlectures for cases that are inspirational. Microlectures should integrate theory with practice [3].

Teachers usually take a long time to prepare the Visual Basic Programming course material, because teachers must prepare material that meets the potential needs of all students and not just be for an individual student. Preparation time for a lecture can be as short as an hour, but also can be several hours. Microlectures compress content that might be in a lecture into a much shorter time than a lecture.

Developing a microlecture can be a severe test of a teacher's knowledge and experience. David Penrose proposes a five-step process to develop a microlecture [2], that can be used in the teaching of Visual Basic Programming, as follows:

1. List the core concepts to be covered during a 60-minute lecture. These core concepts constitute the core of the microlecture.
2. Write a 15- to 30-minute course introduction and summary. This will provide the context for the microlecture core concept.
3. Use a microphone and webcam to produce a video that records the core concept, introduction and summary. The network technology department may need to provide advice and equipment. The completed video programme run-time should be between one and three minutes.
4. Design a task that will guide students toward exploring the core concept. The task should be similar to, or combined with, a case study task, which will aid students' learning.
5. Upload video and tasks to curriculum management system [2].

Example of Case Teaching Using a Microlecture

The loop structure has been chosen as an example of case teaching using a microlecture in the Visual Basic Programming course. The loop structure can reduce having to write source program code by allowing repeated execution of an algorithm. It is the program at the heart of most programs, including Visual Basic. Case teaching and a microlecture were used so as to teach the loop structure in the Visual Basic Programming course. The process diagram for implementing the teaching of the loop structure, with case teaching and a microlecture as auxiliary, is shown in Figure 1.

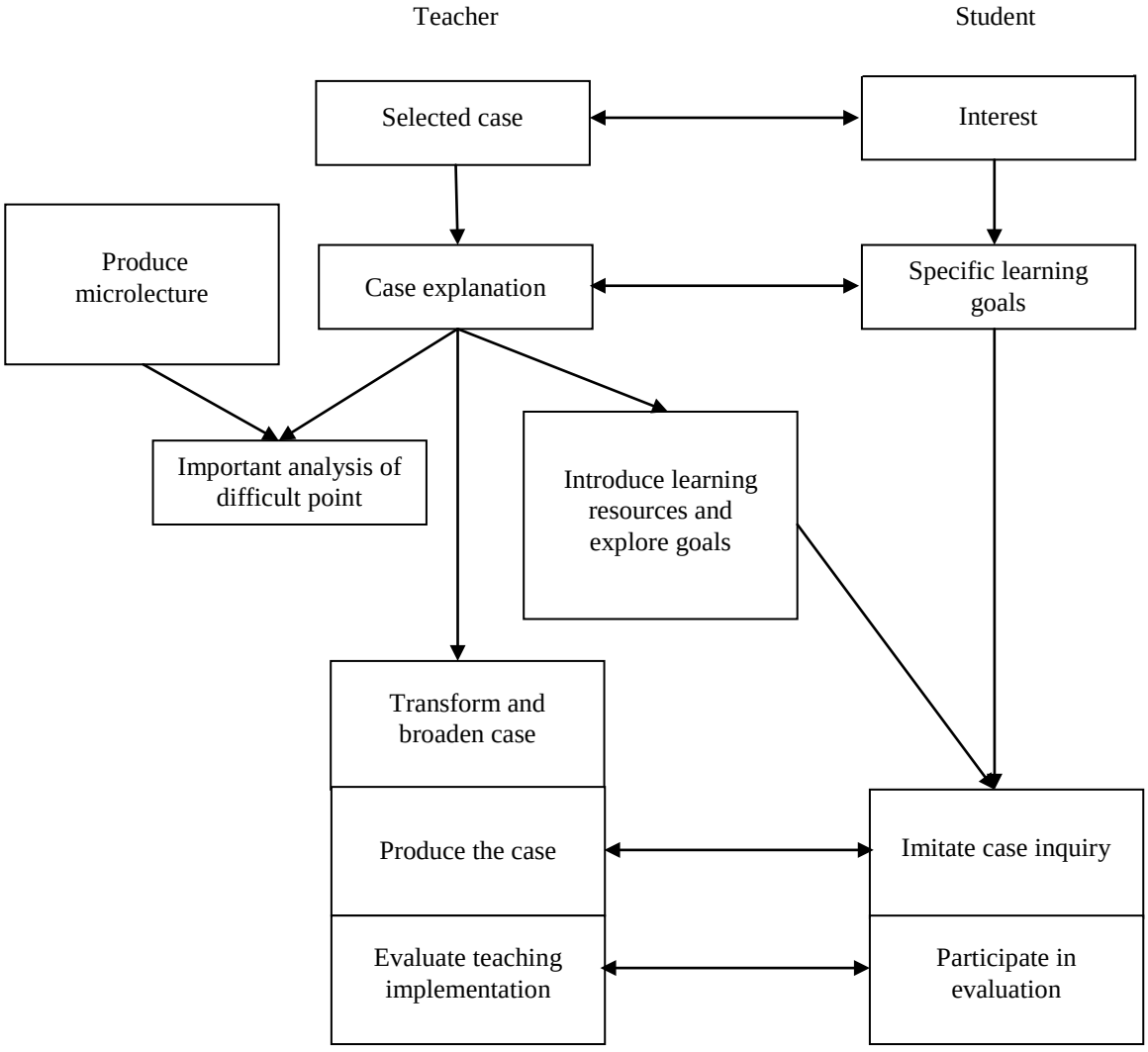

Figure 1: Case teaching with a microlecture as an auxiliary.

The one-minute teaching video, *Story of Gaussian*, which deals with loop structure teaching, was played to the class. This arouses students' interest in learning and active participation in class discussion, so that students are fully engaged in the learning process. The microlecture can be used to review difficulties uncovered in previous classes as part of gaining new knowledge.

In teaching the Visual Basic Programming course, students analyse the loop structure using a flow chart. This is used to introduce the loop structure definition, the loop to be repeated, and the three elements of the loop structure, viz. the count variable, incremental variable and termination condition. Then, at the summary stage, the loop structure was associated with *Olympic* running in the design of the teaching case.

Courseware was produced to demonstrate the relationship between running and the loop structure, and to verify the loop's three elements. In the microlecture, about five minutes was spent on the loop structure.

In teaching the loop structure in the Visual Basic Programming course, the microlecture was used to summarise and explain the difficult part of understanding the loop structure, and to tease out the core concept. The microlecture forms the teaching material that assists students in understanding this knowledge in class. Through learning, students will know the keys to drawing the flow chart of the loop structure are:

1. Determine the loop variable and initial conditions;
2. Identify the loop body;
3. Determine the termination condition.

Hence, students come to understand the concept of the loop structure and can flexibly use it.

Two teaching cases related to the students' real lives are used. One teaching case is described as follows:

There is a 0.5 mm thick paper, folded in half. The question is, how many times it must be further folded in half to make it higher than Mount Everest (8848 metres)? Use programming to determine this.

In the process of the introduction to this case, use the pre-made *Mount Everest* microlecture. This improves students' interest in learning in a relaxed class atmosphere. It provides students with a chance to systematically learn about Mount Everest and alter their thinking that programming is less-stimulating.

Another case relates to personal finance. People increasingly are concerned with the income they earn from interest on their deposits. In one period, a bank's one-year fixed deposit interest rate was 3.06%. If deposits continue, the bank automatically will turn the principal and 80% of the interest into a one-year fixed deposit; 20% of the interest will be paid as tax. Draw a flow chart and write a program to simulate this.

This case uses the *Financial Management* microlecture and not only includes a video, but also animation. Students enjoy watching it, and it includes material they can relate to. People, in today's society, are familiar with stocks, funds and other financial terms, but few have specific knowledge of the area. Students, in fact, would like to have specific financial knowledge. This case improves their knowledge about economic and financial matters.

Students' enthusiasm is rated very highly when they work to solve these two cases, because their interest lies in cases such as these, because they relate to students' real lives. Hence, they realise that studying Visual Basic Programming can solve practical problems in real life, because it links theory to practice.

The last part of the class teaching can make use an interactive microlecture. A microlecture will have a key content, but also focus on a few classic exercises for practice after class. This last part helps to consolidate the students' learning.

In the process of reviewing the learning, the teacher can develop microlecture exercises. Each microlecture exercise should include four or five questions. There should not be so many that the student then begins to feel less stimulated carrying them out, but not too few either, else they will not achieve the purpose of consolidating knowledge.

There are many software systems to assist in setting questions. Examples include Articulate Storyline, and LectureMaker. Storyline can be used to make single choice and other types of integrated question, as well as tracking the questions and providing feedback to the students [4].

CONCLUSIONS

Case teaching with auxiliary microlectures is a highly suitable method for non-computer professional beginners, who are learning visual basic programming. In fact, teaching through case studies is a productive way generally to inspire students, with the use of microlectures as a positive means of contributing to learning through consolidation of knowledge.

Therefore, microlectures are used in the classroom to assist in producing assimilable teaching material and to consolidate students' knowledge. Thus, they improve the teaching process. Also, in the review stage after class, students can easily use a mobile product, such as a smart phone, to undertake the review of the learned content. Hence, it is an opportunity for students to undertake their review anytime and anywhere.

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