Application of blogs in teaching computer graphics

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ABSTRACT: The use of informationisation (or informatisation) in education is expanding and, therefore, the *blog* (Weblog) as a new medium of communication can be introduced into course teaching. It offers new opportunities for individual learning, teaching and management. The research carried out under this study was focused on blog teaching of a computer graphics module. The shortcomings of the computer graphics module were analysed and consideration given to the features of blog teaching that would address them; this module is supplemented by the teacher's guidance. The use of blogs creates favourable interactions between teachers, students, resources and platforms. A blog teaching experiment was carried out with 93 students selected at random, then, divided into experimental and control groups. The results showed that blog teaching is an improvement on traditional teaching and it specifically boosts students' academic performance. Hence, blog teaching as a method deserves to be promoted.

INTRODUCTION

With the rapid development and wide application of computer technology, computer graphics courses have emerged and advanced. Computer graphics, which involves the drawing of graphs using a computer, has the advantages of being accurate and easy to use, with the drawing conveniently placed in on-line storage. Computer graphics is applied widely in industry and, hence, computer graphics courses are important. At present, courses on computer graphics mostly adopt traditional teaching methods, viz. blackboard-based combined with multimedia slides (Microsoft PowerPoint) and assignments.

Some researchers indicate that a number of educators fail to fully cognise the nature and required features of the course and so the standard of teaching is of concern. More specifically, the importance of the computer graphics course is not fully cognised and, it is regarded as just a supplement to traditional engineering drawing. Teaching is simple and students are not enthused by the course [1]. In addition, most teachers attach more importance to knowledge of theory and ignore the cultivation of computer skills and the engendering of students' learning [2].

Blog is a contraction of *Weblog* and is a series of on-line Internet personal entries usually by an individual covering their personal reflections on a matter or matters. Using blogs in teaching can facilitate continuous teaching and continuous learning. In the blog teaching environment, teaching is a dynamic cyclical process. It can highlight a student's understanding of material and boost their interest and participation. Therefore, students personally can experience co-operative learning and knowledge construction [3]. Tan et al assumed that social media-supported collaborative learning is a suitable form for problem-based learning, commonly applied in engineering and technology education [4]. Tang and Lam used blog teaching to establish a learning community and showed by experiment that blog-based teaching has a positive effect on learning [5]. Garcia et al applied the connectivist learning model in higher education to verify the feasibility of the blog teaching mode [6]. Some researchers have combined the blog with Tencent's QQ, an instant messaging service, to form a collaborative learning platform [7]. Bian and Wu constructed a college English course based on teaching blogs and considered this more beneficial for students' independent and individual development [8].

The research reported in this study applied blog teaching to the computer graphics module at the University of Science and Technology Liaoning, with the aim of improving students' learning enthusiasm and efficiency, as well as serving as a reference for other teachers.

BLOG TEACHING

The blog is part of mainstream communications in current society. The following characteristics make blogs suitable for use in teaching:

- The blog is a knowledge manager. It can record, in a timely fashion, the essence of daily thoughts on valuable, related and interesting information. Knowledge workers can absorb knowledge, with distance no barrier.
- The blog is not just a network technology or a Web page, but rather a network culture phenomenon. The blog allows a new lifestyle, new working style, new learning mode, and new means of communication.
- The blog can stimulate students' thirst for knowledge and improve teaching. The blog facilitates interactive teaching. Students can put forward questions via the blog and teachers answer the questions also via the blog. Due to the openness of the blog, other students may see the questions and answers. This improves the efficiency of teachers in answering questions.
- The blog can facilitate the participation of students and other social members. In the blog, all communication is on the same footing, which encourages students to participate. Blogs are different from traditional bulletin board systems (BBS) in that the blog encourages parents or other social members to participate. This can open up the school teaching environment and boost learning participation.

Enhance co-operation between teachers and students to achieve integrated teaching and learning:

As a new medium, the blog is characterised by simple operation, continuous update, individuality, openness, and interactivity. The blog teaching method can transform teaching into a co-operative endeavour between teachers and students. Traditional teaching is dominated by the teachers' teaching and the students' receiving of information, which stresses the teacher's authority, largely ignores students, and does not involve co-operation between teachers and students. This is teacher-centric teaching. In traditional teaching, information is transferred one way, from teachers to students, and the students are passive. To alter this situation, the concept of *integrated teaching and learning* has been put forward at several universities worldwide. Blog teaching can transform traditional infusion-based teaching into a co-operative mode between teacher and student, so that students can improve through personal experience, to boost their academic performance.

Make teaching open, with enhanced communication:

The open and interactive features of blogs transform traditional closed teaching into open teaching. Interactive communication theory considers learning improves through mutual communication between teachers and students. Closed teaching systems, such as that of traditional teaching, no longer meet the requirements of quality-oriented education. Hence, it is necessary to establish open, comprehensive teaching to which blog teaching can contribute. Even if teachers and students are separated by time and space, they can communicate via the blog.

Stimulate students' potential and promote self-actualisation:

The theory of humanistic learning posits that the most useful learning mode in modern society is to let learners know how to learn. The function of the teacher is not to *feed students for life*, but to teach them how to make a living. Teachers may maintain a relaxed, harmonious, democratic and equal learning atmosphere via the blog and, hence, construct a harmonious, democratic and better relationship between the teacher and student. This avoids making students feel depressed or burdened by the learning process and promotes active learning.

Teachers should adopt a student-centric approach and start from students' perspective to provide an atmosphere within which to promote learning, such as arranging assignments and answering questions via the blog. This will make students master learning skills and learn how to *comprehend by analogy*.

APPLICATION OF BLOGS IN COMPUTER GRAPHICS TEACHING

Introduction to Computer Graphics

Computer graphics, also called computer aided design (CAD), is a required technology module at advanced engineering colleges. It is a course in engineering that students do first after entering college. It is called an enlightenment course for future technicians, similar to the linguistics in engineering course. Computer graphics has a specific theory and is strongly practical.

With the help of AutoCAD software and systems, the computer graphics module is graph-based with the aim of studying complex transformations, from a three-dimensional space to a two-dimensional plane, and *vice versa*. The teaching process covers the theory and methods of solving geometrical problems using graphical expressions.

The ultimate objective is to develop a student's ability to imagine three-dimensional geometrical shapes and two-dimensional engineering drawings. This lays a solid foundation for the graduation design and even for a vocation after graduation. Thus, this module directly affects follow-up courses, be they in mechanical or electrical engineering and even has an effect after graduation.

Plight of the Computer Graphics Module

The computer graphics module is important, but there are problems with the practical teaching of it, as follows:

- Contradiction between the reduction in class hours and no decrease in teaching content:

  In recent years colleges have reduced the class hours for most courses and, especially, for foundation courses. However, the teaching content has not been reduced. Thus, course teaching is very intense and, in particular, the practical work suffers. The drawing practical work in computer graphics cannot easily be completed by students during class. If they work after class, there is a shortage of tutors and when students encounter problems, they cannot get timely advice. This negatively affects students' interest and teaching efficiency.

- Contradiction between the large number of students and the number of teachers:

  Because tutoring can be very demanding, computer graphics needs to be taught in small classes of no more than 30 students. However, the implemented policy is to increase enrolments, resulting in the number of teachers being seriously insufficient, and the course has to be taught in large classes, which affects badly the students and teachers.

- Contradiction between the theory and practical nature of the module:

  Although computer graphics has a strong theoretical underpinning, it is very practical. Many students commence their study lacking relevant background theoretical knowledge. Hence, during study of the theory, many students appear to be lost and lack sufficient computer experience.

- Contradiction between required learning autonomy and students' actual mode of learning:

  The computer graphics module requires students to show initiative and to study actively. However, in the practical classroom teaching, teachers dominate the class and students are not active in their learning. Teachers mostly instill knowledge, and students comprehend too little. Students do not undertake enough self-study. This limits their initiative and is not conducive to cultivating their interest.

BLOG TEACHING EXPERIMENT FOR THE COMPUTER GRAPHICS MODULE

Experimental Method

Following an analysis of the applicability of blog teaching, it was introduced into the computer graphics module as a means by which to solve problems of the module.

Teachers establish a teaching blog as an extension of classroom teaching, to make up for the shortcomings of classroom teaching. Specifically, this approach has the following aspects:

- Preview guidance:

  Previewing is an important part of the learning process, but it is difficult for students to learn the key points. Teachers may guide students' previewing - via the blog and in advance. They can list the preview content and key points in detail to boost students' interest, to save time and to promote efficiency.

- Tutoring:

  The computer graphics module is difficult, and students inevitably will have questions. Hence, tutoring is important in consolidating knowledge and mastering skills. Teachers should summarise and review the content, highlight difficult points and key points, answer students' questions and identify common mistakes.

- Assignment feedback:

  Computer graphics is very practical and the theory must be consolidated through plentiful assignments. Teachers may release assignments on the blog, offer students a platform for discussion and give necessary assistance. Teachers should exhibit excellent work from students, to stimulate their enthusiasm.

- Pre-examination tutoring:

  Examination preparation time is tight. Teachers may tutor students via the blog and explain key points and the types of questions in examinations, so as to enhance students' confidence.

- Video teaching:

  The computer graphics module contains a huge amount of information. If students could repeat the classroom teaching, it would assist them in grasping the material. Teachers may use the podcast function of the blog and

release videos of classes as podcasts, so that students can repeat a class as often as required to understand the material.

Experimental Design

To verify the effect of blog teaching on the computer graphics module, an experiment was carried out with two groups of students: experimental and control. The students were from the School of Computer Science in 2014. The experimental group had 47 students, who completed the module using blog teaching; the second group had 46 students, who completed the module using the traditional teaching mode. The examination is composed of an assessment on theory and a practical assessment, using the computer. Each assessment is marked out of 100.

The data were analysed with SPSS 11.5 software. Quantitative data are expressed as mean ± standard deviation ($\bar{x}$ ±sd). Intergroup comparisons used the independent-sample t test. Qualitative data are expressed with a case number and constituent ratio. Intergroup comparisons used a chi-squared test with a confidence level p < 0.05 indicating statistical significance.

Experimental Results

- Comparison of the experimental and control groups:

  As can be seen from Table 1, the experimental and control groups have no statistically significance differences in terms of gender, age, family economic conditions, being an only child, being a class leader and previous performance at a significance level of 0.05. The results show that the two groups are comparable.

Table 1: Comparison of the experimental and control groups.

Item		Experimental group (n = 47)	Control group (n = 46)	t/χ^2	p
Gender	Male	27	28	0.113[a]	0.737
	Female	20	18		
Family economic conditions	Good	16	12	0.804[a]	0.669
	General	17	20		
	Poor	14	14		
Number of only child (%)		21 (44.7)	19 (41.3)	0.108[a]	0.742
Number of class leaders (%)		8 (17.0)	8 (17.4)	0.002[a]	0.962
Age ($\bar{x}$ ± sd)		20.8 ± 1.9	20.9 ± 1.7	0.267[b]	0.790
Previous examination results before the experiment ($\bar{x}$ ± sd)		74.0 ± 5.0	73.1 ± 5.5	0.826[b]	0.411

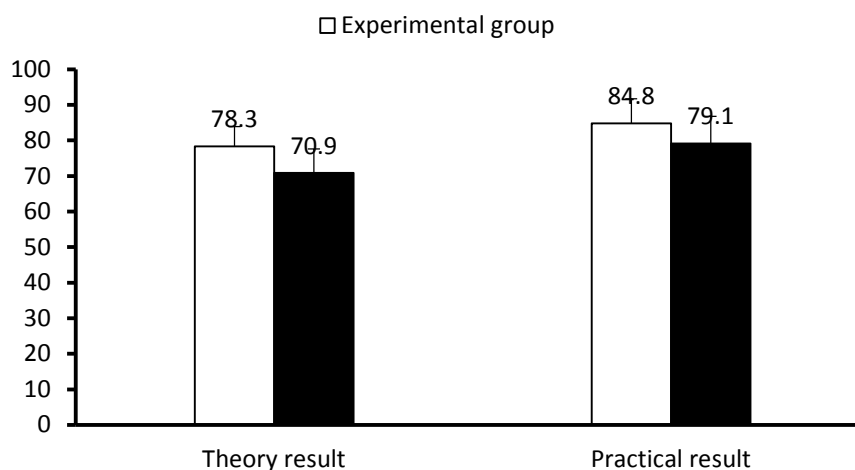Note: [a] is chi-squared test; [b] is t-test

Figure 1: Comparison of final examination results after the experiment.

- Comparison of the final examination results:

  The results for the final examinations for the experimental and control groups are shown in Figure 1. The theory examination result for the experimental group was 78.3 ± 5.6, which is higher than the control group at 70.9 ± 6.7. The difference between the two groups is statistically significant with t = 5.785 and p < 0.001.

In terms of the practical result, that for the experimental group was 84.8 ± 6.9, which is higher than the control group at 79.1 ± 7.7. The difference between the two groups is statistically significant with $t = 3.761$ and $p < 0.001$. This indicates both the theory and practical results of students in the experimental group are higher than the theory and practical results of students in the control group.

CONCLUSION

The experimental results show that blog teaching is superior to traditional teaching. Blog teaching promotes interaction between teachers and students, and among students, stimulates students' active learning, expands knowledge, and boosts learning efficiency and academic performance. The experiment was an effective test of teaching reform. The shortcoming of this study is that only the results of students in the experimental and control groups were compared. In future research, blog teaching content, teaching evaluation and teaching feedback will be studied.

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