All-round Development through Multimedia Project Courses

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ABSTRACT

We describe our experience in introducing multimedia project courses to Physics students. A feature of our scheme is the requirement for students to make presentations with multimedia aids to both university and secondary school students. The scheme was successful in providing the students with opportunities for all-round development.

Keywords

All-round development, multimedia projects, presentation skills, secondary schools

INTRODUCTION

A major emphasis in university education is to promote the all-round development of students according to their own attributes. Important components in their development include skills of searching, discovering, integrating and organizing knowledge, collaborating with peers and communicating their ideas. Many of these objectives cannot be achieved through traditional modes of instruction such as lecturing. Instead, student participation in projects is much more effective.

In this paper, we will share our experience in introducing multimedia project courses to Physics students. While multimedia aids have become a popular means of enhancing the quality of teaching and learning, the major emphasis has been focused on the effects of the *final product*. On the other hand, our scheme emphasizes the *process* of producing such multimedia aids, which also has very high educational values. Through the process of multimedia production, students learn to research a topic, gather information from different sources, and synthesize them into presentable forms. They enhance their presentation skills through evaluation and feedback in rehearsal sessions. In addition, their collaborative and communication skills will be improved through assisting the juniors in a group environment. A feature of our scheme is the requirement for students to make presentations to both university and secondary school students. Presenting to secondary school students with non-technical backgrounds sharpens the need to improve their presentation skills. All these elements contribute to their all-round development.

DESCRIPTION

Our scheme works closely with the project courses for Physics students, initially offered to final-year students (PHYS398) and recently extended to include more junior ones (PHYS191/291/391). The projects covered a wide range of topics, ranging from academic research, development of teaching modules for secondary-school science subjects, to everyday applications of the scientific method. The students choose their own project topic and work under the supervision of a faculty member. After the final presentation, students with outstanding progress and presentable topics were nominated to participate in the multimedia project. They were assigned the task of preparing a multimedia presentation at the popular level, and were required to make an in-depth study of their project content.

In Spring 2003, four project titles were offered to secondary schools: Mobile Networks, Binary Pulsars, Life Out There, and UV Detective. Multimedia aids were used in the talks to explain complicated concepts and make the abstract ideas more clear and fascinating. A group of 11 students was involved, 10 presentations were delivered in six secondary schools, and four other presentations were cancelled due to SARS. In Fall 2003, seven students were involved, eight presentations were delivered in seven secondary schools on the same set of four projects. In Spring 2004, eight project titles were offered: ER Fluids, Mobile Networks, Wonderful Butterflies, Nano Technology, Relativity, The Science of UV, X-ray Astronomy, and Water Game. A total of 12 students were involved, and 24 presentations were scheduled in 19 secondary schools. The presentation materials can be accessed on the web [1].

SUPPORT OF CELT

To assist students in preparing their presentations, they attended the 'Do-It-Yourself Workshop Series' organized by Center for Enhanced Learning and Teaching (CELT), teaching them on methods to prepare multimedia instructional materials for physical science subjects. In the workshops, the students learned:
(1)   Computer Animations
   -   To make interactive animations with Macromedia Flash MX.
   -   To make 3D graphics with 3D Studio Max.
(2)   Audio and Video Editing
   -   To edit audio files with Sound Forge.
   -   To edit video files with Adobe Premiere.
(3)   Website Construction
   -   To construct a website with Macromedia Dreamweaver MX.
(4)   Presentation Skills
   -   To deliver a presentation effectively with MS PowerPoint.

Besides the 'Do-It-Yourself Workshop Series', the CELT Instructional Development (ID) team met some students and provided consultation on developing and enhancing their presentation deliverables. Every presenter of the school talks was required to have at least one rehearsal before their presentations, during and after which the CELT team provided feedback and suggestions.

ACHIEVEMENTS

The multimedia student presentations achieved many objectives of an all-round university education, and reaped benefits to science education at both university and secondary-school levels.

University Education

Through their multimedia projects, students were given the opportunity to develop their independent thinking skills. In preparing presentations appealing to a wide audience, the students were required to study in depth the content of their project topics, ready to face questions raised by the potential audience. They needed to consider the everyday relevance of their academic work, forcing them to take up a much wider perspective. They also needed to expand their scope of research, gather information from different sources, and synthesize the material into presentable forms. This made them more confident and familiar with the topic, and ready to give the talks at the secondary schools.

Furthermore, through the DIY Workshop Series, the students learned how to produce multimedia aids for enhancing presentations. They also learned to evaluate their own work in rehearsal sessions, during and after which their peer students, supervisors, and a CELT team provided feedback and consultation. The students improved their collaborative skills through working in a group environment.

The students also benefited by improving their communication skills. The experience of interacting with a big audience improved the confidence of the students. Moreover, they developed skills in arousing students' interest and acquired techniques for handling challenging questions. They learned how to communicate with the secondary students and talk in a systematic way.

These skills will benefit their personal growth and their future job searches. We can cite the example of a student presenter whose performance in the school talks contributed to her successful admission to the Postgraduate Education Diploma.

Science Education

Through the Mini-lecture Series, the newest and most updated technology and information can be presented to the public. This forms a bridge linking up the university and secondary schools. More secondary school students found out more about the everyday relevance of Physics, eliminating the misconception that it is a very difficult subject.

Secondary School Education

According to a secondary school principal, the school talks broadened the students' scope of knowledge on frontier science beyond the original syllabus. In the talks, the research projects were presented in an interactive way. Students at the secondary schools were encouraged to play an active role in learning because the talks were not

just lectures but also allowed the students to participate. This aroused the students' curiosity in science.

EVALUATION

The evaluation of the projects was implemented through the following means.

Rehearsals

For each project, there must be at least one rehearsal before the school talks. This ensures the content of the talks is suitable for the audience. At the end of the rehearsals, the peer students, the project supervisors, and the CELT team give their considered opinions to the presenters. The students can thus discover their weaknesses and the talks would thus be improved before the formal presentations.

Presentation Assessment Checklists

For each school talk, presentation assessment checklists were distributed to teachers. The checklists contain 20 multiple-choice and one open-ended questions. As shown in Figures 1 and 2, responses were overwhelmingly positive. In Figure 1, the response to our carefully planned content of the presentations was particularly high. Figure 2 shows that the inclusion of multimedia aids made a significant contribution to the success of the presentations. The computer animations and experimental demonstrations accompanying the talks were also very useful.

This indicates that the audience pays considerable attention to these two quality aspects of the talk, and provides a valuable guide to the future development of the projects.

We found that the feedback collected from the secondary schools was very important in improving the presentations. At the early stage of the project, their comments included the use of more graphics in explaining difficult concepts, more connections with daily life, and more interactions with students. After including these suggestions at the latter stage, the quality improvement was significant.
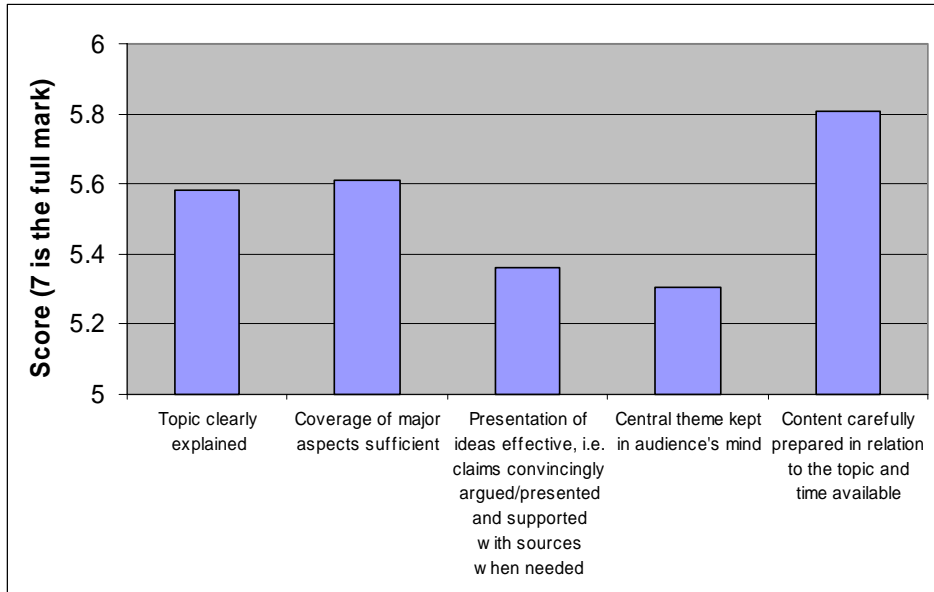
Figure 1. Statistics of the presentation assessment checklists (sample size = 36) on five aspects of the content of the presentations
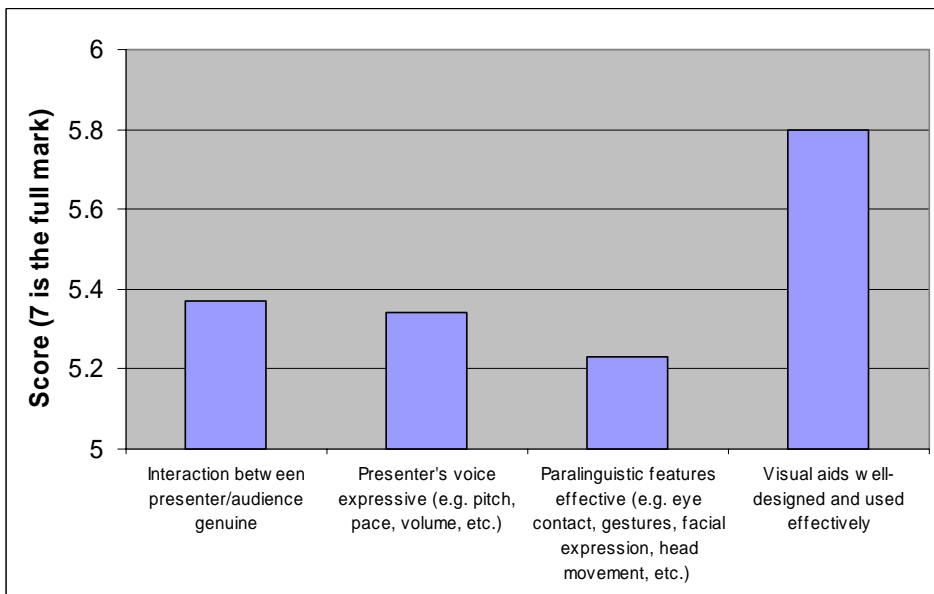

Figure 2. Statistics of the presentation assessment checklists (sample size = 36) on four aspects of the presenters' delivery techniques

Feedback from Secondary Schools

According to the feedback from secondary schools, 'the presenters offered multimedia simulation programs, amusing experiments and research products, which helped our students understand the topics well', 'we thank the faculty team for getting us involved in the program,' 'our students benefited a lot', and 'it is nice to have an interactive game played with students. The animations are impressive and make effective presentation possible.'

Feedback from the Student Presenters

According to one student presenter, he 'became an expert in using Macromedia Flash MX from a new user by making the computer animation game'. Another pair of students remarked, 'looking back on our experiences, although it was a tough time for us to manage both the projects and our academic work, our views, both academic and personal, were broadened,' and that 'throughout the school talks, we built up our self-confidence in front of 400 students, developed our skills in arousing the students' interest and the techniques for handling challenging questions.'

Feedback from Secondary School Students

At the question-and-answer session after each presentation, many secondary school students raised thoughtful questions about the content of the presentation. Their interest was also reflected from the popular response in playing with the computer animations and trying the experimental demonstrations after the presentations.

CONCLUSION

We have described the progress of our scheme on the all-round development of university students through multimedia project courses. The scheme was successful in providing the students with opportunities for in-depth study of a project topic of their own choice, to learn to produce multimedia aids and engage in instructional design. Their integration and collaborative and communication skills were improved. The requirement to make presentations to both university and secondary school students improved the confidence of the students. At the community level, the school talks linked up the university and the secondary schools, providing the secondary school students and teachers with the most updated scientific knowledge, and arousing their curiosity in science. The project also illustrated the effective use of feedback in improving the presentations.

The concept of enhancing project courses with multimedia student presentations is generally applicable to other fields of studies. We hope that our experience will be relevant to other science and non-science subjects.

REFERENCE

[1] http://physics.ust.hk/genphys (retrieved: May 6, 2004)