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The interflow of two rivers: An inter-school CSCL project on improving water quality by using videoconferencing

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Abstract

The aim of this research is to study the effectiveness of using videoconferencing as a tool for collaborative learning on water pollution among students from two secondary schools located in different districts. The poor water quality of the nullahs in urban areas aroused the interest of students from two secondary schools in Tin Shui Wai and Wong Tai Sin who had experienced the nasty smell of the

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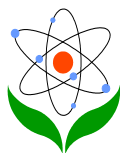videoconferencing
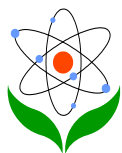
water from Tin Shui Wai Nullah and Kai Tak River respectively. Students of both schools were quickly aware of the need to improve the environment around their schools. Through the use of internet-based videoconferencing, the students shared and learned from each other's experiences in analysing pollutants in their own water channel. With the help of governmental and non-governmental organisations involved in environmental protection, the students also exchanged ideas on how water quality can be improved. They conducted three video conferences thus far. These involved lectures, data exchanges and information sharing. After these conferences, the data taken from the school-based curriculum design, the students' worksheets, their reflections and the video-clips of lesson observation were analysed. This paper discusses the data collected, and the results show that students' interest was aroused and their learning outcomes in knowledge, skills and attitude were recognised. Teachers involved also considered the project to be an opportunity for teacher development and to enhance their own learning.

Keywords: Videoconference, Computer Supported Collaborative Learning, Distance learning, Water quality testing.

Introduction

Using videoconferences for distance teaching to meet the increased demands of learning is becoming more popular. The use of technology in teaching and learning has long been encouraged in education, especially in the recent development of information and communication technology (Education and Manpower Bureau, 1988). The types of technology range from the radio in 1920 to the most powerful microprocessors today. At large social events, such as concerts or football matches, where the crowd may consist of thousands of people, videoconferencing would be one of the many strategies used to meet the desire of the audience.

Videoconferencing is now widely used in broadcasting, business and scientific research. However, it is not that popular in school settings, especially in the classrooms among the junior secondary form students, due to the limited manpower and resources provided to schools in public sector. On the other hand, using videoconferencing in teaching and learning science, like when the teachers and students of two Hong Kong secondary schools used technology to interact and communicate, is often considered trendier. Thus, videoconferencing plays an important role in paving the path for a new era to rise, in which the learning and teaching platform is not only inter-disciplinary, but also inter-district or even

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international. The scale for such a platform is usually small and limited to several venues within the same campus or area.
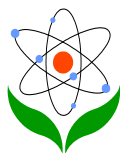
The students in this study were involved in a computer-supported collaborative learning project between two secondary schools in two different districts with an aim to explore different effective ways to improve the water quality through the exchange of ideas and experiences through a distance learning approach.
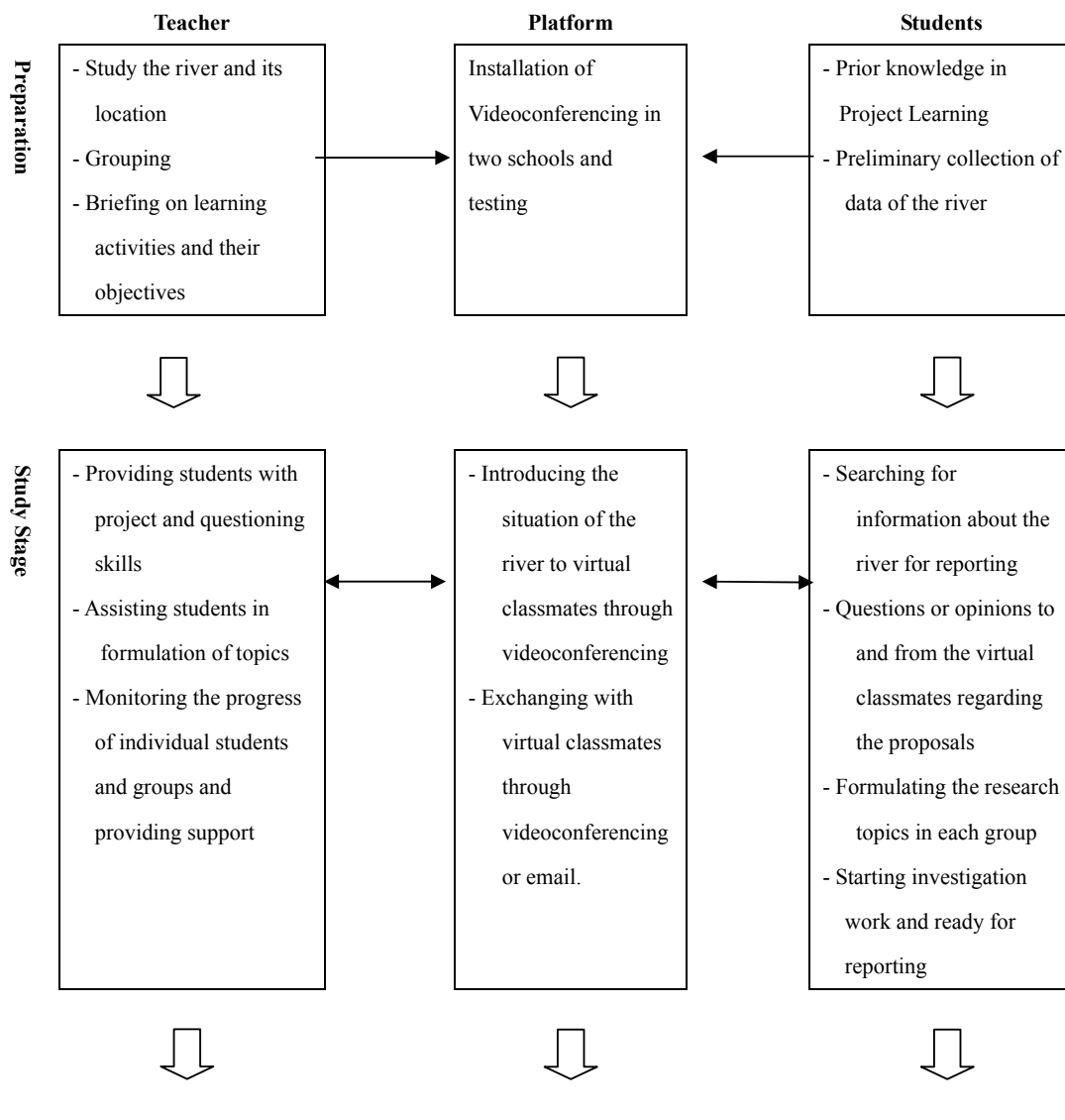
Equipment

In order to connect the videoconferencing capabilities among two or more schools, a P4 or above personal computer with 1Gigabyte RAM on a Windows XP platform is needed. An 8 channels audio mixer, a PCI 1394 cord, a DV (or 3CCD), two speakers and a high transmission rate with more than 3 Megabyte bandwidth are also essential.
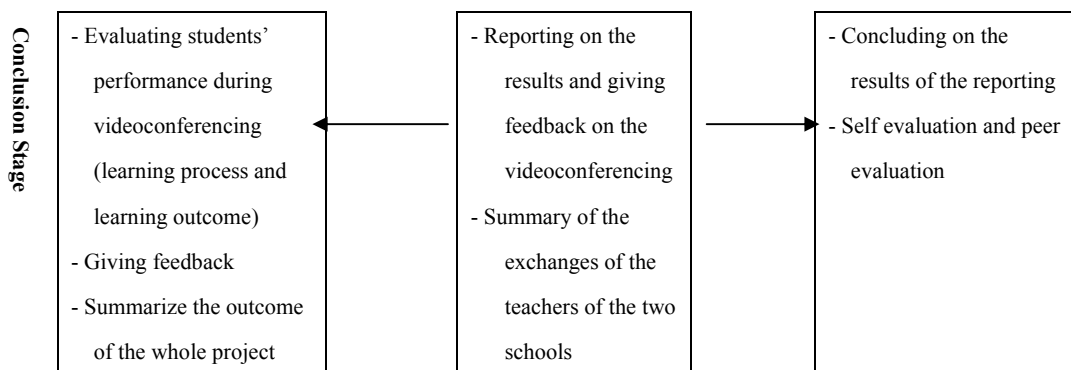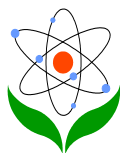
Background of study

Students from School A in Wong Tai Sin felt annoyed by the smell from a nullah, which was later learned to be the Kai Tak River, just adjacent to their school. Some of the students were concerned about the effect of the bad smell on their health and others worried about environmental pollution. The school had prior experience of videoconferencing with a primary school in the same district on the topic of acids and alkali, and with a secondary school in Malaysia during a student debate competition. The principal was looking for more opportunities to communicate with other secondary schools across districts. School B in Tin Shui Wai, a newly developed area in the north-west part of the New Territories, was sited as a remote area away from the central district of Hong Kong. The teacher-in-charge in School B wanted her students to have more exposure and wanted to link up with other schools in the urban areas. In this regard, officers from the Education Bureau tried to match these two schools and met with the two teachers-in-charge. After the first meeting, the teachers agreed to collaborate and do something about a nullah near their schools as their common topic. They drew up the initial collaborative project plan involving the students and the exchange platform (Fig.1). A class of Secondary Form 1 students from each of the two schools was chosen for this pilot study. During the first contact, students were advised to make use of videoconferencing to (i) introduce the history and location of their own water channel, (ii) identify the problem or disturbance created by the nullah and (iii) and suggest solutions to improve the water quality of these two water channels.

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Teachers from each school returned to their school and facilitated their students' work on the history and the problem of their own nullah by reviewing the literature and any relevant information. They also took video-clips and collected information about the geographical features of the nearby areas of the water channel where water sample was collected.

	Teacher	Platform	Students
Preparation	- Study the river and its location - Grouping - Briefing on learning activities and their objectives	Installation of Videoconferencing in two schools and testing	- Prior knowledge in Project Learning - Preliminary collection of data of the river
Study Stage	- Providing students with project and questioning skills - Assisting students in formulation of topics - Monitoring the progress of individual students and groups and providing support	- Introducing the situation of the river to virtual classmates through videoconferencing - Exchanging with virtual classmates through videoconferencing or email.	- Searching for information about the river for reporting - Questions or opinions to and from the virtual classmates regarding the proposals - Formulating the research topics in each group - Starting investigation work and ready for reporting

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Conclusion Stage

| - Evaluating students' performance during videoconferencing (learning process and learning outcome)
 - Giving feedback
 - Summarize the outcome of the whole project | ← | - Reporting on the results and giving feedback on the videoconferencing
 - Summary of the exchanges of the teachers of the two schools | → | - Concluding on the results of the reporting
 - Self evaluation and peer evaluation |

Figure 1. *The initial collaborative project plan*

Aim of study

With the installation of videoconferencing facilities for distance teaching, students from the two schools benefited from the exchange of data and opinions. The aim of this research is to study the learning outcomes among the Secondary Form 1 students from two secondary schools in two different Hong Kong districts through the use of videoconferencing as a tool to learn about water pollution. Through these conferences, students are expected to share or borrow ideas from their counterparts in another corner of the city to improve the quality of the water and the environment around their school campuses.
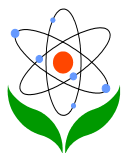
Rationale

The reason for conducting this collaborative project was to improve the water quality of the nullahs in the two areas with the cooperation of groups of students from two secondary schools. Some of their proposals would be submitted to the government departments for careful consideration. If the project is a success, it could then be used as a model for other schools as a collaborative effort in improving the quality of environment through the use of videoconferencing to exchange the ideas and opinions.

Methodology

This is a qualitative research study involving two groups of students using videoconferencing.

Research subjects

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The research involved two groups of Secondary Form 1 students from two schools located at two sides of the city of Hong Kong. School A lies in the middle of the downtown area while School B is situated at the north-west corner of the city. The group from School A consists of 40 students and the group from School B has 35 students. The students have mixed abilities, and their age range is from 11 to 13. All were studying in Secondary Form 1 when the research was conducted.

Research method

To find the learning outcomes of the students through the use of videoconferencing, the researchers needed to capture the learning process, learning product of the students and the reflections from all the teachers involved. The research involved the design of school-based curriculum, lesson observation, collection of students' work and holding an evaluation meeting with the teachers. Content analysis and interviews were used as the main research methodology in this study.
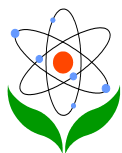
Research instruments

Lesson plans, students' worksheets and their finished product and some video-clips taken during lessons conducted via videoconferencing were analysed. Students' progress was noted by comparing their work and performance in the consecutive videoconferences. What they learned and how they had learned from their counterparts through the videoconferences were also noted as learning outcomes.

Data collection and data analysis

After collecting water samples from their own water channel, teachers of the two schools guided their students to conduct different tests on the water samples taken from various points of the rivers. Data obtained after the different tests were pooled together from different groups for discussion. Students were advised to search the internet for information about the implication of the existence of certain chemicals in water. They tried to draw conclusions from the interpretation of those data after analyzing them with their teachers' help. In order to meet the needs of the students, the teacher responsible for School A visited the Hong Kong Wetland Park with some students and performed some water tests there, as they wanted to compare the water quality there with that of the Kai Tak River.

Results

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The collaborative project commenced in March 2008 after the Easter holiday when students from the two schools started to have their initial field trip on their own river near their schools. The students had their first "handshaking videoconference" in mid-April when their teachers invited other teachers from a third school as guest speakers to share the experience of the ecological field trip. The second videoconference, focusing on formulating their project topics, was conducted in early May, and the third one provided an opportunity for the two groups of students to discuss and to question each other on the research topics of their counterparts. This was done in late May. Students were asked to write their reflection after each videoconference with their virtual classmates.
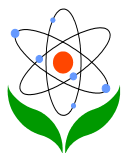
Curriculum design

It was the first time science teachers from two schools developed their school-based curriculum on the topics of water and water pollution. The collaboration gave them good experiences to share with each other and to learn from other teachers about the skills of planning and conducting a field trip. With help from curriculum officers from the Education Bureau, the teachers were involved in lesson design and water testing with updated information.

Students' learning outcomes

Through their reflections after the videoconferences, students were found to have more ideas and insight from the exchanges with their virtual classmates. They learned not only knowledge of water quality and ways of improvement and techniques in data collection and interpretation, but also the attitude on greeting the audience and the awareness of environmental conservation. Besides knowledge building and construction, students also learned the skills to acquire information.

Teachers' reflection

The teacher-in-charge of School A felt that the collaborative project was one of the best ways to widen the perspectives of the students. During the videoconferences between the two schools, he observed that the students made many improvements while exchanging data with their counterparts on the other side of the video system. These improvements include their presentation skills and social skills, which were useful to them as they worked towards an interface to the new senior secondary curriculum. Through their dialogue, their questioning technique was observed to be enhanced together through their thinking skills. For example, they could even think

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of the regenerated energy sources. Therefore, the teacher-in-charge felt that this type of pedagogy and teaching materials could intensify the students' learning experiences and make them more effective learners. He also felt that this kind of collaborative project required very little effort and equipment, but could achieve great effectiveness in learning for both teachers and students. After September 2009, the new senior secondary subjects offered that did not have the required enrolment of students, or supply of manpower and resources, could use videoconferences to help solve these problems. The use of videoconferences capitalize on minimal use of resources, like sharing curriculum design, lecture times and even sharing of venues through distance teaching and learning.

Discussion

The significance of using videoconferencing as distance learning tool

Use of videoconferencing can shorten the "distance" between the teachers and students if done well. It is different from the traditional way of single-sided teaching or teacher-oriented teaching in that videoconferencing can enhance the teacher-student interaction. However, in order to avoid abuse of ICT in teaching, teachers must be careful when videoconferencing is used. The problems of availability and accessibility must be solved. Teachers must feel comfortable using these facilities, but not see these as a burden or extra workload to them.
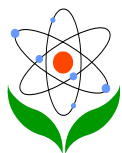
The part played by videoconferencing on computer supported learning

Since computers and the internet are used in the videoconferencing, this project could be classified as computer-supported. Students' learning could be through ICT by retrieving information from internet websites and real-time, face-to-face contact. This kind of teaching is different from an open university programme as it has a strong element of interaction.

The part played by videoconferencing on collaborative learning

This project involved two schools working on the same topic, improving water quality, so the exchange of information and ideas brought the teachers and students closer together. The learning is described as collaborative as students of both schools can learn from each other by building knowledge, acquiring skills and fostering attitudes. Among the students in the same group, they were assigned a task, and each had to take his/her own job seriously in order to meet the deadline.

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After interacting for a period of time on the project, the students' collaborative and team spirit soared to greater heights.

Conclusion

The whole project was completed in July 2008 with a public seminar conducted by the School-based Curriculum Development (Secondary) Section of Education Bureau on the 4th of July 2008, though last videoconference took place in the afternoon of July11th, 2008. Both teachers-in-charge reported the collaborative project as a great success for each of their schools. Ideas were borrowed from School A to treat the water in Tin Shui Wai Nallah. Creative solutions were also made to conserve the environment in and around Kai Tak River. Besides the achievement of the aims and objectives, there were also signs of creation of knowledge, the enhancement of generic skills and a fostering of good learning attitudes among students of both schools. This is the first time in Hong Kong that students from two different secondary schools collaborated to improve the water quality of the water channels around their schools. Although improvement work by government departments and non-governmental organisations continues, opinions and suggestions from the public, especially from students in schools around nullahs, should not be ignored. With videoconferencing, it is now possible to bring students from two different geographic locations together and share their data and opinions virtually. The only problem, however, could be the burden of the teacher who had to lecture both classes while making efforts to look after them.

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