

The distance teaching model of information and technology based on CSCL

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ABSTRACT: Based on computer supported collaborative learning (CSCL) system models, the study presented in this article is an exploration and design of a new teaching model for IT education, which is based upon CSCL synchronous and asynchronous modes being applied together. Discussed in this article are the teaching mode implementation details for currently taught IT courses based on curricular and extracurricular collaborative learning to improve students' ability. Also discussed are the areas to be considered when contemplating CSCL applications.

INTRODUCTION

Computer supported collaborative learning (CSCL) refers to co-operative learning facilitated by a computer network [1]. It is a strategy for organising small groups of students through team learning, with collaborative learning an integral part of the learning objectives. The principle is shown in Figure 1, where the computer network could be a local area network (LAN) or a wide area network (WAN). This teaching method focuses on co-operation between students and between students and teachers. Through this method, high-level cognitive and interpersonal skills are developed. More importantly, learning is not limited by time, location, age or nationality. Learning a language can be facilitated by on-line collaborative learning [2].

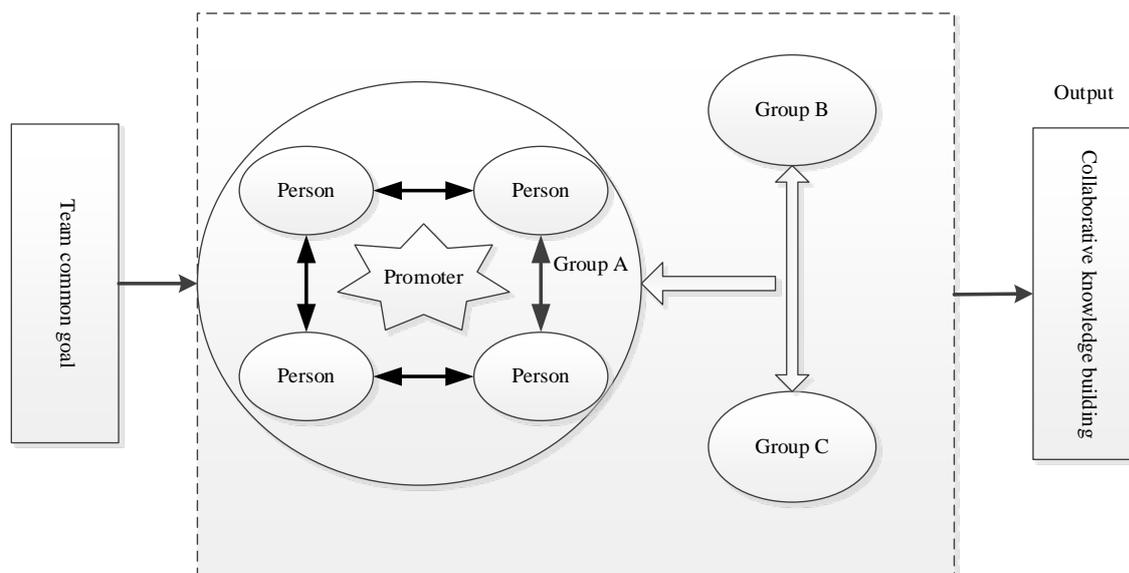


Figure 1: Schematic diagram of CSCL.

With the development of networks, distance education has become one of the hot topics in the research and application of network technology [3]. Currently, most practical remote education platforms are based on information sharing, reflecting individual learning styles but with passive learning. Distance education based on CSCL emphasises real-time,

interactive teaching and learning. In this learning environment, an integrated learning style for individuals and groups promotes the achievement of the teaching and learning outcomes.

According to the analysis in this study of domestic scholars, typical CSCL systems include synchronous and asynchronous learning systems. Collaborative writing, design, research and problem-solving uses e-mail, a BBS (bulletin board system), chatrooms, video conferencing and other communication tools [4]. Huang Ronghuai classified the application of CSCL into four categories, viz. real-time/same place, non-real-time/same place, real-time/remote and non-real-time/remote. This classification provides important guidance in developing CSCL systems. In CSCL, relevant learning data are tracked and stored in a collaborative record. The collaboration data are evaluated and the results for different groups of learners are recorded and saved.

THE DISTANCE EDUCATION MODEL BASED ON CSCL

The distance education model based on CSCL is shown in Figure 2. The computer application platform supports the environment where the computer network could be a LAN or the Internet, with the latter being the most common [5]. CSCL supports learning across different regions, sectors, levels and ages. Participants with a variety of ideas and opinions come together to tackle a problem through frank exchanges and mutual assistance. The diversity and breadth of exchanges develop the students' skills in communication and self-expression.

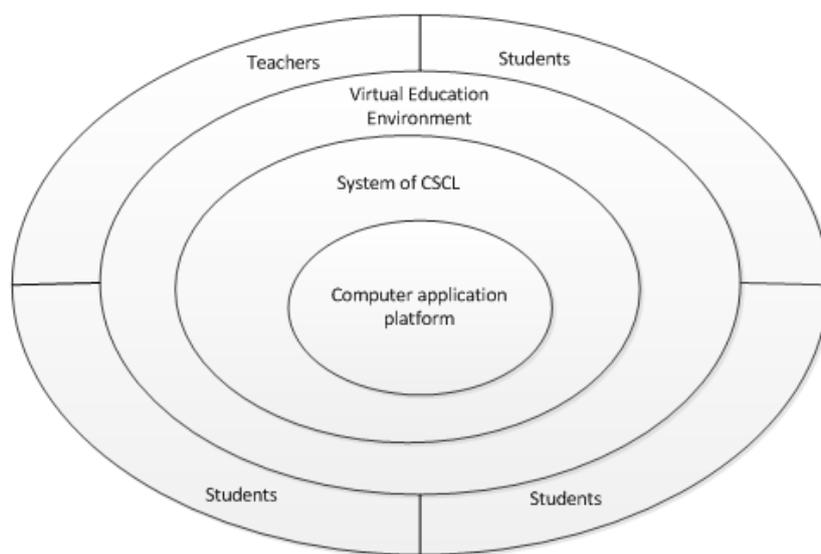


Figure 2: The distance education model based on CSCL.

The Distance Education Collaborative Learning Model

The collaborative learning model emphasises real-time teaching. Students and teachers address questions, and group discussions between students occur concurrently. All teaching is direct face-to-face. The distance education collaborative learning model running environment is shown in Figure 3.

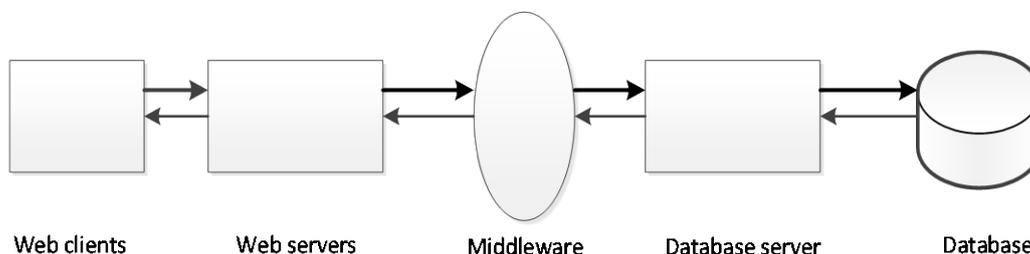


Figure 3: The running environment of the system.

The CSCL platform is the centre of distance education and supports collaborative learning for teachers and students. The platform must meet the International Telecommunications Union (ITU) (H.323)/T.120 multimedia communication and data conferencing standard for audio, video multipoint, multipoint courseware sharing, whiteboard and other services. An explorer function provides a virtual space and services facility for teachers and students.

Teachers and students can apply to use an existing virtual space for real-time collaborative teaching. The *explorer* manages the related resources and maintains resource usage statistics. Users (collaborative learners) can be assigned to

the resource explorer virtual space. The virtual space explorer arranges resources based on the decision to accept or reject an application for access. Based upon the use of the virtual space, users can arrange their own learning curriculum. Users can arrange lectures and develop their own learning plans based on their interests and available time.

Remote collaborative teaching is inseparable from courseware authoring publishing systems. Clients for these systems include collaborative distance learning for teachers and students [6]; for example, the Microsoft NetMeeting software for CSCL for real-time collaborative distance learning.

The NetMeeting Development Kit (SDK) can be used to develop real-time multimedia communication systems for education. NetMeeting can support speech, the sending and receiving of video, the input and transfer of text, and the sharing of applications between students and teachers, and students and students. Users can participate in the use of a drawing board including with images, collaborate in producing text, and can also pass each other files.

The CSCL Design for IT Teaching

The construction of a new teaching model should be guided by advanced educational theory. Constructivist education theory provides a theoretical foundation for the CSCL model. Constructivism stresses that learning is the process whereby learners actively construct an internal psychological model of knowledge. It emphasises that students in the learning process actively construct the meaning of knowledge in line with contextual learning activities and with personal experience. Hence, new knowledge reflects personal understanding of the meaning of that knowledge. Information technology teaching should take full advantage of information technologies to improve the teaching quality, but the resources are inadequate. Using the CSCL model, synchronous and asynchronous interleaved teaching of IT was analysed, as shown in Figure 4.

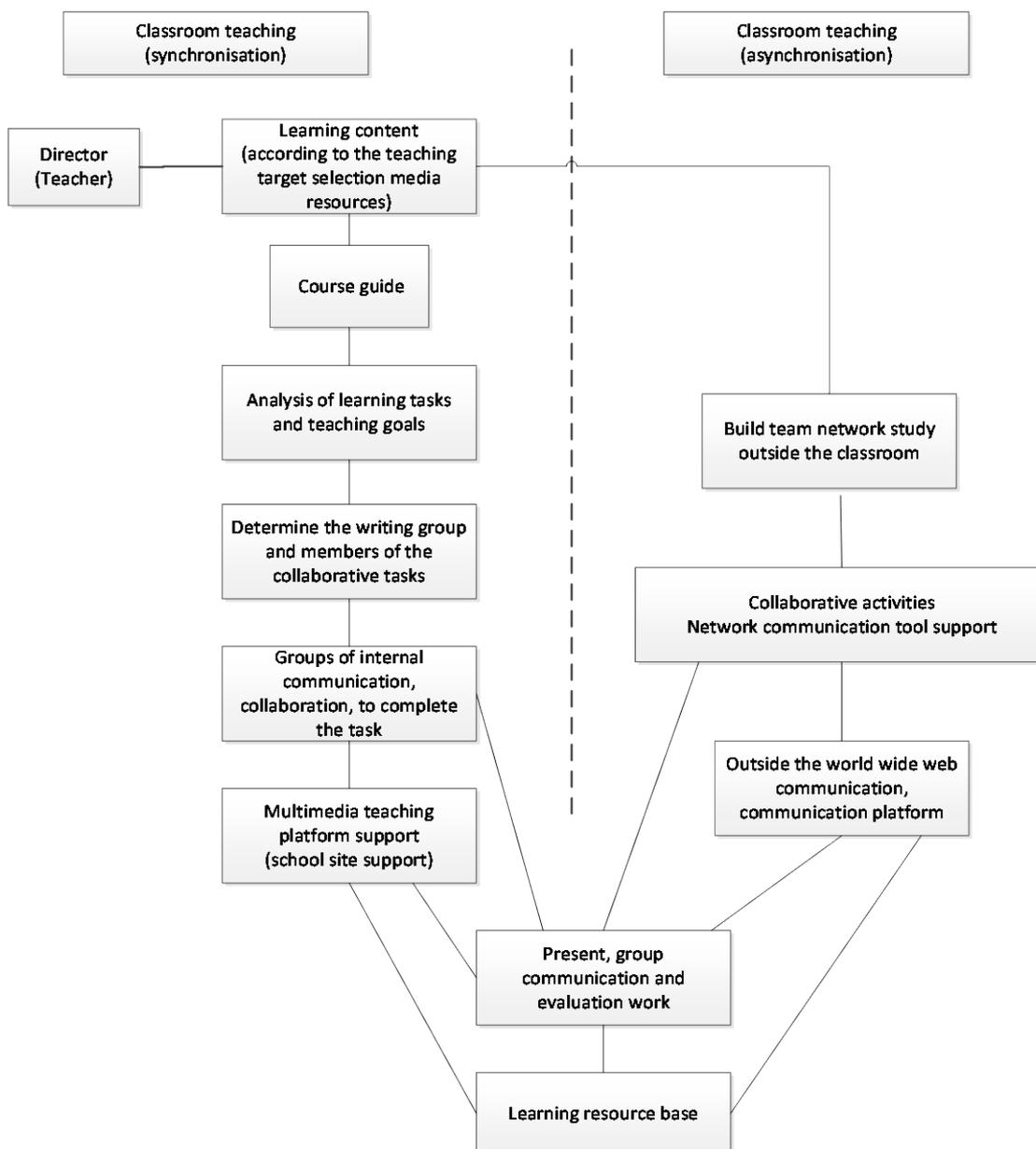


Figure 4: The synchronous and asynchronous teaching process.

Synchronous CSCL Teaching

Design Ideas

Synchronous CSCL teaching refers to theme-based teaching of information technology in the classroom, and the creation of collaborative learning environments [7]. Teachers will explain the creation and integration of knowledge by the division of labour through group collaboration and exchanges between groups, so that students acquire skills in information technology in a mission-driven learning environment.

In this teaching model, teachers are mentors and observers of students by answering questions. Students are the subjects of learning through collaborative group work. In this teaching mode, in appropriate time, teachers have to co-ordinate the overall tasks to develop semester topics and themes. Teachers have to design a strategy for the convergence of curricular teaching and extracurricular group collaborative learning.

The Teaching Process Design

- Course introduction: in this stage, the learning objectives are used to determine the theme of collaborative learning, while also creating a collaborative learning environment.
- Analysis of learning tasks and learning objectives: to support the use of network teaching, students are informed of the learning tasks and objectives, while the required skills are demonstrated to them; for example, how to collect information, how to post on the bulletin board system (BBS) forum for discussion, how to use message boards, e-mail and off-line co-operative modes. Students should be proficient in Web browsing, searching and exchanging information. This facilitates their learning in the asynchronous collaborative learning environment and smooths communication between teachers and students.
- Determining the collaborative team structure and the division of roles: research shows [8] students learn better when they are in a collaborative team with good organisational structure than they do in traditional forms of organisation where study groups are formed, and that this directly affects the quality and effectiveness of learning. For example, students for this study were divided into groups based on the desire to learn and student personality. In an experiment, the authors divided 56 classes into eight groups, each with a team leader who allocated responsibilities to the team members. Responsibilities included gathering images, collecting text and music, and being in charge of the layout.
- Collaboration among team members: this means achieving collaborative activities, which include collaboration and co-ordination of extra-curricular activities. This requires the use of BBS, chat rooms, e-mail and remote collaboration platforms.
- Evaluation of collaborative learning outcomes: the students' work was evaluated within the groups and between groups. There was both a student assessment and teacher evaluation. Afterwards, the students' school work was saved to a repository site.

Asynchronous CSCL Teaching

Team collaboration activities carried out at this stage provide students with a platform for the exchange and synchronisation of learning. The teaching mainly occurs between IT lessons. A network study group is built according to students' ability, available time and other factors. It enables students to improve their technology skill levels and to eventually form excellent study groups. The groups promote collaborative learning among the whole class, thus, forming a spiral learning organisation to improve learning.

In the realisation of this process, it is necessary for teachers to arrange times for team members' collaborative exchanges. Teachers should participate in a timely manner with the students, through a network of asynchronous collaborative activities; students learn to become mentors. Teachers should well organise subject content, monitor and guide, and actively support the joint working group; hence, helping team members to establish good relations and promote collaborative learning. The evaluation of student work is eventually stored in the school library.

CSCL in Information Technology Education

Computer supported collaborative learning (CSCL) in today's network environment is an important learning strategy, which breaks the traditional teaching model by providing multi-directional interaction between teachers and students, students and students, as well as students and teams. The ability of students, their attitudes, feelings and experiences, and many other factors have a profound impact on their learning outcomes.

The application of information technology in education, taking advantage of computer networking, can rectify current IT education problems. The teacher can teach information technology in asynchronous communications with students, avoiding the blockages caused by synchronous means. Thematic learning models allow students to integrate information technology into a comprehensive whole, avoiding rigid teaching modes. But CSCL has some issues worthy of further consideration, as will now be outlined.

Improve Teachers' Information Technology Skills

In CSCL teaching, teachers must master not only the logical sequence of the teaching content and objectives, but more importantly, the collaborative process design rules for student collaboration and learning. Teachers entering the CSCL environment must understand what it takes to become a powerful assistant to students' learning and adapt to the new environment. This requires teachers to have a rigorous pre-lesson instructional design and evaluation mechanism, so that they become the designers and integrators of information technology. Teachers need enough time to design classroom and extra-curricular collaborative learning tasks. This facilitates normal university college students developing rigorous approach to scholarly endeavour.

Implementation Issues Regarding Interactive Collaborative Learning

Information technology should be repositioned in the education sector, so that people come to realise its importance, and give information technology education more emphasis. This should also drive the efforts of university educational technology researchers.

CONCLUSIONS

With the development of computer network and communication technology, the computer-supported collaborative learning model gradually will become the dominant mode. In this mode of learning, the ability to take full advantage of computer networks will be considered for each subject area. Improving the efficiency of learners is a problem worthy of study. The authors will continue to monitor developments in this area to add further depth to their teaching.

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