Instructional Development for Knowledge Creation in Large-scale Classes

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Abstract: Large-scale classes are unavoidable, even indispensable in higher education. They are necessary in order to accommodate a large number of students at one time and to respond to their needs. Mere lecture style instruction is not effective to satisfy the diversity of the audiences' expectations. Teamwork and group discussions stimulate students into creating new images, clarifying their thoughts and developing models to express ideas and acquired knowledge. Instructional principles and models are developed in three sequential trial courses building on the following six guidelines; (1) one educational principle of the right to learn depending on one's capabilities; (2) two social views of the school as a learning community and a learning organization; (3) three developmental steps involving images, models and empirical propositions; (4) four school factors of educational ideals, teachers' competence, the realities and the constraints, (5) five learning principles of autonomy, collaboration, contribution, responsibility and respect, (6) six instructional components of meaning, activities, contents, environment, tools and outcome.

Introduction

Big lecture rooms in universities are designed to accommodate a large number of students and for disseminating the most recent academic and/or professional knowledge produced by a limited number of researchers. Recent developments in information and communication technologies and the outcome of practical research facilitates knowledge dissemination through TV, Web sites and other technological media on a global scale. At the same time, these new technologies and networks provide a means for facilitating knowledge production not only by researchers but also by students. Higher education is changing its role from transmitting knowledge unilaterally to producing it collaboratively with citizens to solve daily problems. Team working and group discussions are the most effective way to produce knowledge applicable to daily problems, such as environment, welfare, transportation, communication, etc. Higher education is expected to take on the responsibility for knowledge production. Large-scale lessons are indispensable for responding to social needs and providing efficient knowledge dissemination. A new style lesson concept for large classes other than lectures is needed to accommodate the diversity of audiences in universal higher education.

Japanese students are ready to absorb knowledge with a passive attitude, but reluctant to express their own ideas in front of teachers or peers in formal settings. On the other hand, they are very eloquent in informal setting and enjoy chatting with their friends. To strengthen their presentation capabilities in public and enhance their competence to become future teachers, an instructional method involving team working and group learning is under development in large class settings. Instructional principles and models are developed in three sequential trial courses building on the following six guidelines; (1) one educational principle of the right to learn depending on one's

capabilities; (2) two social views of the school's responsibility as a learning community and a learning organization; (3) three developmental steps involving images, models and empirical propositions; (4) four school factors of educational ideals, teachers' competence, the realities and the constraints, (5) five learning principles of autonomy, collaboration, contribution, responsibility and respect, (6) six instructional components of meaning, activities, contents, environment, tools and outcome, plus a 6x6xN group formation and instructional management.   The above-mentioned items were gradually formed during a sequence of experimental instruction episodes titled 'Introduction to Instructional Technology' and 'Introduction to Instructional Design and Analysis'.

Toward Autonomous Learning and Knowledge Creation during Teacher Training

Japanese teacher training programs have been strictly controlled by the national government's standards and required a certain number of credits in a variety of subject matters for teacher certification. The training system follows the conventional knowledge transmission model and produces teachers as knowledge transmitters.   The complicated daily home life and school life, however, require teachers in reality to be problem solvers.   When we try to develop an entirely new instructional procedure in these conservative circumstances, we should start from conventional teaching with the intention of minimizing the possible defects of the new attempt on students while trying to persuade our colleagues of the new approach's value.   We need to show the relevance of new attempts over the conventional teaching style, as well as their innovative features for the future development of education.   Three stages for the implementation from conventional teaching to autonomous and creative learning is introduced in this paper.

When student teachers develop lesson plans, they feel a great difficulty to start from a description of educational goals and go on to predicting learners' activities vividly.   It is hard for them to proceed from the instructional designing that is based on the National Course of Study to organizing learning events in order to attain some instructional goals.   Students' heads are filled with their experiences as learners themselves in elementary and secondary schools already; they have their own set images concerning school life, classes and teachers.   Creative ideas start from ambiguity and proceed to more concrete concepts.   Students therefore could start expressing images and describing them in a form of graphic representation with their primitive concepts of instruction based on their past experiences. Starting from this reality, students work in teams and create instructional modules for teaching practices enhancing these primitive ideas and assumptions.   To guide their autonomous team activities, the following six items were gradually developed during the course of the lessons.

(1) One educational principle: the right to learn depending on one's capabilities

The Constitution of Japan maintains as follows:

Article 26:   All people shall have the right to receive an equal education corresponding to their ability, as provided by law.

The strong governmental policy for promoting a national education has hampered the development of teachers' initiatives while strengthening their passive attitudes towards the instructional planning needed for an entirely new situation.   Students also tend to think of education as their duty rather than their right.   It is indispensable to transform this attitude into an autonomous decision in order to plan their learning.   Japanese education is still of a paternalistic nature, from elementary to higher education.

(2) Two social views: the learning community and the learning organization

The school has two aspects of a community and an organization.   The community aspect tends to be stable and maintains its cultural heritage, while the organization part acts as an agent to enhance its own functions and renovate them.   The school is expected to be a learning center for its community and to alter any conservative features to correspond to society's changing, growing needs

and the learners' expectations.
(3) Three developmental steps: images, models and empirical propositions

   The traditional procedure for developing instructional programs starts with the instructors identifying educational goals and instructional objectives. When students fully expect to identify these goals and the meaning of learning, instructors have to clarify their expectations and explain the meaning. To develop the instructional process, instructors have to express ambiguous images at the beginning, then clarify them gradually in accordance with the students' progress, identifying the real learning events and describing them in the form of models and empirical propositions. These images, models and propositions are modified repeatedly during and after the classes, stored in a computer and utilized to design the next lessons.

(4) Four school factors: educational ideals, teachers' competence, realities and the constraints.

   School education is too complex for novice teachers to be able to describe its relevant factors. Education students will be expected to plan a virtual school, but limited to taking these four factors into account. Educational ideals should correspond to teachers' competence and the realities that schools always face, including countless constraints.

(5) Five team learning principles, ACCRR: autonomy, collaboration, contribution, responsibility and respect.

   To change the students' present passive attitude into one of active learning, five principles are introduced from the beginning of the courses and repeatedly referred to during the semester.

(6) Six instructional components, MACETO: meaning, activities, contents, environment, tools and outcome.

   The instructional process is very complex. It is hard to design one fully from the beginning. Using this list of components stored in an Excel file can suggest the elements to be considered in instructional designing.

(+) Plus 6x6xN formation, or 6 students in 6 teams, which form a cohort, and N cohorts are simultaneously managed in a class by using ICT.

The above-mentioned six items gradually emerged during three empirical trials. This study has a twofold objective. One is to confirm its own validity and the other is to implement it as a legitimate teacher preparation program. The framework was intensively examined over the last three years to test its validity in the 'Introduction to Instructional Technology' and 'Introduction to Instructional Design and Analysis' courses. The first stage started with 228 undergraduates, and advanced to a course for 78 students in a laboratory amply equipped with computers and finally to a course for 108 students in an ordinary classroom and a small computer laboratory.

Three Instructional Trials

   Three steps took place to convert the introductory lesson from a conventional teaching mode to knowledge productive learning. The common goal of these trials was to encourage students in these courses to propose a virtual school for teamwork and an example of a lesson plan for individual student to conduct a class on a specific subject or topic.

(1) The first stage: (see Figure 1a and 1b)
   Subject: 'Introduction to instructional technology 2000'
   Number of students: 228
   Lesson: fifteen lessons on Fridays 16:10-17:40
   Capacity of Classroom: 300 seats for lecture style instruction
   Facility:, one computer and portable projector
   Aims of the first stage: to keep participation active and a high rate of student attendance

In this course, each team produced a virtual school and tried to clarify its educational aims, the facilities available in the school, a timetable of lessons and other details.   They also referred to homepages of different schools on the Internet and had direct contact with actual schools resembling their virtual schools.   They tried to express their perceptions using illustrations and figures.   This first stage focused on keeping their attendance over ninety percent during the whole term.   I avoided providing an overwhelming amount of information or forcing the students to receive and understand the meaning of what was presented.   They were expected only to express their ideas of a virtual school and develop a lesson plan.

The 228 students were grouped into 6 large divisions containing 6-7 member teams which worked independently from the others.   Within each cohort of 6 teams, they exchanged ideas in the form of poster sessions, presenting their works on the walls of the classroom in the midterm of the course before they proceeded to the next individual work on lesson planning.

(2) The second stage: (see Figure 2)

Subject: 'Introduction to Instructional Design and Analysis'

Number of students: 78

Lesson: fifteen lessons on Fridays 10:40-12:10

Capacity of laboratory: 93 seats in a computer laboratory

Aims of the second stage: to confirm the effect of computer utilization and networking for group-work and judging the quality of reports

In this course, computer facilities were amply provided and each student could enjoy sufficient opportunity of using PowerPoint and Word to express his or her ideas.   In spite of such an ideal technological setting, their images of virtual schools were not rich in comparison with those generated in the first stage.   In this configuration of computers, students' discussions were not heated or sufficient to generate new ideas.   This experience showed that group discussion is indispensable to create new ideas of a virtual school; adequate technological facilities do not necessarily guarantee a high quality of instructional products.

(3) The third stage: (see Figure 3)

Subject: 'Introduction to instructional technology 2001'

Number of students: 108

Lesson: fifteen lessons on Thursdays, 14:30-16:00

Capacity of Classroom: 200 seats in a lecture room and 40 seats in a separate computer laboratory

Aims of the third stage: to ensure effective team working and quality reports on the design of a virtual school, and examples of a lesson plan on a specific subject or topic.

This course was conducted in an ordinary classroom equipped with a projector and screen with about forty computers in a laboratory apart from the classroom.   Mobile phones were used to communicate with each other in order to adjust work meetings out of the classroom for exchanging ideas. The experience in the third stage suggests that the most productive outcomes result from the optimal combination of lecture, team working and individual work by using computers, mobile phones and walls for poster sessions.

Conclusion

Information and communication technology and science on teaching and learning enabled us to develop an entirely new style of instruction for coping with a great number of students having different experiences and variable interests.   Lecture style instruction is neither attractive nor effective for active attendants to produce new knowledge.   A sequence of instructional trials showed that student discussion in teams stimulates creative learning and produces a visible and viable instructional outcome

in university teacher training courses.

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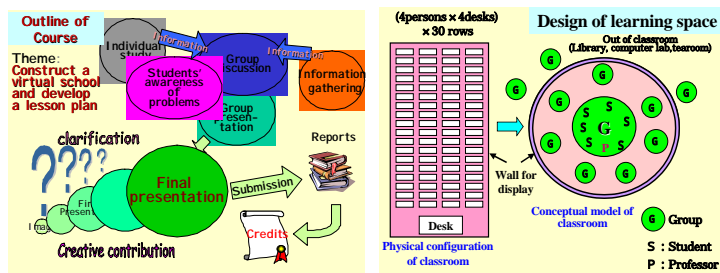
Figure 1a   Outline of course and learning space in the first trial

Figure 1b   Group discussion and the first poster session in the first trial
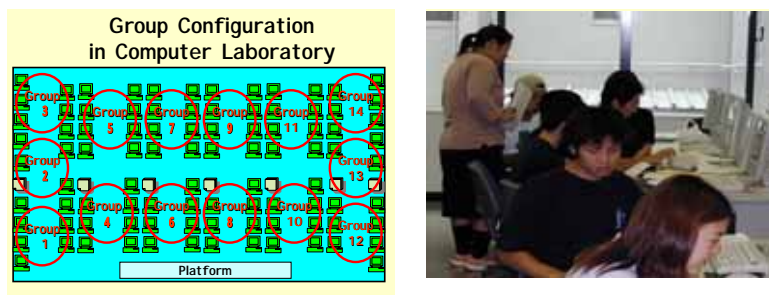

Figure 2   Computer laboratory and team working in the second trial

Figure 3   Team working and the first outcome in the third trial