

DISTANCE LEARNING AND EXCHANGE OF SCIENTIFIC KNOWLEDGE VIA INTERNET

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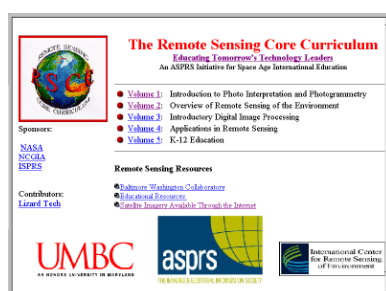
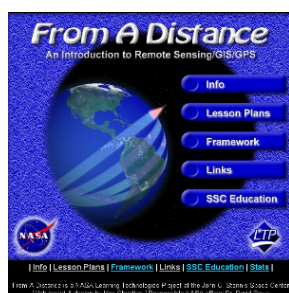
KEY WORDS: CAT/CAL, Teleconference, Photogrammetry, Remote Sensing**ABSTRACT**

As chairs of the ISPRS Working Group VI/2 "Computer Assisted Teaching(CAT)", the authors have been trying various ways to utilize computer/Internet technology for education. At Aalborg University, Joachim Höhle is performing distance learning for remote sensing as well as photogrammetry. The both way communication with Internet is changing the style of distance learning. Höhle proved the advantage of using Java technology for allowing people to use CAT/CAL software freely on Internet. In Tokai University, Kohei Cho has been investigating ways to exchange knowledge among the scientists/students via networks using videoconferencing technology etc. These experiences strongly suggest the advantages of using Internet for education.

1 INTRODUCTION**1.1 Educational Materials on Internet**

Internet is dramatically changing the situation of education. Nowadays, various kinds of educational materials are on Internet, and anyone can access to suitable information by using search engines such as yahoo. Moreover, not a few web sites on Internet are well prepared for education. The WWW technology allows educators as well as students to access to educational materials spread all over the world.

For example, NASA Learning Technologies Project(LTP) web site (<http://learn.ivv.nasa.gov>) is a good entrance for accessing educational materials and resources related to NASA. Especially, "From A Distance" web site within LTP (<http://education.ssc.nasa.gov/ltp/Default.htm>) is well prepared for the education of remote sensing, GIS, and GPS. Practical lesson plans for Grades K-3, 4-8, 9-12 are presented, and teacher approved web sites are listed. The Remote Sensing Core Curriculum(RSCC) web site (www.umbc.edu/rscc) is another good example. It is a kind of online textbook for remote sensing and photogrammetry. Even though, you don't have any educational materials, you can teach or learn remote sensing, photogrammetry as well as GIS using these educational materials on Internet. Of course, sophisticated educational materials can also be provided with CD-ROMs (Cho et al. 1999). However, there are several advantages of Internet against other media. One is the actuality of the contents. Since the contents can be revised at any time, students can see latest information/news of the subject. Another advantage is accessibility. Since Internet is connected to various web sites, students can easily jump to other web site just like looking other pages of the test book.



(a) NASA/From a Distance

(b) Remote Sensing Core Curriculum

(c) Hong Kong Baptist University

Figure 1. Well prepared web sites for education

1.2 Distance Learning on Internet

Now a days, "distance learning" is often used to describe education via Internet. However, distance learning have many meanings and definitions. The United States Distance Learning Association (USDLA) defines distance learning as "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (http://www.usdla.org/02_definition.htm).

Distance learning in the past used to be something like the following: A teacher on the one end is speaking to a microphone or to a video camera, and the students are listening or watching it with radio or TV monitor on the other end. This classic approach has been dramatically changed in the times of the Internet and multi-media. Distance learning is no one way communication anymore. Nowadays, videoconferencing technology allows a two-way communication between a teacher and students with audio, video and shared whiteboard. Computer Assisted Teaching/Learning (CAT/CAL) software can be used on various computers connected to internet by the use of the Java technology (Höhle 1999). Interactive is the keyword for distance learning via Internet.

2 INTERACTIVE DISTANCE LEARNING

The self-teaching using the educational materials on Internet is popular, but it is rather a passive approach in distance learning. In this chapter, the authors would like to explain about more interactive approach in distance learning.

2.1 Distance Learning Course at Aalborg University

The course "Remote sensing and image processing" is a part of a distance learning education in "Geoinformatics" at Aalborg University which lasts 2 years and finishes with a "Master degree" in Technology Management. The education uses the Internet and the computer conference system "First Class" for communication between the teacher and the students and between the students. In addition to various other courses several weekend seminars, excursions and project work are part of the education (Sørensen, 1998). The course material consists of literature (textbooks and articles), interactive learning software, Orto and LDIPInter (<http://sunsite.auc.dk/LDIPInter>), and series of questions distributed via the Internet. After studying the course material the students answer the delivered questions and respond via the computer conference system to the teacher who evaluates the solutions and returns answers or corrections. The course finishes after three weeks with an examination which also takes place on the Internet. In addition to the various courses two projects have to be carried out by a group of students. The GIS related projects can include remote sensing and image processing topics as well. The master education is designed for professional people in practice. It requires about 20 hours of study per week which usually has to be done beside job work. The course material is in Danish and English, the communication and examination are, however, in Danish. The course is part of the live long education strategy for Danish chartered surveyors and currently takes place for the third time.

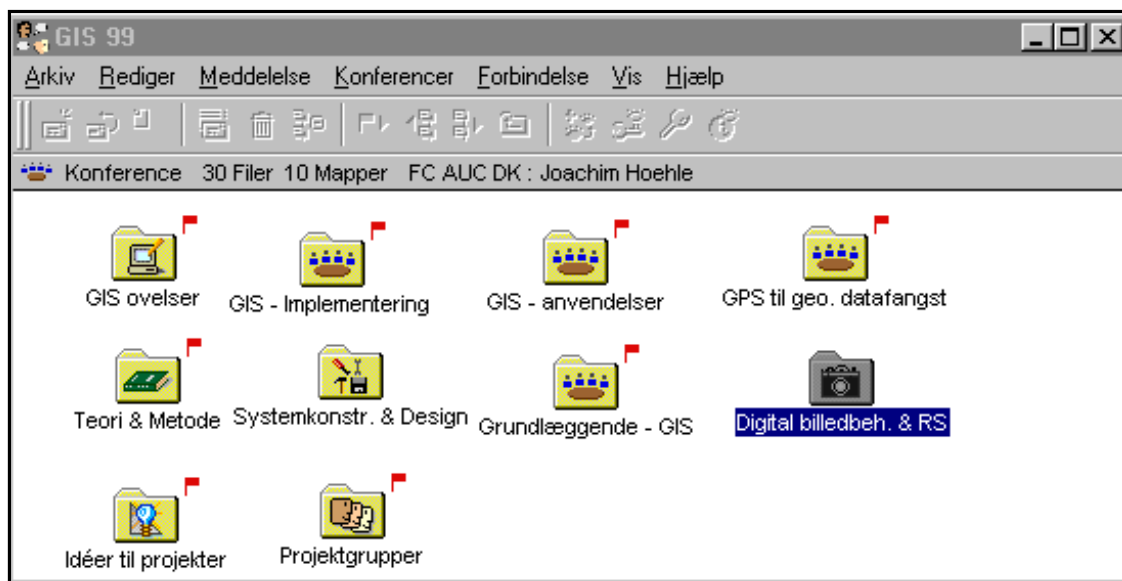
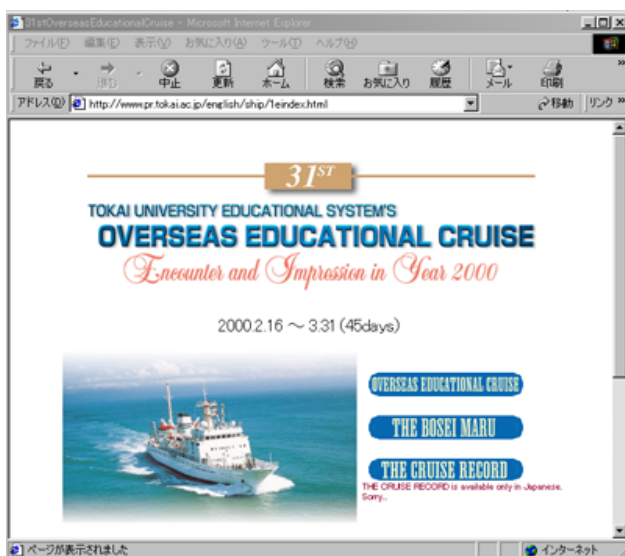


Figure 2: User interface to the conference system "First Class". (The red flags indicate that new mail has arrived in a conference or folder. By means of a function "History" it can be seen if the mail has been read by the person it was sent to.)

2.2 Overseas Educational Cruise Web Site at Tokai University

In order to encourage students to experience life on the ocean and foreign cultures, Tokai University Educational System is organizing overseas educational cruise almost every year. Teachers and students make friendly visits to foreign countries with university-owned Research and Training vessel BOSEI MARU and experience foreign cultures and circumstances. Various lectures and events are scheduled during the cruise. This year the Cruising was performed during February 16 to March 30 and visited Southern Pacific Islands such as Pohnpei, Samoa, and Tahiti. The daily report from the cruising team was uploaded to the university web site (<http://www.pr.tokai.ac.jp/english/ship/index.html>) via INMALSAT. Moreover, using GPS and remote sensing technology, the location of the vessel was plotted on the GMS(Geo-stationary Meteorological Satellite) image and was also uploaded to the web site every day. So anytime, the students in Japan who were not attending the cruise could know what was going on at the cruise, and how was the cloud cover of the area. The students in Japan also can upload the ideas or impression to the web. This is a kind of global classroom. The Students in different places could share the experiences and knowledge using the web.



(a) Title page



(b) Lectures on the vessel



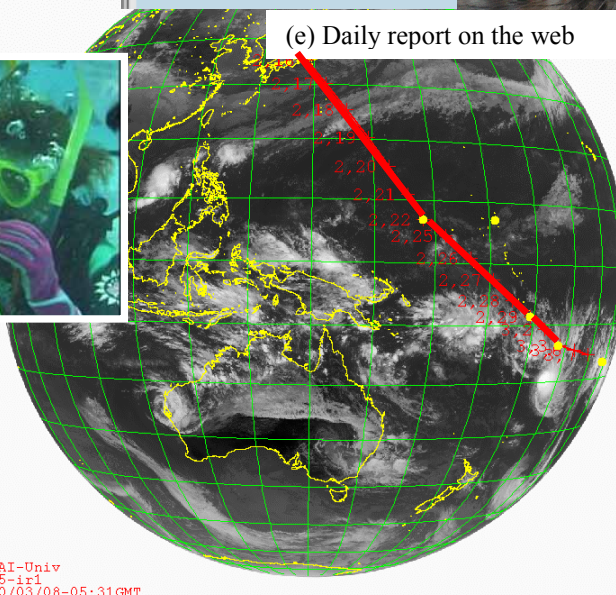
(c) Scuba diving



(d) Foreign cultures



(e) Daily report on the web

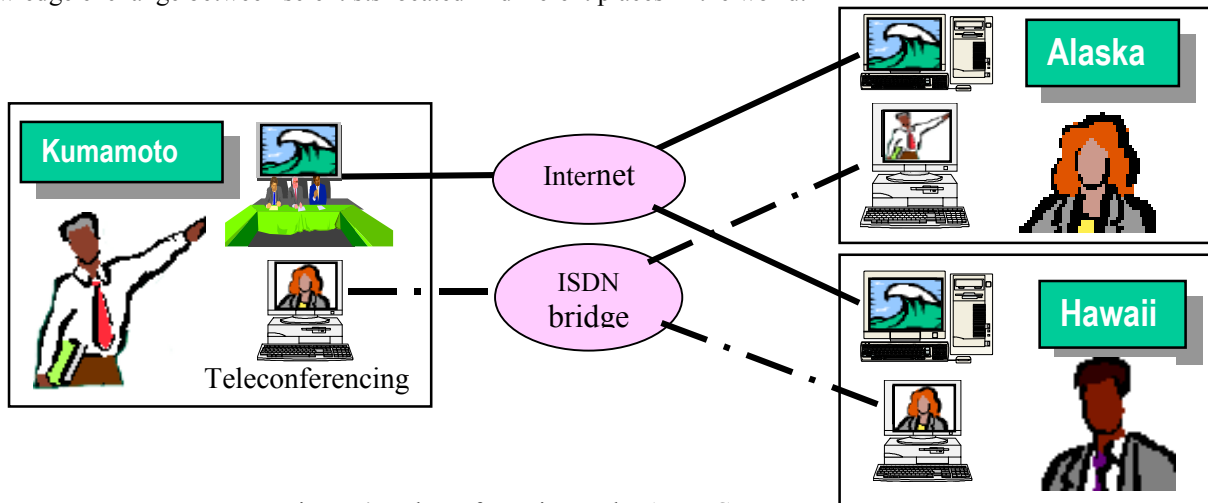


(f) The rout of the vessel overlaid on the GMS image

Figure 3. Various information on the overseas educational cruise web site at Tokai University.

3 TELECONFERENCING FOR KNOWLEDGE EXCHANGE

These days, teleconferencing or video conferencing is becoming very popular with the use of ISDN or Internet. Even the attendees of the conference are in various places, they all can get gather and exchange information and knowledge by using teleconferencing technology. The Tokai University Educational System (TES) organizes the Asian and Pacific University Presidents' Conference, a forum for leading scholars to gather and discuss global environmental issues, every two years. The attendees are from various countries, and it is not easy for all to get together. To improve the situation, TES have started to use teleconferencing technology at the conference since 1997. In January 1999, the seventh conference was held in Kumamoto, Japan. At that time, Alaska, and Hawaii were connected to Kumamoto for teleconferencing. Interesting demonstration was performed between Alaska and Kumamoto. Roger Hansen of the University of Alaska was giving a presentation at the conference place in Kumamoto concerning the tsunami simulation, while his assistant was commenting from their campus in Alaska using teleconference system. Some examples of 'Tsunami' simulation were demonstrated using their web site. Finally, Hansen requested his assistant to do the real time simulation using super computer in Alaska assuming that an earth quake occurred in Alaska. About one hour later, before the closing of the conference, the simulation result was uploaded on the web site and was demonstrated at the conference place. The result showed that the 'Tsunami' might arrive to Japan within a hour, but the damage was estimated to be less than Hawaii. The scientists in Kumamoto and in Hawaii commented on this simulation and some discussion followed. This kind of demonstration does appeal participants the advantage of teleconference for knowledge exchange between scientists located in different places in the world.



□□□□□□□□ Figure 4. Teleconferencing at the APUPC

4 CONCLUSIONS

As chairs of the ISPRS Working Group VI/2 "Computer Assisted Teaching (CAT)", the authors are trying/researching various ways to utilize computer/Internet technology for education (Cho et al. 1997). As described in this paper, Internet has become one of the main media for education. There are various kinds of educational materials on Internet, and more possibilities in the future. But the quality or levels of those materials are quite different. A certain guideline for the preparation and evaluation of good educational materials may be needed in the future.

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