Practice of International Distance Learning between Three Points of Japanese and Korean Middle Schools using DVTS

Abstract

In this paper, we practiced a international distance learning about energy problem between three points of Japanese and Korean middle schools using DVTS on the gigabit network, translation chat and Web-GIS. Consequently, the followings are obtained. Domestic DVTS communication got high quality picture. Students and teachers' evaluation about availability was very high.
**Introduction**

According to an advancement of ICT (Information and Communication Technology), we can use DV (Digital Video) movies and connect the Internet from everywhere with broad band. These trends make a learning more activated such as practical class work[1] using gigabit network and high quality DV movies, and an experimental study[2] about an educational evaluation of deteriorated DV movies for distance lecture.

By the way school students need an international viewpoint beyond the sea and a global thinking in order to solve the Earth Environment. Problem and the Peace of the World. So, we should study these applied research which it is possible to realize using advanced technologies. On the other hand, a distance learning between some countries have important problem about language for conversation, learning materials and learning content etc. Additionally the distance learning between over two locations need a main teacher for development of class work. If it is possible the main teacher would rather locate another venue than the place of students sitting for the sake of keeping equal footing.

Consequently we practiced the three points international distance learning of environment education using gigabit network and high quality movies between Japanese and Korean middle schools. And we used Web-GIS as educational materials, translation chat as blackboard and human translation. In this paper a case study of applied technology was written for the effective learning.

**Methods**

**Concept of this class**

We show Fig. 1 as a concept of this class. This class was constructed from three venues for the following reason. Generally speaking main teacher is needed for the sake of control center that decides speaker order and timing of the class development on distance learning. However that roll makes a difference of position according to involve the main teacher. That is, main teacher's students have a consciousness of master class and other teacher's students have a consciousness of slave class. According to this point, equal footing both of them is not keeping, thereby their opinion and comment are influenced. Consequently main teacher should be located another place except for students' places.

Then three venues are the following: Japanese side middle school was Attached Middle School of Faculty of Education, Nagasaki University. Korean side middle school was Attached Middle School of School of Education, Chonnam National University and main teacher was located Faculty of Information Science, Kyushu Sangyo University. And Nagasaki side subject name of this class was called "life environment" and included fifty two students, their grade was second, and two school teachers. On the other hand, Gwangju side was special class constructed for this events and included thirty three students, their grade was from first to third, and three school teachers. In addition Fukuoka side had the following three men; a main teacher, a translator and an expert of electric power in order to give some comments.

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**Fig. 1  Image of this class**
Network and System

We show Fig. 2 as network environment. As you can see this figure, we utilized the following network; JGN(Japan Gigabit Network)[3], QGPop(Kyushu GigaPOP Project)[4], Genkai(Genkai-Hyeonhae Gigabit Network)[5] and KOREN(Korea advanced REsearch Network)[6]. So, we could connect between Nagasaki University and Chonnam National University by gigabit network and communicate each other with DV movie called DVTS(Digital Video Transport System). Of course Kyushu Sangyo University was connected to the QGPOP. However unfortunately both of middle schools were connected with 100Mbps.

Then we constructed the system for switching and mixing video streams indicated Fig. 3. By this construction, Nagasaki University and Chonnam National University were available to communicate with a pair of DVTS. In this figure, Kyushu Sangyo University received movies from Nagasaki and Korean sides, and sent to two sides movies created by switching and mixing three venue's pictures.

Details of DV movie and audio systems on this distance learning is shown at Fig.4(a)(b). As you can see Fig.4(a), DV movie received with PC indicated "DVTS Receiver from ChNU" and "DVTS Receiver from NU". And these DVTS streams were transmitted to the video mixer via "DV Deck" and IEEE1394 cables, and displayed to the TV monitor. On the other hand these DVTS movies were mixed or switched by operator and this processed movie was sent to two sides with PC indicated "DVTS Sender to ChNU" and "DVTS Sender to NU" via "Media Converter" and IEEE1394 cables. In the next place, Nagasaki/Gwangju system is shown at Fig.4(b). As you can see this figure, DV movie was received with PC indicated "DVTS Receiver" from Kyushu Sangyo University via network and this venue's picture that two DV cameras pictures were switched by "Video Switcher" and transmitted PC indicated "DVTS Sender" via "DV cam" and IEEE1394 cables. In addition three venues' audio were created by "Audio Mixer Echo Canceller etc.", so we could get clear sound.
Also these DVTS streams' traffic were measured with tcpdump at each venue and all of movies sending and receiving at each venue were recorded by DV decks or DV cams.

Learning Content and Materials
We held two days distance learning. First day students exchanged each other about school introduction and Q&A using this system, and second day they discussed each other seriously about the future of energy.

In second day's class we picked up the problem of an electric power energy as the content for Environment Learning because we thought that this electric power problem was able to discuss globally beyond the each country. Then a object of this class was set like this "Lets think future of energy beyond the sea!". Learning development was like this, students watched graphs of electric power generation ratio about few countries involved their own country, after the discussion students made a presentation of their opinion each other with two-way DVTS movie. Students also discussed an electric power generation and made a presentation of their opinion each other.

At this moment, learning materials with the Web-GIS is shown as Fig.5. This figure indicate example of the data about ratio of electric power generation in Japan. We supposed to assist students thinking actively with Web-GIS maps and data created by our staff according to show these maps on the screen for each side students. In addition, these Web-GIS was made with easy English and Kanji character which were possible to read by students. However Web-GIS operation was executed by our staff.

Translation
We utilized a translation method with human translator for conversation between two languages. Human translator stood by main teacher at venue of Fukuoka. So this translator made possible two-way real time translation smoothly.

Then according to the translation chat system, developed by KEPCO(Kyushu Electric Power CO., inc.), was made us possible to share a class work information as the anyone readable blackboard except for difference of language. At this moment an example image of the translation chat is shown at Fig. 6. This system made possible to display automatically translated words and sentence written by Japanese or Korean languages. This system's operation was also too easy, so we made students input short sentences for their opinion and results of discussion.

Results
Bit Rate and Picture Quality
In this study we could get some results. A relation between elapsed time and bit rate is shown at Fig. 7(a)(b) on first day distance learning. Fig.7(a) means that this bit rate was indicated the traffic measured on KSU(Kyushu Sangyo University) from KSU to NU(Nagasaki University) and from NU to KSU. As you can see this graph two traffics consisted with each other and indicated 29Mbps. So we can say that a packet loss hardly saw between KSU and NU. This tendency was also observed second day's class. In addition the DVTS stream generally need a bandwidth about 29Mbps. The example of DVTS picture observed at KSU is shown as Fig. 8. As you can see this picture was very clear and we could not see a noise. As well this picture was painted by author to remove his name on the hanging name sheet for keeping his privacy.
In the next place Fig.7(b) means that this bit rate was indicated the traffic measured on KSU from KSU to ChNU(Chonnam National University) and from ChNU to KSU. As you can see this graph the bit rate from ChNU indicated 6Mbps and the bit rate to ChNU indicated 8Mbps. Unfortunately we could not get enough bandwidth between KSU and ChNU, between KSU and NU was same, so DVTS stream was transmitted as keeping low frame rate. The frame rate was set with 7fps each other. This graph means that if sending bit rate was equal, the packet loss was equivalent to 2Mbps. In this moment we show the example of DVTS picture from CHNU to NU via KSU and recorded at NU at Fig.9. As you can see this picture, picture quality was not so bad. This means that as mentioned above the DVTS movie's frame rate was low, however the picture quality of one frame was high. So we could not observe so many noises.

Subjective Evaluation with Questionnaire

We could get a questionnaire after the second day's class at NU venue. That results are shown at Fig. 10. Items of "Usefulness", "Convenience" and "I want to use" indicated high score, so we can say that our distance learning classes got high availability. In the next items of "Translation Chat", "Easy to speak" and "Communication gap", students(Learner)' scores were comparatively high than teachers'. This means that students talked about real Korean, so they evaluated highly caused by their emotion through experiences. On the other hand teachers evaluated not so highly. Especially items of difficulty caused by difference between languages evaluated severely. This means that teachers evaluated from the view of needs for real learning. Method for breaking down the difference of language is one of our important problem. Lastly items of "Picture quality" and "Smoothness" got average scores.
However, this point is not so difficult, because network technology is advancing very quickly and near future a bottleneck of the bandwidth is going to clear. caused by many researchers have a interest.

**Conclusion**

We practiced international distance learning about exchange and energy problem using DVTS, Web-GIS, translation chat and human translator between Japanese and Korean middle schools. Consequently, the following results were obtained.

- We practiced international distance learning about environment education using high quality movie through gigabit network, human and chatting translation system between Korea and Japan.
- Domestic DVTS communication got high quality picture.
- Students and teachers' evaluation about availability was very high.

Through this research we got big results and a problem related to break down the wall of language.

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**Reference**


