

## A Note : Information Education \* 1

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### Summary

On the first part, we note a meaning of information ability (information literacy), historical outline of policy for developing it, school subject of "Information", and information education in Japan.

On the other part, we note concepts of Internet, preparedness of schools with computers and with connection to Internet, and practical education with Internet in America and in Japan. At last we consider on the school education in nearly future.

### I. Developing an ability to use information

#### 1. Concept of "ability to use information"

The ability to use information consists of three parts as follows: 1) practice of information use (information literacy), 2) scientific understanding of information, 3) aptitude as a participant to informatized society. These view-points were presented in the last revision of the National Education Standard by the Ministry of Education, Science, Sports, and Cultures (MESSC).

#### 1) Practice of information use (Information literacy)

This is the ability to collect, judge, process, present, create information, to transmit and communicate information and to adjust it to suit a specific receiver. It is also necessary to select a medium of delivery appropriate to the task or a purpose.

It is important to understand that this ability is connected to using information but not to the use of a specific instrument of information. In the process of acquiring this skill, we must practice a series of information operation such as collection, judgement, processing, presentation, creation, transmission, and communication. A teacher needs to help a child solve willingly his/her concrete problem concerning information processing. Because children respond to information which is practical, they will know if the collected information is useful, and if the medium selected is adequate. There is a great variety in the ability of students to elaborate on

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and transmit information. At first, child needs to be trained in using the information instrument, but at higher level, he/she must plan, execute, and evaluate the information collection, processing, and presentation in every school-task.

## 2) Scientific understanding of information (Ability of understanding the information process)

The ability to understand the information process is concerned with understanding properties of information media as a foundation of information use, understanding the basic theory and methods to manage information appropriately, and evaluating and improving the student's use of information.

A teacher needs to help children understand scientifically a basic principle or theory concerned with information and its technology. Children are expected to comprehend the mechanism of the computer and the Internet system. It is not only for the sake of using the system, but also to have wisdom to consider the direction for improvement of information technology by comparing the system. Children can self-estimate how appropriate the medium and method selected, and they can improve their choice themselves. Concerning to the contents of information knowledge, they must learn subject Information as an required subject in junior and senior high school.

## 3) Aptitude as participant to informatized society (Information morals and ethics)

Here we concerned with understanding roles and effects of information and its technology in social life. We must teach responsibility and a morality for using information with consideration of ethical and moral principles to participate in creation of desirable informatized-society.

Children must learn 1) positive and negative effect of the use of informatization on individuals and society, 2) their role in an information society which is complex. Informatized society is consisted of the network of information. The more information which is exchanged on the network, the more possibility of economical or legal problems occurring. There can be serious unexpected effects when computer system are mishandled or when networks are disturbed by malicious tampering with information systems. They point out that there are happened on the network misunderstandings which occur hardly in everyday communication as face-to-face. In today's world, it is necessary for individuals to know how to communicate morally and responsibly using information technology.

One of the aptitudes as participant to informatized-society, that is, comprehension on the role and effect of information and information technology in daily life, is mainly contented in a new subject "Information". On the other hand, it is planned for children to learn ethics or responsibility for information from early stage of an elementary school.

## 2. Historical outline of policy for improving the ability of students to use information technology

### 1) In 1983

In October, the Education Contents Department of the National Education Council reported "power of self-education", that is, "power to acquire will, volition, aptitude, ability, and learning-method to learn volitionally by one-self." In the further school, they asserted it would be important to educate the power of self-education. For the purpose, they pointed out the followings:

- a) Strong will or volition to learn volitionally without flinching from difficulty.
- b) Ability to investigate actively method of solving a problem.
- c) Ability to set a purpose volitionally, to select, and to use appropriate information.

d) Acquisition of learning method what and how to learn.

2) In 1985

In March, the Education and Broadcasting Department of the Social Education Council reported basic policy of computer-use in school education as titled "On micro-computer-use in school education".

In June, the primary report of the Temporary National Education Council asserted necessity for educational policy of informatization.

In August, the primary report of the Investigation Council on Primary and Secondary Education for Informatized Society asserted basic idea of computer-use in school education as followings:

- a) Realization of essential purpose in school education.
- b) Developing of new disposition for information.
- c) Computer-use according to developmental stage.
- d) Activation of school by using of various media.

In December, the Educational Media Department of --- reported the basic policy for classification and development of educational computer-program in the report "Development Policy of Educational Software".

3) In 1986

In April, the secondary report of the Temporary National Education Council reported three basic rules for the informatization in school, and ability to use information.

In October, the middle report of the Temporary National Education Council asserted 1) to set a unit "Information Base" in subject "Technology and Home-making" in junior high schools, 2) for the board of directors to be able to set a new subject or course in high schools.

4) In 1987

In April, the tertiary report of the Temporary National Education Council reported a concept of "intelligent school".

In the same month, the Educational Media Department of --- asserted a national network of educational information by the "new media", in the report titled "Life-long-learning and New-media".

In December, the main report of the Educational Curriculum Council asserted 1) to develop the ability and aptitude for using of information media like a computer, 2) to teach computer and its operation appropriately according to their development stage, 3) to teach information and its media isolated from the Education Standard.

4) In 1988

In August, the report of the Temporary National Education Council asserted the most important tasks of contemporary education to be solved.

5) In 1989

In March, the newly revision of the Education Standard asserted necessity of computer education and computer-use in many educational subjects.

6) In 1990

A Manual of Information Education published by MESSC defined "ability of information-use" as individual's ability to select and to use information and its media in volition.

The ability is consisted of following four aspects;

- a) To estimate, select, arrange, and process information, and to create and communicate a new

information.

b) To understand the nature of informatized society, and the effect of informatization on society and human.

c) To comprehend importance of concept "information", and to take responsibility for using information technology.

d) To understand the basic aspect of information science and the basic structure of computer, and to acquire the basic operation.

In June, the Educational Media Department of ---- published "A standard curriculum for training of audio-visual education media", and asserted for teachers to be trained to operate a computer as an educational media.

7) In 1993

The Conference on facilitation of improvement in senior high school education published "The forth report of improvement in senior high school education ---- a course of Integrated Study", and asserted "Integrated Study" Course as the third course deferent from the Standard Course and the Vocational Course in senior high school.

8) In 1998

The Conference of investigation on essentials of primary and secondary education for the informatized society asserted clearly concept of "ability to use information" as the purpose of information education. It is consisted of three items; 1) practical power of information-use, 2) scientifically understanding of information phenomenon. 3) aptitude to participate into the informatized society.

In December, the sixth revision of Education Standard in elementary and junior high school was published, and it must be enforced at spring, 2002. The period of "Integrated Study" will be perfectly enforced in 2002. The unit of "Information Base" will be obligatory to subject "Technology and Home-making" in junior high school.

9) In 1999

In March, the Education Standard in senior high school was revised and it's standard will be enforced in 2003. A subject "Information" will be obligatory in the Standard Course. High school students will have to select at least one of three subjects; "Information A", "Information B", and "Information C". "Information A" contents 1) to understand information system and to elaborate to use information, 2) to collect and communicate information by using a computer, 3) to use integrated application software, 4) to know computer's development and alternation of life-style. The half or more of these contents are realized practically. "Information B" contents 1) to use a computer for problem-solving, 2) to understand computer architecture and its function, 3) to make a model to solve a problem and to use a computer for it, 4) to acquire information technique for the informatized society. One third or more of all classes are realized practically. "Information C" contents 1) to understand the process of information-digitalization, 2) to understand the computer network and to use the system, 3) to collect and communicate information and to aware one's responsibility for using the system, 4) to understand the effect of the informatization on our society. One third or more of all classes are executed practically.

On the Web-page of the answer for the Q57 in "Part 2 Educational Reform QA" in the MESSC's home page, they say as followings; "All courses will also focus on the rules and manners required in the information society. The major difference with other subjects is that

practical learning to use computers and the Internet will be emphasized. Depending on the course, more than one half or more third of total class hours will be allotted to practical studies."

### 3. Developing the abilities in every subject of school education

#### 1) Computer education and four aspects of the abilities

a) Abilities to judge, select, and process information and to create and communicate with new information.

In subject "Japanese", it is purpose to develop abilities to comprehend contents of a speech or sentences, abilities to make summary appropriately for the corresponding to the purpose and needs, abilities to collect necessary information and abilities to consider one's thought.

In subject "Sociality, Geography-history, and Public", it is purpose to improve abilities and aptitude of collecting and selecting various materials for the contents of learning task.

In subject "Arithmetic and Mathematics", it is purpose to develop abilities to understand correctly the number, the figure, and the function, and abilities to collect necessary information, abilities to process it suitably, and abilities to judge it appropriately.

In subject "National science", it is purpose to understand a series of procedure as collecting, processing, data through observation and experiment, and to do problem-solving by using computer for information retrieval, measurement, and information processing.

In subject "Drawing and Handicraft", it is purpose to improve abilities to create and communicate a new information by using computer application-soft for design.

In subject "Technology and Home-making", it is purpose to develop abilities to select information by using various application-soft, and abilities to use a computer as a means to solve a concrete problem on daily life. Especially in subject "Home-making" of senior high school, it is purpose to understand a relation between information and daily life, to improve abilities of selecting suitable home-information, and to use it.

In subject "Foreign Language", it is purpose to develop abilities to communicate through the Internet.

In subject "Special Activity", it is purpose to improve abilities of information-selection, -processing, and -concluding through a class as using school-library, and carrier-guidance.

b) Understanding feature in information, and effect of information on a society and individuals.

In subject "Society", it is purpose to develop abilities to understand informational communication in society and effect of informational development on a society.

In subject "Health and Physical Training", it is purpose for children to understand effect of use of informational instrument as computers on human being.

In subject "Technology and Home-making", it is purpose for children to understand a role and effect of informational instrument as computers on daily life and industrials.

In subject "Home-making" (high school class), it is purpose for students to understand a role and effect of computer on housing system.

c) Recognizing importance of information, and being aware of responsibility for information

In subject "Society", it is purpose for children to understand importance of information.

In subject "Moral", it is purpose for children to respect one's and other's rights.

In subject "Special Activity", it is purpose for children to know appropriate application of information.

d) Understanding basic information science and features of information instrument (computer), and having abilities to use information.

In subject "Math" (junior high school class), it is purpose for pupil to understand presenting calculation procedure as a flow-chart, and presenting-method as binary digit or  $b \times 10^n$ .

In subject "Math" (high school class), it is purpose for student to learn "calculation and computer", "calculation method and computer", and "application math and computer".

In subject "Natural science" (junior high school class), it is purpose for pupil to understand developmental process of computer as informational instruments.

In "Natural science" (high school class), it is purpose for student to learn communication, processing, and creation of information in subject "Physics" class (1-A).

In subject "Technology and Home-making", it is purpose for student to understand a role and function of computer within manipulating it, and to be able to make some simple programs by improving one's ability for appropriate use of information.

2) Basic concept to use computer as an instrument of schooling

a) Why should a computer be used?

(1) Bringing up power of self-education

This item contents the followings; volition to learn willingly, searching to solve a problem, ability to set one's purpose and to use relevant information selectively, and acquisition of learning method as what and how he/she learns.

(2) Developing ability to use information

This item contents the followings; abilities to select, process, create, and communicate important information, to understand an effect of informatization and informatized society on human, to acquire cognition and responsibility for importance of information, and to learn basic concepts of the computer and information science.

(3) Fostering computer-literacy under view point of the new academic achievement

This item contents active-using ability of computer.

(4) Bring up abilities of active correspondence to informatized society

This item contents the followings; abilities to clarify one's purpose, to select one's necessary information, to use appropriately an information-device for the sake of purpose-realization, and represent one's own effortful information by an information-device. The last behavior is said "production of knowledge".

b) How should a computer be used?

In elementary schools, it is important not to suit teaching method to a computer-program but to select and use a necessary program-soft for own teaching schedule.

In junior high schools, a computer should be used for education about computer (subject "Information Base") and for aid to teaching-method

## II Internet and School Education

### 1. What is Internet ?

"Network" is an organized system connected some independent elements through some nodes. In earlier period of computer, network was consisted of a main frame computer and some terminal devices. As personal computers spread, communication network of personal computers was structured under a host-computer. Users of this network can communicate to each other

through E-mail system or bulletin board system by using public telephone line. LAN (local area network) is a co-using system of a calculation-server, a mail-server, a file-server, etc. by connecting many personal computers. Internet is world-wide network system connecting academic network, commercial network, etc. It may be likened to the network of networks in the world.

More technically speaking, Internet is a network system connecting among computer-networks in the world according to connection with TCP/IP (Transmission Control Protocol/Internet Protocol). Internet has been developed from ARPAnet (Advanced Research Projects Agency network) since 1969. ARPAnet was divided MILNET (Military Network) and ARPANET in 1983. At this time, TCP/IP was applied. NSFNET (National Science Foundation Network) was planned in 1984. In this year JUNET (Japan University Network) was started, and applied to the international connection in 1989. At July, 1995, Internet was consisted of more than 150 countries. More than 6.6 million host-computers were connected to each other in the world. More than sixty million people used Internet in 1995. Fifty-five percent of them used it for education.

Sixty-five percents of Internet users are Americans, thirty percents are EU-people, and only two percents are Japanese, at present 1995.

## **2. Arrangement of Internet system in Japanese schools**

The number of schools with Internet-connection is increased year by year corresponding with the diffusion of information-education. At April, 1999, the number of elementary schools with Internet-connection is 6499 schools (27.4%, total is 23686). The case number of junior high schools is 4461 schools (42.8%, total is 10432). That of high schools is 2651 (63.7%, total is 4161). And that of special education schools is 334 (36.3%, total is 920). The numbers content some schools in which only one computer is connected to Internet, therefore these statistical numbers does not always present satisfactory computer-environment.

The number of elementary schools with Home-Page on web is 1908 (8.1%). That of junior high schools is 1290 (12.4%). That of high schools is 1465 (35.2%). That of special education schools is 179 (19.5%). The following URLs are references; <http://okumedia.cc.osaka-kyoiku.ac.jp/educ/>, <http://www/degi.co.jp/>.

## **3. What is possible by Internet ?**

Main functions on Internet are followings; 1) Through the WWW (World Wide Web) we can read, edit, and create simply information consisted of Hyper Text on which character-, picture-, sound-etc. information are integrated in one file, 2) By e-mail computer-users can communicate to each other. Merits of this function are followings; using digital data, dealing a lot of data, being able to deliver a letter without contact to a person, being low cost, and being rapid. 3) Through Net News we can communicate to unspecified number of people in reference to specified topic. 4) By executing FTP (File Transfer Protocol) we can transfer a file to own computer from the host computer in a network. 5) Through Telnet we can connect to another computer in a network.

## **4. Education used Internet in America**

The Federal Bureau of Education proposed that all young Americans would be able to operate computer under the policy of Technological Literate. And the submit committee of the

president proposed that all schools of elementary and junior high in America would connect to Internet.

The California State Bureau of Education proposed it as main policy that computers would be spread as instruments for learning to the public schools in that state. TC (Technology Coordinators) was settled as a professional group.

All public schools in a city, Georgia, were connected by glass-fiber cable to each other under the IBM foundation.

"Global class-room" is a trial for children to learn common subject by connecting to more than two class-room through Internet. NREN (National Research and Educational Network) is settled to deliver useful programs for from kindergartens to high schools, and to increase children's academic achievement. Kids-net is managed by TERC (Technical Education Resource Center) under the NSF (National Science Foundation) in cooperation with the National Geographic Society. Every year more than 250 thousand students of elementary school in USA participate to Kids-net and measure volume of acid rain and ozone band. Global school-network is a project that Kids-net is expanded to world-scale and all over world children observe weather and environmental pollution. Some schools in Japan participate to it.

NPTN (National Public Tele-computing Network) is a network with low cost. Through NPTN "Tele-Olympics", "Simulation Projects", etc. are executed. "Tele-Olympics" is a project to compete records on the Network which are gained from actual athletic competition on ever school-ground. "Simulation Projects" is a project that the participant schools play each role from launching to making return a space-shuttle, and they compete successfully under cooperation of them.

The Smart Valley Plan is a private project executed at the Silicone Valley, California. This project is not only technical development to realize high quality society but also an experiment for construction of new social-structure with education and medical treatment used Internet, multimedia, etc. technique. A school connects to an expedition making an exploration into the Nile, and executive virtual field trip.

The Jayson Project is a free project by the EDS (Electronic Data System Ltd.) company. The purpose of this project is to make a virtual experience of the most interesting point in the world. The theme has been exchanged every year. The theme of 1989 was an exploration to the bottom of the Mediterranean. That of 1990 was an investigation of a sunken ship at the bottom of the Ontario. That of 1991 was an exploration of the Galapagos islands, 1994 was an investigation of the tropical forest in Beriese at the middle America continent, and 1995 was an investigation of a crater in the Kilauea.

## 5. Education used Internet in Japan

The project of one hundred schools was a project led by the Ministry of International Trade and Industry. The Ministry Project for Network System in Japan at 1993 had two projects. One of them was a project to settle the Center for development and facilitation of software for education in the Shounan Fujisawa campus of Keio University, and to construct a situation to create and edit educational soft-wares by school teachers. The other was a project to connect one hundred schools to the Internet and to create and transmit visual and sound information. The participant schools announced their activities in 1996. See URL; <http://www.cer.or.jpD/CEC/>.



"Ko-net" plan was a social contribution project that one thousand schools were connected to Internet by NTT foundation. NTT supported they connected to Internet by ISDN line on the hard-ware side, with necessary application programs. It aided they settled computers for the sake of learning on the network, on the soft-ware side. When pollution of heavy oil by a broken ship had happened on the Sea of Japan, volunteer information were used effectively through the network. See URL; <http://www.wnn.or.jp/wnn-s/>.

Hirano Elementary School (public, in Ohtsu city) was a member of 100-schools-project. In this school, children administrate computers and system surprisingly. The forth graders experience to send a series of special products in Shiga prefecture surveyed by themselves, and to receive information of special products in various prefectures from various schools in all Japan, in their learning class of local "Shiga prefecture". In home-room activities, the sixth graders experience a world trip virtually by "Virtual World Orientierung" through the network. See URL; <http://www.otsu-edunet.ed.jp/~hiranote/>.

Hikari Junior High School (attached to the Faculty of Education, Yamaguchi University) was a member of 100 schools project. In this school, pupils can access to Internet from each classroom. The study theme of this school is "Creation of education for individual learning by using information". Each class-room has a LAN-terminal for the sake of the theme. See URL; <http://kids.glocom.ac.jp/schools/Hikari/index.html>.

Miwa Elementary School (public, in Kanazawa city) had settled a campus LAN at first of all public schools in Japan. The LAN is connected to the Municipal Education Center and the Prefectural Education Center by an exclusive line. Each center has various application programs and data, and sends necessary information to the school, according to demands of the school. The school has 18 class-rooms which have a computer in every room. The school's server stores information from the center, and sends it to a necessary class-room. Thus the school is set up an environment of learning through multi-media as a whole. Each child in this school has a card with barcode, inserts it to a computer, and operates exchange of e-mail, retrieval of materials from the library, and taking-out them if necessary. Teachers can access to the learning records and health records by the barcode number. See URL; <http://www.ishikawa-c.ed.jp/~miwaxe/>.

Sakaide Junior High School (attached to the Faculty of Education, Kagawa University) develops unique and flexible classes as an integrated study class. One of free study classes has a theme like as "I so around world -- Let's rediscover Japanese culture through international communication!" See URL; <http://educenter.ed.kagawa-u.ac.jp/center/secondary/sakachu/>.

Fuzoku Junior High School (attached to the Faculty of Education, Shiga University) participates to the GLOBE plan that is an observation program of the earth study for environment. The plan is a project that Gore, vice president of USA, in 1994 proposed that children lived in more than 25 countries survey weather and living things, and send the results to the GLOBE Center through Internet. URL of this school is <http://www.fc.shiga-u.ac.jp/home/index.htm>, URL of the Center of GLOBE Japan is <http://www.fsofee.u-gakugei.ac.jp/>.

Fuzoku Elementary School (attached to the Faculty of Education, Kanazawa University) was reconstructed with sufficient multimedia-system in 1995. It connects to the General Information Processing Center in Kanazawa University by an exclusive line. Children can connect to Internet from every point in the school. If they are in a circle diameter 10 meter from a node, they can

access to Internet by infrared rays without a cable. They use note-type computers connected to the server without a LAN cable. URL of this school is <http://www.kanazawa-u-e.ed.jp/>.

E square (E<sup>2</sup>) project has run by the Ministry of Education, Science, Sports, and Culture, and the Ministry of International Trade and Industry. The project has plans that all the public schools in Japan connect to Internet until end of 2001, and that participant schools of 100 schools project and the new 100 schools project have been executed for the purpose as followings; 1) To proffer the know-how of the 100-schools-project, and develop it. 2) To contribute for the concerned of education to refine altogether. 3) To verify a progressive teaching-methods used information technology. E square means a square (space) for education on a cyber space so called. E presents "educational" or "electronic". Like as a central open-space in a town, a square presents the followings; 1) All the concerned of education go in and out there freely. 2) They collect, exchange necessary information, and discuss teaching methods. 3) They report the results to elementary, junior high, and high schools in all Japan. Also, E<sup>2</sup> presents a new teaching method by the Educational×Electronical (E×E). The project has two subprojects; 1) aiding project for school network system, 2) using project of progressive information-technology. The aiding project has activities as followings; 1) To present necessary information to a school with a plan that they use Internet for their education. 2) To proffer a discussion space for Internet-user schools to communicate each other about their experiences. 3) To proffer a practical space to participate to education with Internet. The using project has activities as followings; 1) To invite for the practical school of Internet education to investigate a new and more refined technique for better education. 2) To aid for their schools to research practically with cooperation. 3) To present the results on the Home-Page of E<sup>2</sup>, and to collect opinions. 4) To verify a new educational technology. See URL; <http://www.edu.ipa.go.jp/E-square/>.

The Model Project of Network for Progressive Education was enforced by the foundation of the MESSC and the Ministry of Posts and Telecommunication in 1998. The project was the followings; 1) To construct the connection of high-speed exclusive line from the municipal education center to schools in same area. 2) To develop new teaching-methods used the model network. About 1000schools of 30area participate to the project.

The project of Informatization in Education which had discussed basic view-points of instrumentation for information-education reported to the Prime Minister in July, 1999. The report indicated that the facilitation of informatization in education has three effective points, and proposed some ways of the facilitation for accomplishment of the purpose. One of the three effective points was "children will vary", that is that future children will learn intensively, will logically construct their opinion in listening to another opinion, and will actively assert their opinion. The second point was "schooling will vary", that is that teachers will be able to realize desirable schooling as like as children intensively participate to learning activities, by means of computer and Internet. The last was "a school will vary", that is that facilitation of informatization in schools will produce a good effect not only on teaching-activities but on class and school administration, and on the relationship among school, home, and local area, and that school itself will vary as thus.

The Project of Relational Connection among Schools by Using Multimedia was enforced by the foundation of the MESSC and the MPT. The project had three purposes. One of them was to connect to 600 schools in 25 area by the high speed and integrated network. The second was

to facilitate various relationships among the schools by remote teaching method through the network. The last was to intend to increase educational opportunity and variation for children to learn, by means of technology above mentioned.

#### **6. A few samples of using Internet in a school**

##### 1) To collect necessary information according to a task

Pupils and students access to the government white paper, the statistic materials of various fields, and/or various databases all over the world, and use them for their learning in their classes.

##### 2) To use e-mail to exchange information

Children in elementary school ask a question to students or researchers in a university, receive an answer from them, and ask further question to them, and so on. Exchange of e-mail gets over the framework of distance, time, age, etc. and gives a strong impression to the children.

##### 3) To use e-mail to be experienced in a foreign language

Communication to schools in foreign country makes naturally and intensively children understand the foreign language. Such an experience helps them to comprehend another culture.

##### 4) To make up a home-page to send information

Children can experience their delight to send by themselves information by making up their home-page. Their needs to convey information to companion develop their ability of communication. Cooperation with class-mates to make up a home-page help them to notice importance of cooperating.

##### 5) To develop ability of sentence comprehension

Through some communications to the other, children improve their ability of sentence construction, comprehension, and elaboration to higher level by themselves.

Learning activities used Internet have additionally three effective points; 1) to know importance of intellectual ownership right, 2) to notice importance of manner in sending information, 3) to form attitude of active communication and intensive learning. On the first point children became to know existence of the intellectual ownership right through experience that they encounter a sentence or presentation which another has made. They modify it by a multimedia technique very simply, and send it on the Internet. They aware its importance by being a sender themselves. On the second point, children become to know that they had better not to send a wrong information, or information that slanders or defame someone. They learn right relation with information through the Internet. On the last point, a pupil who scarcely utters in the normal learning situation, sometime becomes to utter actively in the learning situation with a computer. It is a case that a new environment of learning with pupil's interest improves his/her intensive learning attitude.

#### **7. School education in the Internet age**

The school education with Internet system, they expect, will vary on the followings;

##### 1) From "education to learning"

They say 21<sup>st</sup> century will be age of "learning" contrast with 19<sup>th</sup> and 20<sup>th</sup> century that was age of "education". The main reason is existence of the Internet that can communicate bi-directionally and admits for individual to participate in learning situation. Individuals will be able to communicate intensively through a computer connected to Internet.

## 2) Reconstruction of academic achievement

In near future education, it is importance that individuals develop their volition to learn a thing necessary by themselves, and form attitude to react intensively and appropriately an exchange of society. In information education that stands on a view point of the new academic achievement, it is more necessary to improve "information literacy" to understand exactly information technology, and to realize intentional communication.

## 3) Exchange of teacher's role

In developing of Internet education, teachers will have to exchange their roles from as conveyers of knowledge to as supporters of pursuing-learning and to as consultants of learning method.

## 4) From positive education to communicative education

Persons who open their home-page on web-cite, have been increasing also in Japan. Sending something to the world is to know oneself. It is realized under condition that one has self-identity. Thus individual educates oneself intensively with communication to another.

## 5) Extension to life-long learning

Using Internet in the field of life-long learning is increasing. Various classes as a hobby and a qualification, are opened. The MPT plans to open a beginner class of Internet at the local post office for the olds lived near. Test cases are enforced in Tokyo and Kanazawa city.

## 8. Practical web-cites of Internet education

1) The Curriculum Research and Development Center, attached to the Faculty of Education, Gifu University. It proffers 1) iconic information for making a subject-material of multimedia,

2) Article information for researching logical and practical education. <http://www.crdc.gifu-u.ac.jp/>.

2) MIEP (Multimedia / Internet Education Project). It introduces the activity results and activity plan of participant schools that execute experimental education with Internet and/or multimedia. <http://www.miep-unet.ocn.ne.jp/>.

3) Net Classroom. This is a classroom on the network. Children in an elementary and a junior high learn delightfully and play wisely in the classroom. <http://www.education.or.jp/>

4) Puchinetto (in Japanese). It has many home-pages as are useful for studying of pupil in elementary and junior high, and for playing wisely and cheerfully. <http://navi.ntt.co.jp/pettit/>

5) Kids Park Kyoto. It is a home-page that Kyoto branch of NTT opens. It proffers useful information for Internet education in schools and for learning of school-subjects. <http://www.kyoto.isp.ntt.co.jp/wnn-c/kidspark>.

6) Tohoku Gakuin Junior and Senior High School. It proffers a list of home-pages every school-subject. It is beneficial for practical using in school. [http://www/jhs.tohoku-gakuin.ac.jp/sch\\_in\\_net/sin.html](http://www/jhs.tohoku-gakuin.ac.jp/sch_in_net/sin.html)

7) A museum of museums. It's title is "school Museum". It proffers a list of museums every school-subject. <http://www.hus.osaka-u.ac.jp/esthome/matusita/Museum/Museum.html>.

8) The municipal Science Museum in Sendai. It has a database of scientific sammples. <http://www.smus.city.sendai.jp/Welcome.html>

9) NHK. It proffers "Gakkou Housou Onrain" (in Japanese) that presents information of the Broadcasting for Schools. <http://www.nhk.or.jp/scfi/>.

10) Monbusho (The Ministry of Education, Science, Sport, and Culture). The reports of some

councils are proffered on the home-page. <http://www.monbu.go.jp/>.

11) ACE. ACE is a teachers group for research of using computers to education. It proffers practice of education with computers and Internet. <http://www.ace.or.jp/>.

12) Mediakids. This project is a network for practical research by the Apple Computer Co. and the Global Communication Center, International University. <http://www.mediakids.or.jp/>

13) KIDS LINK. It is a project of mailing list children all over the world are participating. <http://skr.or.jp/~kids/>.

14) World School. It is a project for children to communicate to the world through children's common exploration. <http://wsj.ecoclub.or.jp/>.

15) Japanese School Project. It is a project that Japanese schools oversea connect to schools in Japan, and that they exchange information each other. <http://www.ak.cradle.titech.ac.jp/ngp/>.

16) Think Quest. It is a contest that is executed on the Internet in America at first. Its purpose is not competition but developing a culture for young students to construct educational materials on the network by their own words. <http://www.thinkquest.gr.jp/>.

17) Strong Link Selection. This is a collection of URL that is opened at the home-page of Takaodai Junior High School in Kanazawa city. <http://www.city/kanazawa.ishikawa.jp/tyu/takaodai/>.

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