Creating the Learning Environment of the Future

The Use of ICT in Education

MIC
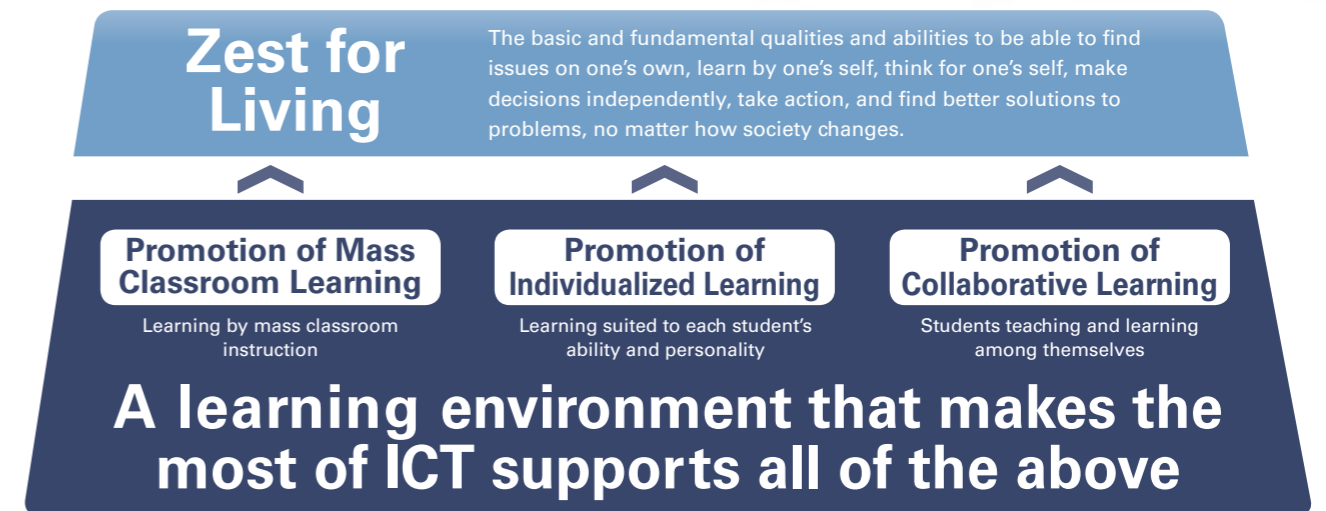Ministry of Internal Affairs and Communications
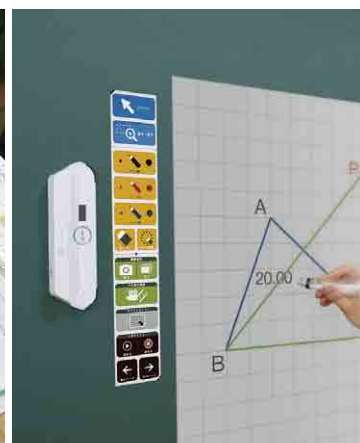
The future of learning environments is undergoing change brought about by information and communication technology (ICT).

Model schools throughout Japan have been equipped with interactive whiteboards, one tablet computer per student, and wireless LAN and cloud environments, laying the foundation for experimental studies of teaching and learning environments. This research has yielded numerous results.
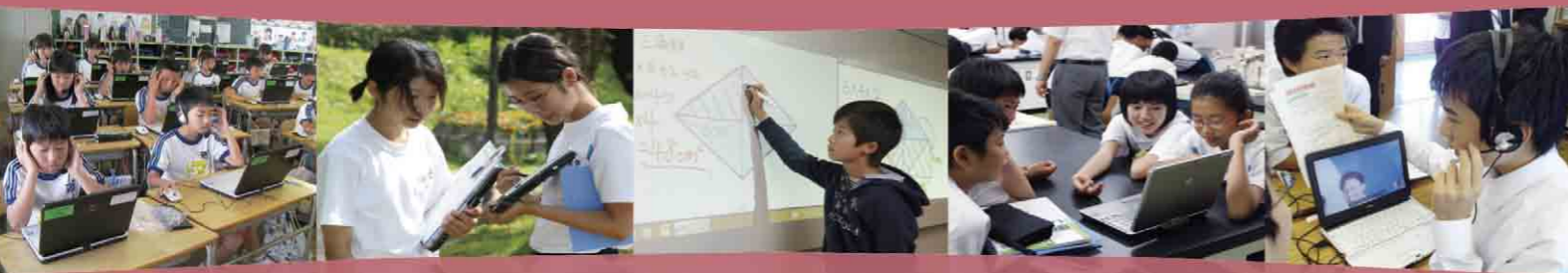
01 | Why is ICT Necessary Now？

It is important to have a learning environment that makes effective use of ICT's distinctive features in order to foster the abilities required for children living amid the drastic changes of the 21st century.

Zest for Living

The basic and fundamental qualities and abilities to be able to find issues on one's own, learn by one's self, think for one's self, make decisions independently, take action, and find better solutions to problems, no matter how society changes.

Promotion of Mass Classroom Learning

Learning by mass classroom instruction

Promotion of Individualized Learning

Learning suited to each student's ability and personality

Promotion of Collaborative Learning

Students teaching and learning among themselves

A learning environment that makes the most of ICT supports all of the above

02 | What will Change by the Use of ICT？

Traditional education will be valued while those parts of it that should be extended, broadened, or deepened will evolve significantly.

Changes in Learning Environments

【 Abundant Information 】
- Enable use of multimedia content
- Increase volume of information communicated and received

【 Efficiency 】
- Facilitate accumulation and sharing of materials
- Speed up communication

【 Visualization 】
- Students' thinking processes become visible
- Other students' opinions and conceptual approaches become visible

Changes in Students

【 Enable Proactive Learning 】
- Enable more proactive participation in classes
- Making classes easier to understand raises the level of interest

【 Foster Communication Skills 】
- Expand opportunities for students to explain their own opinions and listen to others

【 Acquire Information Literacy 】
- Acquire PC and Internet skills
- Expand experience in collecting, organizing, and using information

A View of a Learning Environment that Uses ICT

Use of ICT in Regular Classes

Creating Materials in Individual Study

Using tablet computers and the Internet for taking notes and summarizing research topics contributes to development of skills in information selection and expression.

ICT enables the following

- Students can express themselves using many diverse colors and lines
- Larger amounts of information can be used
- Hand-written and typed materials can be freely combined
- Photographs and drawings can be used at will

Talking Together in Groups

Not only can students "tell" each other about their opinions, but they can also "show" them using tablet computers, etc. and this adds depth to their discussion and understanding.

ICT enables the following

- Classmates' opinions can be easily incorporated by additions or revisions to created material
- Trial-and-error learning activities are possible

Presentation of Learning Results

When interactive whiteboards are used for presentation of learning results, the information put together by an individual student can be displayed in large size and shared with the entire class.

ICT enables the following

- Individual students can share their conceptual approaches and points of view on a large screen
- Simultaneous split-screen display on one large screen enables students to compare their conceptual approaches
- Learning results can be easily reproduced and saved in digital form
- Instructional materials can be distributed in digital form without printing them out

Instruction by the Teacher

Real time exchanges in digital data form can be carried on with students in regular classes. Instruction and guidance can conform more closely to circumstances.

ICT enables the following

- The necessary data can be distributed for each class
- Student's understanding and learning progress can be grasped in real time
- Communication becomes smoother

Cloud

Wireless LAN

Interactive Whiteboard

かくれたおはじきは？

Tablet computer for each student
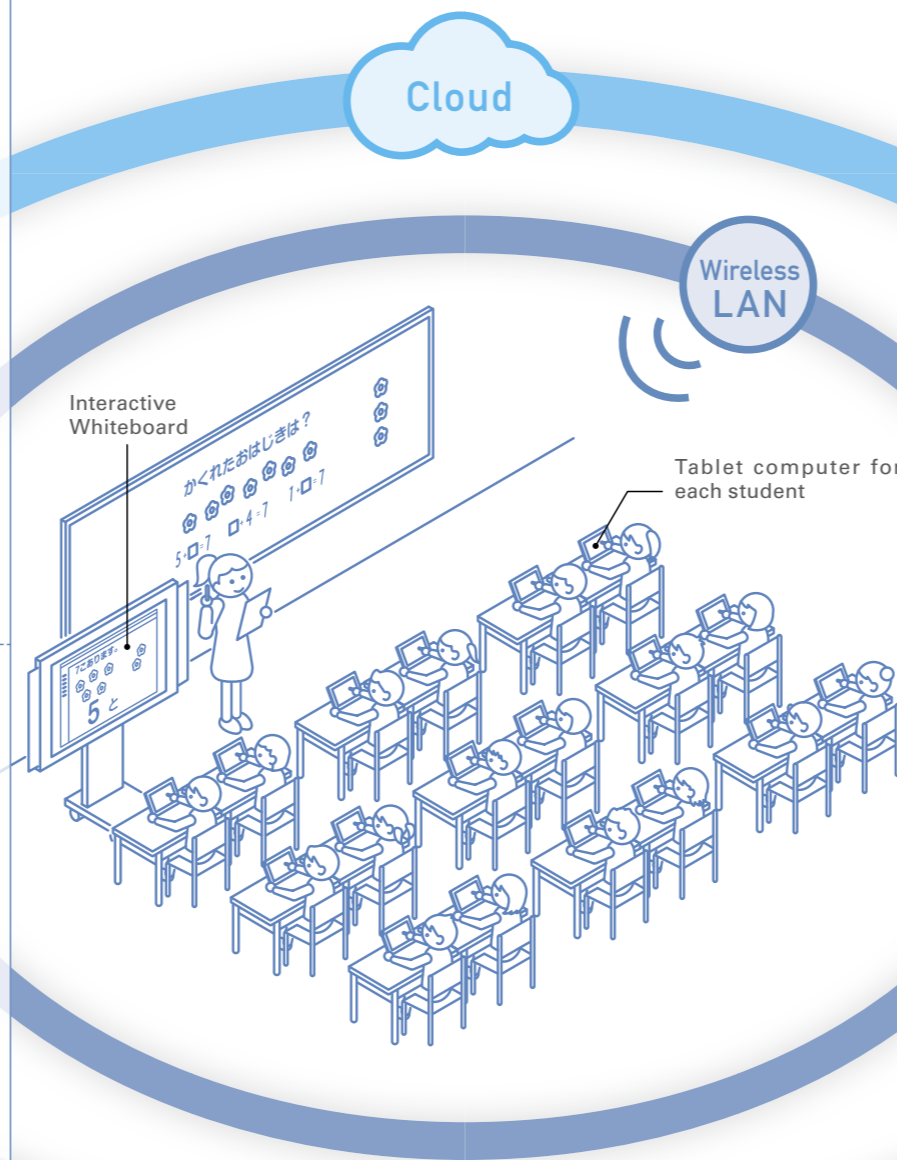
Use of ICT in Other Scenarios

Exchange with Remote Locations

Video conferencing systems make it possible for students to carry on exchanges with students in other schools and countries from their own classroom.

ICT enables the following

- Exchange with schools in places with different climates and cultures
- Language learning communication with native speakers

Safety and Security in Times of Disaster

ICT also shows its power in times of disaster. Information is provided by social networking services on the cloud, heightening safety and security at school and at home.

ICT enables the following

- Instantly check on people's safety
- Provide and disseminate disaster information

After- and Outside-School Activities

ICT can also be used in the wide world outside the classroom.

ICT enables the following

- Utilization in student council and school club activities
- Making records of activities on social studies field trips, study camps, etc.

Collaboration with the Home

Using tablet computers and cloud services enables more meaningful preparation for lessons as well as review even at home.

ICT enables the following

- Collaboration with the home

ICT Environments will Shape the Learning of the Future

One Tablet Computer for Each Teacher and Student

Tablet computers allow handwritten input and touch screen operation. Used in conjunction with paper notebooks, they enhance learning effectiveness.

Interactive Whiteboards Make Learning Bidirectional

Interactive whiteboards allow writing on the screen and expanding the screen image. Instruction can proceed in coordination with the students' tablet computers. There are integrated types, board types, board types that attach to blackboards, and others.

Wireless Networks throughout the School

This is equipment that connects tablet computers, interactive whiteboards, and other ICT devices in a wireless network.

Wireless LAN

Cloud Services Synchronize Information Inside and Outside School

The cloud is a system for distribution and use of applications and educational content as well as for all types of information sharing. The cloud will provide a foundation that links the learning environment of the future.

Cloud

04 Various Types of Tablet Computer

Tablet computers are among the main ICT devices that will be used in the learning environment of the future.
The capability for intuitive operation is a distinctive feature of tablet computers because one can operate them by touching the screen directly. Moreover, conventional personal computers could only be used in computer classrooms, but tablet computers can be hand-carried so they are available for use in ordinary classrooms and even outside the classroom.
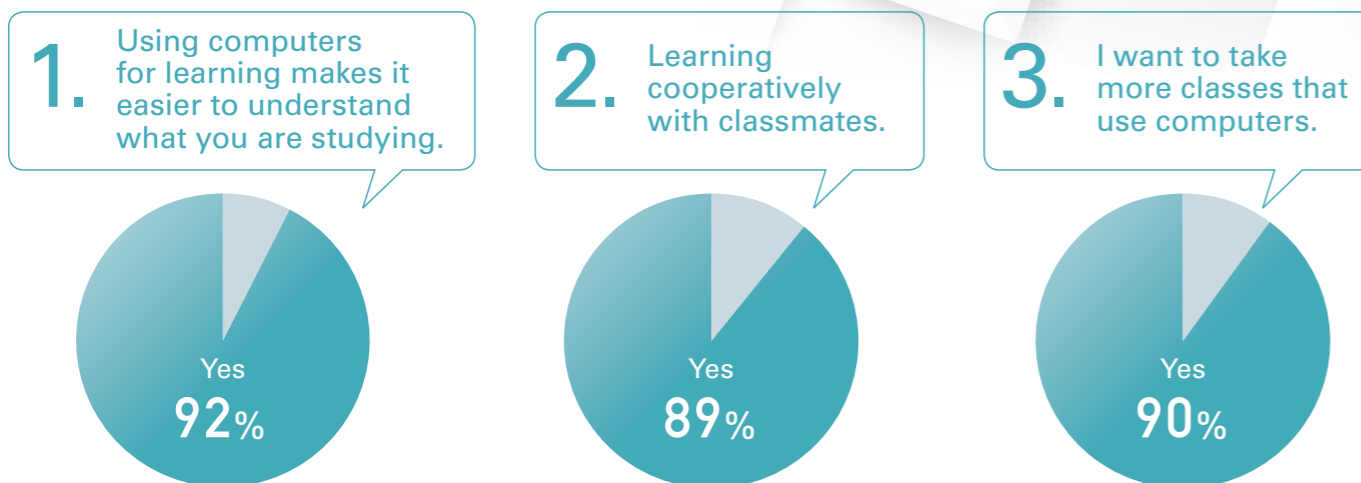Tablet computers are of various kinds. There are (A) slate types that do not have keyboards, (B) convertible types with screens that can be configured to be like notebook computers, and (C) separate types that allow the screen and keyboard to be separated. Various different operating systems are also available. Tablet computers are continuing to evolve year by year, and their use is becoming widespread throughout society as a whole.

(A)Slate type   (B)Convertible type   (C)Separate type

05 Learning with ICT: Voices of Experience

◎What Students and Guardians Say

The following responses were received from students who experienced learning through the use of ICT at model schools of the Future School Promotion Project.

1. Using computers for learning makes it easier to understand what you are studying.

2. Learning cooperatively with classmates.

3. I want to take more classes that use computers.

Yes
92%

Yes
89%

Yes
90%

Results from questionnaire survey of students at model schools, excerpted from the Ministry of Internal Affairs and Communication (MIC) "Guidelines (Handbook) 2013 concerning Information Communication Technology to Promote Use or Application of ICT in the Field of Education (Elementary School Edition)"
(Survey of 3rd through 6th grade elementary school students conducted at end of 2012 fiscal year)

Guardians who observed learning utilizing ICT in action had the following impressions.

I think it is important to become familiar with ICT devices like these in society in the future.

I felt both analogue and digital methods gives the students increased power of expression.

The students are studying hard, and seem to be enjoying themselves. I think this is surely going to be useful for them in the future.

Excerpted from "Other Results" in MIC "Guidelines (Handbook) 2013 concerning Information Communication Technology to Promote Use or Application of ICT in the Field of Education (Elementary School Edition and Lower Secondary and Special-needs School Edition)"

06 Having Gone through Experimental Studies, this Approach is now Spreading throughout the Country

The "Future School Promotion Project" (FY 2010-2013) of MIC and the "Learning Innovation Project" (FY 2011-2013) of the Ministry of Education, Culture, Sports, Science and Technology have implemented empirical research at 20 model schools with the aim of creating the learning environment of the future through the use of ICT.
The data and knowledge acquired through these experimental studies have provided a foundation for increasing numbers of local governments and other such bodies to engage in ICT in the field of education.

Model Schools Nationwide

Elementary Schools ⟨East Japan Region⟩

Ishikari Municipal Konan Elementary School (Hokkaido)	Sagae Municipal Takamatsu Elementary School (Yamagata)
Katsushika Municipal Honden Elementary School (Tokyo)	Nagano Municipal Shiozaki Elementary School (Nagano)
Uchinada Municipal Onebu Elementary School (Ishikawa)	

Elementary Schools ⟨West Japan Region⟩

Obu Municipal Higashiyama Elementary School (Aichi)	Minoo Municipal Kayano Elementary School (Osaka)
Hiroshima Municipal Fujinoki Elementary School (Hiroshima)	Higashimiyoshi Municipal Ashiro Elementary School (Tokushima)
Saga Municipal Nishiyoka Elementary School (Saga)	

Special-Needs Schools

Toyama Prefectural Furusato Special-Needs School (Toyama)	Kyoto Municipal Toyo General Special-Needs School (Kyoto)

Lower Secondary Schools

Shinchi Municipal Shoei Junior High School (Fukushima)	Joetsu University of Education Fuzoku Junior High School (Niigata)	Matsusaka Municipal Mikumo Junior High School (Mie)	Saga Prefectural Takeo Seiryo Junior High School (Saga)
Yokohama Junior High School affiliated with the Faculty of Education and Human Sciences at Yokohama National University (Kanagawa)	Wakayama Municipal Joto Junior High School (Wakayama)	Niimi Municipal Tessei Junior High School (Okayama)	Miyakojima Prefectural Shimoji Junior High School (Okinawa)

07 Activities to Date and Vision for the Future

The creation of learning environments utilizing ICT is more than just a matter of increasing efficiency. Its purpose is to further deepen each individual's learning, promote mutual teaching and learning, and to transform classes and learning into something more effective.
ICT devices are undergoing dramatic evolution, and the circumstances of society are also continuing to change. The Ministry of Internal Affairs and Communication is therefore continuing its efforts to respond flexibly to these evolutions and changes while working to realize a learning environment that is optimal for the student.

The Learning Environment of the Future

Q&A

Here we will introduce some of the doubts and questions that have been expressed to us regarding the use of ICT and the creation of the learning environment of the future.

Q1 ▶ Were Future School Project classes held using only ICT devices? I think that paper has its good points, too.

A Classes at the model schools of the Future School Promotion Project were not held using ICT devices only. Teachers used their own creativity and ingenuity to hold classes in ways that would make advantageous use of the distinctive features of digital materials and conventional printed materials.

Q2 ▶ Doesn't this tend to make person-to-person communication tenuous?

A We could say rather that opportunities for communication increased. Using interactive whiteboards and tablet computers, students were able to present their own ideas to their groups or to their whole class more efficiently and to engage in activities like giving presentations and discussing matters together.

Q3 ▶ What changes did you see in the students after the three-year period of experimental studies?

A As activities making use of ICT proceeded, we received comments such as: "The students are starting to do things more proactively." "Since there are more opportunities to give presentations, the students have begun expressing themselves more considerately. For example, even when they are communicating their own thoughts, they check to see whether the people they are talking to understand what they are saying."

Q4 ▶ Can we observe some classes that make good use of the ICT environment?

A Soumu Channel (MIC Channel) on YouTube has public information and dissemination videos of the Future School Promotion Project. These show scenes of classes utilizing ICT.

http://www.youtube.com/user/soumuchannel

YouTube ⇒

| Soumu Channel (Outline of the Future School Promotion Project) | Search |

Q5 ▶ What kind of examination do we need to carry out to create a learning environment like this?

A There are many matters that should be examined when introducing this kind of learning environment. For details, please see the Guidelines (Handbook) published by the Ministry of Internal Affairs and Communication. It can be downloaded from the following website.

Future School Promotion Project Promotion of ICT in Education
Ministry of Internal Affairs and Communications
http://www.soumu.go.jp/main_sosiki/joho_tsusin/kyouiku_
joho-ka/future_school.html

*Japanese only

Q6 ▶ What are the government's plans for this?

A The government aims to achieve the adoption of IT for education in all elementary schools, junior high schools, high schools, and special-needs schools by 2020, and also to introduce educational and learning environments that seamlessly link the school and the home.