

## Emergence of Digital Textbook: Why we need it?

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### Introduction

Meditational means (Wertsch, 1993) develops our ways of thinking when we use it as a part of our life. As the Gutenberg galaxy (McLuhan, 1962), ICT influences cultural revolution and changes our social value. Digital textbook is the one of the major candidate to change the school culture. Because of it is inevitable, attractive and unavoidable, many counties consider or begin to introduce it on the reason just not late for the movement on this Knowledge Based Societies. On the other hands, the well product based society like Japan, there are a number of discussion why. Because to push the Knowledge Based Society means to reorganize the developed society and have to brake some values for new valuing. For knowing the meaning of revolution, this paper quote the ongoing discussion in Japan and introduce the software 'dbookpro' which supports developing digital textbooks.

### The Status of ICT Education in Asia

ICT is the base for Knowledge Based Society. Tools for ICT have to revise it for new generations within at most ten years. The cost is usually getting cheaper within a few years. Developed countries already spend huge cost for revision for continuously participation and developing countries do not need to spend it because if the cost for the same technology became half within a few years. The establishment of ICT infrastructure is rather suitable for small countries than big countries. The fact that Obama administration decides the re-establishment of ICT infrastructure as a principal strategy. Innovation of ICT promotes the devices, which aims to become closer to the interface of human beings, as well as it hidden into every device and goods which we have been using but for enabling integrative use each of them under ICT. The use of computers and/ or new technology used to require study and practice. However, this could be seen as the old generation as for the technology of which every people do not need to have because better technology for universal use could be brought in few years if there are good market.

Depending on the Report on the Status of ICT Integration in Education in South East Asia (SEAMEO, 2010, p12), there are very much differences as follows:

ICT In Education Dimensions	Emerging	Applying	Infusing	Transforming
1. National ICT in Education Vision	Lao PDR; Timor Leste	Cambodia; Myanmar	Brunei (Towards Transforming); Indonesia; Philippines; Thailand; Vietnam (Towards Transforming)	Malaysia; Singapore
2. National ICT in Education Plans & Policies	Lao PDR; Timor Leste	Cambodia; Myanmar	Indonesia; Philippines; Thailand	Brunei; Malaysia; Singapore; Vietnam
3. Complementary National ICT & Education Policies	Lao PDR; Timor Leste	Cambodia; Myanmar	Indonesia; Philippines; Thailand	Thailand Brunei; Malaysia; Singapore; Vietnam
4. ICT Infrastructure & Resources in Schools*	Cambodia; Indonesia; Lao PDR; Philippines; Timor Leste	Cambodia; Indonesia; Philippines; Myanmar	Malaysia; Thailand; Vietnam	Brunei; Malaysia; Singapore; Thailand; Vietnam

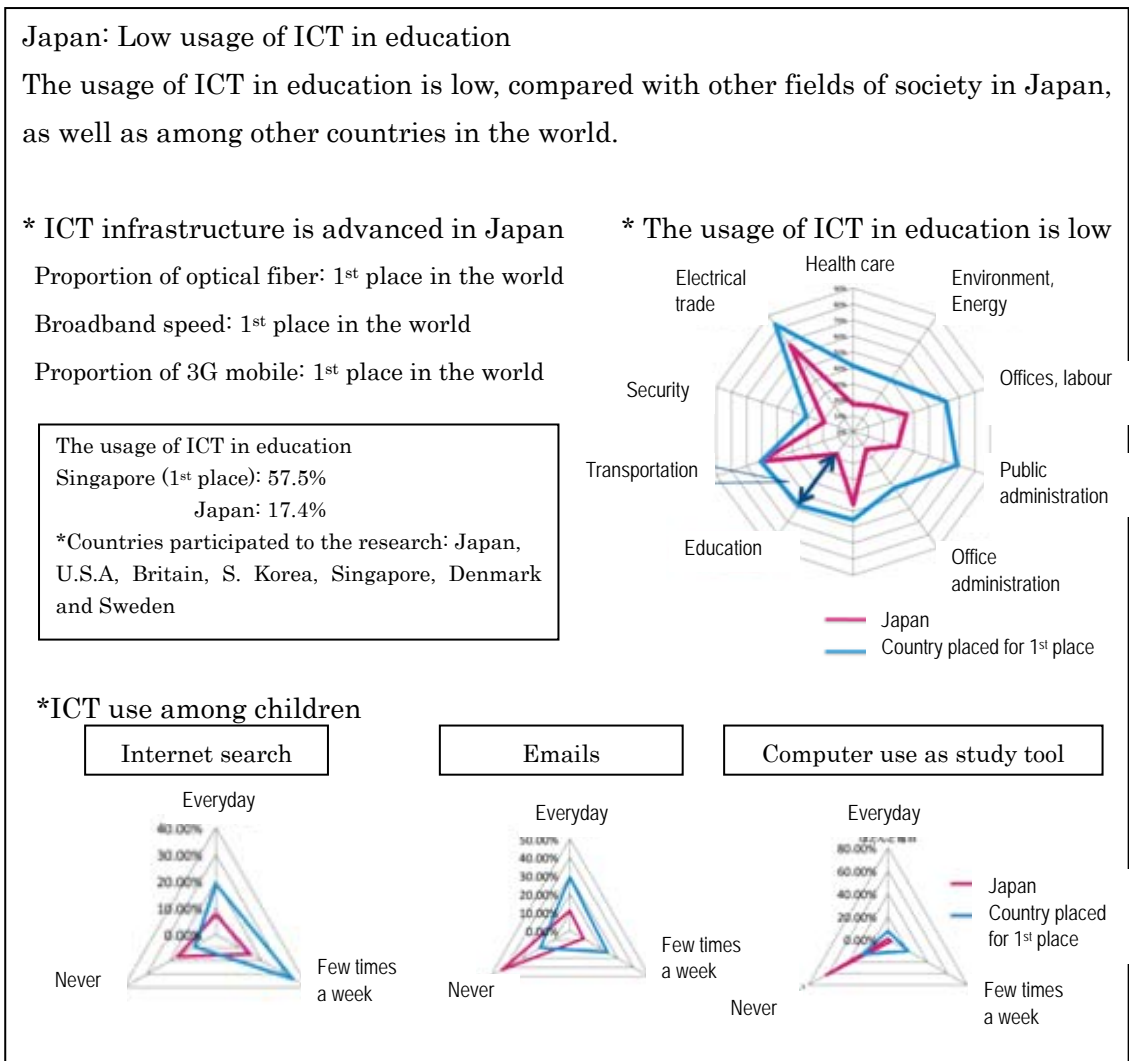
ICT In Education Dimensions	Emerging	Applying	Infusing	Transforming
5. Professional Development for Teachers & School Leaders	Lao PDR; Timor Leste	Cambodia; Indonesia; Myanmar	Malaysia; Philippines; Thailand; Vietnam (Towards Transforming)	Brunei; Singapore
6. Community/ Partnership	Lao PDR; Timor Leste	Brunei; Cambodia; Indonesia; Myanmar	Philippines; Thailand; Vietnam	Malaysia; Singapore
7. ICT in the National Curriculum	Cambodia; Lao PDR; Timor Leste	Indonesia; Myanmar; Philippines; Thailand	Brunei; Malaysia; Singapore (Towards Transforming); Vietnam	
8. Teaching & Learning Pedagogies*	Cambodia; Indonesia; Lao PDR; Myanmar; Timor Leste	Cambodia; Indonesia; Malaysia; Myanmar; Thailand; Vietnam	Brunei (Towards Transforming); Indonesia; Malaysia; Philippines; Thailand; Singapore; Vietnam	Malaysia; Singapore; Vietnam
9. Assessment	Cambodia; Indonesia; Lao PDR; Myanmar; Philippines; Timor Leste	Thailand; Vietnam	Brunei; Malaysia; Singapore	
10. Evaluation & Research	Cambodia; Lao PDR; Philippines; Timor Leste	Indonesia; Thailand; Myanmar	Brunei (Towards Transforming); Malaysia; Vietnam	Singapore

Whatever the current situation is, the countries in emerging stage could be promoted to infusing stage, when the situation of foreign exchange is improved and the budget allocation becomes clearer. In current stage, we should say that there is no necessity to introduce tools which needs special training. For example, who need the training to use mobile phone. The necessary technology could be spread in few years without training.

Any country could use the innovative ICT properly, as long as considering the timing to develop infrastructures. On this meaning, emergent stage is not so far from applying and infusing stages because every country have to introduce or revise ICT system itself. It is not good idea to take time just for ICT education instead of basic literacy subject such as language and mathematics. Such ICT is usually in appropriate for uses. If ICT is good enough to teach, it should be used in any subject. ICT skill cannot develop without content such as academic subjects. If it is necessary for academic subject, teacher must use it inevitable.

Case study: Japan

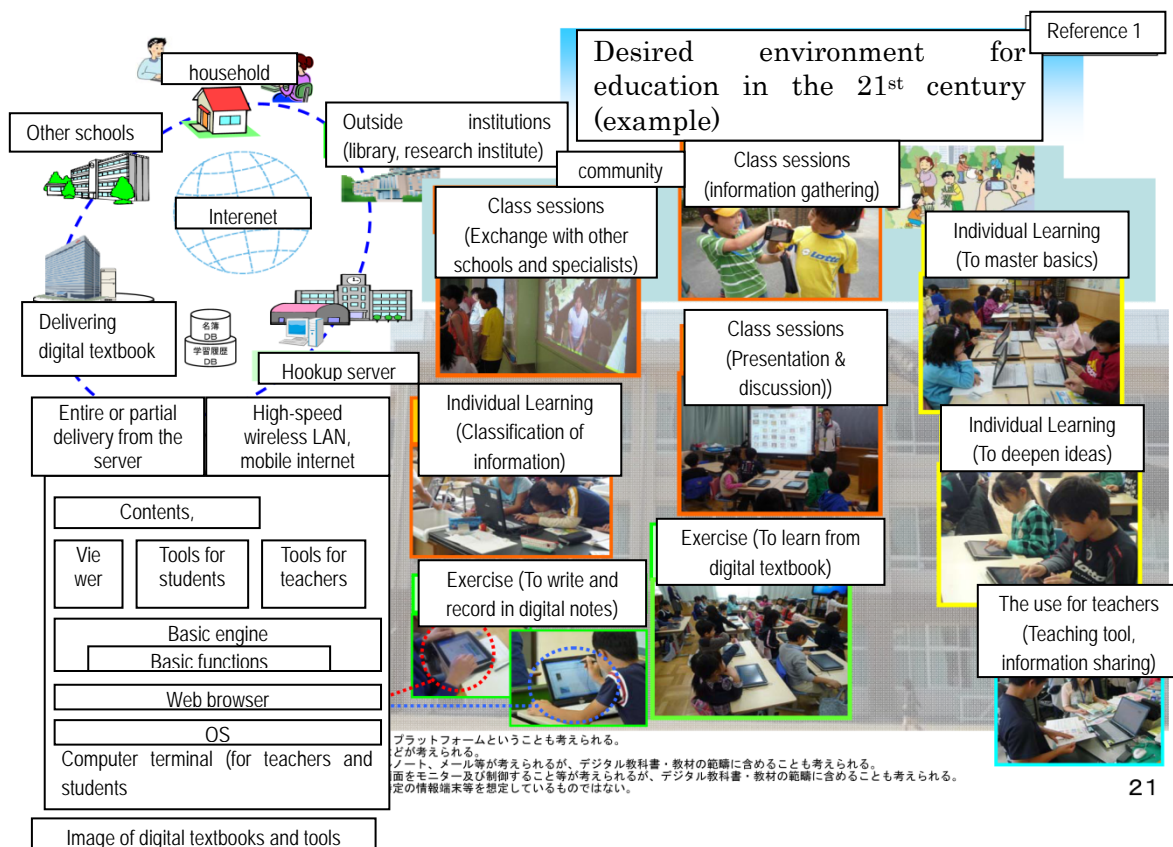
Japan have been using ICT for education from 1980s in the schools. ICT level in common is quite advanced in Japan. From 2005, major textbook companies have been distributing e-textbooks for the classroom projectors. Nevertheless, ICT has not yet promoted much in the field of education.



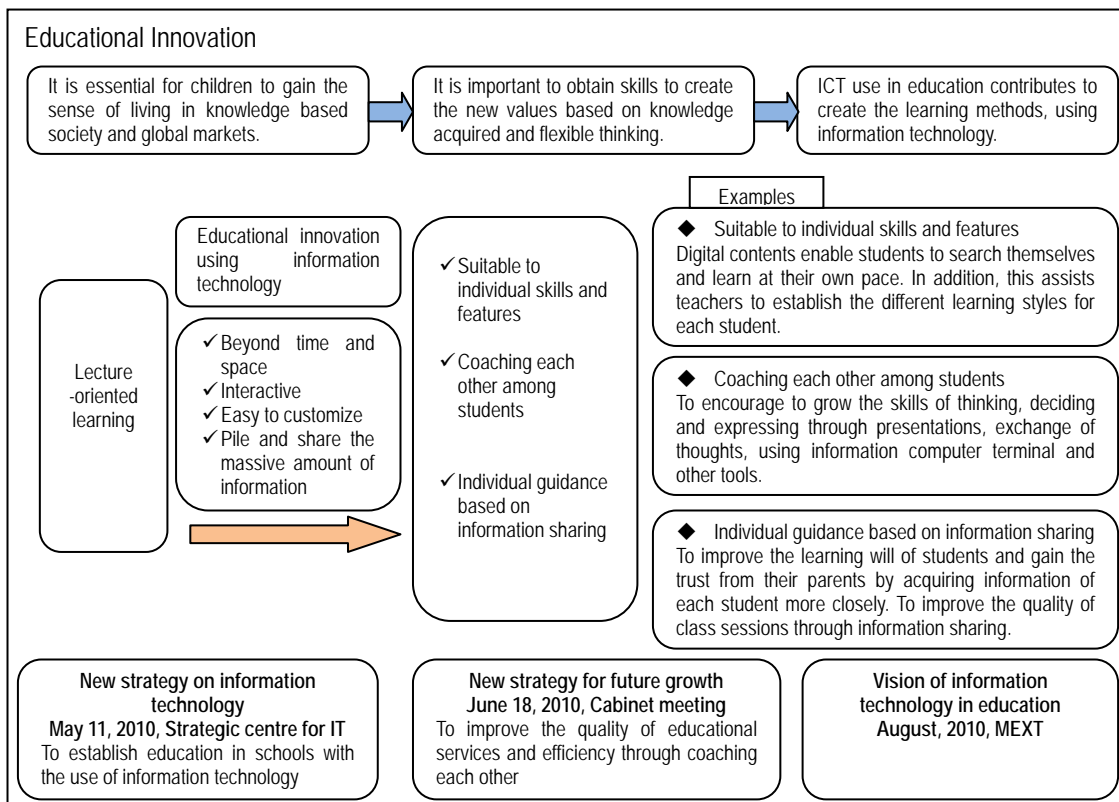
One of the reasons which delay the usage of ICT in education is that Japan succeeded its education without any ICT use. According to a statistics of Ministry of Education, Culture, Sports, Science and Technology (MEXT) in 2007, the average of teachers in elementary school is 44.4 years old, while 43.8 years old in junior high school and 45.1 years old in high school. Considering the fact that teachers in Japan are between 22 and 60 years old, the average age should be 41 years old. As you see above, actual average age of teachers is bit older, which means beyond a half of teachers are over 45 years old. They use computer for their office work but not for their classroom. Japan succeeded to bring high qualified education to the children throughout 1990s, the era we did not have internet. From 80's every school began to equip computer and teachers made experiments but finally, many of them recognized that it is not necessary to use. Another reason which delays the usage of ICT in education is decentralization policy of public administration. The ICT budget allocated to the districts from MEXT was not used properly for the original purposes, due to the financial crisis in 2000s. Each district established its own ICT management system and policy, which is controlled by different committees with support of different companies to protect personal data. In this way the network cost, which could have been very much cheaper and easy to use in centralized system, rose drastically.

In order to improve ICT use in education, MEXT decided to consider the introduction of electronic educational tool "Digital Textbook" to schools on 14<sup>th</sup> of April, 2010. Based on this, "Conference for computerization in school education" was established, which aims the development of educational tools with the use of images and sounds and the improvement of individual coaching at schools.

MEXT indicates the following example for the introduction of ICT in education.



MEXT together with Ministry of Public Management, Home Affairs, Posts and Telecommunications started the following project to 20 schools with the budget of 1.33 billion yen.



It is emphasized that the table in above explains the necessity of ICT use in education to the public, as the education described above does not require ICT entirely. It shows that the necessary effort by government official to set the grant.

For example, in the document, improved individual coaching at schools is expected through ICT use in education. However, it is often said that computers disrupt the shared time between teachers and students in Japan instead. Teacher spend hours to respond emails and so on. They are expected to record everything in documents and files. The management of files is tightened strictly to protect personal data based on school information management system. Some claim that teachers are stuck in front of computers in teachers room, as there are many files to be fulfilled and it is not allowed to take files outside.

We do not argue if the above claim is right or not because it happened on this Knowledge Based Society. Nevertheless, it is clear that the explanation in above table does not reflect the reality as such. At the current stage, where the experimental budget has just allocated for digital textbook, it is difficult to assure the possibilities described above.

One of the reasons that support the usage of ICT use in education in Japan as well as emerging nations in ICT development is to promote industries. Japanese business model that overwhelms the world economy in the 20<sup>th</sup> century is based on the development of high quality products made for 100 million people in Japan are preferred by all over the world. Automobile became one of the typical Japanese products. Now, the business model itself changed. Japan produces hybrid cars and imports normal Japanese cars from South East Asia. Yano Research Institute Ltd. estimated the size of internal market for digital education in Japan as 4,000 billion Japanese yen. This includes the expenditure by parents. It was expected that the market of computer terminal for digital text books reaches up to 1,000 billion Japanese yen. There was the idea that the digital textbook targeted for Japanese users could have been convertible for its worldwide market. This follows the previous success model of Japanese business. The earlier the innovation is, the more there is a possibility of capturing the worldwide market in knowledge based society. On the other hands, the publisher is considering the next step. Most of textbook publishers are under the printing companies. Now they are considering the next step for survival.

Now the cost is major problems to use ICT. The world factories are shifting from China to India. Apple in the United States of America developed “ipad”, while South Korea

decided to distribute digital textbook to all the schools, with aiming the development of computer terminal for digital textbook. The main OS is monopolized by USA. Apple produce OS and products only for Apple. Everyone knows China can produce similar products in much cheaper costs within their country even if there are some difficulties to exports. Google considered the Apple strategy. Acquisition of Nokia by Google pushes South Korean makers to the difficult position where they provide the products and obtain the temporary share.

On this situation, we hope that the price of digital computer terminal drops sharply once new companies join the market and competition starts, while pioneer companies renew the product standard in complicated manner to prevent a sudden fall in price. Developing countries and emerging countries need to search a stable product with proper prices without being baffled by profit oriented strategy of companies.

#### Are You Sure? from the Academics

The countries in East Asia that have Nobel prize winners are only Japan, China and Taiwan. Among those countries, Japan acquired the most winners. Since 2000, European countries have not obtained Nobel prize in physics and chemistry. In the case of Fields prize, which is known as “Nobel prize in mathematics”, only Japan and Vietnam obtained winners in Asia. It can be said that the quality of academic research in Japan led the world during the 20<sup>th</sup> century. This was the reflection of high quality standard in Japanese education. It is clear that this was not the result of ICT use in education.

Eight societies under the committee for education under Maths and Science Societies affiliated to Science Council of Japan, which are Information Processing Society of Japan, Mathematical Society of Japan, Chemical Society of Japan, Japan Society of Chemistry, Japan Statistical Society, Zoological society of Japan, Physics Education society of Japan and Japan Geoscience Union made the following demands on digital textbook in November 2011.

Article 1: Do not let the introduction of digital textbook affect the actual amount of time on experiments and observations

Article 2: Focus on learning scientific facts rather than just watching pictures and images.

Article 3: Do not reduce the time of constructing diagrams and/or calculating done by students themselves with paper and pencils due to the use of digital textbook

Article 4: Afford the opportunities that students take notes to record the classes.

Article 5: Do not concentrate heavily on exercises with filling blanks and choosing the right options.

Article 6: Encourage the exchange of thoughts among students.

Article 7: Do not concentrate much to prepare a beautiful presentation in class sessions and do not discourage to grow the skills of writing

Article 8: Continue improving the individual teaching skills as well as teaching materials.

Article 9: Use ordinary paper based textbooks along with digital textbooks for the time being and adopt paper based textbooks for administering evaluation.

Above articles suggest to prevent digital textbook distracting the achievements established from previous Japanese educational model. They also insist the essential factors in future Japanese education.

Explanation that accepts the mobile computer terminal and digital textbook without any doubt or concern could be seen as explicit and patent. However, it is rather irresponsible from the view of academics, such as educational research of mathematics. Personal Computers were widespread in 1990s. At the end of 1990s, the benefit and weakness of using computers became apparent, therefore it was emphasized to learn how to use computers in effective manners. We find something difficult, then we desire to solve it. When we use computer as a tool to solve problems, students do not experience anything in the process, including the sense of achievement. They should learn the way and basis to reach to the answer. Otherwise they never know how to choose.

For instance, when taking notes, some idea and/or thought may cross his/her mind. S/he may take a picture, instead of taking notes about them. Though both actions look the same, S/he has the opportunity to deepen the idea while taking notes. It is concerned that students lose such opportunities and they even do not know that they had such opportunities.

It is important to acknowledge that there are weak points of using computers and digital textbook. Without considering this, the quality of education aimed is never reached. This is a concern from academic field.

Principal Software “dbook Pro”

The ideology of “dbook Pro”, which is developed by CRICED (Centre for Research on



International Cooperation on Educational Development) and provided to SEAMEO (South-East Asian Ministers of Education Organisation), is to provide digital textbooks for free to anybody in the way that expand the use of paper based textbooks and blackboard without neglecting the benefit of traditional teaching methods.

The biggest feature of digital textbooks made from “dbook Pro” is that they look the same to the paper based textbooks. Therefore, they can be utilized in the same way of using paper based textbooks, when some digital functions are not required. Though this sounds paradoxical, this can prevent the situation where digital textbooks may cause some weakness and/or difficulties based on the judgment of each teacher. For example, once a presentation is prepared in power points, you may feel to present every single slide. As a result, lecture-oriented teaching in classes is escalated. On the contrary, it is easier for a teacher to arrange the style of when and how to use digital functions in digital textbooks made from “dbook Pro”. Following shows some examples of using digital functions.

- (1) Using it as blackboard by highlighting the particular parts of text or writing in blank page,
- (2) Reading textbook together in a class while showing the particular parts in the screen,
- (3) Showing the contents attached to digital textbooks, such as pictures, movies and computer simulations,
- (4) Showing other information by linking to the web contents to digital textbooks, and
- (5) Renewing any information attached to digital textbooks when required.

In Japanese classes, students present their thought on blackboard in front of other students. In addition, teachers summaries what they learn at the end of each session. Therefore descriptions written in blackboard during a session is kept until the end in the way students memorise the flow of the session. In this case, digital textbooks can be a part of blackboard. Students can easily connect what they learn to the section of textbook in this way.

Many interactive boards used now have the link to power point slides. On the age of interactive boards systems power point is an old fashioned way. Students do not have it, thus they cannot go back to the previous pages, while teacher follow the presentation as it is made in Power Point. Therefore it is functioning as for the lecture tool. As

mentioned earlier, blackboard is a space for presentations from students. In digital textbooks, blackboard is a part of screen to show textbook and write down the students ideas in both board and screen.

Computer was often used in a limited way apart from the contents of textbooks. Digital textbook enable the contents of textbooks to connect to outside source of information on the internet in comprehensive way.

Difference between graphing software for mathematics and digital textbook

The NCTM in USA set the curriculum standards of mathematics in 1989. It was the result of learning from the good examples from other countries such as Japan. The curriculum suggested to introduce graphing tools instead of teaching calculation repeatedly to the students who cannot understand. Educational software like graphing tools was introduced as a way of teaching something. Therefore these software were not necessary to use many countries. On the contrary, in the case of digital textbook, the textbook itself is the curriculum. Digital textbook itself contains the additional contents and free software to teach the textbook effectively on the top of basic educational curriculum. Many countries bought the national license to introduce ICT into classroom and most of them did not used by teacher because it is not necessary to use and without using it we can teach it. Now, we do not needs such a license because digital textbook and freeware are integrated use and distributed by free.

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