

A Taxonomy of Curricular Goals for ICT Literacies for Teachers

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Abstract

This paper will present a taxonomy of curricular goals aimed at developing ICT literacies. The taxonomy originates from a theoretical perspective that sees ICT literacies in terms of social practice and a changing discourse about communication. Specifically, the paper will report how the taxonomy has been applied to the Information and Communication Technologies (ICT) curriculum in Japan where efforts are underway to move ICT as a subject area in secondary schools into the elementary and middle schools. However, the goal is to fully integrate ICT into a program of ICT literacies across the curriculum. The taxonomy represents a framework for doing so, recognizing that many teachers are not consciously aware of ICT literacies, or even if they are aware of it, they cannot conceptualize how it might be integrated meaningfully into the curriculum. To illustrate how the framework might be applied, data from some instances at Japanese school will be presented. The teacher who is the focus of the instances is an expert teacher who at the time of data collection had begun to use multi-media but had little awareness of or commitment to ICT literacies. The teacher's shift toward an awareness of ICT literacies will be presented in light of the taxonomy presented at the outset of the paper.

Key Words: ICT, literacies, teacher education

1. Background of this paper

Why was "A Taxonomy of Curricular Goals for ICT Literacies" set as the theme of the report? Here are two reasons.

The first reason is that it is not easy for both students and teachers to enjoy exploring the subject matters and research theme by using ICT. Because the teachers haven't any opportunities to get wide aspects from a sound ICT pedagogy.

We have already had some excellent ideas of the curriculum framework around ICT literacies for teachers and the preceding researches to integrate ICT into subject matters. For example, we can find some ideas easily in ISTE (International Society for Technology in

Education), ITEA (International Technology Education Association), the various trials of other universities, and the rubric around ICT in the various countries etc.

So we can design the coursework and workshop for prospective teachers and in-service teachers by referring to the above ideas and preceding researches. However we often meet the phenomena that the students in their class are not willing to work, though the teacher has already participated in in-service coursework and workshop to integrate ICT into subject matters etc. Why?

Now we can often find that the ICT curriculum for the teacher education in Japan focuses on operational and functional aspects. The course we call "oper-

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ation of ICT" focuses on teaching the university students how to use e-mail, word processor, spreadsheet, and database. Also the course we call "instruction method and technology" emphasizes how to integrate ICT into subjects teaching effectively. However the integration doesn't always succeed. The course teachers often tend to teach university students the instruction technology based on subject contents from the operational and functional aspects, not from critical and social aspects. Though the university students might learn the competences to operate ICT in the subject teaching, they don't have any opportunities to analyze the subject contents using ICT from critical and social aspects and to reflect their own activity using ICT from critical and social aspects. This way, the university teachers might limit some possibilities for university students to learn ICT. We can presuppose that the new teachers graduated from this course might give a similar teaching practice to school students without analyzing their students' needs, situation, and the developmental perspectives. The teachers might reproduce the similar students to them around ICT. The problem is that the policy and plan around ICT for teacher education is read by university teachers from narrow aspects, or doesn't work in a university course. As the teachers are not able to design the classes from wide and deep aspects as results of coursework in University, both teachers and students are not satisfied with the classes.

In summary, university teachers should reconsider the content of their coursework around ICT, by collecting and analyzing the data about what kinds of trouble school teachers have and the unexpected effects are caused from what school teachers are not conscious of. Also it is necessary for prospective teachers and in-service teachers to have some opportunities to reflect their images of the class using ICT from wide aspects as much as possible. So we took this topic because we need a frame of reference for university teachers and school teachers to get wide aspects from a sound ICT pedagogy.

The second reason is that we don't have the common curriculum framework around ICT for teacher education in University in Japan. The responsibility of the curriculum around ICT for teacher education depends on each faculty or University, without sharing the standard around ICT for teacher education.

The ministry of education, culture, sports, science

and technology in Japan made clear the guidelines of ICT in education by the reports from the meeting committee around ICT in 1998. By referring to this report about the policy and plan, we can have some images to design the curriculum around ICT in Japan. But the practice around ICT has just begun. We need a lot of time to accomplish this policy and plan concretely not only at school but also in teacher education. Without having the consensus of concrete goals and targets for teacher education, to require the better quality of the class using ICT at school is to lead the results to lay a heavy burden on teachers. We should have some opportunities and make a basic plan to discuss the curriculum framework around ICT literacies for teachers at university level as soon as possible. We should indicate a taxonomy of curricular goal, as a basic plan to discuss the standard of competences around ICT literacies for teachers from wide aspects.

From the above mentioned, the topic of this report is decided.

As a procedure to explore this topic, this paper sets the following key question. And we try to answer the key question from the some instances and referring to the various research papers and books around ICT literacies.

2. A Key question

How can "A Taxonomy of Curricular Goals for ICT Literacies for teachers" be constructed?

3. Review of precedent researches

Many researchers and educators have expressed the concern about the speed and level at which new information and communication technologies (ICT) have been integrated into the curriculum and instruction of schools. For example, Papert (1993), an early proponent of using computers to positively transform instruction, stated dishearteningly that schools treat new technologies like the body's white blood cells treat an invading virus.

More recently, Leu (2000) has argued that schools are not meeting their obligation to help students become literate for a future that will clearly involve proficiency in using ICT, nor is it easy to meet that obligation given rapid changes in the landscape of lit-

eracy. Such concerns, to varying degrees, cut across cultural and national boundaries even, perhaps ironically, among the most developed and technologically advanced nations in the world such as Japan and the United States. Although it is possible to identify some localities, schools, and classrooms where ICT has been integrated substantively into the curriculum and instruction (e.g., Garner & Gillingham, 1996), they have typically been noteworthy because they are exceptions often presented to encourage emulation by educators who are less enlightened or who are struggling to contend with the implications of new reading and writing technologies.

Extending the problem is that the most common avenues employed to stimulate integration of ICT into the fabric of literate activity in classrooms have not been widely effective, especially when introduced without concern for the socio-cultural milieu of schools and classrooms (see Means, 1994). These avenues include providing extensive training to pre-service and in-service teachers in the use of ICT, outfitting schools and classrooms with the latest ICT hardware (e.g., computers and internet connections), and developing innovative ICT applications and activities.

For example, Bruce and Rubin (1993) after many years of experience in developing and implementing a computer-based program designed to encourage process writing and reading for meaning, concluded that teachers often subverted the intended use of the program to meet their own instructional goals. Likewise, Reinking and Watkins (2000) found many factors in the school and classroom environment interacted to determine the extent to which a computer-based literacy activity was adopted by teachers and was successful in meeting its intended goals.

Equally ineffective have been the strong urgings of a relatively small but vocal community of scholars who have pointed out that literacy researchers and practitioners must expand their conceptions of literacy (e.g., Flood & Lapp, 1995; Reinking 1996; Reinking 1997). Researchers have for the most part not focused extensively on ICT as a topic of study nor considered its implications across a variety of topics in the field (Kamil, Intrator, & Kim, 2000).

Further, one indication that calls for integrating ICT into the literacy curriculum has not been widely successful is the existence of special awards and recognitions for teachers who have done so. Although

all of these avenues are useful and perhaps necessary to increase the likelihood that ICT will become integrated into instruction and literacy development, they have proven not to be sufficient. We believe that to understand and confront the lethargic pace of ICT integration in schools and the research about the development of ICT literacies a deeper analysis is needed. That is, we believe that more fundamental and less obvious reasons may create important obstacles and sources of resistance to satisfactory integration of ICT. For example, viewing literacy in terms of ICT potentially undermines many basic assumptions across the spectrum of conventional print-based literacies such as the centrality of the alphabetic code (e.g., The Cognition and Technology Group at Vanderbilt University, 1994), the difficulty of textual materials, and well-entrenched concepts such as those associated with authorship and ownership ideas (e.g., Reinking, 1997).

Further, teaching that integrates ICT into literate activities in schools may undermine, or be perceived to undermine, conventional models of teaching and learning that places the teacher and specified content at the center of what is to be learned. As a case in point, technology standards established by the International Society for Technology in Education (1998) clearly argue for models of education and literacy that are more progressive than models instantiated in most classrooms today. At the very least there are not well-established instructional niches into which ICT inspired instruction and activities can fit.

We believe that the deeper analysis needed will be more likely to occur through the development of theoretical frameworks aimed at understanding exactly what enhances or inhibits the integration of ICT into instruction and how integration relates to literacy development.

Further, we believe these theoretical frameworks should acknowledge that achieving ICT integration and the development of ICT literacies is a transformative process involving complex socio-cultural factors and multiple realities (Bruce, 1997). We know of no systematic attempts to create such a theoretical framework. Likewise, few studies have examined the process of ICT integration in any detail (see e.g., Reinking & Watkins, 2000) and fewer that have examined it using any theoretical perspective. Thus, in this paper we present several theoretical frameworks

based on our own research and experiences in classrooms, both as university teachers working with pre- and in-service teachers and as researchers observing and attempting to effect ICT integration in primary and secondary classrooms. Such theoretical frameworks, we believe, will be useful in integrating ICT and developing ICT literacies for researchers conducting studies related to that process, for educators who wish to reflect upon their practice, and for teacher educators who wish to consider how best to prepare teachers. We do not offer these frameworks as highly refined models, but ones that are evolving in our own thinking and that await empirical data to substantiate or to refute. We illustrate the development and application of these frameworks in relation to several teachers' classrooms in Japan where one of us has collected considerable data.

4. What is "ICT Literacies" ?

As we told at "Background of this paper", the term of "ICT" is popular at the teacher education in Japan. The university teachers, who have the responsibility of educational method etc., often use this term. But the images of ICT depend on each university teacher. So we can not avoid using term. Rather we must make clear the meaning and range of ICT in teacher education. Moreover, we must define ICT from not only the physical aspects and functional aspects, but also the knowledge and ability level to be requested the school teachers, because we explore the meaning of the ICT in teacher education. Thereupon, we chose the term of ICT "Literacies". Of course, we have many terms to express the similar meaning, for example, computer literacy, media literacy, technological literacy etc. So we try to make clear "what is ICT Literacies" from now on.

In this paper, we attempt to use the term of "ICT Literacies" from wide aspect rather than narrow aspect, which only operate ICT. So we try to define the range of ICT Literacy by referring to the definition of other similar literacy here.

For example, Seife (1999) explains the Technological literacy as following. "In this book, readers will encounter two definitions of technological literacy. [Technological literacy involves] computer skills and the ability to use computers and other technology to improve learning, productivity, and performance

second definition of technological literacy that this book offers (and, indeed, focus on) refers not only to what is often called "computer literacy", that is, people's functional understanding of what computers are and how they are used, or their basic familiarity with the mechanical skills of keyboarding, storing information, and retrieving it. Rather, technological literacy refers to a complex set of socially and culturally situated values, practices, and skills involved in operating linguistically within the communicating."

Also technology for all Americans projects (2000) defines the Technological literacy as following. "Technological literacy is the ability to use, manage, assess, and understand technology. A technologically literate person understands, in increasingly sophisticated ways that evolve over time, what technology is, how it is created, and how it shapes society, and in turn is shaped by society. He or she will be able to hear a story about technology on television or read it in the newspaper and evaluate the information in the story intelligently, put that information in context, and form an opinion based on that information. A technologically literate person will be comfortable with and objective about technology, neither scared of it nor infatuated with it."

Spitzer, Eisenberg, and Lowe (1998) show the features of literacy of visual, media, computer, network, and information as following. "Visual literacy is defined as the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images". "Media literacy is the ability of a citizen to access, analyze, and produce information for specific outcomes". "Computer literacy is generally thought of as familiarity with the personal computer and the ability to create and manipulate documents and data via word processing, spreadsheets, databases, and other software tools". "Closely related to computer literacy is network literacy a term that is still evolving. In order to locate, access, and use information in a networked environment such as the World Wide Web, users must be network literate". "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information".

Gilster(1997), wrote the book of title "Digital literacy", defines the Digital literacy as following. "Digital literacy is the ability to understand and use information in multiple formats from a wide range of sources when

it is presented via computers."

Warschauer (1999) defines the Electronic literacy as following. "Electronic literacy involves not only adapting our eyes to read from the screen instead of the page but also adapting our vision of the nature of literacy and the purposes of reading and writing."

Potter (1998) defines the Media literacy as following. "Media literacy is a perspective from which we expose ourselves to the media and interpret the meaning of the messages we encounter. We build this perspective from knowledge structures. To build our knowledge structures, we need tools and raw material. The tools are our skills; the raw material is information from the media and from the real world. "

Knobel, and Healy (1998) define the critical literacy as following. "we define critical literacy as the analysis and critique of the relationships among language, power, social groups and social practices".

The various literacies, which we cited at the above, have common points and different points. Though the relationship among them is complicated, you might find the character of skill-technology base, representation base, or sociocultural base, etc. in each definition.

Also, Tyner (1998) explains the relationships among the various literacies as following in the topic of "representing literacy in the age of information". "Three multiliteracies – computer, network, and technology – have implications for the general proliferation of new technology tools in society. For that reason, computer, network, and technology literacies can be discussed as tool literacies. Three others – information, visual, and media – are particularly relevant to the

uses of technologies within the context of schooling. They stress the need to analyze information and to understand how meaning is created. Because they address the construction of information as well as tools, information, visual, and media literacies can be characterized as literacies of representation..... Information literacy, visual literacy, and media literacy are closely compatible and provide some foundation for research and practice about the use of literacy for contemporary schooling, because they contain critical literacy competencies that are familiar in alphabetic literacy"

As a result, referring to the above preceding studies, we attempt to understand ICT Literacies as figure1. In short, ICT literacies relate to "the literacies based on tools and technology's conception", "the literacies based on mode of representation", and "the literacies based on sociocultural conception". However ICT literacies take notice of interaction among them. In other words, ICT Literacies include the all of literacies cited at the above as relative area. We think ICT literate person draws on "the literacies based on tools and technology's conception", "the literacies based on mode of representation", and "the literacies based on sociocultural conception".

5.Exploring the key aspects of curriculum framework

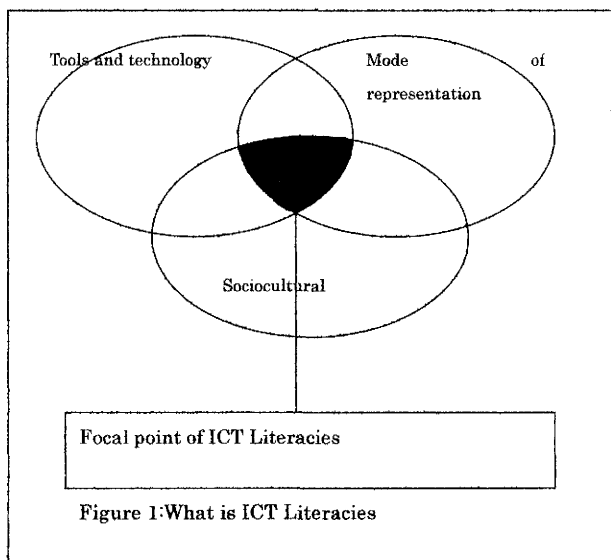
To answer the above key question, at first, we tried to analyze the some instances of 20 teachers at primary school in Japan. We focused on what kinds of ICT literacies were requested each teacher, through typical three instances. Then we attempted to define the key aspects of curriculum framework to be able to give the perspective as next step to the teacher.

Next, we attempted to define the key aspects of curriculum framework to be able to give the perspective as next step to the teacher through review of some preceding studies.

5.1. From the instances of practice

In what follows, we try to analyze 3 instances at primary school in Japan by using figure2 because we make it clear what is requested each teacher as next step.

Figure2 expresses the wall, which the teacher often faces in her/his practice using ICT. First wall appears when the teacher tries to acquire the knowl-



edge about ICT and the operational /functional skills.

Second wall appears when teacher tries to acquire the knowledge, ability and perspective to integrate ICT into subject matters.

Third wall appears when teacher tries to construct the class using ICT from wide aspect.

(1) Instance 1 : Math in Grade 5 at primary school.

This teacher has the 20 year's experience as primary school teacher. She has much knowledge and rich experience about instruction skill about math.

An aim of this class is to use ICT to prompt the understanding how to calculate an area of a parallelogram. As method and media, she used traditional lecture method, computer, and touch screen projector.

What she emphasizes in this class was to make students understand how to calculate an area of a parallelogram using ICT.



However, during the class, she often had troubles around the operation of ICT. When she couldn't use the ICT according to her aims, she returned to traditional method. She wanted to teach students math using ICT. But students wanted to learn how to operate the material on computer. At first, students were very interested in ICT. She often limited student's utilization of ICT freely. Gradually, students weren't interested in the class. As she had attention to do the math class using ICT effectively, she wasn't conscious of the differences between her aims and students' needs. She faced the first wall. As she has rich experience as teacher, she can talk the perspective to integrate ICT into math and can plan the class from wide aspect. However, the nervousness of ICT operation gave her the not good judgment of the instruction. At that time, what was requested her was the systematic knowledge around ICT and operational/functional skill around ICT.

| | | | |
|---------------------|------------------------|--|--|
| | Operational/functional | | |
| Knowledge about ICT | | | |
| Skill about ICT | | | |

(2)Instance 2: History in Grade 6 at primary school.

This teacher has the 13 year's experience as primary school teacher. He has much knowledge and rich

experience around ICT.

An aim of this class is to make students construct the story of historical events and give the presentation of the research. As method and media, he used cooperative learning method by groups, books, TV, VTR, Multimedia & Audio CD, Internet.

What he emphasizes in this class was to make students clear their own interests and investigate the historical events critically and practically using the various media. (He was interested in media literacy and information literacy). If students requested to learn how to use media and understand the functionality, according to necessity, he led students to the media and ICT world.



Both teacher and students started from a topic of history textbook. Both tried to inquire into historical events from multiple aspects. Some students became the active users of ICT as a results.

As he had rich experience around ICT, he was already beyond the first wall. However he faced the second wall. He paid attention to critical reading about the materials to integrate ICT into history. However he didn't have the concrete strategy about how he should guide the students to critical reading of the historical events. He needed to integrate "the literacies based on mode of representation" into "the literacies based on tools and technology's conception", which he had already acquired, in order to integrate ICT into history.



Especially, in this case, what is requested him was the systematic knowledge around critical thinking and to pay attention to the critical aspects around the utilization of ICT in his class.

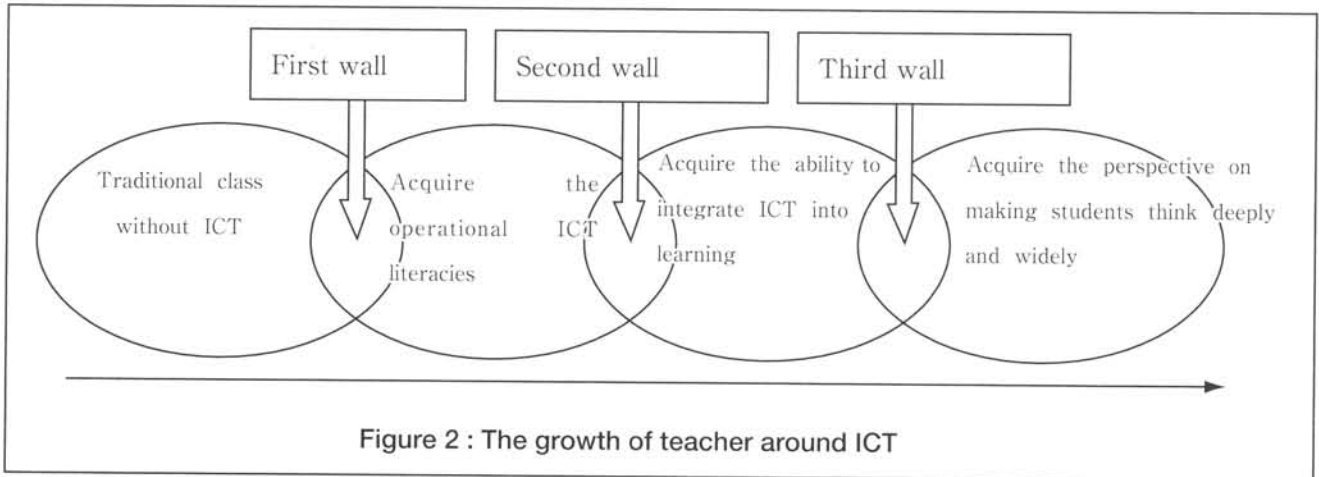
Especially, in this case, what is requested him was the systematic knowledge around critical thinking and to pay attention to the critical aspects around the utilization of ICT in his class.

| | | |
|------------------------|----------|--|
| Operational/functional | Critical | |
|------------------------|----------|--|

(3) Instance 3: Reading in Grade 6 at primary school.

This teacher has the 23 year's experience as primary school teacher. She has much knowledge and rich experience around both reading and ICT.

An aim of this class was to make students read



the life history of "Mother Teresa" deeply through communicating with the prospective teachers (from the different age stances). As method and media, she used collaborate learning method, teleconference system & BBS.

What she emphasizes was to make students experience to read the literature beyond classroom discussion by using ICT.

Students, teacher, and preservice teacher students worked together about reading the life history of "Mother Teresa". Then they told their feeling and thinking from each stance, compared with their own stance, and discussed their life from now on by using teleconference system (real time and different place)& BBS (different time and different place). Also teacher set the opportunity for her students and preservice teacher students to meet face to face after the end of class.

As she had rich experience around both reading and ICT, she was already beyond the first wall and second wall.



However she faced the third wall. She paid attention to social practice. She tried to make students to look at the different thinking at different stance and in social practice. However she was worried about how she should guide the students to social practice. She needed to integrate "the literacies based on sociocultural conception" into "the literacies based on tools and technology's conception" and "the literacies based on mode of representation", which she had already acquired, in order to construct the reading class using ICT from wide aspects.

What is requested her was the systematic knowledge around scaffolding the students toward the social practice and was to pay attention to the other instances of practice from the social aspects, relating to the utilization of ICT in her class.

| | | |
|------------------------|----------|--------|
| Operational/functional | Critical | Social |
|------------------------|----------|--------|

From the above mention, we could extract the three aspects clear here, as the ideas to construct the curriculum framework around ICT literacies from wide aspects.

5.2. From the review of some preceding studies

Labbo and Reinking (1998) point out there are the multiple realities of technology in literacy research and instruction even in practitioners (teachers around literacy education) on a broad scale. (1)New digital technologies should be available for literacy instruction.(2)New digital technologies should be used to enhance the goals of conventional literacy instruction.(3) New technologies should be used to positively transform literacy instruction.(4) New technologies should be used to prepare students for the literacy of the future.(5) New technologies should be used to empower students. These aspects indicate that it is very important because it is very useful for us when we have the aspects to analyze that each teacher has a different perspective.

Also Lankshear and Knobel (1997) give us the following two views about how we think about the relationship between technology and literacy, referring to Bigum and Green (1993). The first is the 3D view (operational, cultural, critical) as sociocultural approach toward literacy research. The second is the 4 views (technology for literacy, technology as literacy, literacy for technology, literacy as technology) to view the rela-

tionship between literacy and technology. These views are very useful for thinking about the relationship not only technology to literacy but also ICT to learning.

Accordingly, referring to the above preceding studies and other preceding studies (Lankshear and Snyder, with Green, 2000; Reinking, Mckenna, Labbo, L., & Kieffer, 1997; Selefe, 1999; Snyder, 1998; Taylor and Ward, 1999), we attempted to extract the aspects to make curriculum framework. As a results, we paid attention to the ideas to produce the aspects, as following here.

- 1) New digital technologies for literacy instruction.
- 2) New digital technologies to transform traditional literacy instruction.
- 3) New technologies as prepare for future.
- 4) New technologies for empowerment.
- 5) Technology for Literacy.
- 6) Literacy for Technology.
- 7) Technology as Literacy.
- 8) Literacy as Technology.
- 9) Operational.
- 10) Cultural.
- 11) Critical.
- 12) Sociocuratural

From the above ideas, we could make common meanings clear, for example, a) the ability to use the technology to accomplish an aim and a goal, b) the ability to understand the meaning about literacy and technology per se, and c) the ability to reflect the own activity and participate in new things toward transformation from various views etc.

6. Constructing a taxonomy of curricular goals for ICT Literacies

From the above work, we could extract the some aspects to make the curriculum framework around ICT. By making clear the some aspects to make the curriculum framework, we can proceed to the next step. That is to make clear a taxonomy of curricular goals for ICT Literacies.

So we attempt to construct a taxonomy of curricular goals for ICT Literacies here, by using aspects of the curriculum framework.

At first, referring to have made the aspects clear from 5.1 and 5.2, we decided to set "the area of influence or effect" as the horizontal line. This has a range from local to global. This is composed of functional, critical, sociocultural as aspects.

Functional aspect means that teachers can access and operate ICT according to the aims.

Critical aspect means that teachers can analyze, interpret, evaluate, the meaning of information by

using ICT, relating to actual social praxis.

Sociocultural aspect means that teachers can pay attention to language, information, knowledge, technology constructed by social history and culture from wide aspects and can participate in social praxis positively.

Next, as well, referring to have made the aspects clear from 5.1 and 5.2, we decided to set "the relation between literacy and ICT" as the vertical line by modifying them. This has a range from "the literacy to use ICT as tool" to "the literacy to have the meta-cognition about the own activity". This is composed of literacy through ICT, literacy about ICT, and literacy of ICT, as each aspect.

Literacy through ICT means that teachers can use ICT flexibly as tool in subject teaching, and use the reading, writing, and talking ability to be acquired by using ICT practically.

Literacy about ICT means that teachers can understand logic, function, and character etc. of ICT.

Literacy of ICT means that teachers can reflect their own activity and to find the best way to accomplish their goals.

Figure 3 expresses curriculum framework based on 3×3 aspects.

Moreover, we attempt to make clear each element within curriculum framework. This expresses some ideas of a taxonomy of curricular goals for ICT literacies. Each element around the goals is from ① to ⑩. What kinds of goal do we aim at in each practice? For example, they are like following.

- ① To challenge the class using ICT from now on.
- ② To make students acquire the ability to use ICT flexibly when the students learn subject's contents and explore a topic.
- ③ To make students acquire the knowledge to use ICT flexibly when the students learn subject's contents and explore a topic.
- ④ To make students acquire the disposition and method to reflect and control their own activity, in which the students use ICT flexibly.
- ⑤ To make students acquire the ability to read the various information analytically and critically, relating to the social praxis, when the students learn subject's contents and explore a topic using ICT.
- ⑥ To make students acquire the knowledge around ICT to read the various information analytically and critically, relating to the social praxis, when the stu-

dents learn subject's contents and explore a topic using ICT.

(7) To make students acquire the disposition and method to reflect and control their own activity, in which the students read the various information analytically and critically, relating to the social praxis.

(8) To make students acquire the ability to evaluate the cultural inheritances and their own experiences etc. socially and historically, and the attitude to participate in social praxis positively, when the students learn subject's contents and explore a topic using ICT.

(9) To make students acquire the knowledge around ICT to evaluate the cultural inheritances and their own experiences etc. socially and historically, and to participate in social praxis positively, when the students learn subject's contents and explore a topic using ICT.

(10) To make students acquire the disposition and method to reflect and control their own activity, in which the students evaluate the cultural inheritances and their own experiences etc. socially and historically and participate in social praxis positively.

teacher, who explores the practice around ICT, because the teacher can reflect their stance in practice by using this taxonomy. Actually, when teacher looked at this taxonomy, she/he asked us how to look at, and then they thought about their own stance. They could have some perspectives about what they do now and at their next step.

The second, this taxonomy is very useful for the researcher, who explores the practical findings around ICT practice, because the researcher can analyze the ICT practice systematically, widely and deeply by using this taxonomy. For example, we can analyze the each instance on 5.1 as following. The teacher on instance 1 stood on (2). But she was lack of the literacy about (3). She didn't have the conception of the literacy (1) at that time. So she faced on the first wall. The teacher on instance 2 stood on (5). But he was lack of the literacy about (6). He didn't have the conception of the literacy (7) at that time. So he faced on the second wall. The teacher on instance 3 stood on (8). But she was lack of the literacy about (9). She didn't have the conception of the literacy (10) at that time. So he faced on the third wall.

Finally, this taxonomy is very useful for the teacher educator, who explores how to instruct ICT practice to preservice teacher students and inservice teachers in the coursework and workshop, because the teacher educator can have the holistic and systematic aspects around ICT practice by using this taxonomy.

We expect this suggestion will connect to answer the key question.

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| | | Area of Influence or Effect | | |
|---|----------------------|--|--|--|
| Global | | Socio-Cultural | Critical | Local |
| Relationships between Literacy and Information and Communication Technology | Literacy through ICT | Literacy learned by using ICT in the socio-cultural construction of knowledge ③ | Literacy learned by using ICT logically and analytically in social practice ⑤ | Literacy learned by using ICT from pragmatic aspect ② |
| | Literacy about ICT | Literacy about ICT information on the socio-cultural construction of knowledge ③ | Literacy about ICT information on social practice from logical and analytical aspect ⑤ | Literacy about ICT information from pragmatic aspect ③ |
| | Literacy of ICT | Meta-cognitive literacy of ICT in the socio-cultural construction of knowledge ⑩ | Meta-cognitive literacy of ICT to think social practice logically and analytically ⑦ | Meta-cognitive literacy of ICT in practice ④ |

Figure3. A Taxonomy of Curricular Goals

Figure3. A Taxonomy of Curricular Goals

7. Usefulness of this taxonomy

Up to this point, we were looking for some aspects to curriculum framework from practice and theory, then we tried to construct "A Taxonomy of Curricular Goals for ICT Literacies" in order to explore the answer to the key question .

By the way, for whom is the above taxonomy useful? Here, we attempt to make the thing clear.

The first, this taxonomy is very useful for the

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