

Research Report 4 on Curriculum Principle for the Development of Competencies: Summary of ICT Literacy and Competencies

1. Objectives and Summary of the Research Study

(1) Objectives of the Research Study

The objectives of this project are to conduct comprehensive research on curricula for development of the competencies, to organize the basic principles in order to design the educational goals and contents, learning and teaching methods, and assessments in an integrated manner, and to provide basic materials for teaching purposes. The objective of this report is to examine the competencies required in the 21st century, relating to utilization of information and information tools that are collectively referred to as “ICT literacy” and “information skills.” In particular, according to the Report towards the New Courses of Study entitled, “Revision of the Next Courses of Study for Kindergartens, Elementary Schools, Lower Secondary Schools, Upper Secondary Schools and Schools for Special Needs Education, and Necessary Policies” (December 21, 2016), information utilization skills are expressed as “the competencies to be nurtured and utilized as the basis for all learning going beyond the subjects, etc.”, and related materials are being collected and reviewed based on the objective of concretely thinking about the direction of these competencies.

(2) Summary of the Research Study

In this report, by focusing on ICT literacy, we were able to collect examples of ICT literacy education, including related societal changes, changes in the competency goals, educational trends in other countries, and programming education; examples of ICT utilization as seen from the outcomes of education and learning research, and basic materials on the positioning of ICT literacy etc. in the competencies required in the 21st century; and to organize the direction of ICT literacy as goals and means of learning. The research was conducted using a case study method which incorporated a policy document study, literature review, and focused interviews, etc.

2. Summary of the Research Outcomes

(1) Societal changes related to ICT literacy and changes in the competency objectives

A crosscheck of the developmental ideas of information technology against changes in the state of society reveals that current-day technology has begun to successively actualize the developmental concepts conceived in the latter half of the 20th century. In Japan as well, what we are seeing is progress in development such as the spread of hardware, connections to networks, and the flourishing of social networking services and other (Figure 1). In line with this situation, the competency objectives established in information education etc. in Japan and abroad have been shifting since around the year 2000 from information literacy and IT skills to ICT literacy and multi-literacy using terms which explicitly include “communication.” It has been suggested that competencies are required where people

acquire the literacy to be able to transform the vast amount of information available on the Internet into meaningful and coherent knowledge, and to interact with others using networks through meaningful transmissions.

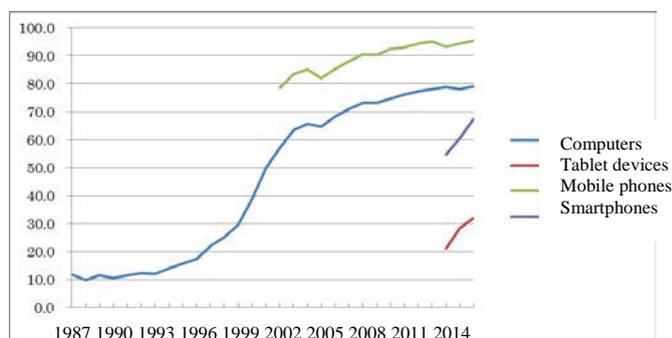


Figure 1. Rate of hardware and Internet spread by household

(2) Educational trends of ICT literacy in other countries

The research studied the four countries of England, South Korea, Singapore and Australia with regard to ICT literacy education in the curricula of other countries. Each country had in common: (1) the listing of ICT literacy as an objective of competency, and learning through use not only in individual subjects but across subjects. etc., and (2) in individual subjects, a focus on education for digital literacy, including programming, and a link to the development of higher cognitive abilities and an attitude of advancing towards an information society or knowledge-based society.

(3) Trends of programming education in Japan and abroad

The results of an examination of the current state of programming education in Japan and other countries indicates that programming tends to be adopted as an official subject in each country, or as the content of a subject, but it has been suggested that rather than as a means of training programmers, it is thought to be effective as a way of developing learner competency. With regard to practices of programming education, the objectives were broadly divided into the five categories of (1) training programmers, (2) promoting the learning of subject matters, (3) developing higher cognitive abilities, (4) acquiring new learning media, and (5) participating in the creative activities of a digital society. It has been suggested that owing to the possibility of greater emphasis being put on objectives other than (1), programming education needs to be considered together with ways of learning.

(4) Examples of teaching practices using ICT and perspectives on learning

The innovative changes taking place in the goals of learning, the role of ICT towards these changes, and “perspectives of learning” to support learning using ICT were reviewed. As teaching examples, the characteristics and aims of learning using the learning support system, which are the subject of

Table 1, have been listed, but while the functions that are utilized are diverse, close compliance with the aims could be seen in all of the systems. Therefore, there is a universal benefit to ICT, and the point isn't to elicit general guidelines for education in line with such benefit, but instead to select, create and utilize the functions of ICT depending on what needs teaching at the time, which is precisely why it has been suggested that it is necessary to ensure parallel operation of the type of continuous lesson improvement and system improvement known as design research.

Table 1. Characteristics and aims of the six learning support systems

System	ICT characteristics (functions)	Aims
Group scribbles	Immediate sharing, editing and displaying of information	Collaborative learning through individual and group exchanges
Model it	Automatic calculation and simulation	Scientific skills such as modeling
Bio kids	Database utilization	Observation and analysis Scientific skills such as scientific reasoning
Thinker tools	Simulation Agents	Scientific understanding Meta cognition (epistemology / self-adjustment learning)
WISE	Simulation Inquiry support agents Visualization	Scientific understanding Scientific skills such as meta-cognition (epistemology / self-adjustment learning) discussions
Knowledge Forum	Bulletin board Analysis tools	Collaborative explanation building Metacognition (intentional learning)

(5) The need for integral reform in order to develop ICT literacy

The report organizes the above points within the context of future required competencies into the position and details of ICT literacy, handling together with information utilization skills, development and evaluation of ICT literacy, a support system for its development, and the direction of information education. As a result, it is important to provide children with a consistent and unified learning experience since the perspectives of how we are to use the information and for what purpose, and how we are to foster utilization skills so as to lead to the creation of society and to individual happiness are vital. Moreover, since rapid progress in the field of ICT has given rise to new functions, it is naturally important not only for the elementary school students but for all teachers to develop their ICT utilization skills as an ongoing process, which will help them make decisions while they are actually teaching. Regardless of what competency goals are set, if they are to be taught sufficiently, such goals, subject matter, learning and teaching methods, and evaluations will have to be designed in an integrated manner and put into actual practice, and to be able to achieve this, it has been suggested that support in terms of the system and environment, which includes pre-service training and in-service teacher

training for such purpose will also have to be conducted in an integrated manner.

The establishment of an infrastructure such as the installation of equipment tends to come first, but if we start by making proposals based on envisioning the kind of learning we wish to elicit from the children and the goals of learning, and derive an infrastructure based on these, the objectives of ICT utilization will become clearer, and it will be easier for ICT utilization to become part of daily use, and for integral reforms to be made that go beyond the learning environment of the student to the entire system and environment.