Human Resource Development for Society 5.0
～Changes to Society, Changes to Learning～
(Summary)

2018.6.5
Minister's Meeting on Human Resource Development for Society
Task Force on Developing Skills to Live Prosperously in the New Age

文部科学省
MEXT
MINISTRY OF EDUCATION,
CULTURE, SPORTS,
SCIENCE AND TECHNOLOGY-JAPAN

1. Vision of society for Society 5.0, and the kinds of human resources and forms of learning needed
(Building upon discussions in Minister's Meeting on Human Resource Development for Society 5.0)

Vision of society for Society 5.0

Development of AI technology ⇒ AI technology can provide alternatives for routinized work and work that can be expressed numerically
⇒ Changes to industry, changes to ways of working

Issues for Japan

Lack of human resources engaged in AI research and development; declining birthrate and societal aging; weakening of bonds; decreasing opportunities to experience nature

Strengths as human beings

Sensitivity and ethics to understand and give meaning to the real world; ability to confront and adapt to conflicting demands and the unexpected; ability to take responsible action

Forms of learning in Society 5.0 and the kinds of human resources needed in Society 5.0

How AI and other advanced technologies will affect education ⇒ Transformation of forms of learning
(Ex.)   • Offering study plans and study content based on an understanding and analysis of study logs, etc.
     • Supporting study in more sophisticated ways based on study log records (provision of content tailored to study conditions, matching of study environments, etc.)

Changes to schools / Changes to learning   ⇒ Society 5.0 schools (age of "learning")
 • Schools with one-size-fits-all classes → Sites of learning where individuals learn according to their own pace, ability and interests, while steadily attaining fundamental academic abilities such as reading comprehension
 • Studying in groups based on school-year grade-level → Expansion of learning beyond grade levels to include more collaborative learning in mixed-age, mixed-grade groups based on level of attainment, subject matter, etc.
 • Studying in school classrooms → Diverse learning programs that also utilize universities, research institutes, corporations, NPOs, education/culture/sports facilities, and so on

Skills commonly needed: Ability to accurately interpret and respond to writing and information
Ability to engage in and apply scientific thinking and inquiry
Sensitivity and ability to discover and create value; curiosity and the inquisitiveness
Human resources to lead a new society: Human resources who discover and create leaps in knowledge that are the sources of technological innovation and creation of value
Human resources that create platforms that connect technological innovations to societal issues and create platforms
Human resources that can leverage and extend AI and data in various fields

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< Kinds of human resources and forms of learning needed >

< Current conditions, issues, etc. >

< Direction of policy measures to pursue >

Transformation of forms of learning

Development of commonly needed skills

Development of human resources to lead a new society

[At all stages of learning]
- Lack of self-guided, independent learning in collaboration with others while steadily mastering fundamental academic abilities

[Elementary and lower secondary school]
- High level of achievement on OECD/PISA
- On the other hand, amid changes in home and information environments, there are issues in reading comprehension—the ability to understand and think about what writing and information mean
- The chain of poverty must be broken and steady progress made toward attaining fundamental skills needed by all children in Society 5.0

[Upper secondary school]
- General courses are 70% (800k persons), specialized courses are 30% (300k persons)
- Humanities make up 70% of general courses (500k persons) and many students split into either the humanities or sciences in their second year. As a result, students tend not to learn enough on specific subjects.
  ※ For instance, only 20% (140k persons) of all general course students take "physics."
- Potential of various kinds of learning regardless of grade level (collaboration with institutions of higher learning, industry, etc.)

[From high school graduation to working member of society]
- Four-year universities are 50% humanities and social sciences (300k persons), 20% science and engineering (120k persons), 10% health, and 20% education, arts, etc.
  ※ Other countries: Science and engineering make up nearly 40% in Germany and nearly 30% in Finland and Korea
- STEAM and Design Thinking are needed in education
  ※STEAM＝Science, Technology, Engineering, Art, Mathematics

I. Provide a variety of learning opportunities and spaces to achieve **"fair, individually optimized learning"**

II. Ensure that all children and students acquire fundamental academic abilities—e.g. **basic reading comprehension, mathematical thinking**, etc.—and **information competency**

III. **Transcend the humanities/sciences divide**

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3. Leading Project (1) for Society 5.0

I. Provide a variety of learning opportunities and spaces to achieve "fair, individually optimized learning"

○ **Development of a pilot project for a variety of collaborative kinds of learning, including individually optimized and mixed-age/mixed-grade learning**

※ Elementary, middle and high schools nationwide will participate (Number of schools to be determined in the future)

- To achieve individually optimized learning tailored to the abilities and aptitudes of each individual child or student, practical research and development will be conducted based on individual learning tendencies and current activities (including sports, culture, special activities, club activities, volunteering, etc.), as well as the characteristics of each subject/unit, using learning portfolios (see below) that track study logs, etc. (e.g. individually optimized learning to ensure steady attainment of basic literacy and mathematical thinking)
- Practical research and development will also be conducted on collaborative learning in mixed-age/mixed-grade groups (e.g. mixed-age/mixed-grade collaborative learning based on English-language ability)
- The project collaborates with regional human resources and others to advance a "team school" and provide a varied learning program that includes hands-on activities
- The use of practices such as Advanced Placement, early matriculation, and early graduation will be encouraged to ensure that child/student learning environments are more individually optimized. To engender a desire for varied learning in students, the use of gap years at universities and leaves-of-absence to engage in diverse learning outside of school will also be encouraged with a view to advancing individually optimized learning.

○ **Use of learning portfolios to track study logs, etc.**

- Using EdTech, study logs that record individual learning will be digitized and tracked as learning portfolios, which will not only accelerate the integration of instruction and assessment but also enable their use by children and students themselves. For this reason, improved surveys of nationwide academic ability and learning conditions and a smooth introduction of basic diagnostics of learning, including the introduction of CBT, will create a cycle of assessment and improvement by enabling an ongoing awareness of individual child/student attainment in fundamental academic abilities and information competency, as well as the ability to provide rapid feedback.

○ **Improved educational quality and more enriched learning environments through the use of EdTech and Big Data**

- To promote the use of EdTech and big data, discussions will be held on drafting necessary guidelines and on building a platform to collect, share and use data.
- Preparation of ICT environments and development/hiring of ICT human resources will also be accelerated to keep pace with digital textbooks, digital instructional materials, CBT adoption, and so forth.

II. <u>Ensure that all children and students acquire fundamental academic abilities—e.g. basic reading comprehension, mathematical thinking—and information competency</u>

○ <u>Steady attainment under new National Curriculum Standards</u>

- Steady attainment under the new National Curriculum Standards stresses mastery of fundamental academic abilities, including vocabulary knowledge, structural awareness of sentences, literacy, arithmetic and mathematical thinking. (Surveys of nationwide academic ability and learning conditions, Common Test for University Admissions, basic diagnostics of learning likewise stress these abilities.) For this reason, support for learning will be strengthened by accelerating the preparation of instructional materials, ICT environments, and EdTech that improve instructional methods, such as individually optimized review, and support more effective instruction.
- Mastery of academic abilities will be promoted through the use of learning portfolios that track study logs, etc. (see I.).

○ <u>Attainment of information competency</u>

- Discussions will be initiated regarding the addition of "information" as a subject to be tested on the Common Test for University Admissions (from 2024).
- Data science and statistics education will be strengthened across elementary, lower and upper secondary school.

○ <u>Instructional procedures will be established at schools and the teaching certification system will be improved to ensure that fundamental academic abilities are steadily mastered.</u>

- Establish instructional procedures as schools such as assigning single-subject teachers to upper elementary grade levels
- Given that the elementary school teacher employment exam has become less competitive than the lower and upper secondary school teacher employment exams and that relatively few teachers have certificates for specific subjects such as technology and information at the lower and upper secondary school levels, the teaching certification system will be updated in order to enhance and strengthen instructional procedures, both qualitatively and quantitatively (e.g. flexibility in obtaining teaching certificates for multiple types of school or subjects and enabling candidates to obtain certificates for specific subjects more flexibly based on years of experience and area of specialization).

III. Transcend the humanities/sciences divide

○ **Reforming high school-to-university articulation to enable study of both the humanities and sciences**
 • Human resources with understanding of both the humanities and sciences will be developed not only by ensuring steady attainment of the new National Curriculum Standards, which requires the basic skills— probability, statistics, and basic programming, as well as science and social science—that are needed in a variety of academic disciplines, but also by having in place conditions to serve students who wish to pursue more advanced topics, such as differential equations, linear algebra, Bayesian statistics, and data mining.

→ Creation of a Consortium for World-Wide Learning (WWL)
 • Consortiums for WWL will be created to offer study programs/courses in advanced and varied subjects, including AP (Advanced Placement), that individuals can take based on their interests, traits, etc. (approximately one location per 60,000 upper secondary school students will be created, with each center to be housed in national / public / private upper secondary school and/or technical college campuses in each prefectures around the country).
 • Short / long-term study abroad at foreign partner schools will be mandatory, high-level human resources accepted from abroad and classes and research conducted in English with exchange students

 • Given the need to reform the dividing situation between the humanities and sciences in upper secondary schools, the needs of society, and international trends, universities will be encouraged to review their educational programs to provide the kind of education that many students will need in the future (e.g. STEAM, Design Thinking, etc.).
  Transition to a framework that can provide across departments liberal arts that are studied in common by all students and specialized fields (e.g. human and social sciences, STEAM, healthcare, etc.) that are selected by students.
 • In addition to the development of leader and expert AI human resources majoring in STEAM, human resources majoring in the human and social sciences will also be developed to acquire needed AI-related knowledge through studying both the humanities and sciences. Expert human resources in AI will also be developed at colleges of technology and specialized training college, not only universities.

→ Development of advanced expert human resources in areas like AI
 • Expansion and strengthening of cross-curricular mathematics and data science education (e.g. centers created, standardized curriculum, etc.) etc.
→ Offering practical education and developing expert human resources through industry-academia collaboration
 • Development and delivery of practical educational programs through industry-academia collaboration; incentives to attract investment from industry etc.

○ **Developing human resources that study the merits of local regions and support communities**
 • Collaborative courses involving upper secondfary schools, local municipalities, institutions of higher education, and industry will promote the development of local human resources by creating environments in which students can study various fields such as welfare, the agricultural, forestry and fishery industries, and tourism.

→ Creation of Region[3] High Schools※ (Region-Cubic High Schools) ※Upper secondary schools of the region, by the region, for the region
 • By building a consortium between high schools, local governments, institutions of higher education, corporations, medical and caregiving facilities, the agricultural, forestry, and fishing industries, and so on and requiring students to take distinctive subjects specific to the industries and culture of their region (e.g. tourism studies) through discovery-oriented learning, etc., educational institutions will be transformed into places where students can discover "what they want to do."
 • To promote collaboration between prefectures and municipalities, efforts will be required to include local mayors and/or superintendents as members of the school management council at prefectural upper secondary schools that are community schools