

# Roadmap on the Utilization of Data in Education

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Digital Agency

Ministry of Internal Affairs and Communications

Ministry of Education, Culture, Sports, Science and Technology

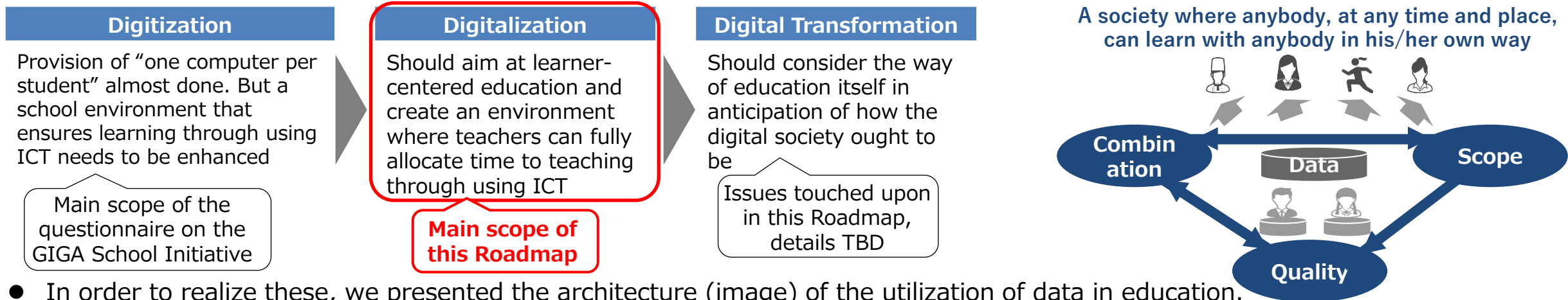
Ministry of Economy, Trade and Industry

*\*This is the digest version in English. The original text is at the following URL in Japanese.*

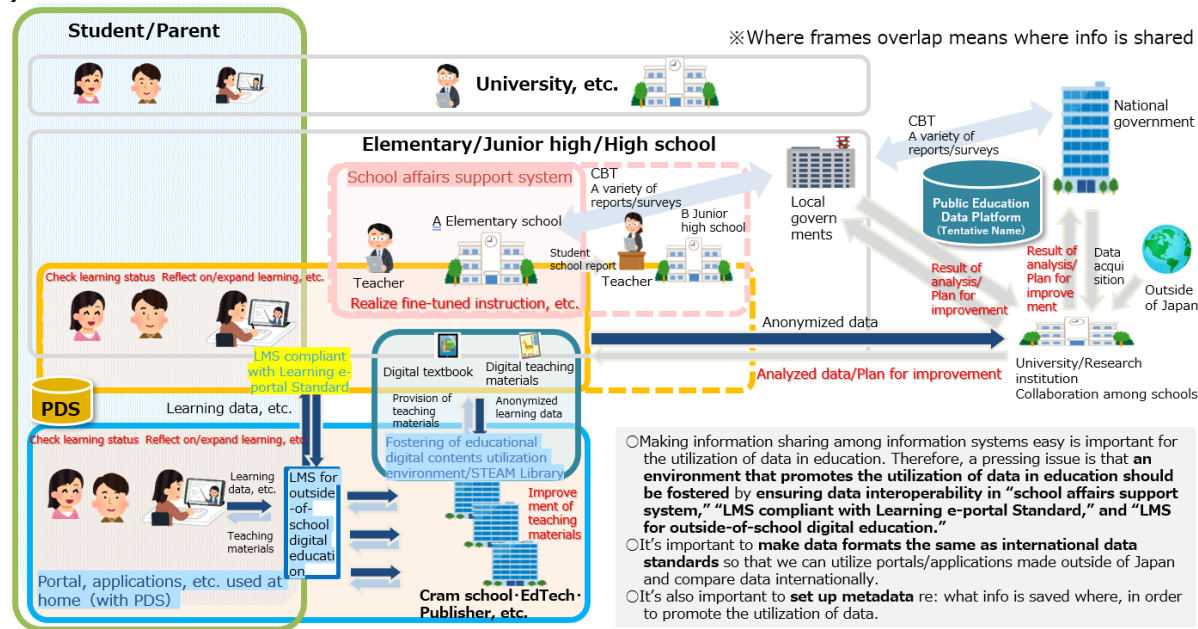
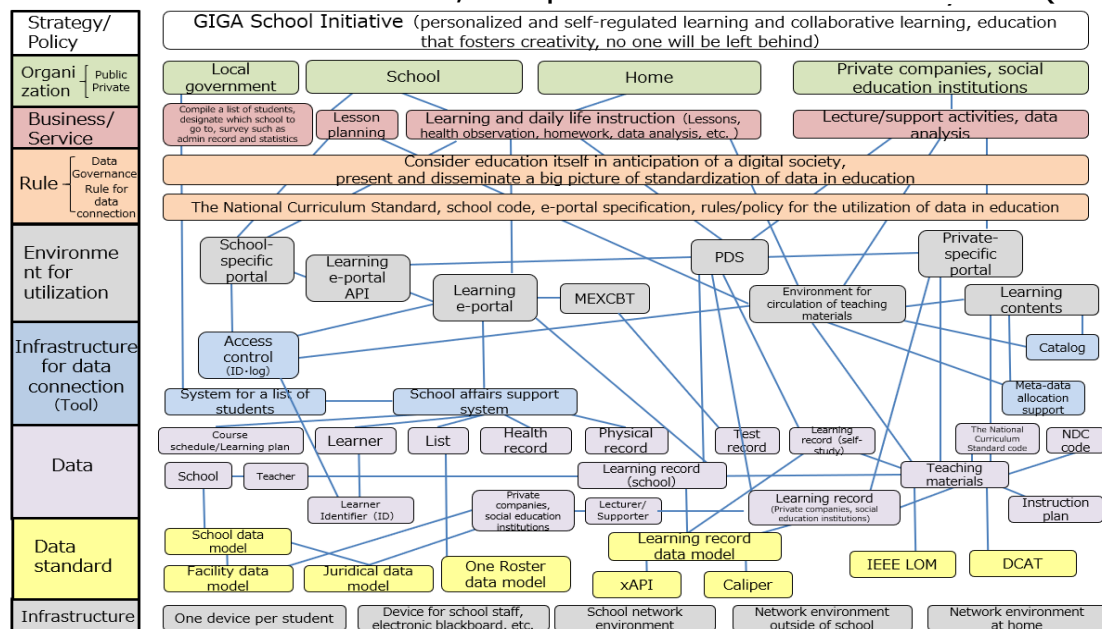
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# Summary of the Roadmap on the Utilization of Data in Education (1)

- Following [The Report on the Questionnaire to Students and Educators on the GIGA School Initiative](#) published in September 2021, ministries concerned started to draft the roadmap toward the utilization of data in education. Firstly, we set the mission of digitalization in education as **“a society where anybody, at any time and place, can learn with anybody in his/her own way,”** and “three cores” – enriching the **(1) scope, (2) quality, and (3) combination of data** - for realizing that mission.



- In order to realize these, we presented the architecture (image) of the utilization of data in education.



- Making information sharing among information systems easy is important for the utilization of data in education. Therefore, a pressing issue is that **an environment that promotes the utilization of data in education should be fostered by ensuring data interoperability in “school affairs support system,” “LMS compliant with Learning e-portal Standard,” and “LMS for outside-of-school digital education.”**
- It's important to **make data formats the same as international data standards** so that we can utilize portals/applications made outside of Japan and compare data internationally.
- It's also important to **set up metadata** re: what info is saved where, in order to promote the utilization of data.

# — Summary of the Roadmap on the Utilization of Data in Education (2)

- On top of these, issues and necessary measures in regard to each layer such as **“rule,” “environment for utilization,” “infrastructure for data connection (tool),” “data standardization,” and “infrastructure”** are clarified.

Issue	Future Direction
Big picture of data in education	Divide data in education into (1) subject information, (2) content information, and (3) activity information, and give an overall image with the architecture taken into consideration.
Putting surveys, etc. online, and standardizing data in education	In addition to putting surveys, etc. online, promote standardization of data with some priorities in mind as needed, while referring to international standards and adapting them to the current situation of Japan.
The way the platform in the field of education ought to be	On top of analyzing new values and necessary functions in data connection, map out related policies such as “learning e-portal,” “out-of-school digital education platform,” and “data platform in public education,” etc. within the big picture.
Enhancing data utilization environment for schools, local municipalities, etc.	For schools and local municipalities, etc. to utilize data in education, consider measures regarding network environments in schools, digitalization of school affairs, ICT devices for teachers and students, and the utilization of common infrastructure such as Government Cloud.
Rule/Policy for the utilization of data in education	Clarify principles for the utilization of data in education as well as the direction of the guidelines on utilizing “one device per student” with safety and security and on security policy in educational information, and situations where data management such as personal information becomes an issue.
Ensuring lifelong learning environment	For anyone to continue learning over the course of his/her life, clarify issues such as the provision of opportunities for literary acquisition in accordance with life stage and situation, visualization of learning output, ID, Personal Data Store, and Information Bank.
Realizing support to children in need through data connection	Support a pilot program in local governments that utilizes data in education, childcare, child welfare, medical care etc. for discovering children truly in need and providing push-type support to them by establishing a system to connect them as needed.
The way of education itself in anticipation of the digital society ought to be	Ministries concerned, as “One Team,” consider room for improvement in legislations, etc. in order to truly realize personalized and self-regulated learning and collaborative learning, based on the mission and vision.

- **From October 25 to November 26 last year, we asked for public opinions** on this Roadmap by using Digital Agency Idea Box. We nailed down necessary policy measures based on opinions from the public and experts, etc., then published this Roadmap. Coupled with the **Priority Policy Program for Realizing Digital Society**, we will **steadily promote necessary policies as well as flexibly revise them while taking future situational changes into account**, in collaboration with a variety of stakeholders.

# Summary of the Roadmap on the Utilization of Data in Education (3)

- “To be” in the short-term, mid-term, and long-term is presented below. We will promote policy measures based on the roadmap in addition to clarifying and indexing what attributes and capabilities should be developed, while creating use cases in pilot programs.

## Short-term (Around 2022)



- Surveys and procedures in schools, etc. becomes online in principle
- Reduce burden of schools by promoting digitalization of school affairs such as making paperwork, etc. digital in principle
- Get rid of obstacles in infrastructure (e.g., network environment)
- Standardize fundamental items of educational data (e.g., subject info that is commonly collected by law or survey across the country)

### <Issue/Problem>

Heavy burden of survey and paperwork, most of which processed by paper

### <To be>

Reduce burden by putting surveys, etc. online



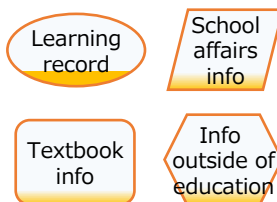
## Mid-term (Around 2025)



- Daily use of device by learners, which enables collection of log for utilization data in education
- Object and activity info standardized to a certain degree, which realizes data connection across schools and local municipalities
- Comprehensive support based on learning status in each place such as school, home, and alone partially realized

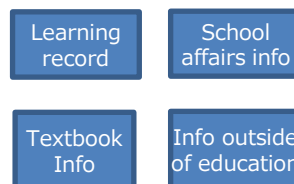
### <Issue/Problem>

No data collection across schools / local municipalities



### <To be>

Promote EBPM and create new instruction/learning methodology by data standardization



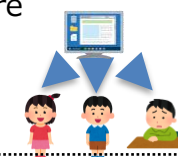
## Long-term (Around 2030)



- Learners can store and utilize their own data over the course of their life by using PDS
- Standardization of object and activity info realized to a more sophisticated degree
- Push-type support to children in need of help realized
- “Individually optimized learning” and “collaborative learning” truly realized

### <Issue/Problem>

A possibility that the fundamental framework of learning instruction in which “in school” “teachers” “at the same time” teach “to students in the same grade” “at the same pace” “the same content” cannot work anymore



### <To be>

Anybody, at any time and place, can learn with anybody in his/her own way



## Concept of KPI to realize the vision above

- Progress on the digitization of survey and procedures
- Progress on the digitization of school affairs
- Indicators re: infrastructure (device, network, etc.)
- Daily use of device

※It is important to measure these factors multi-dimensionally

- Progress on the realization of personalized and self-regulated learning and collaborative learning through the use of ICT
- Improvement of information utilization ability (Survey on info utilization ability this year)
- Situation of data utilization
- Improvement of teacher instructional abilities to utilize ICT
- Reduction of school staff workload (Survey on school staff working situation this year)

- Improvement of academic achievement (National assessment of academic ability, etc.)
- Improvement of so-called non-cognitive abilities (National assessment of academic ability, etc.)
- Reduction of school staff workload (Survey on school staff working situation this year)

3. Necessary factors for accumulation and circulation of data in education

(Issues re: future circulation of data in education)

- Patterns of data use in education, as well as the destination to store, differ by stakeholder and type of information. In order for necessary info to properly circulate among stakeholders, **on top of decentralized management of data, standardization of data and infrastructure/rules for circulation are needed.**

Clarification of patterns of data use in education (Draft)

Stakeholder	School affairs info	Teaching materials info		Learning record info		Personal data outside of education
		School edu	Private edu	School edu	Private edu	
Provider of school affairs support system	○	—	—	—	—	—
Establisher of school (Board of Education, etc.)	○	○	—	—	—	—
School/Teacher	○	○	—	○	—	—
Student	—	○	○	○	○	○
Cram school, etc.	—	—	○	—	○	—
Teaching material company (Textbook, supplementary teaching materials, study applications)	—	○	○	—	—	—
Public institution other than school	—	—	—	—	—	○
Institution outside of education such as hospital, etc.	—	—	—	—	—	○

※○ is attached to those who use the data primarily. According to the Act on the Protection of Personal Information (incl. the revision by the Act on the arrangement of related acts for the formation of a digital society, etc.), the data could be provided to those who are marked with “—”, on condition of the consent of him/herself, except for cases specified by laws. Additionally, this classification does not apply to anonymously processed information that will not allow to identify persons and thus can be provided to third parties without the consent of him/herself.

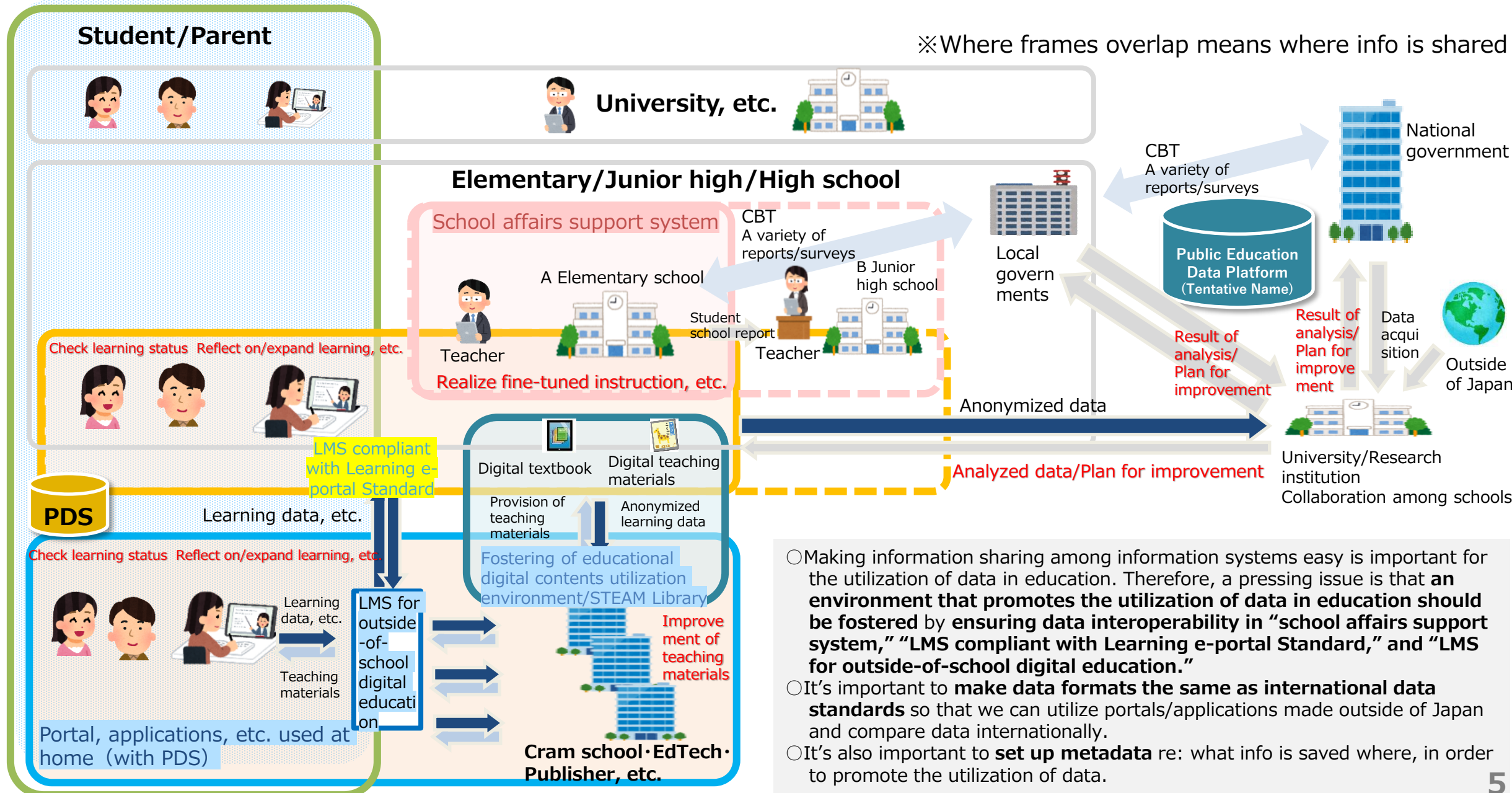
Clarification of destination to store data in education by stakeholder (Draft)

Data storage of establisher of school	○	—	—	○	—	—
Data storage of teaching material company (Textbook, supplementary teaching materials, study applications)	—	○	○	○	—	—
Data storage of cram school, etc.	—	—	—	—	○	—
Data storage of provider of school affairs support system	○	—	—	—	—	—
Student PDS	—	—	—	○	○	○

(Note) “Data is intangible and is not subject to property right, possession right, usufruct, and collateral right according to the Civil Code. Therefore, presence or absence of rights relating to data based on the concepts of property or possession rights cannot be determined (cf. §206 and §85 of the Civil Code). Moreover, there are limited cases where data is legally protected as an intellectual property right or commercial secret by the Unfair Competition Prevention Act. Therefore, the protection of data will be attempted through contracts among stakeholders in principle.” (Excerpt from Ministry of Trade and Industry “Guideline of the contract on the utilization of AI/Data version 1.1” )



## 6. The way the platform in the field of education ought to be (mapping of related policies within the big picture)



# — 8. Rules/Policy for the utilization of data in education (Fundamental concepts)

## Principles of utilization of data in education (Interim report by the Expert Panel on the Utilization of Data in Education: published in March 2021)

### (1) Education/learning precedes technology

- The purpose of utilizing data in education is to check each student's situation multidimensionally based on these kinds of data, and to enable fine-tuned instruction in order to bring out the possibilities of each student in each scene of educational activities such as learning instruction, student counseling, class management, and school management.
- Utilization of data, etc. is a means to that end, and it's important not to regard the utilization of technology and data as an end in itself.
- Those who utilize data in education are students (learners), parents, school staff, schools, establishments of schools, administrative organs, research institutions such as universities, etc. Every stakeholder needs to take actions so that "learners" (incl. parents) will be beneficiaries.

### (2) Utilize up-to-date and universal technology

- In order to fully utilize data in education for education/learning in the future, it's necessary to ensure interoperability rather than establish a partially-optimized framework/system. As technology for utilizing data in education rapidly progresses worldwide, adopting international standards, etc., in order to utilize cutting-edge knowledge in other countries as well as ensure interoperability, is needed.
- On the other hand, as school education relies heavily on culture and customs, etc., it's necessary to create a system suitable for Japanese elementary and secondary education, while making use of knowledge such as international standards.

### (3) Aim for a simple and effective framework

- It's important to create a framework in which teachers in busy schools can feel the effect of utilization in a minimally-burdened, simple way.
- With the "One source, one master" concept as a principle, the establishment of a framework in which stakeholders in school education such as schools, local governments and private companies can utilize data in a convenient way without duplicate input is needed. The clarification of the definitions of words as the precondition of data input, etc. is also needed.

### (4) Ensure safety and security

- Given that students are minors in principle, in order to realize the harmonization of utilization of data in education and safety/security, a framework/rules that enables utilization in a safe and secure way while fully protecting privacy, etc. is needed.
- Circulation/utilization of personal data should be done with the understanding and agreement of the person, and it should be ensured that persons will not inflict a loss by data utilization in an undesirable way.

### (5) Small Start/continuous improvement

- In addition to a rapid progress in the utilization of data in education, it's not easy, for the time being, to comprehensively decide on which type of utilization is most effective. It's important, also from the standpoint of ensuring safety/security, to build on practices while accumulating and sharing a variety of use cases, and then disseminating what turns out to be effective.
- Therefore, rather than aiming for a specific, complete and nationwide method of utilization, a step-by-step approach with gradual improvements is needed.

## Additional factors to consider based on the aforementioned mission and vision

- On condition of not regarding the utilization of technology and data as an end in itself, **education/learning itself needs continuously updating** in order to realize personalized and self-regulated learning and collaborative learning through the use of them.
- The concept of "**Fundamental principles for the formation of a digital society**" should be applied to the field of education.
- Also take a stance of **improving the sustainability of education/learning** (ensure learning under a disaster/pandemic, work style reform in schools, etc.) through the use of digital.
- Need to consider **seamless utilization of data that focuses** not only on elementary and secondary education, but also **on higher education, lifelong learning as well as preschool education**.
- Need to establish a framework for the accumulation and circulation of data in education with **future connection of data inside and outside of school** in mind.
- **Improve the UI (User Interface) and UX (User Experience)** thoroughly from the standpoint of users.
- Commit to **Business Process Re-engineering based on digital such as making the procedures of school affairs more effective** by reducing calculation and paperwork that "teachers" do not necessarily need to do through the utilization of data.
- **Enhance accountability of administrative organs** through the utilization of data in education, thus ensuring safety and security.
- **Necessary persons, at necessary times**, should have **easy access to necessary information**.
- Ensure that the utilization of data **will not lead to selective screening of individual students as well as visualization of one's inmost heart, such as faith and values, that he/she would not want to be exposed**.
- **Ensure proper handling of personal information, etc.** based on the Act on the Protection of Personal Information (incl. the revision by the Act on the arrangement of related acts for the formation of a digital society, etc.), by those who utilize data in education, such as administrative organs, local governments, research institutions and private companies.
- Take an agile-thinking approach in a spirit of "**Try first**" and "**Starts small and grows big**."
- On condition of small start/continuous improvement, also take a stance of **Business Process Re-engineering based on digital** rather than replacing a paper-based process with digital-based one.





# 10. Realizing support for children in need through data connection

(A pilot project by the Digital Agency)

## Expense for Promoting the Digitalization of the Semi-Public Sector (A Pilot Project for Supporting the Connection of Data Regarding Child)

### Project Overview/Purpose

- As for now, when it comes to data in such fields as education, childcare, child welfare, medical care, etc.,(\*) they are handled at different departments within the local government such as the Board of Education, childcare department, child welfare department, medical care department, and tax affairs department. Additionally, there are a variety of institutions concerned such as child consultation center, social welfare service corporation, medical institution and school, each of which, based on their respective role, engage in support for children by utilizing the information that they have.

(\*) Examples of these data are shown below:

Education: Situation of utilizing financial aid for school attendance, number of absences, status of tardiness/leaving early

Childcare: Attendance

Child welfare: Receipt of public assistance and child rearing allowance, notification of child abuse by parent/cohabitant

Medical care: Medical checkup (height, weight, temperature, etc.), record of consultation

Economics: SES, taxation status, record of relocation

- On the other hand, while giving consideration to the protection of personal information, making the most of data regarding child for discovering children truly in need and provide needs-based support to them is needed.

### Image of Project/Examples

- Support a pilot project in which local governments, by establishing a system for connecting data in such fields as education, childcare, child welfare, medical care, etc. as needed, utilize them for discovering children truly in need and providing push-type support to them. Also consider issues from the institutional standpoint, etc.

(Ref) Examples of local governments that are taking the lead

①Minoh City, Osaka Prefecture

- By using the “Child Development Monitoring System,” classify children through (1) economic situation (receipt of public assistance, child rearing allowance, financial aid for school attendance, and exemption of residence tax), (2) child rearing ability (child abuse consultation, health guidance consultation), (3) academic achievement (average adjusted deviation score in all subjects and its change), and (4) non-cognitive abilities, etc. (self-esteem, adaptability to society, health/physical strength, fundamental trust), and then utilize the results for support and monitoring through case meetings, etc.

②Amagasaki City, Hyogo Prefecture

- Establish the “Child Development Support System” in which information from eight systems (residence record, health and welfare, education, etc.) is collected and staff in charge of child support can have cross-sectional access to information regarding child, and utilize it for full, continuous, and seamless support for children.

### Money Flow

Consignment

National government

Local government, etc.

### Expected Effects

- “No one will be left behind & Human-friendly Digitalization,” as well as holistic support for child-raising families in need of support and personalized and self-regulated learning based on the needs of respective children can be realized by making it possible to solve societal problems such as child poverty and abuse, and change administrative services into push-type ones.

# 1. The way of education itself in anticipation of the digital society ought to be

## (The goal of Digital Transformation in education)

- The goal of Digital Transformation in education is to realize learner-centered education by enriching the combination of a variety of “places”, “people” and “contents” relating to learning.  
 (“A society where anybody, at any time and place, can learn with anybody in his/her own way”)

※Regardless of the situation below, there are schools that are already engaged in cutting-edge practices of personalized and self-regulated learning and collaborative learning through the use of ICT.

### Teach “at school”

- ✓ Education should be provided at a “place” of school in principle.
- ✓ Given the importance of interaction among students themselves as well as students and teachers, students should study at school.



### “Teachers” teach

- ✓ Lessons are instructed mainly by teachers who have teaching certifications.



### Teach “at the same time”

- ✓ Students study the same content in groups.



### Teach “to students in the same grade” “at the same pace” “the same content”

- ✓ The contents that should be taught in each grade are stipulated by the National Curriculum Standard.
- ✓ Students, regardless of their progress on learning, take lessons of the same content at the same pace and time.



## World after Digital Transformation in education (The goal)

### Can learn “at any place”

- ✓ Schools provide learning opportunities that cannot be provided by other places, given the importance of interaction among students themselves as well as students and teachers.
- ✓ Other learning opportunities can be provided at places most suitable for the learner.



### Can learn “with anybody”

- ✓ The role of teacher will be design and support learning so that each student can progress, in addition to teaching knowledge and skills.
- ✓ Teachers are also expected to serve as coordinators who utilize resources such as human resources for learning that should be provided in a group of students.



### Can learn “at any time”

- ✓ Learn collaboratively what can be learned only in groups.
- ✓ From quality management at the entry point to that based on a hybrid of the entry and exit points.



### Can learn “in his/her own way”

- ✓ What students learn and in what order will differ based on respective needs and understanding of each student, with the help of big data analysis.
- ✓ The typical method regarding what to learn and in what grade and order will become only a standard.

