Research note

Children with Disabilities in Japanese Schools: Between Assistive Technologies and Social Barriers

Anne-Lise Mithout

Summary
Japan is a pioneer country in the field of assistive technologies for people with disabilities. These technologies are not merely objects: they are designed to support disabled persons' social "integration" and the creation of an "inclusive society." That is, a society in which every aspect of life is accessible to any citizen — regardless of his/her life circumstances. In contrast to rehabilitation policies, which provide disabled individuals with special assistance (including assistive technologies) that help them to adapt to society, inclusion policies are instead aimed at transforming society so as to adapt it to the different needs of its citizens. The movement for "Universal Design," which emerged in the 1980s, has as its aim the connecting of technological and social issues, by improving the accessibility to various aspects of social life through technological and architectural means. In Japan the government is paying increasing attention particularly to the education sector, where assistive devices are seen as key to enabling disabled children to attend ordinary schools alongside nondisabled peers — so as to improve their access to higher education, and to a broader range of job opportunities. In practice, though, to what extent do assistive technologies and Universal Design actually contribute to the improvement of disabled children's inclusion in ordinary schools in Japan? This research note is based on quantitative data taken from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) statistics, and qualitative data from ethnographic fieldwork that was conducted in five Japanese primary schools. It analyzes the social processes and institutional barriers that shape the use of assistive technologies in the country's schools. It shows that, in the Japanese supposedly technology-friendly social context, there still remain strong barriers — ones that can be identified as social rather than technical — to disabled children's greater inclusion in the country's schools.

Keywords: disability, Japan, assistive technologies, universal design, education

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Introduction

On this morning, the teacher is explaining the basic principles of tectonics plates. He illustrates his speech with animated drawings that glow with bright colors on a brand new, extra-large LCD screen. The whole class seems captivated, and when the teacher asks students to take a guess at the details of the geological mechanisms a crowd of hands rises and students wait with eager eyes to give their answer in an enthusiastic voice. Among them, sitting at the front of class, A-san says nothing, but still watches the screen with keen interest. A-san has a cognitive disability. The LCD screen provides her with visual support for abstract explanations, enabling her to gain a better understanding of key concepts. However the device, instead of being specifically dedicated to her, is used for the benefit of the whole class. This scene, which I observed on November 8, 2013 in a primary school in Higashihiroshima City, Hiroshima prefecture, perfectly exemplifies what "inclusive classrooms" can be: "Universally Designed" ones where technologies are used to meet the specific needs of children diagnosed as "disabled" and to enable them to attend ordinary schools, while also offering additional pedagogical tools to the class as a whole.

However it is noteworthy that this scene was observed on the day of a *kôkai jugyô kenkyûkai* (open-class research meeting); that is, a special day on which parents (overwhelmingly mothers) were invited to attend classes and observe lessons. Teachers from other schools also came along to contribute to training sessions and discussions on the theme of "school innovation" (transcribed into katakana: *sukûru inobêshon*). *Kôkai jugyô kenkyûkai* are held at least once a year in every Japanese school, and are often designed to be a showcase moment of pedagogical innovation. They sometimes have a strikingly dramatized aspect to them, as well as a cold, carefully calculated perfection too. As such, the flawless exhibition of Universal Design in the observed situation is not necessarily representative of everyday life in class.

For several decades now Japan has been portrayed as a very technology-friendly society. The Japanese government cultivates this image, especially by implementing technology-based policies for the purpose of solving different social problems. In the field of health, new technologies like robotics are developed as responses to the challenges of an aging society. They also constitute one of the key factors in the support system for people with disabilities. Japan has long been one of the most advanced countries in terms of techniques for care and rehabilitation, leading to the development of a wide-ranging research field called Rehabilitation Studies (*rihabiritêshon-gaku*).[1] In the field of education too, the promotion of technology-

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1   There exist a large number of research organizations dedicated to rehabilitation, focusing on different fields thereof. Among them are the Japanese Association of Rehabilitation Medicine, Japan Society of Vocational Rehabilitation, the Japanese Society for Neural Repair and Neurorehabilitation, the Japanese Society for Respiratory Care and Rehabilitation, the Japanese Association of Psychiatric Rehabilitation, the Japanese Association of Oral Rehabilitation, the Japanese Society of Neuro-

based pedagogy has become a priority.[2] At the crossroads between both fields, education for disabled children — now called Special Support Education (*tokubetsu shien kyôiku*) — relies on technology to provide disabled children with support that is adapted to their educational needs, and to promote their greater inclusion in ordinary classrooms nationwide.

Indeed at present, both in Japan and worldwide, support policies for disabled persons are based on the idea of creating an "inclusive society"; that is, "a society for all in which every individual, each with rights and responsibilities, has an active role to play" (United Nations 1995: Chapter 4, §66). This philosophy particularly relies on the technological concept of "Universal Design" defined as the "design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Center for Universal Design, cited in Stephanidis 2009: 28). According to this conceptualization, assistive technologies are not an end in themselves but rather should serve as a means for promoting disabled people's active citizenship and their participation in various aspects of social life — in a society where all activities (be it in the field of economy, politics, leisure, daily life, and so on) are accessible to any citizen, regardless of their own particular abilities and needs.

This concept has come about along with the recent evolution in the notion of "disability." In Japan, as in most industrialized countries, social protection for people with disabilities has progressively expanded, starting from provision for the war wounded and progressively extending its scope so as to encompass, from the 1970s on, various situations (physical disability, visual and hearing impairments, incapacitating illnesses, and mental disability) within a unified welfare system. However in the 1990s the definition of disability was broadened further, as so-called developmental disorders (*hattatsu shôgai*) gained political recognition after receiving growing attention in the medical field and through the activism of parent groups (Teruyama 2009). Only in 2004, through the Law on Support to People with Developmental Disorders (*Hattatsu shôgaisha shien-hô*), were these emotional, language, and learning disorders finally recognized as disabilities. For the educational sociologist Kimura Yuko (2006, 2015), this process is part of the medicalization of society (*shakai no iryôka*), and especially the medicalization of difficulties at school. The diversification of individual situations labeled as

cognitive Rehabilitation, and the Japanese Society for Musculoskeletal Medicine. Each of these organizations regularly holds conferences and publishes specialized journals. Further, more than a hundred universities have a Rehabilitation Studies Department *(rehabiritêshon gakubu)* (Kansai Gaidai University website).

2   Since 1985 the MEXT has successively launched three plans to develop the use of Information and Communication Technologies (ICT) in the classroom, both as a means of educating students so as to meet the needs of an ICT-based society and in order to promote the use of innovative pedagogies. The latest project, "Vision for the Computerization of Education" *(kyôiku no jôhôka bijon)*, launched in 2011, promotes in particular the use of tablets as pedagogical devices (MEXT 2014).

disabilities has been part of a process of change in the conception of disability itself. Under the influence of disability scholars such as Michael Oliver (1990) and Tom Shakespeare (2013), there has been a shift from a purely medical conception of disability (known as "the medical model") to a more social one ("the social model") thereof. This shift will be explored in greater detail below.

In the field of education, it is now widely admitted that one key to the better integration of disabled people into society is their enrollment in ordinary schools.[3] In Japan this development has been promoted through a shift from Special Education (*tokushu kyôiku*) to Special Support Education (*tokubetsu shien kyôiku*). The latter is conceived of as providing children recognized as disabled with special support adapted to their needs, within the framework of ordinary schools. It is based on the assumption that the difference between disabled and nondisabled children is tenuous: only very few "situations of disability" make enrollment in special schools necessary, while special support provided in ordinary schools can be beneficial to all children — not only those with disabilities (MEXT 2007b). Universal Design plays a major role in the construction of this system, as assistive devices can enable disabled children to attend ordinary classes. The creation of universally designed lessons can benefit all students, regardless of their particularities, as they are supposed to meet a broad range of educational needs (MEXT 2009).

In practice, to what extent do assistive technologies and Universal Design genuinely support the inclusion of Japanese disabled children in ordinary schools?

Considering the field of education as exemplifying the complex relationship between social context and technology usage, this research note aims at examining the appropriation of technologies in the Japanese primary school system. It does so by investigating to what extent technologies that are designed to foster disabled people's social participation actually do — or do not — fulfill this initial ambition. This paper does not investigate in depth the situation of device-making companies, but will adopt a user-oriented perspective. It is based on the methodology suggested in Science and Technology Studies (STS); that is, investigating the social processes surrounding and shaping the usage of technology, and the theoretical framework of Disability Studies — focusing particularly on the concept of "inclusion."

Studying technology usage through the lens of Universal Design and Disability Studies is one way to investigate the various processes through which technology is appropriated in a specific social context. Beyond technical aspects, I will also explore the underlying assumptions and values that are conveyed by assistive technologies, highlight the hurdles that impede the development of universally

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3	A notable exception is the case of the Deaf community, which in Japan defines itself as a cultural minority and defends deaf children's access to special schools. Herein they can communicate with deaf peers with sign language, and become self-assertive deaf adults who contribute to the vitality of Deaf culture — conceived of as being radically different from its mainstream counterpart (see Nakamura 2006).

designed classrooms in Japan, and show that tools that have been designed to improve disabled children's school life can turn out to in fact be potential stigmas for their users.

This research highlights the fact that, in practice, the issue of school inclusion in Japan is closely linked to the broadening of the definition of disability. Indeed, most users of assistive technologies in ordinary schools are not children who would have been sent to special schools a few years ago but rather those who fall into the recently created (and somewhat vague) category of having "developmental disabilities." On the other hand, children who fall into disability categories that have a tradition of requiring special schooling are still enrolled en masse in special schools — where they use technologies that, as a consequence, cannot be said to facilitate their integration. This research note thus shows that, in the supposedly technology-friendly social context of Japan, there remain strong barriers in schools to the inclusion of disabled people, ones that can be termed social rather than technical.

Between technology and society: Universal Design

Since the 1980s disabilities policies all over the world have been converging, following principles that have been promoted by international organizations (notably during the United Nation's Disabled People's International Year in 1981) and in answer to the claims of Disability Rights activist associations. These policies are based on one key idea: supporting disabled people's participation in all aspects of social life, as opposed to formulating policies that are focused on developing specialized care institutions in which persons with disabilities would live separate from the rest of society.

Governments have thus acknowledged the fact that disability is not only a medical issue but also a social one. They thus increasingly follow what is called the "social model of disability": the phenomenon should not be conceived only in terms of bodily or cognitive dysfunctions (a conception called "the medical model of disability"), as it is also the consequence of life in a more or less "dis-abling" social environment. In one of the most famous books in the field of Disability Studies, *The Politics of Disablement* (1990), Michael Oliver analyzes disability as a social construct influenced by capitalist ideology, and highlights how disabled people's lives are shaped and limited by norms that were created by the medical sciences and industries (as companies select a certain type of workforce, on the basis of physical and cognitive criteria). On the theoretical level, the social model of disability distinguishes between *impairment* (that is, a physical, sensorial, or mental functional disorder that affects an individual), *disability* (the limitation of activities resulting from impairment in a given social environment), and *handicap* (a disadvantage resulting from impairment/disability, one that prevents the individual from fulfilling

a role that would be "normal" according to her age/sex and sociocultural factors) (WHO 1980). Tom Shakespeare notes that:

> While doctors and professions allied to medicine seek to remedy impairment, the real priority is to accept impairment and remove disability. Here there is an analogy with feminism, and the distinction between biological sex (male and female) and social gender (masculine and feminine) (Oakley, 1972). Like gender, disability is a culturally and historically specific phenomenon, not a universal and unchanging essence (Shakespeare 2013: 216).

The social model of disability was adopted by the World Health Organization in 1980 in its International Classification of Impairments, Disabilities, and Handicaps, as a guiding theoretical framework for worldwide disability policies. The internationally promoted version was slightly toned down relative to the suggestions made by British disability scholars such as Tom Shakespeare and Michael Oliver (Fougeyrollas 2002). The model has been criticized for its shortcomings, for instance the lack of representativeness of the diversity of disabled people's situations, negligence of some aspects of disabled people's lives (such as the experience of having a disabled body), and the various differences that exist between their situation and that of ethnic or sexual minorities — commonly cited as points of reference by the Disability Rights Movement. However it has at least enabled disabled activists to set a clear political agenda and contributed to a change in ways of conceiving of disability, especially for disabled people themselves. In this conception, they are no longer considered to be intrinsically diminished or inferior beings — but rather as persons who are able to take part in a collective struggle for the improvement of their daily living conditions (Shakespeare 2013).

The social model of disability thus laid the first foundational stone for an inclusive society; that is, "a society for all in which every individual, each with rights and responsibilities, has an active role to play" (United Nations 1995). This is furthermore a society in which every aspect of life is accessible to anybody, regardless of their specificities, as opposed to one where disabled people have to live in a special environment that has been specifically designed for them. Contrary to rehabilitation policies, which provide disabled individuals with special assistance (especially assistive technologies) in order to help them to adapt to society, inclusion policies are instead aimed at transforming society so as to adapt it to the different needs of its citizens.

In the field of education, the publication of the Warnock Report in the United Kingdom in 1978 was a major historical turning point — as it presented a breakthrough approach to disabled children's education. As opposed to the tradition of enrollment in special schools, it suggested that disabled children were not radically different from nondisabled peers and introduced the concept of "children with special educational needs." It thus called for broadening the definition of disability at school, and a better consideration of all the dimensions of disability and not only on a medical level. The notion of special educational needs is a conceptual

innovation aimed at facilitating a paradigm shift. However its definition varies from one country to another. Its imprecision makes it more a political buzzword or a category of commonsense knowledge than a concrete sociological concept (Ebersold and Detraux 2013), and it remains a social category that can result in discrimination (Lavoie et al. 2013).

Despite the concerns that it raises, the concept of special educational needs has continued to gain prominence ever since the 1980s specifically through the intervention of UNESCO. The Salamanca Statement (1994) defended the idea of education for all, one that fosters the participation of any individual regardless of their particularities. Along with the internationalization of this idea emerged a debate between the champions of integration and of inclusion (Vislie 2003). Mercier and Grawez suggest the following synthesis:

> Integration means favoring the adaptation of the disabled person in an ordinary environment: she must fit in mainstream norms and social values and develop strategies to be recognized "like the others." Inclusion implies a dialectical process where, on the one hand, the disabled person tries to adapt as much as possible to social norms and, on the other, social norms are adjusted to accept differences (Mercier and Grawez 2006: 31).[4]

Nevertheless, there is currently no consensus regarding the conceptual distinction between the two terms.

On the political level, even though the effects of the Salamanca Statement have appeared only slowly most countries have nonetheless launched reforms based on its principles since the year 2000. In Japan the reform toward "inclusive education" (*hôkatsu na kyôiku*) took place in 2006, within the framework of a general reform of education. The revision of the Fundamental Law of Education (*Kyôiku kihon-hô*) in 2006 saw the appearance of the following statement: "The State or local authorities should provide disabled children with adapted educational support, so that they can receive a full-extent education corresponding to their situation" (Art. 4, § 2). This has set the framework of the new system, with it being based specifically on the notion of "support" (*shien*).

Even though the reform did not create radically new educational structures, it did aim at promoting enrollment into ordinary schools. By shifting from Special Education, a term conveying a very negative image of disabled children and their education, to Special Support Education, which is anchored in the philosophy of inclusion, Japan pledges to "offer an education corresponding to the level of preschool, primary school, junior high school, or high school, while providing the child with skills and knowledge necessary to her autonomy, enabling her to overcome the difficulties regarding learning or daily life, according to her disability" (Article 72 of the Revised Law on School Education (*Gakkô kyôiku-hô*, 2006)). This law sends the message that the purpose of disabled children's education is no

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4   All translations presented in this paper are the author's own.

different from that of ordinary education: there are only additional goals that are specific to disability (Kanazawa 2013), especially concerning the development of autonomy. In practice, it has resulted in measures like the appointment of Special Support Education Coordinators in every school and the enhancement of ordinary teachers' training to meeting diverse educational needs in their classroom.

This is where technology can turn out to be a major asset. The idea of Universal Design was first introduced by the architect Ronald Mace in 1974, who defined it as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (cited in Stephanidis 2009: 28). This means that universally designed buildings or products are not created specifically for disabled people; they are made to be easily used by everybody, regardless of age, health condition, or sensorial capabilities. Therefore, even though the development of Universal Design relies on the outcomes of research on assistive technologies its core approach is ultimately different. A universally designed environment will not "assist" anyone with specific technologies: it will be designed in such a way that users will need the least-specific assistance. In Japan, as in other countries, Universal Design was at first mainly an architectural concern. It emerged first in the 1980s, and its progressive implementation contributed to meeting the needs of both disabled and elderly citizens in terms of access to public infrastructure and transport (MLIT 2001). At that time the term in use was "the making of a barrier-free society" (*shakai no bariafurî-ka*), defined as a process aiming at removing the barriers that prevent elderly and disabled people from moving freely in the public space (MLIT 2001). However, along with the diffusion of the concept of inclusion in the decade after the year 2000, the scope of these policies has also evolved. It encompasses now various fields such as work and education, from a universal perspective that is not directed toward specific population categories (Prime Minister's Cabinet 2008). In this light, it appears that Universal Design as a concept lies at the crossroads between technology and society.

In the field of education, technology enables ordinary teachers to adapt their lessons to the different needs of disabled children; it enables children with various difficulties and abilities to attend the same classroom. Moreover the MEXT has promoted the use of ICT in education in an attempt to adapt the Japanese school system to the challenges of an information society. Indeed, ICT are seen as a means of simultaneously favoring the individualization of lessons in a collective context and students' ability to work in teams and offer each other mutual support (MEXT 2011), thus fitting in with the perspective of Universal Design.

In practice, though, does technology enable teachers to provide adaptations of their lessons that are specific to the needs of children with disabilities (in the perspective of assistive technologies, meaning enabling disabled children to get by in an environment that was not designed for them), or does it contribute to the creation of an inclusive school environment (following the core principle of Universal Design)?

Methodology

The material discussed here was collected during a nine-month fieldtrip that was conducted between 2013 and 2014.[5]

The state of appropriation of educational assistive technologies in Japanese schools needs to be examined from both quantitative and qualitative perspectives. A quantitative approach enables us to assess the extent to which potential technology users attend ordinary school and highlights the fact that the repartition of students in the different schooling structures is very dependent on the type of disability being considered. On the other hand, a qualitative approach gives us an insight into the lives of children with disabilities at school and their subjective experiences as technology users. It enables us to understand the social processes that shape the (absence of) appropriation of assistive technologies in ordinary classrooms, and the nature of the social hurdles that impede its development — as well as its also effective usage for the purpose of inclusive education for disabled students.

Consequently, in addition to analyzing quantitative data from MEXT statistics, I also conducted ethnographical fieldwork, visiting 20 schools (both special and ordinary ones) in Tokyo, Kyoto, and Hiroshima prefectures. The core focus of my research was on investigating the evolution of special schools as a phenomenon happening in parallel to the development of inclusive education. I mostly focused on six schools for the blind, but also visited nine special schools of other types (for the deaf, for physically impaired children, for children with mental disabilities, and for children with long-term illnesses).[6]

Additionally, it appeared necessary to explore the transformations of ordinary schools — in order to be able to analyze the observed phenomena within their general context. I therefore gathered data on inclusive schools by observing five primary school classes (2nd, 3rd, and 5th Grades) that included at least one child diagnosed as disabled.[7] In all schools, I conducted interviews with the teachers of the classes observed; I also interviewed a number of Special Support Education Coordinators, schoolmasters (*kôchô*), and headteachers (*kyôtô*). Moreover I took part in research days that teachers attended as part of their training, and met various university professors who specialized in Special Support Education — as well as parents of disabled children.

6   These are the five existing categories of special school, or more precisely were until recently; as part of the shift to Special Support Education, all these categories have been faded by the MEXT into a single one — namely "Special Support Schools."

7   In all cases they happened to have *hattatsu shôgai*, the type of disability that is by far the most commonly encountered one in ordinary classes.

Even though technology was not the main focus of my study at the time, I gathered data concerning its usage during observations and interviews — these sources provide the primary material on which this research note is based.

Paradoxical practices of Universal Design in education

A large part of STS research is based on the concept of sociotechnical systems. Such a system is a network of relationships that include human and nonhuman actors. Michel Callon (1986) was one of the first sociologists to postulate that, when studying the complex processes that result in innovation in a given social system, human - — human and human - — device interactions should not be analyzed separately: they are part of a joint system that should be interpreted as a whole.

In the case of educational technologies, the system is composed of: technical devices, the industrial manufacturers of those devices, the Japanese state (for example MEXT, which provides funding for equipment), children with disabilities (and their families), teachers, and nondisabled children in ordinary schools. This article does not investigate the situation of device-making companies. Yet it is worth mentioning that, in the field of assistive technologies for disabled people as in technologies for the elderly, Japanese companies like Honda or Kawada Industries achieve high levels of performance; moreover manufacturers of assistive devices are enthusiastically supported by the Ministry of Economy, Trade, and Industry (METI), because the government has identified this field as a key market for Japan's future economic strategy. This means that assistive technologies do indeed exist, and are readily available to Japanese consumers.[8]

Existing educational assistive technologies are numerous and diverse in nature, but most of those observed as being in use in the course of this research were based on ICT. For example children with visual impairments can use a computer and a screen in order to zoom in on an image or to change the color of a text, which enables them to follow the same lesson as other children with only a few adaptations to their visual capabilities. Blind children can use a Braille computer, which features a Braille keyboard and a Braille screen, so that they can read and write documents that can then be easily transferred to the teacher's own computer and automatically transcribed into black and white letters. Children with learning difficulties can use various applications for tablets, which help them to learn and remember words or numbers through images or different colors.

However the concrete use that is made of these devices in school is not entirely determined by their technical features, even though the function of a given technological object can be inscribed in the artifact itself (Akrich 1992). In fact, there are two ways of integrating them into a classroom: by using them as assistive

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8   For an overview of existing technologies and current research, see National Rehabilitation Center for Persons with Disabilities (2016).

tools that meet the specific needs of disabled children, or by incorporating them into a broader vision of inclusive education (according to the perspective of Universal Design). In practice, a universally designed educational environment is based on school activities that every child can easily understand and in which every one of them can easily take part — as opposed to schools where children with specific difficulties take extra and individual classes. Universally designed education and educational assistive devices are the focus of a great deal of action research in schools, especially in Japan where research takes up an important position within teachers' activities. In practice the implementation of universally designed lessons is challenged by several problems, as the following discussion will show.

The next sections analyze the state of appropriation of educational assistive technologies in Japanese schools, first from a quantitative and then from a qualitative perspective.

The situation in numbers: Do target users of assistive technology attend ordinary schools?

In order to analyze the current state of use of assistive technologies in Japanese schools, it is essential to first examine the repartition of disabled children between the different types of schooling structure. The 2006 reform aimed at promoting inclusion in mainstream schools, rather than creating special schools per se. However, the latter did not disappear. Inclusion can take two forms: individual inclusion in an ordinary classroom along with nondisabled peers, or enrollment in a special class inside an ordinary school. As such, there exist three possibilities when it comes to schooling for children with disabilities. Table 1 below shows the repartition of students at the primary and junior high school levels in 2012, depending on their type of disability:

Table 1: Repartition of children in the three schools structures, by type of disability

	Special schools	Special classes	Individual inclusion	Total
Mental disability	58,371 (40%)	86,960 (60%)	X	145,331
Emotional disorders	X	67,383 (90%)	7,450 (10%)	74,833
Language disorders	X	1,568 (5%)	32,674 (95%)	34,242
Autism	X	X	11,274 (100%)	11,274
Learning disorders	X	X	9,350 (100%)	9,350
Attention deficit	X	X	8,517 (100%)	8,517
Physical disability	21,838 (83%)	4,374 (17%)	17 (0,06%)	26,229
Visual impairment	2,874 (83%)	417 (12%)	161 (5%)	3,462
Hearing impairment	5,008 (60%)	1,329 (16%)	2,056 (24%)	8,393
Long-term illness	12,513 (84%)	2,397 (16%)	20 (0,01%)	14,930

(Source: MEXT 2012)

The table reveals notable variations between the different categories of disability. In the cases of physical disability, visual impairment, hearing impairment, and incapacitating illness,[9] it becomes apparent that, despite the official promotion of inclusivity, the majority of children are still enrolled in special schools. Therefore assistive technologies, if used, cannot be called a vector of school inclusion for these children. For example, I mentioned earlier that there exist a wide range of technologies that can favor the adaptation of lessons for visually disabled children. The statistics presented here tend to show that these technologies are very rarely used in ordinary schools, and that, in this context, they do not contribute to the creation of a universally designed classroom.

Moreover even though the cases of emotional, language, and learning disorders seem at first to prove that some categories of disabilities are entirely taken charge of in ordinary classes rather than in a special environment (as the above table shows, these children are massively enrolled in "individual inclusion"), they must still be examined carefully. Indeed, as described above, these disorders have been categorized as disabilities only recently: they are parts of what are classed now as developmental disorders. Therefore, they have not traditionally been taken charge of in special schools or special classes: they exist as categories only within the framework of ordinary schools, as a consequence of the medicalization of various difficulties occuring in the school context (Kimura 2006, 2015). Although this does not mean that children who live with these disorders do not benefit from the use of assistive technological devices in the educational context, it cannot be said, based on these cases, that assistive technologies enable children with disabilities to be relocated from special schools to ordinary classrooms.

Finally, mixed results can be seen in the categories of mental disability and autism (the latter of which was, prior to the 2006 reform, a subcategory of mental disability that could not be catered for in ordinary schools). Children with autism do now attend ordinary classes, which can be seen as sign of improving schooling conditions in terms of their inclusion. Regarding the other categories of mental disability, 60 percent of children do indeed attend ordinary schools — yet none of them are enrolled in an ordinary class. As such, they cannot be said to have completely left a special environment for an inclusive one.

The conclusion we can draw from quantitative data regarding the development of inclusive education in Japan is thus mixed. The only case in which enrollment into ordinary schools seem to have made significant progress over special schooling is that of children with autism. In the cases of other disabilities that have a tradition of

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9   As defined according to precise medical criteria in the annexes of the Law on Social Protection for People with Physical Disabilities (*Shintai shôgaisha fukushi-hô*), first issued in 1949 and progressively revised so as to extend the scope of the definition of disability. Indeed, even though the system has been reformed to focus on children's individual needs rather than medical categories, standardized categories are still in use in school administrations and continue to influence and be influenced by the use of medical technologies for diagnosis and therapy (Hogle 2008).

special schooling, there seem to be barriers to the development of inclusive education. Even though assistive technologies that could favor inclusive schooling do exist, they are little used in an inclusive context (as statistics show that there is no transfer of students from special to ordinary schools). Therefore, it can be assumed that barriers preventing disabled children from attending ordinary schools are not purely technical — and thus, presumably, rather mostly social. The next section strives to analyze, based on qualitative data, the nature of those barriers — and of the social processes that contribute to the success or failure of the appropriation of assistive technologies in ordinary classrooms.

Social hurdles to the emergence of universally designed education

In the course of this research I have identified three key issues that restrain the development of universally designed classes using assistive technologies: the current system of funding, the lack of adequate teacher training, and the existence of strong conformity pressures in ordinary classrooms. Each of them can be related to specific actors within the above-described sociotechnical system.

The issue of funding

Funding for assistive technologies is granted by the MEXT, which manages all schools in Japan. However funding is not granted to individual users. Money is provided rather to schools, so that technological devices become collective property. Since there are almost as many types of assistive device as there are children with a disability, it is however very difficult for school administrators to make investment decisions concerning these technologies. Indeed, foreseeing which devices are the most likely to be helpful to future students is crucial — as most are extremely expensive. It transpired in my interviews with Special Support Coordinators and schoolmasters that schools tend to give priority to equipment that will be used by as many students as possible. Consequently in the case of disabilities that have a low prevalence, for example visual impairment, ordinary schools have very little incentive to buy an expensive Braille computer because the probability that the school will take in a blind child in the future is low, compared to the high price of the computer. Therefore, schools that decide to invest in this kind of equipment are mostly special schools for the blind.

The 2006 reform gave special schools a new role: they were now to serve as local centers of expertise offering support to ordinary schools that include disabled children. Lending expensive adapted technological material is supposed to be one aspect of this support. However, in practice, the amount of special schools' available technological equipment remains limited: in fact it is rather common to see schools for the blind themselves sharing expensive devices, lending them to one another — depending on students' actual needs in each school (Kaneko 2013). Therefore,

special schools hardly own the necessary volume of equipment to additionally supply ordinary schools.

This process seems to grow into a vicious circle: ordinary schools do not invest in assistive technologies because they do not enroll blind students and, conversely, blind children cannot attend ordinary schools because the latter do not have the assistive devices necessary to adapt lessons to these children's needs. Therefore, financial resources — that is, school budgets and the procedures through which money is allocated to schools, and devices to students — appear to be one of the reasons why the existence of assistive technologies in itself does not initiate the participation of disabled children in ordinary educational institutions as much as it could.

Teachers and the need for training

The development of universally designed classes requires the intensive training of teaching staff. Indeed, in order to be able to design lessons for all children their teachers have to be aware of different individual needs. These educators also need to know and be proficient in a wide range of instruction techniques, especially ones involving assistive technologies — so as to be able to come up with solutions that will meet as many different needs as possible.

Managing heterogeneity is one of the main challenges that Japanese teachers have to face today. Since 2007 every ordinary school in Japan has been required to employ a teacher who specifically supports those teachers who have children with disabilities or various difficulties in their class. These individuals are called Special Support Education Coordinators (*tokubetsu shien kyôiku kôdinêtâ*), and one of their tasks is to provide ordinary teachers with help and advice regarding the use of the assistive technologies that are used by, or useful to, disabled children (MEXT 2007b).

In spite of these endeavors however, the actual results vary from one school to another and from one teacher to another. In the course of this research I observed two different types of case. Although the small number of schools observed does not enable me to extrapolate the proportions in which these situations occur on a broader scale, I noticed that in two of the schools (those concerned — meaning both teachers and non-disabled students — were dedicated to including children with difficulties in a supportive atmosphere. But in two other schools (, I observed classes where the teacher mostly ignored the disabled children or interacted with them only when trying to make them keep quiet while the lesson went on for the rest of the class. In the fifth school (, the situation was mixed: in the three classes that I observed, two appeared to provide a rather supportive environment for the children with disabilities attending them while in the third the teacher was frequently overwhelmed by the bursts of emotion (be it anger or laughter) of a student with an "emotional disorder."

Interpreting teachers' struggle to provide individualized support adapted to disabled students as an individual lack of goodwill would conceal the reality of Japanese teachers' daily work. As numerous studies have shown (for example MEXT 2013; Usui 2001), in recent decades teacher's professional stress has undergone a dramatic increase: be it because of a growing number of discipline problems, longer working hours due to collective work and administrative tasks, or the necessity of meeting the unrealistic demands of "monster parents" (Onoda 2008). Teachers count among the professionals facing the highest levels of stress and exposure to burnout in Japan. For many of them, then, committing themselves to including a disabled child seems to be yet another burden in an already exhausting professional environment (Takada, Nakaoka, and Huang 2011). Training in inclusive teaching and the use of assistive technologies, though officially promoted, is thus structurally and institutionally discouraged, as its benefits are not clearly perceived by teachers relative to the amount of additional effort it calls for. Those teachers who are actively involved in universally designed and inclusive education do so out of personal willingness, often with little institutional support.

Teachers' resources, in terms of knowledge, skills, and time, are therefore another factor that impacts on the creation of a universally designed education in Japan. The current professional environment in the country's schools appears to be a structural disincentive for its implementation.

Nondisabled peers: The influence of symbols and stigmas

For children with disabilities, using a specific technological tool is not only a technical issue but also a social and symbolic one. Indeed, the appropriation of an assistive device is not only a matter of knowledge and know how: usage also involves interpersonal relationships, as it rarely occurs in a simple student–device configuration. It is more often anchored in a broader social situation, of which the disabled student–computer interactions are only one aspect. Upon being brought into the classroom the assistive device becomes a part of it, and thus turns into a "mode of reformulation of interpersonal relationships" (Winkin 1996: 227).

As such assistive technologies, as they are used primarily by disabled children, can be perceived as a specificity of theirs, a mark of "difference" — one that is always at risk of turning into a stigma.

In fact disability has a strong connection with school bullying (*ijime*), especially for children with autism (Tada 1998). In this context special technological devices become potential targets for incidents of bullying, and cases of disabled children getting their special devices stolen or broken by other children are frequently reported.[10] This phenomenon is not unique to Japan. However in addition to it

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10   In popular culture a recent manga comic Koe no katachi (Ôima Yoshitoki, published by Kôdansha in 2013–14), translated into English as A Silent Voice (published by Kôdansha Comics USA in 2015–

another social process can be observed there, one that seems much less documented in other countries. It appears that many Japanese children who are partially sighted or of partial hearing try to hide their difficulties as long as possible, because they do not want to be diagnosed as disabled. They prefer not to receive any assistance, not to use any assistive device, rather than having to bear the disability label. Although no data has been published on this subject to date, several experts on visual disability at the National Research Institute on Special Support Education (*Kokuritsu tokubetsu shien kyôiku sôgô kenkyûjo*) that I interviewed estimated that the official number of visually impaired children may be as low as half of their actual number due to this reluctance to be diagnosed as such. In the course of my research, I met a boy who had managed to hide his visual impairment until he was nine years old.[11] The reason for this behavior was that he did not want to use a magnifying glass, because he thought that it would mark him out as different from other children. In spite of the efforts being increasingly paid to early diagnosis of disability (Sakuma, Tanabe, and Takahashi 2011; Sasamori 2010), it thus seems that the label is still a difficult one to bear in Japanese ordinary schools. This echoes the assessment that, in spite of sustained political calls to improve diversity in the classroom (Tsuneyoshi et al. 2010), it remains difficult for students who belong to any kind of minority to find their place in a school environment where peer pressure and pressure to conform are still high (as analyzed in MEXT 2007a).

In this context it appears that potential users of assistive devices — those students for whose benefit these were created in the first place — are not necessarily willing to use them, due to reasons of social stigmatization. Whereas the very purpose of universally designed education is the creation of a school environment meeting everyone's needs — that is one where, at the very least, everyone should feel ok to have specific needs that are different from the rest of the group's — the Japanese classroom remains a social environment that is characterized by strong conformity pressure.

Indeed, as opposed to the frequent widespread assumption that Japanese people/children are technology-friendly, the limited appropriation of disability-related technologies in ordinary classrooms reveals that all devices are in fact not equally attractive, depending on the social context. However it should be mentioned

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16), tackles this issue by exploring the psychology of a young boy who repeatedly breaks the hearing aids of a deaf classmate.

11   Interview of special teacher, and observation conducted in School O2. The boy attended this school only for individual support with the special teacher, while simultaneously being enrolled in another school located in the same area. This is a situation that is rather common for Japanese children with a visual impairment, as the number of teachers specialized in handling this type of disability is currently very low. Noteworthy is the fact that, in such cases, children who go for individual support to a school different from the one where they attend ordinary classes are required to commute between both schools accompanied by a relative (so that the special teacher has weekly contact with the family). The relative is, in most cases, the mother; this requirement can turn out to be a heavy burden for working mothers (as was the case for the single mother of the boy mentioned here).

that I did observe one ordinary class where a technological device had apparently served as an "asset" for the disabled child in question. I was told by the (ordinary) teacher that other children, at first interested in the object, had gradually also become interested in the person using it: technology appeared to act as a medium facilitating contact between the child and his peers, who eventually started to play together.

Nevertheless, the complex processes resulting in the success or failure of the inclusion of a disabled child into a classroom show that technology per se is not an asset. Depending on the social conditions in which it is used, it can be a double-edged sword involving as many risks as potential benefits.

Conclusion

This paper aimed to assess to what extent assistive technologies and Universal Design contribute to improving disabled children's inclusion in ordinary schools in Japan. By analyzing the development of school inclusion and the social processes as well as institutional barriers that shape the use of assistive technologies in schools both from a quantitative and a qualitative perspective, it has highlighted several social — as opposed to technical — barriers that prevent assistive technologies from becoming a large-scale trigger for greater inclusivity. The funding allocation system, the need for teacher training, and peer pressure are the main factors that impede improved school inclusion based on technological means. Highlighting the main issues arising in the process of creating a universally designed education reveals that, in spite of the development of assistive technologies, there remain strong barriers — ones that can be labeled social and institutional — to the development of disabled children's participation in educational activities, and indeed social ones at large. By considering the extent to which assistive technologies and Universal Design contribute to improving Japanese disabled children's inclusion in ordinary schools, I have shown that the usage of assistive technologies in ordinary schools is in fact limited in scope (as children with disabilities other than *hattatsu shôgai* are still currently attending special schools en masse). I have furthermore analyzed three kinds of hurdle that impede their effective adoption — and, consequently, the creation of universally designed classrooms. Each of these hurdles is related to a type of actor involved in the actor–device network system that shapes the appropriation of educational assistive technologies: schools' and families' (lack of) purchasing power for them, due to the state's rules regarding the allocation of financial resources in this field; teachers' (limited) resources in terms of knowledge, skills, and time in a context where managing heterogeneity in the classroom seems to be yet another stress factor for teachers already under significant pressure; and, peer pressure/conformity pressure — wherewith technological devices are always at risk of being turned into markers of "difference" and into social stigmas (even

though they may also, in some cases, turn out to be an "asset" for the disabled child, by helping them to form bonds with nondisabled peers).

As of now, most political efforts are seemingly being paid to improving the educational conditions of students with developmental disorders — that is, children who have no tradition of enrollment in special schools. It appears that current policies are mainly aimed at offering support to a circumscribed group of children (all the more clearly delimited by the fact that one of the government's priorities on the subject of disability is early diagnosis), rather than at the creation of universally designed schools that would meet the needs of everyone regardless of their specificities. As the trend toward the medical labeling of children with educational difficulties is likely to continue, further research is needed so as to determine how to solve the apparent paradox, one highlighted by disability scholars all over the world (Stiker 2003), of a system that produces "differences" through such medical diagnosis — to be done, ultimately, in order to provide universal support.

As the qualitative analysis used in this research is limited in scope (with a small number of ordinary schools actually observed), it does not provide a significant hint about the proportions in which the above-described situations may occur nationwide in Japan. Further investigation should therefore be conducted henceforth, so as to assess to what extent the conclusions presented here are statistically representative of the situation — both in Japan and indeed worldwide — on a broader scale.

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