Diversity and Assistive Technology: An Analysis of Special Education Magazines from 1999 to 2000 in Japan and the United States

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Introduction

Assistive Technology, (hereafter AT) is, in general, any technology that can be used to receive information and communications support services regardless of person, place or time. AT is not only used by people without disabilities, but also more and more by disabled persons. The usage of AT by people with disabilities has increased little by little and the need for it is still growing. In addition, research on AT that targets people with disabilities in particular has also been advancing in recent years. However, we suspect that the general public's awareness of the needs for, and possibilities of use of AT for people with disabilities is not yet sufficient.

According to Rose and Meyer (2002), the more people with disabilities use AT, the more actively they can increase their participation in society.[1)] That is to say, that by making good use of AT, we can encourage the possibility of participation in society. In other words, AT could be said to be 'a tool of hope'. In the United States, the development of new AT-related equipment coming from ordinary companies which is geared towards people with disabilities, has progressed right alongside the recognition of special education teachers and welfare services officials associated with people with disabilities (including those in regular schools).

In America in the 1990s, two policies named the *Universal Design for Learning* (UDL) and the *Individual Education Program* (IEP) were incorporated into the education system in order to better allow children with disabilities to receive education in Information Technology. [2)] In addition, in the United States in 1973, legislation related to Assistive Technology was enacted, currently enabling, even within IEP, AT to be provided and applied. That legislation is: the *Americans with Disabilities Act* (ADA), the *Assistive Technology Act of 1998* (ATA), and the *Individuals with Disabilities Education Act Amendments of 1997* (IDEA). In contrast, laws related to AT for persons with disabilities have not yet been enacted in Japan.

In Japan, according to Chapter I of the General Provisions of Special Needs School Curriculum Guidelines issued in 2008, during the formation and implementation of school curriculums, a matter to be considered is that even at school, computers and Information Technology networking are to be treated as teaching materials and tools. Also, in Japan, the Ministry of Health, Labour and Welfare has conducted business related to information communication support equipment since May 1996. Providing information about communication support equipment and assistive devices has also been cited as a feature of business in the municipality services supporting the daily life of people with disabilities as "support to enhance the social ability and use of social resources."

In the business contents of those implementation guidelines, concerning information communication support equipment services as "concrete examples of the support necessary to take advantage of social resources," the following is mentioned:

advice on use of welfare equipment, guidance on information equipment, support related to information and communication equipment required by people with disabilities, communication support, home renovation advice, and providing information on living in the community.

In this study, in order to understand how people with disabilities in Japan and the

United States make use of AT, we examine the research trends in special education journals related to AT. Rather than making persons with disabilities adapt to the advanced information society of AT, it is important that society makes an environment where persons with disabilities are more able to securely and safely use AT. Throughout this study we refer to how to create an environment within the information society for people with disabilities in Japan and the United States. In other words, the primary concern of this study is to consider the environment where AT is used in Japan and the United States and about the usability of that new technology. The perspective of this study is that by comparing the environment, the system usage, and the social and general system for AT in both countries through special education information magazines, we can better orient ourselves toward a "*barrier-free*" information communication society for persons with disabilities in a diversity society in the future.

Purpose and methods of this study

The purpose of this study is to reveal the trend of needs for AT in the field of special education by analyzing two special educational journals: "*Teaching exceptional children*" in United States and "*The Practices in Special Education (Zitsen Syougaizi Kyoiku in Japanese)*" in Japan. We analyzed whole contents relating to AT in these journals from 1999 to 2009. An overview of the target journals are shown in Table 1 (on the next page).

In America, laws and social systems vary from state to state, but nevertheless, in comparison to other countries, the United States as a whole was the earliest to introduction legislation concerning education policies for AT for persons with disabilities. In order for persons with disabilities to take advantage of AT, various government and local public bodies have offered support. In the target American journal, "Teaching Exceptional Children," various reports, practices and case studies were introduced.

On the one hand, in each region of Japan, support for AT continues with each Rehabilitation Center playing a central and active role in allowing persons with disabilities to better make use of AT in a more secure environment. In the Japanese journal *"Zitsen Syougaizi Kyoiku"* ("Practices in Special Education"), there were a lot of articles about the importance of the creation of special social environments for persons with disabilities to use AT. Table 1. Overview of special education magazines in Japan and the United States

	Japan	United State
Journal Title	Practices in Special Education	Teaching exceptional children
Year First Published	1972(Monthly□	1920(Bi-Monthly□
Publisher	Gakken	CEC

Scope	Apr 1999 - Oct 2009	Apr/May 1999 - 2009 Sep/Oct
Composition	From 1990□ Special Feature - Language - Arithmetic - Mathematics lectures - autism lectures From 2006□ - Special Feature series Changed from: "The Future of Practices in Special Education" to "The Future of Information Practices in Special Education"	From 1990□ Special Feature series □Introducing new papers □ How to create IEP for special needs teachers (the theme for IEP differs each time□ □Support and information for parents □New special education information
Primary Special Feature Theme	2000 -Class management of energetic Special Education Classes -Calling in specialists during the Period for Integrated Study -Words for spending life with children -Making practical teaching materials using IT - Raising the power to live with independence using food preparation	2000 □Diversity in the new millennium . Continuing Professional Education . Curriculum . First-Year Teachers and Retention . Collaborative Strategies . Changes at CEC . Cultural and Linguistic Diversity . Designing Instruction to Support The Success of All Students

As well as examining the commonalities, differences, and the nature of the use of AT in both countries, research trends in AT concerning children with disabilities in the United States and Japan, they are also analyzed from the following points of view:

- Number of papers written on AT
- Age levels and subject
- Type of disability
- Target audience of each paper
- AT which is covered
- AT and its 4 areas

Results

The number of articles concerning AT

After the examination of 10 years worth of special education magazines, it was found that the Japanese journal "Practices in Special Education" contained 30 topics concerning AT, and the American journal "Teaching Exceptional Children" contained 45 topics. Concerning the number of topics on AT, the Japanese journal had fewer contents. (See Fig. 1)

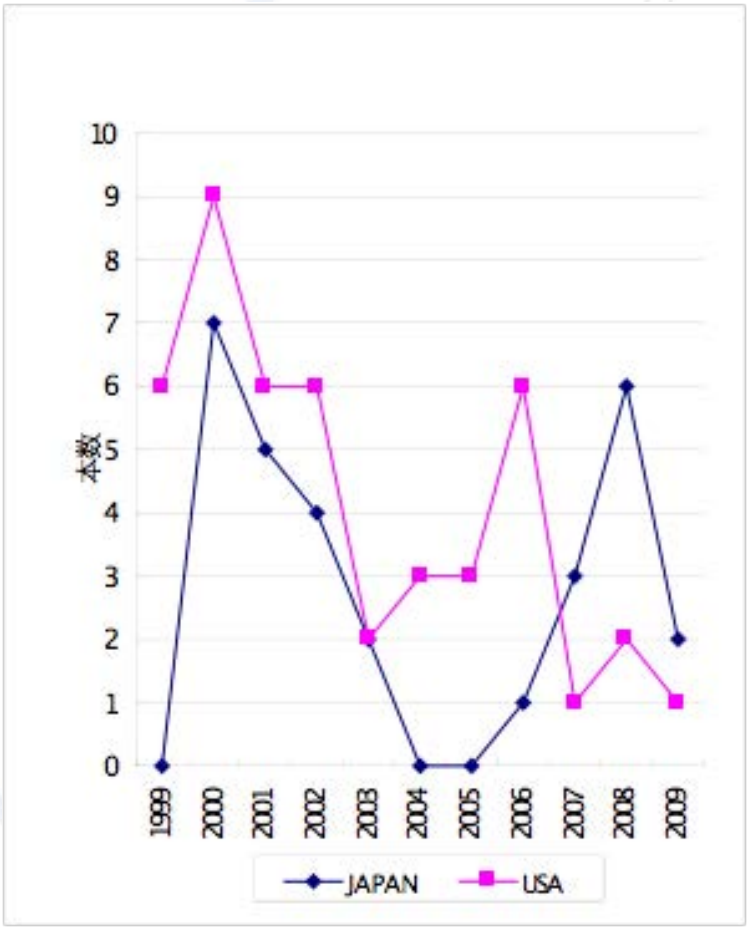

Fig.1 Number of topics concerning AT

Also, as shown in Table 2, the number of papers in "Practices in Special Education" totaled 380, while the number of papers in "Teaching Exceptional Children" totaled 1350.In "Practices in Special Education" the year in which the most papers concerning AT appeared was the year 2000 with a total of 7 papers. From 1990, many topics related to computers appeared. From 2000 onwards, topics such as "Mobile Phone Life" and "Making Use of the Internet" gradually started to appear. The

contents of the main topics were: "from the field of personal computing," "development environment of teaching software," "conditions of easy-to-use AT," "multi-media in vocational training," "your computer usage guide" and etc.

Table 2. Number of papers

	Japan	No.	United States	No.
1999	*vol. 320 □ vol. 322*	42	*vol. 31 /NO. 4 □ vol. 32/ NO. 3*	40
2000	*vol. 323 □ vol. 325*	63	*vol. 32/ NO. 3 □ vol. 33/ NO. 3*	40
2001	*vol. 336 □ vol. 350*	300	*vol. 33/ NO. 3 □ vol.34/ NO□1*	20
2002	*vol.351 □ vol. 356*	120	*vol. 34/ NO. 4 □ vol.35/ NO□3*	40
2003	*vol. 357 □ vol. 364*	165	*vol. 35/ NO. 3 □ vol.36/ NO□2*	30
2004	*vol.377 □*	20	*vol. 36/ NO. 3 □ vol.37/ NO□2*	30
2005	*vol.388 □*	20	*vol. 37/ NO. 3 □ vol.38/ NO. 3*	40
2006	*vol. 392 □ vol. 403*	240	*vol. 38/NO. 3 □ vol.39/NO□1*	20
2007	*vol. 404 □ vol. 411*	160	*vol. 39/NO. 3 □ vol.40/NO. 2*	30
2008	*vol. 418 □ vol. 426*	180	*vol. 40/NO. 3 □ vol.41/NO. 2*	30
2009	*vol. 428 □ vol. 429*	40	*vol. 41/NO. 4 □ vol.41/NO. 5*	60
		1350		380

□Due to missing issues, we could only analyze one issue for 2004 and 2005

In the American journal "Teaching Exceptional Children," the year with the most subjects related to AT was 2000 with 9 times. Since the 1980s, many subjects relating to "PC users" have been issued, and from the 1990s, many subjects with reference to various forms of AT have been issued. Upon entering 2000, topics covering how we can safely use AT at home and at school, the rules for using AT, and AT which can be used for work and home start to appear.

Target age levels

An analysis was done of the age levels of the target children and adults in each paper. The classifications used were "INFANT," CHILD (Including Preschool), "SCHOOL AGE," "YOUNG," "ADULT," "ELDER" and "ALL (Including children and adults with disabilities)."
The percentages are shown in Fig. 2.

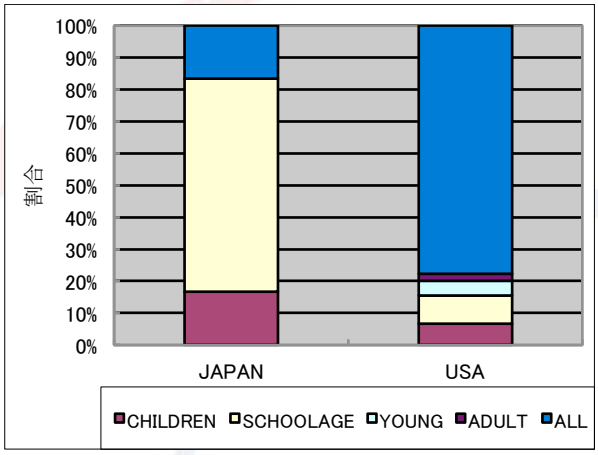

Fig. 2 Targeted age levels

In "Practices in Special Education," the most frequent age level targeted for essays to do with AT was "school-age." For example, the most common topics were those that discussed the utilization of personal computers at special needs schools and school elementary schools collaborative learning using groupware or "study notes," special education software that can be downloaded, groupware or "study notes," and case studies which can be implemented at the school, and software for special needs schools. Topics about AT were found a total of 30 times: 20 times for "school-age," 5 times for "children," and 5 times for "all."

In the American journal, "Teaching Exceptional Children," the highest number of essays was found in the "all" category. For example, there were such articles as "Monitoring Literacy Learning, Using the Internet," "Look! I am on TV" and "Using Videotaped Self-Modeling to change Behavior." The next largest category was "school-age." however, essays which were focused on special education (inclusive education) were most common. In contrast to "Practices in Special Education," “Teaching exceptional children” included a large amount of content discussing "AT for persons with disabilities," as well as describing AT utilization for adults. For example, although there are two articles titled "That's the job! I Want!" and "How Technology Helps young People in Transition" which describe the use of AT in employment, they also cover various areas such as using AT as a means of communication, reducing potential problems in the workforce for disabled people by utilizing AT, and finding a job by using AT.[3)]

On the other hand in the Japanese Journal, "Practices in Special Education," the main content was the use of AT in special needs schools. Content related to AT which can be used by persons with disabilities in adulthood and pre-school-age childhood, were almost entirely absent. Moreover, there were many cases in which the age was unknown.

Disability of interest

In "Practices in Special Education," there were 30 essays which covered the target issue of AT for disability. Of the 30 essays, there were 24 which included content for the category "all." However, 80% of them had not been classified with respect to the type of disorder. As for the remaining essays, there was 1 essay for children with LD or ADHD, and 2 essays with content on PDD and autism.

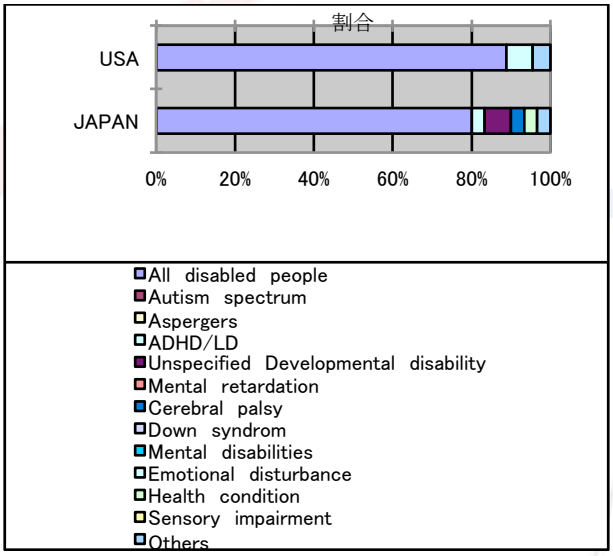

Fig. 3 Type of disability

Following the same trend, in the American Journal “Teaching Exceptional Children” the category containing the largest number of papers to do with AT was the “All” category, and of the remaining 5 papers, 3 papers were on LD and ADHD, and the remaining 2 were reviews. Both countries had similar results regarding the use of AT and disability. There is guidance for children with ADHD on making use of websites to promote leadership, lessons on how children with LD can use "Self Monitoring Systems," and the like. For autism, there is "Self-Modeling" and providing support while using the television. So far, regarding the use of AT, the research which has come out has been centered on AAC, VOCA etc. which has it's own challenges, but in recent years studies have been coming out on the use of AT for all children, and not only the physically handicapped.

Target audience of each paper

There are four categories for “Target Audience,” “Special education teachers,” “Parent,” “Disabled people/children” and “All.” The most common target audience in "Practices in Special Education" was "special needs school teachers." For example, the main contents included such topics as: guidance in using AAC, guidance in using computers, (introduction of coaching contents). The next largest category was “All,” however, contents aimed at teachers and parents, therapists, special needs schools, and the disabled have only been issued from June 2001. It must be noted that although parents are included in the “All” category, there were no contents specifically for parents.

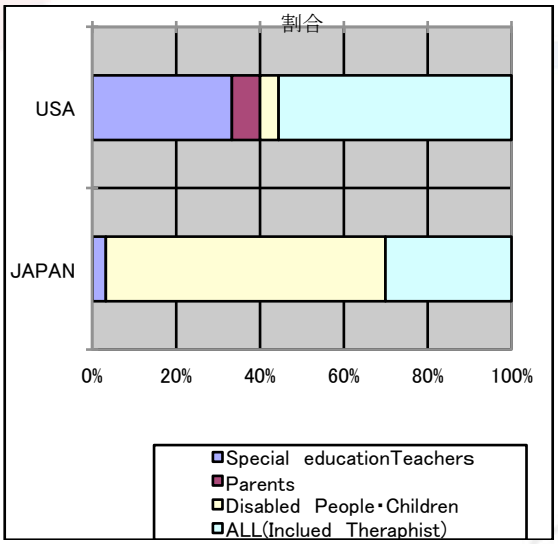

Fig.4 Target audience of each paper

On the other hand, in the American Journal, "Teaching Exceptional children," there was also content aimed at parents about the use of AT in the home. How to make use of AT in the home is described in detail. For example, there were such titles as: "What Should We Expect of Assistive Technology?," "Being Sensitive to Family Goals," "School-To-Home Notebooks - What Parents Have to Say" and the like. Among them, how the parents can mentor about AT is written in detail, as well as measures and issues related to technology use in the past. In addition, the largest category was “All” with the second largest being “Special Education Teacher.” To state it clearly, in America, there are many articles describing how to take advantage of AT for which the target audience is not only the special needs school teachers, but also special needs class teachers and regular teachers in regular schools, therapists, and the like.

Types of AT which are taken up

At was divided into 8 types: "PC," "Mobile Phone," "DVDs and CDROM," "Software," "Internet and Websites," "TV and Video," "All Types of AT" and "Other." Looking at the type of AT taken up in "Practices in Special Education", the largest category was "PC." For example, "From the field of personal computing," "Guidance on the use of computers" and so forth. In particular, the series called "From the field of personal computing" from March of 1997 to the March of 1998, various methods and teaching materials (course materials using a PC) related to the personal computer were introduced. The case was stated that the PC is a medium of expression and texting, which can be used by friends, and about how it can be utilized in special needs schools in particular (see Fig.5).

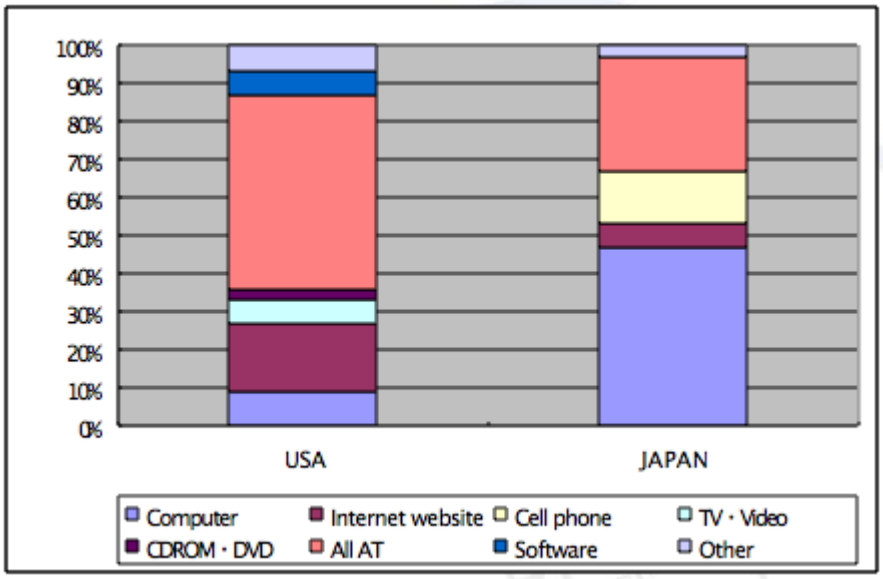

Fig. 5 Types of AT which are taken up

The second largest category was "All Types of AT." Those articles included titles such as "Assisting Children with Developmental Disabilities who Feel Troubled" and "Efforts to Expand Textbooks Toward the Goal of Barrier Free Textbooks." From the late 1990s to the early 2000s, the contents concentrated on personal computers and software etc., but currently, articles describe general usage of AT and digital textbooks. In particular, in 2003 "Do Disabled Children Also Need Cell Phones?" became a hot topic. Mobile phones were included as a form of AT and examples of application were also described.

On the other hand, the largest category in the American Journal was "All Types of AT." For example, "AT Competencies for Special Education." Here, ideas such as the relationship between IDEA and AT, the plans from now for the utilization of AT, and precautions to take while using AT are described. The next largest category was "Internet Websites", but it is important to note that internet usage in the United States was extremely high. Examples are: "Using Collaboration" and "The Web to Implement the CEC Standards", "Accessing The Curriculum-E-PAL WRITING" , "Using the Internet to Improve Homework Communication" and etc. In "Using Collaboration and The Web to Implement the CEC Standards, " how to make use of AT in inclusive education was described.[4)] In addition, "Accessing The Curriculum-E-

PAL WRITING" included content which encouraged people whose disabilities make it difficult to make friends to actively use web sites for making friends and improving human relations.[5)]

"Using the Internet to Improve Homework Communication", the authors describe certain problems which can be solved by using websites. For example, to perform more effectively at home when students receive an assignment from their special needs school, when students come across a difficult section, or when students have a question for the class teacher. Especially in America, within AT, there is content on utilization of CD-ROM and TV, but that utilization method is the "Self-Modeling" method. The "Self-Modeling" method is a way for children with disabilities to check their own problem behavior by watching a recording of themselves while they were doing the behavior. In the United States, this "Self-Modeling Support" is said to have been effective for children prone to problem behavior.[6)] This method of assessment makes active use of AT, and it was utilized not only in child development centers in the United States, but also in special needs schools. In addition, there are also methods such as "Video Therapy." The support devices mentioned in the Japanese journal "Practices in Special Education" were cameras, the digital mouse, the digital pen blackboard etc.

AT and its four Areas

In this study, we have analyzed both educational journals from 5 points of view. We have seen the characteristics, both the similarities and the differences, of both magazines. At this point, we decided to use as a reference the concept of International Classification of Function is an international life functional classification, to reorganize the divisions (personal area, environment space, activities and social participation area, mind and body functional area) of AT into four areas. This is because it can be evaluated according to the needs for the features and contents of special education magazines in both countries. That is to say, that by using the four areas, it is possible to evaluate the changes in inhibition and social policies and the promotion of performance and environmental assessment concerning AT. Papers on AT were analyzed according to the four areas. For each region of classification criteria, the educational magazine's contents relating to AT were read, and for each content the corresponding regions were tabulated separately. The concepts and standards of each area is as follows: The "Health and Mental/Physical Functioning" area includes disease/modulation. The "Environment Space" are includes Social structure and social attitudes. The "Personal" area includes age/experience. The "Activities and Participation" area includes challenges and each individuals life situation.

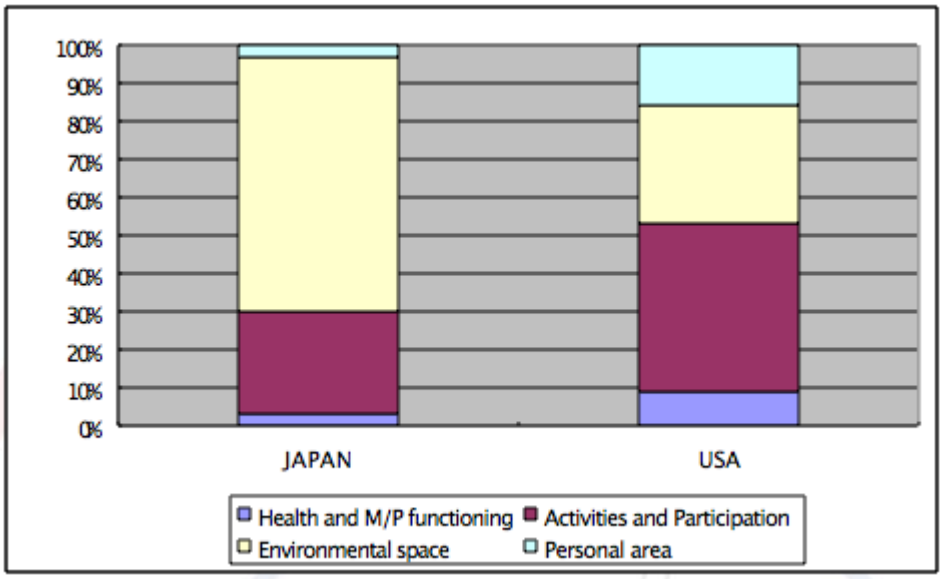

Fig. 6 The four areas of AT

In “Practices in Special Education,” the largest areas were “Environment Space.” The authors described the same primary contents which stated that for children to utilize AT, the key factor is creating the environment. This idea appeared many times in “Practices in Special Education.” Example titles include: "From the Field of Personal Computing," and "Educational Use of Hypertext Multimedia Software made by Children," "Practices in Personal Computing," "Personal Computers as a Means to Use Video Conferencing Over a Network," and etc.

In the current study, there were many articles that stated for the sake of "school activities and social participation," creation of the environment should take precedence. "Efforts to expand textbooks toward the goal of barrier-free textbooks," and "digital information sharing systems" is also seen in recent years. There were areas in common between the American Journal and the Japanese Journal, but articles in "Activities and Social Participation," and "Environment Space" were the most common.

Challenges and considerations

According to Rose and Meyer (2002) et al, in the United States where AT and ICT is talked about in terms of "The New Role of AT / ICT," these terms mean AT and ICT will perform a new role as information communication support equipment for people with disabilities. It is not only a single technique, but a means to present the possibility of a new form of social participation for people with disabilities. However, it is a fact that persons with disabilities, in reality have difficulties in school activities and social participation. [7)]

In “Teaching Exceptional Children” and also in the results of this study, it is shown that an important characterization has been made in school activities and social participation, which is similar to what Rose and Meyer have said, that AT gives the disabled the possibility to sooner participate socially. Concerning the AT so far, our thinking have been centered on how to enable humans to access the devices (Device Accessibility). In other words, we placed great importance on how to make the button

easier to push or how to make the Japanese characters easier to see.
It can be said that this is an approach from the point of view of an improvement of environmental factors as a mitigation of "function form failure." However, for the AT in the future, there is a need for a comprehensive technology to reduce various difficulties according to the needs of persons with disabilities. In addition, for the majority of people with disabilities in the United States, the very first time they receive services is at rehabilitation centers and hospitals.

In this manner, the movement to educate experts using PT, OT and ST in facilities, and also people who will become experienced with knowledge of AT to work among teachers involved in special education in schools, is actively seen in all regions of the United States in education programs designed to teach AT. [8] Also in Japan, development centers where educators can learn about AT are in short supply and according to the All-Japan Information Learning Promotion Board (2010), currently in Japan, welfare information technology coordinators who support the independence of persons with disabilities are trained to be those coaches. [9] This is the work to be done for persons with disabilities and the elderly: to teach technology competency in order to be able to support independence, depending on the disability, with AT teaching aides.

Lastly, content relating to AT in "Practices in Special Education" and "Teaching Exceptional children" is shown in Table 3 as "Keywords for Persons with Disabilities and AT." In "Practices in Special Education," there were many reports concerned with creating an environment for the use of AT in the future. On the other hand, in "Teaching exceptional children," there were many case reports on the actual use of AT. The difference with Japan is the "cooperation of home and school." In addition, in the United States, there were notes and information written in great detail on actual usage for parents using AT in the home. Also, by looking at IEP, we could observe each usage of AT in various areas, and AT utilized to meet the needs of people with disabilities.

Upon review of the magazine over the past 10 years, the reality of how people with disabilities are using AT in various situation has been revealed. However, what results were observed, and what has been established, could not clearly be seen. AT is being used in both countries, but development of the system and social environment for using AT effectively, will still be a challenge in the future, especially for Japan.

Throughout life, persons with disabilities are supported by a variety of AT. It should be utilized not only in special needs schools, developmental centers, at home, and in cooperation with parents in self-contained classrooms in normal schools, but should also be utilized as a general service for education, welfare and in the medical field. It is our hope that more comprehensive studies on AT for persons with disabilities are carried out by researchers in the diversity society.

Notes

1) Rose D. H. and Meyer A. (2002). *Teaching every student in the digital age: Universal design for learning, VA:* ASCD. p. 11.
2) *libid*
3) Morgan R. L. and Ellerd D. A. (2002). That's the job! I want!, *The Council for Exceptional Children.* 32 (4), p. 44.
4) Cramer S. et al. (2000). Using collaboration and the web to implement the CEC standards *The Council for Exceptional Children*. 32 (5), pp. 12-19.
5) Stanford P. and Siders J. A. (2001). Accessing the curriculum –E-pal writing. *The Council for Exceptional Children*. 34 (2), pp.21-25.
6) Devon S. J. and et al. (2004). Using the internet to improve homework communication. *The Council for Exceptional Children.* 36 (3), pp.64-73.
7) Buggey T. (1999). Look! I'm on TV, *The Council for Exceptional Children.* 31 (4), pp.27-33.
8) Rose D. H. and Meyer A. (2002). *Teaching every student in the digital age: Universal design for learning, VA:* ASCD. pp.7-8.
9) Please see more http://www.e-at.ne.org

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