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ORIGINAL ARTICLE

Survey on Support Needs of Braille-reading Students in Inclusive Higher Education in China

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ABSTRACT

This study is focusing on the campus activity and supporting needs of the visually impaired students who use Braille in higher education in China. The purpose of this study is to obtain the information which is helpful for improving the supporting system and learning environment for students with visual impairment. A survey was performed on 17 students who use Braille. We find out that mobility support and digital braille conversion are most common needs for surveyed students. Personal computer and screen reader are most common assistive devices that students need. The results of this study showed the measures to construct the support system for the visually impaired students based on the rational consideration. Based on the findings from this study, we recommend that universities should focus on providing students with support related to braille version textbooks and support related to extracurricular activities.

<Key-words>

inclusive higher education, braille-reading student, support needs, reasonable accommodation

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I . Introduction

In 1985, it was firstly clarified in law in China that people with disabilities had the right to access higher education. Since then, special education colleges (colleges for students with disabilities) were gradually established in universities to satisfy the needs of students with disabilities. In 2008, China agreed and adopted United Nations Convention on the Rights of Persons with Disabilities (CRPD) in which proposed the concept of proper convenience. The second provision specifies the concept of reasonable accommodation. Reasonable accommodation means consideration in good faith of the terms of proposals for affiliation prior to the time that contracts for alternative rates of payment are entered into or renewed.

Furthermore, the 24th provision points out that both inclusive education system and people with disabilities have the right to be provided with reasonable accommodation. In 2012, provisions in the law named Regulations for building barrier-free environment in China specified that people with visual impairment should be provided with proper convenience including the access to braille or magnified version of examination paper in entrance exams, job-hunting activities, and certification tests.

Entrance examination to attend universities in China has two forms, including National College Entrance Examination and Individual Entrance Examination. Due to the relatively lower knowledge level of students with disabilities in early stage, Individual Entrance Examination remains to be the major approach for students with visual impairment to access higher education.

Students who chose Individual Entrance Examination can only take the exam of one university. There are only a few special education college recruit students with visual impairment by the way of Individual Entrance Examination. However, if students with visual impairment take National College Entrance Examination, there will be around 3000 universities for them to choose, which offer the students much more possibilities to attend regular universities but not only special education colleges. But, by the year of 2014, due to the inaccessible of braille version of exam papers, no students who could only read braille attended regular universities by taking National College Entrance Examination. In the year of 2015, there was one student who could only read braille firstly admitted by a university through National College Entrance Examination. From then on, braille students started to join inclusive higher education in China.

It is necessary for universities to make fully preparations to accept students with disabilities. Currently, it is the fifth year for regular universities in China to accept students with visual impairment. Because most of regular universities are short of experiences in teaching and accommodating students with visual impairment, how to assist the increasing number of those students to successfully complete their study has become a question. Establishing an effective and comprehensive supporting system will be a challenge for universities.

Studies have shown that a universal design for all students is beneficial to students

with visual impairment¹⁻²). Previous studies found out that visual impairment significantly affect the study life. Extracurricular training and activities can improve confidence and study efficiency³⁻⁴). In the meanwhile, some researchers and teachers suggested some other effective and necessary supporting items in areas such as examination, job-hunting activity, health issue, barrier-free environment, volunteer work, etc. They also pointed out the shortness in supporting activities⁵⁻⁷). A study in the year of 2020 showed that the supporting contents should be different towards visually impaired students who used braille and visually impaired students who used regular text. In order to enhance support for the visually impaired students in China, learning the experience in supporting reading and writing from other countries is necessary⁸). However, due to the difference between foreign languages and Chinese language, it's almost impossible to duplicate the supporting system from foreign countries. The related study needs to be conducted in future.

To find out the evidence and basis for supporting the study life of braille students and building the support system is the major purpose of this study. There are four issues studied and discussed in this study, including the basic information of braille-reading students, attitudes of braille-reading students toward higher education, on campus activities of braille students, and the supporting items that should be provided for braille students in terms of proper convenience.

II. Method

1. Questionnaire design

This questionnaire is an improved version of the questionnaire in the survey on Campus Activities and Support Needs of the College Students with Visual Impairments in China⁸). The contents include four aspects: basic situation of visually impaired students, their attitude towards higher education, campus activities and reasonable accommodation items needed. Based on the survey⁸), learning experience projects for blind schools are added, support items discussed in the previous study about reasonable accommodation items are retained, and the latest version of support survey for disabled university students from JASOO is referenced⁹); items such as whether photography and recording is needed in classroom, reasonable accommodation for arriving late and leaving early and economic aspects, etc. are added. Inquiry of examination-related reasonable accommodation items are added. Finally, the reasonable accommodation items are defined as four dimensions: 15 items in class, 6 items related to examinations, 20 extracurricular items and 16 aids, 57 items in total. Furthermore, the answers to the quotations of (necessary, in great need, in certain need, not required) are revised into those to trichotomy (necessary, unnecessary but required, not required).

2. Respondents

Visually impaired students who are either enrolled by or graduated from regular

colleges or universities in China. Respondents need to meet the following conditions.:

- (1) Having a Chinese disability certificate, and the type of disability is visual impairment.
- (2) Braille-reading students.
- (3) Higher inclusive education is received.
- (4) Having the learning experience in regular universities in China.
- (5) Visually impaired students who are not enrolled in the special education colleges affiliated to regular universities.

3. Distribution and collection of questionnaires

From March to June 2020, with the assistance of One Plus One, a non-profit organization supporting visually impaired people in China. A total of 18 questionnaires were collected, and one of the questionnaires with 15% missing information was removed. 17 (94%) valid questionnaires were confirmed finally. The Mike CRM electronic questionnaire platform was used to issue and retrieve anonymous questionnaires. Snowball sampling method was used to collect data.

All 17 students were braille-reading students. Among the respondents, there were 8(47%) males and 9(53%) females with an average age of 22 (± 1.87) years old.

4. Data statistical approach

Professional statistical software JMP9.0 (SAS Institute, Japan) was used to make the total and percentage statistics of all the data obtained by items, and standard deviation value was calculated. Moreover, the “necessary item” in the support requirements was set as 2 points, “unnecessary but required” was set as 1 point, “not required” was set as 0 point, and the average points of the support items were sorted.

5. Ethical Review

The study got permitted with the ID of Tsuku2019-158A by Ethical Review committee of University of Tsukuba, Japan. All respondents were informed the purpose of this study, and the study was conducted after getting permission from them.

III. Results

1. Information about visual impairment

Regarding to the visual impairment level of student respondents, there were 12(71%) respondents with Level 1 visual impairment (Vision is less than 0.02 and the field of view radius is less than 5 degrees), 3(17%) respondents with Level 2 (Vision is greater than or equal to 0.02 less than 0.05 and the field of view radius is less than 10 degrees), 1(6%) respondent with Level 3 (Vision is greater than or equal to 0.05 less than 0.1) and 1(6%) respondent with Level 4 (Vision is greater than or equal to 0.1 less than 0.3) each.

The causes led to visual impairment of them are as follows: 9 (53%) were caused by congenital disorders, 5 (29%) were caused by acquired diseases and 3 (17%) were caused by accidents. Regarding to whether the respondents have attended special education school especially for visually disabled students, 11 (65%) of them started to attend special education school since primary school, 1 (6%) started to attend special education school since junior high school, and 5 (29%) of them have never attended the blind school.

4(24%) are freshmen, 3(18%) are sophomores, 2(12%) are juniors, 4(24%) are seniors, and 4(24%) have graduated.

2(12%) are majoring in traditional Chinese medicine, 1 (6%) in traditional Tibetan medicine, 2 (12%) in musicology, 2 (12%) in psychology, 2 (12%) in English, 1 (6%) in social work, 1(6%) in computer science, 1(6%) in law, 2(12%) in Chinese language and 3 (18%) are unknown.

2. Attitudes of respondents towards universities

In terms of campus Entrance motivations, 15 (88%) respondents thought that acquiring new ability was the main goal or motivation for attending higher inclusive education. And 13 (76%) respondents thought obtaining knowledge was their main goal, while only 5(28%) respondents choose obtaining qualifications or certifications as one motivation.

In terms of Learning Objectives, 16 (94%) respondents choose “Learn more about your area of expertise” is, followed by “A wide range of knowledge and education”11(65%) and “Social common sense” 11 (65%). These three items are all about acquiring knowledge. It can be seen from the table that the greatest goal of braille learners in higher inclusive education is to acquire more knowledge (Table 1).

<Table 1> Reasons for attending higher inclusive education

	Item	N	%
Entrance motives	Ability	15	88%
	Knowledge	13	76%
	Life has improved	11	65%
	Education in higher education	10	59%
	Family Wishes	8	47%
	Qualifications	5	29%
Learning Objectives	Learn more about your area of expertise	16	94%
	A wide range of knowledge and education	11	65%
	Social common sense	11	65%
	Knowledge in favor of future work	10	59%
	personal interests	8	47%
	Practicum and job hunting	5	28%
	Make friends and good relationships	5	29%
	Foreign language.	3	18%
	Get better at working with your pc	3	18%

3. Activities at school

In terms of learning methods, 14 (82%) use computers to read textbooks in the form of electronic documents. Although they are students who use Braille, only four (24%) read the material after they convert it to Braille.

In the same breadth, in the option of taking notes, 11 (65%) take notes by computer and 10 (59%) take notes in Braille, which also indicates that computer is an important learning aid. Besides, braille is still an important means of learning for students who use braille, while they can use ordinary words to record by operating computer in an auditory manner. Recording pen is also crucial, 9 (53%) use it. There are 4 (24%) students who choose to handwritten, as shown in Table 2.

In terms of campus mobility, most of the students have received orientation and mobility training and were satisfied with the training effect 10 (59%). Half of the students walking on campus could walk independently with the white cane, and 9 (53%) could walk independently without the white cane. This shows that most braille-reading students are capable of walking around the campus. However, only 3 (18%) were allowed to mobilize independently without the white cane outside, as shown in Table 2.

In terms of the access to information, 9 (53%) students hope to obtain information on campus from the campus website, while 16 (94%) students use mobile phones to obtain information off campus. Both web pages and mobile phones users use the Internet to obtain information, which is also the main way for Braille-reading Student Group to obtain information at present, as shown in Table 2.

<Table 2> Activities at school

	Item	N	%
How to read the materials	Reader function	14	82%
	Braille and then read	4	24%
	Reading with optical aids	3	18%
	Record and then read	2	12%
	Zoom in and then read	1	6%
	I can read it directly.	1	6%
How do I take a note	Typing on your computer	11	65%
	Make a note in braille	10	59%
	They make a recording	9	53%
	Handwritten	4	24%
	Don't take notes	4	24%
Walking training	Experienced and satisfied with the training effect	10	59%
	No experience	4	24%
	Experienced and not satisfied with the training effect	3	18%
On campus	Walking alone (no white cane)	9	53%
	Walking alone (using a white cane)	8	47%
	Accompanied by students with low vision	8	47%
Outside	Walking alone (using a white cane)	11	65%
	Accompanying the other person	10	59%
	Walking alone (no white cane)	3	18%
How to information on the school	Mobile phone	16	94%
	The school's homepage	9	53%
	Oral Notices	7	41%
	Radio	5	29%
	Braille	5	29%
	Social software	3	18%
	Printed materials	1	6%
How to collect the social information	PC	11	65%
	TV	4	24%
	From someone else	4	24%
	Radio	2	12%
	Others	1	6%

4.Support needs based on reasonable accommodation

In class, “Braille version of textbook”, “Allow changing courses due to disability”, “Braille version of materials” “Key points of information on black board” were top four needs for braille-reading students, occupying the first three items in the order. Moreover, instead of teachers explaining the contents of blackboard contents orally, most students need teachers to provide with key points of blackboard writing (Table3).

In the unnecessary but required items, 13 (76%) are “allowed to record or take photo/video”, “11 (65%) are allowed to acquire magnified version of materials” and “10 (59%) are of electronic version of materials” are the top three items. All these three items

are word related. “Allow being late or leaving early due to disability 17 (100%)”, “Personal Study assistant 15 (88%)”, “Larger print size of textbook 15 (88%)” are the least needed, as shown in Table 3.

<Table 3> Items of in class

Sort	Item	Necessary		Unnecessary but required		Not required		SD
1	Braille version of textbook	13	76%	4	24%	0	0%	0.44
2	Allow changing courses due to disability	13	76%	4	24%	0	0%	0.44
3	Braille version of materials	8	47%	9	53%	0	0%	0.51
4	Key points of information on black board	8	47%	9	53%	0	0%	0.51
5	Assistant staff for helping study	5	29%	11	65%	1	6%	0.56
6	Permission of recording or taking photo/video	3	18%	13	76%	1	6%	0.49
7	Magnified version of materials	4	24%	11	65%	2	12%	0.60
8	Electronic version of materials	4	24%	10	59%	3	18%	0.66
9	Electronic version of textbook	4	24%	8	47%	5	29%	0.75
10	Provide front seats for students with visual impairment	5	29%	4	24%	8	47%	0.88
11	Desks designed for students with disabilities	1	6%	11	65%	5	29%	0.56
12	Oral explanation of information on black board	1	6%	3	18%	13	76%	0.59
13	Personal Study assistant	1	6%	1	6%	15	88%	0.53
14	Larger print size of textbook	1	6%	1	6%	15	88%	0.53
15	Allow being late or leaving early due to disability	0	0%	0	0%	17	100%	0.00

The top three outside-class activities are still related to word format, with braille format conversion of materials ranking the first for 16 (94%) students, information accessibility ranking the second for 12 (71%) students and library usage ranking the second for 12 (71%) students in parallel.

Among the unnecessary but required items, outside-class activities support, mobile support on campus, and personal study assistant are the top three. The least needed is psychological counseling for 8 (47%) students, as shown in Table 4.

<Table 4> Items of outside-class activities

Sort	Item	Necessary		Unnecessary but required		Not required		SD
1	Translation of study materials to braille	16	94%	1	6%	0	0%	0.24
2	Barrier free information service	12	71%	5	29%	0	0%	0.47
2	Library usage	12	71%	5	29%	0	0%	0.47
4	Scholarships	10	59%	7	41%	0	0%	0.51
5	Internship related	10	59%	6	35%	1	6%	0.62
6	Job-hunting activities	12	71%	2	12%	3	18%	0.80
7	Recommendation of barrier free service	9	53%	6	35%	2	12%	0.71
8	Training for job-hunting	8	47%	6	35%	3	18%	0.77
9	Allow volunteers entering campus and dormitory	6	35%	7	41%	4	24%	0.78
10	Outside activities	2	12%	13	76%	1	6%	0.44
11	Move inside campus	2	12%	13	76%	2	12%	0.50
12	Health counseling	5	29%	7	41%	5	29%	0.79
13	Reduction of tuition fee	6	35%	5	29%	6	35%	0.87
14	personal study assistant	2	12%	12	71%	3	18%	0.56
15	mobility orientation training	5	29%	6	35%	6	35%	0.83
16	Living and dormitory	4	24%	7	41%	6	35%	0.78
16	Relationship service	4	24%	7	41%	6	35%	0.78
18	Instead of writing	1	6%	10	59%	6	35%	0.59
19	Book reading service	0	0%	11	65%	6	35%	0.49
20	Psychological counseling	1	6%	8	47%	8	47%	0.62

In the examination, what braille-reading students need most is reasonable accommodation in the form of examination answers. In addition, the extension of examination time is also desired by most Braille Students. The examination paper of enlarged word version is the least needed, as shown in Table 5.

<Table 5> Items of exam

Sort	Item	Necessary		Unnecessary but required		Not required		SD
1	Convenient methods for answering questions	12	71%	5	29%	0	0%	0.47
2	Braille version of exam papers	8	47%	9	53%	0	0%	0.51
2	Exam in single room	8	47%	9	53%	0	0%	0.51
4	Change exam content	5	29%	8	47%	4	24%	0.75
5	Elongation of exam duration time	2	12%	12	71%	3	18%	0.56
6	Magnified version of exam papers	2	12%	2	12%	13	76%	0.70

In terms of aids, the most needed items are computer 14 (82%), screen reading software for the visually impaired 14 (82%), and mobile phone 13(76%). All three are accessories related to accessibility of information. There results show that information accessibility-related aids are necessary aids to ensure that the braille-reading students complete their learning tasks.

White cane 10 (59%) and braille display 7 (41%) are the unnecessary but required options. Guide dog is the least needed option 14 (82%) (Table 6). The low demand for guide dog may be caused by the insufficient condition on campus to nurture dogs.

<Table 6> Items of aids

Sort	Item	Necessary		Unnecessary but required		Not required		SD
1	Personal computer	14	82%	3	18%	0	0%	0.39
1	Screen reader machine	14	82%	3	18%	0	0%	0.39
3	Smart phones	13	76%	2	12%	2	12%	0.70
4	Software designed for students with visual impairment	11	65%	4	24%	2	12%	0.72
4	White cane	11	65%	2	12%	4	24%	0.87
6	Braille printer	8	47%	6	35%	3	18%	0.77
6	Braille block inside campus	8	47%	5	29%	4	24%	0.83
8	Braille display	6	38%	7	41%	3	19%	0.75
9	White cane	3	18%	10	59%	4	24%	0.66
10	Tablet PC	4	24%	6	35%	7	41%	0.81
11	Recording pen	3	18%	6	35%	8	47%	0.77
12	Mp3 player	2	12%	4	24%	11	65%	0.72
13	Magnifying glass	3	18%	2	12%	12	71%	0.80
13	Printer	3	18%	2	12%	12	71%	0.80
15	Video magnifier	1	6%	5	29%	11	65%	0.62
16	Guide dog	1	6%	2	12%	14	82%	0.56

IV. Discussion

1. Attitudes of Braille-reading students towards higher inclusive education in China

In terms of motivation, the top factors influencing braille-reading students are ability and knowledge. This group of data shows that students using Braille are more likely to choose higher education because they can improve their inner learning and personal quality rather than reputation and qualification. Regular institutions of higher education have more professional and richer curriculum than special education colleges have. Moreover, regarding to the learning objectives of the respondents, the top two objectives are gaining more professional knowledge and common sense of life. Collected, the results answered the question that why braille-reading students choose to attend higher inclusive education after taking the college entrance examination for the disabled.

2. Features of on campus activities of braille-reading students

This study selected three aspects for study, which included on campus mobility, information acquisition methods and learning methods.

In terms of on campus mobility, the collected data showed that 13 students have received orientation and mobility training, and most of them were able to walk independently on campus. Nine students could walk independently on campus without using white cane, while eight students walked on campus with white cane, and there were still eight students who need to mobilize with help from other people. However, the number of students who do not use the white cane off campus is reduced to three, the number of people who use the white cane increases to 11, and the number of people who need to travel with others increases to 10, suggesting that in a relatively familiar environment on campus, the braille-reading students have higher walking abilities compared with an unfamiliar environment off campus. It can be taken into account that these students may need more travel assistance in off-campus activities.

In terms of methods of information acquisition, 9 students would like to acquire information from school website, 16 students would like to acquire through mobile phones, and 11 would like to acquire through computers. All of them used the Internet to acquire relevant information. This set of data shows that the Internet is the most important information acquisition channel for braille-reading students. In addition, although there are a lot of word recognition software, few students like to read paper notices.

In terms of learning methods, 14 students use computers to read textbooks in the form of electronic documents, which indicates that computers are the most important learning aid, and electronic documents are the most important form of textbooks. 13 students choose to submit reading text as the way to hand in their homework; submitting a hard copy may be a good joint for the use conversion between Braille and ordinary word for Braille using students. However, the printed copies cannot be confirmed again on their own in a non-vision way. This group of data also shows that students receiving higher

inclusive education can only communicate with teachers in colleges and universities and complete the study task by mastering the output skills of reading text in addition to using Braille. In addition, the learning process requires to use ordinary word and rely on hearing to complete the reading tasks of textbooks and materials. The data suggest that for students using braille, the use of ordinary word is also an essential skill for them in regular colleges and universities.

3. Important support needs of the students with visual impairment in China

In this study, the usage scenarios of reasonable accommodation items are divided into three aspects: in class, outside class and examination. Besides, the aids and the transformation of relevant environment fall into one aspect independently.

In class, what braille-reading students need most were “Braille version of textbook” and “Allow changing courses due to disability”. In the reading data of teaching material, it shows that the most common way for braille-reading students to read textbooks is reading through computer. For braille-reading students, although they can use the electronic version of the teaching material, using braille by touch has long been a habit of learning. If it is changed, the learning efficiency and academic record might be affected. In addition, there are some courses that must be completed visually, which need to be studied by replacement. In class, the teacher’s blackboard writing content is for temporary, and it is hard for visually impaired students to understand instantly. Therefore, if there are visually impaired students in class, the teacher should better provide the explanation of blackboard writing content within the scope of his or her ability, which is also one of the reasonable convenience. Nagoka’s study in 2012 demonstrated that information technology changed the situation that students with visual impairment had to rely on others to deal with text¹⁰.

Regarding to outside class, the first three items of required reasonable accommodation are still related to braille textbooks and materials. Combined with the above reasonable accommodation of classroom requirements, it also shows that under the current Chinese higher inclusive education system, the most reasonable accommodation for students using Braille is the conversion of the Braille format of textbooks. Meanwhile, the first two items of unnecessary but required items are all reasonable accommodation for the support of campus activities, which indicates that although students using Braille have a certain ability to walk independently, campus activities cannot be successfully involved and completed only with the ability to walk, but also requiring a lot of detailed support.

Although the result here showed that not many students chose psychological counseling, some other studies reported that more psychological issues existed in students with congenitally visual impairment than that existed in students without visual impairment. Therefore, universities should provide more mental guide for students with congenitally visual impairment.

In terms of the examination, the most necessary item is the appropriate form of answer sheet. Even for the same test paper made of paper, if braille students can choose oral

answer questions and acquire some flexibility in time, they can complete the examination just like other students. Considering that it takes a lot of manpower and resources plus professional participation to translate from ordinary word paper into the Braille paper, it can be said that it is a good choice to change the form of answering.

In terms of aids, computers, mobile phones and professional braille display software for the visually impaired are necessary, which indicates that Chinese students who use braille do not mainly rely on learning braille, but also rely on hearing to complete their learning. In addition, white cane and braille display devices are unnecessary but required aids. In combination with other relevant needs of this study, travel support and Braille textbooks and aids are three major reasonable convenient needs of students using Braille in ordinary colleges and universities.

4. Recommendations to universities based on the results of this study

According to the results, supporting for the outside activities and transforming the textbook to braille version are two most important needs of students with visual impairment. Therefore, we suggest that China higher inclusive education should support those two items. Personal computer and screen reader are two most important study devices based on our study. To ensure that students can be provided with such assistance, we suggest that universities should have funding for the support and specific stuff to do related work. Making a flexible supporting plan based on individual need is also considerable. In the meanwhile, according to the principle of reasonable convenience, the supporting work should be conducted within an acceptable limit for both students and universities. Besides, survey and evaluation for each student need to be performed before conducting the supporting work. Universities need to consider offering maximal support with minimum resources.

5. Limitations of this study

Although we conducted the survey by questionnaire in the whole country, there are only a few braille-reading students successfully attended Chinese higher inclusive education. The situation leads to a small sample size, which cannot cover the whole information of braille-reading students in China. Besides, because that all the collected information related to the needs of braille-reading students were from the students, and the faculty members of universities were not involved in the study, this might lead to the presence of data bias.

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