

# Analysis of Educational Support for Students with Low-Vision and Strategies to Improve the Quality of Education

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## Abstract

The purpose of this study was to find an effective educational support plan for students with low-vision by examining the educational support status and educational needs for them. For the purpose of this study, the researchers used survey methods. A survey was conducted on teachers in charge of educating students with low-vision in order to examine the actual conditions of education support for students and their demands for educational support in terms of creating a physical environment and supporting school life. Above all, a physical environment suitable for visual characteristics of students with low-vision should be supported so that students could use their residual vision efficiently in their learning activities. Also, administrative and financial support is needed to create a school environment so that students with low-vision can participate in their school life and perform learning activities more efficiently. In addition, it is necessary to develop an evaluation tool that can more objectively evaluate the degree of adaptation to school life of students with low-vision and educational programs for students with low-vision. It can improve school life skills such as interpersonal skills and self-confidence necessary for students with low-vision to form friendships with other students.

**Keywords**— Educational support, educational needs, students with low-vision, physical environment, school life support

## 1. Introduction

Vision plays a significant role in obtaining information necessary from the external environment for human life. People with visual impairment show various learning and social characteristics depending on the cause, degree, and time of the impairment. Therefore, in order for a person with visual impairment to live an independent and functional life in society, appropriate support according to individual characteristics is necessary [1].

In the field of education for the people with visual impairment, various approaches were attempted according to the characteristics of the visual impairment. Until the early 1960s, educational interest in students with visual impairment was focused on blind students. However, after the revolutionary study of Barraga [2], students with residual vision gradually began to take interest in using the residual vision. In line with this context of education for the people with visual impairment, a special class for students with low-vision was established in Wolgye Elementary School in Korea in 1969, and education for students with low-vision began. However, although an external environment for education was created through the establishment of special classes, effective education was not achieved due to the absence of an internal environment such as a lack of experts and lack of educational support to meet the needs of students with low-vision [1].

According to 2020 Special Education Statistics, over the past five years, blind students accounted for an average of 2.18% of all students with special needs. In the case of 2020, there were 1,908 school-age students with visual impairment, accounting for about 2.0% of the total 95,420 students eligible for special education. In addition, the proportion of students with low-vision among visually impaired students is gradually increasing [3]. Moreover, the ratio of students with low-vision among students with visual impairment exceeds about 70% [4].

Although research on various subjects is being actively conducted in the field of visual impairment, research on low-vision is relatively insufficient compared to other fields in the research field of visual impairment [5]. In particular, the visual characteristics of students with low-vision and their ability to use vision can be an important criterion for successful performing tasks in learning and their life. Also, the characteristics of low-vision are very diverse depending on the cause. Moreover, even with the same causative disease, the characteristics appear differently depending on the progression of the disease [6]. Therefore, in order to provide effective education for students with low-vision, it is necessary to identify the visual characteristics according to the causative diseases of students with low-vision and provide educational support based on these characteristics [6]. In this study, the researchers tried to find an effective educational support plan for students with low-vision by examining the educational support status and educational needs for students with low-vision who are arranged by school level and school course. The research questions of this study are as follows.

First, what about the current status of educational support and the needs for educational support in terms of creating a physical environment for the effective education of students with low-vision?

Second, what is the current status of educational support and the needs for educational support in terms of school life support for students with low-vision?

## **2. Research Method**

### **2.1 Participants**

For the purpose of this study, the researchers used survey methods. In the survey, a total of 262 teachers participated in the survey. A brief look at this is as follows. By gender, 74 (28.2%) were male and 188 (71.8%) were female. The final educational background was 187 bachelors (71.4%), 69 masters (26.3%), and six doctoral students (2.3%). Also, by qualification type, 164 teachers (62.6%) of special schools, 67 teachers (25.6%) of general schools, and 31 teachers (11.8%) of both certificates were found, and by working organization, 23 teachers of national school (8.8%), 197 teachers of public school (75.2%), and 42 teachers of private school were found. By school level, there were 42 students (16.0%) in schools for the students with visual impairment, 73 students (27.9%) in general schools, and 147 students (56.1%) in special classes in general schools. By school curriculum, 126 students (48.1%) were in elementary school and 136 students (51.9%) were in secondary school. In particular, the number of teachers with less than five years of teaching experience for students with low-vision was 229 (87.4%), compared to 33 (12.6%) of the teachers with more than five years of teaching experience for students with low-vision.

## 2.2 Survey Questionnaire

The questionnaires used in this study were developed through literature analysis, expert review, preliminary research, and researchers council on previous studies. The survey questionnaire were used as five-point Likert scale. The detailed development process for the questionnaire items is as follows. First, domestic and foreign related prior studies on the status of education support for students with low-vision, demands for educational support, and educational support measures were analyzed to develop the first preliminary questions. Second, the validity of the contents of the first preliminary questions developed was verified with a blind education expert (two professors majoring in blindness). Third, based on the preliminary questions that verified the validity of the content, from June 1 to 15, 2020, 10 special teachers (two teachers from special schools for the visually impaired, two teachers from the special education support center for the visual impairment at the base, two special education support centers) Preliminary survey was conducted for students, two teachers in special classes, and two teachers in special schools) to examine their validity. Fourth, for the readability of the questionnaire questions, one Korean language education expert (reading major) reviewed the grammar. Lastly, the Researchers' Council reviewed the contents derived from the expert review, preliminary research, and synopsis, revised and supplemented the contents of the questionnaire to complete the final questionnaire. The contents of the questionnaire developed through the above process are as follows in Table 1.

**Table 1. Survey Questionnaire**

	Contents	n	types
Demographic Information	Gender Academic Background Teaching Career Qualification Type Establishment and Working status Experience in Teaching Students with low-vision Affiliation Area	7	Likert-Scale
Creating Physical Environment	Physical Environment Support Things to Consider When Supporting the Physical Environment	7	Likert-Scale
Supporting School	School Life Support Status	5	Likert-Scale

Life	School Life Support Needs		
Total		19	

### 2.3 Implementing Survey

To collect questionnaire data, an online survey was conducted for a total of 3 weeks from July 10, 2020 to July 31, 2020 through the survey system on the website of the National Institute of Special Education. The online survey was conducted through the following process. In order to increase the response rate of the survey, an additional survey was conducted for two weeks from August 24, 2020 to September 5, 2020 using the online survey system as in the main survey

### 2.4 Statistic Analysis

The data collected in the survey of this study were first reviewed by the researchers' meeting and then analyzed using SPSSWIN (ver. 25.0). Descriptive statistics, frequency, and percentage were calculated to analyze the actual conditions of educational support for students with low-vision and the demand for educational support.

## 3. Results

### 3.1 Creating a Physical Environment

#### 3.1.1. Lighting Support for Students with Low-Vision (Duplicate Response)

Table 2 shows the results of the lighting support provided for students with low-vision. As shown in table 2, 'Provide the appropriate brightness level of classroom lighting' was the highest at 37.4%, 'There is no special support' with 36.2%, and 'The brightness of the bathroom lighting is at a similar level to the brightness of the classroom' with 9.0% is followed. Based on these results, it was found that most schools or classes did not provide support using the four lighting support methods: classroom brightness management, bathroom brightness management, stair brightness management, and personal stands.

By school level, the highest number was that special schools provide adequate classroom lighting level (41.7%), while general schools had no special support (42.5%). In terms of curriculum, in the case of kindergartens and elementary schools, the highest ratio was that the brightness level of classroom lighting was adequately provided (41.1%), and the highest ratio was that there was no special support for secondary schools (38.0%).

**Table 2. Lighting Support for Students with Low-Vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Providing adequate levels of brightness for classroom lighting	129 (37.4)	30 (41.7)	99 (36.3)	65 (41.1)	64 (34.2)
The brightness level of the bathroom lighting is provided at a brightness level similar to that of the classroom.	31 (9.0)	10 (13.9)	21 (7.7)	12 (7.6)	19 (10.2)
The brightness level of the stair lighting is provided at a brightness level similar to that of the classroom.	29 (8.4)	12 (16.7)	17 (6.2)	10 (6.3)	19 (10.2)
A personal stand is provided for students who want bright lighting.	18 (5.2)	9 (12.5)	9 (3.3)	9 (5.7)	9 (4.8)
There is no special support	125 (36.2)	9 (12.5)	116 (42.5)	54 (34.2)	71 (38.0)
others	13 (3.8)	2 (2.8)	11 (4.0)	8 (5.1)	5 (2.7)
Total	345 (100.0)	72 (100.0)	273 (100.0)	158 (100.0)	187 (100.0)

### 3.1.2. Support for Glare Reduction for Students with Low-Vision

Table 3 shows the results of glare reduction support provided for students with low-vision. As shown in table 3, 'they are installing blinds or curtains on the window' was the highest at 29.8%, 'there was no special support' at 26.5%, and 'instructing students to lower the brightness of the screen of a computer or magnifying reader' was found at 18.6%. Based on these results, it was found that teachers in charge of educating students with low-vision are supporting glare reduction in schools by mainly using

four methods: installing blinds, using a matte blackboard, adjusting the brightness of a monitor, and using an angle-adjustable reading table. By school level, the highest number of special schools installed blinds or curtains of bright colors on the windows (31.5%), and no special support for general schools (33.0%) was the highest. By curriculum, the highest ratio was 'installing bright-colored blinds or curtains on windows' (32.6%) in kindergartens and elementary schools.

**Table 3. Support for Glare Reduction for Students with Low-Vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Brightly colored blinds or curtains are installed on the windowsill	117 (29.8)	29 (31.5)	88 (29.3)	60 (32.6)	57 (27.4)
Using a (matte) blackboard with less light reflection	40 (10.2)	11 (12.0)	29 (9.7)	18 (9.8)	22 (10.6)
Instructing to lower the screen brightness when using a computer or magnifying reader	73 (18.6)	27 (29.3)	46 (15.3)	30 (16.3)	43 (20.7)
Reducing the light reflected from the book, an adjustable angle tool (e.g., reading table, etc.) is supported.	47 (12.0)	20 (21.7)	27 (9.0)	25 (13.6)	22 (10.6)
No special support	104 (26.5)	5 (5.4)	99 (33.0)	45 (24.5)	59 (28.4)
Others	11 (2.8)	0 (0.0)	11 (3.7)	6 (3.3)	5 (2.4)
Total	392 (100.0)	92 (100.0)	300 (100.0)	184 (100.0)	208 (100.0)

### 3.1.3. Support for Color Contrast Enhancement for Students with Low-Vision

Table 4 shows the results of color contrast enhancement support for students with low-vision. As shown in table 4, 'there is no special support' was the highest at 42.9%, and 'yellow bands, etc. are attached to the corners of the stairs', followed by 20.0%. Based on these results, most schools (classes) for students with low-vision do not use high-contrast mats, attach yellow strips at the corners of stairs, manage high-contrast floors and walls and equipment, and attach/paint high-contrast strips on major school facilities for enhancing color contrast. By school level, the highest number of special schools was that yellow bands were attached to the corners of the stairs to distinguish them (30.7%), and that there was no special support for general schools (55.3%). By curriculum, the most common cases were that there was no special support for both elementary and secondary schools (42.9%) and secondary schools (42.9%).

**Table 4. Support for Color Contrast Enhancement for Students with Low-vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Using a high-contrast mat on my desk	11 (3.1)	5 (5.7)	6 (2.3)	6 (3.6)	5 (2.7)
The color of the floor and wall in the hallway is high in contrast.	40 (11.4)	22 (25.0)	18 (6.9)	18 (10.7)	22 (12.1)
Yellow bands are attached to the corners of the stairs to distinguish them	70 (20.0)	27 (30.7)	43 (16.4)	39 (23.2)	31 (17.0)
Desks and equipment in the classroom have a high contrast with the color of the floor or walls.	29 (8.3)	10 (11.4)	19 (7.3)	11 (6.5)	18 (9.9)
For easy identification of school facilities, contrast-colored bands are attached or marked with paint.	42 (12.0)	19 (21.6)	23 (8.8)	18 (10.7)	24 (13.2)

No special support	150 (42.9)	5 (5.7)	145 (55.3)	72 (42.9)	78 (42.9)
Others	8 (2.3)	0 (0.0)	8 (3.1)	4 (4.4)	4 (2.2)
Total	350 (100.0)	88 (100.0)	262 (100.0)	168 (100.0)	182 (100.0)

### 3.1.4. Desk and Reading Desk Support

Table 5 shows the results of desk and reading desk support for students with low-vision for comfortable posture and reduction of physical fatigue. As shown in table 5, 'there is no special support' was the highest at 46.6%, 'a reading table is provided' was at 15.0%, and 'a height adjustable desk is provided' was at 12.1%. Based on these results, it was found that most schools with low-vision students did not support desks or reading tables suitable for students with low-vision. By school level, the highest rate was that special schools provide a desk that is larger than a regular desk so that an enlarged reader can be placed (30.1%), and that there is no special support for general schools (57.9%). By school curriculum, there was no special support for both elementary and secondary schools (45.9%) and secondary schools (47.3%).

**Table 5. Desk and Reading Desk Support (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Reading tables are provided so that students do not bend their heads or backs.	47 (15.0)	19 (26.0)	28 (11.7)	26 (17.8)	21 (12.6)
Providing desks that can be adjusted in height so that students do not bend their backs.	38 (12.1)	12 (16.4)	26 (10.8)	14 (9.6)	24 (14.4)
A desk that is larger than a	53	22	31	23	30

regular desk is provided so that a magnifying reader can be placed.	(16.9)	(30.1)	(12.9)	(15.8)	(18.0)
Providing a desk that can be angled so that students do not bend their heads.	15 (4.8)	11 (15.1)	4 (1.7)	4 (2.7)	11 (6.6)
No special support	146 (46.6)	7 (9.6)	139 (57.9)	67 (45.9)	79 (47.3)
Others	14 (4.5)	2 (2.7)	12 (5.0)	12 (8.2)	2 (1.2)
Total	313 (100.0)	73 (100.0)	240 (100.0)	146 (100.0)	167 (100.0)

### 3.1.5. Placement of Students with Low-Vision

Table 6 shows the results of the placement of seats for students with low-vision to use their residual vision efficiently. As shown in table 6, 'Place the seat near the blackboard' was the highest at 41.7%, 'Place the seat on the left or right or in the center of the classroom considering the student's view' was at 23.0%. By school level, in both special schools (30.5%) and general schools (44.8%), 'Place a seat in the front seat close to the blackboard in consideration of the student's eyesight' was found to be the highest. By school curriculum, in both kindergartens and elementary schools (40.7%) and secondary schools (42.6%), 'In consideration of the student's eyesight, place the seat in the front seat close to the blackboard' was the highest.

**Table 6. Placement of Students with Low-Vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Placing the seat in front of the blackboard in consideration of the student's eyesight	203 (41.7)	32 (30.5)	171 (44.8)	94 (40.7)	109 (42.6)

Placing seats where they can reduce glare for students	76 (15.6)	23 (21.9)	53 (13.9)	32 (13.9)	44 (17.2)
Seating is arranged taking into account the student's preferred level of light (close to a window or fluorescent light).	69 (14.2)	23 (21.9)	46 (12.0)	31 (13.4)	38 (14.8)
In consideration of the student's vision problem, place students in an appropriate seat among the left, center of the classroom, and right side of the classroom.	112 (23.0)	25 (23.8)	87 (22.8)	60 (26.0)	52 (20.3)
No special support	22 (4.5)	2 (1.9)	20 (5.2)	14 (6.1)	8 (3.1)
Others	5 (1.0)	0 (0.0)	5 (1.3)	0 (0.0)	5 (2.0)
Total	487 (100.0)	105 (100.0)	382 (100.0)	231 (100.0)	256 (100.0)

### 3.1.6. Needs to Improve Physical Facilities in Schools

Table 7 shows the results of the needs for improvement to increase accessibility to school facilities for students with low-vision. As shown in table 7, 165 (31.4%) answered 'student seating arrangement' was necessary, and 99(18.9%) answered 'a desk with adjustable height and angle' was necessary. In addition, 83(15.8%) answered 'appropriate lighting', 72 (13.7%) answered 'anti-glare', and 41 (7.8%) answered 'modified bulletin boards and signs'. It was found that most schools need administrative and financial support to improve physical facilities. By school level, contrast (25.0%) and lighting (25.0%) were the highest in special schools, and student seat placement (35.4%) was the highest in general schools. By school curriculum, the request for 'student placement' was the highest in both elementary and secondary schools (30.8%) and secondary schools (32.0%).

**Table 7. Needs to Improve Physical Facilities in Schools (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Light (brightness)	83 (15.8)	21 (25.0)	62 (14.1)	39 (15.4)	44 (16.2)
Anti-glare	72 (13.7)	11 (13.1)	61 (13.8)	32 (12.6)	40 (14.7)
Contrast (high contrast environment)	57 (10.9)	21 (25.0)	36 (8.2)	33 (13.0)	24 (8.8)
Student Placement	165 (31.4)	9 (10.7)	156 (35.4)	78 (30.8)	87 (32.0)
Height and angle adjustable desk	99 (18.9)	14 (16.7)	85 (19.3)	48 (19.0)	51 (18.8)
Adjusting Posts and Signs	41 (7.8)	5 (6.0)	36 (8.2)	18 (7.1)	23 (8.5)
Others	8 (1.5)	3 (3.6)	5 (1.1)	5 (2.0)	3 (1.1)
Total	525 (100.0)	84 (100.0)	441 (100.0)	253 (100.0)	272 (100.0)

### 3.2 School Life Support

#### 3.2.1. How to Check the Adjustment to School Life of Students with Low-Vision

Table 8 shows the results of examining the degree of adaptation to school life of students with low-vision. As shown in table 8, 'student interview' was the highest at 27.1%, 'parent interview' was 26.0%, 'student life observation' was 23.8%, 'cooperation with other teachers in the school' was 15.9%.

By school level, observation of school life (26.0%) was the highest in special schools, and parental interviews (26.9%) and student interviews (26.9%) were the highest in general schools. By school curriculum, parental interview (27.3%) was the highest in kindergarten and elementary school, and student interview (30.5%) was the highest in secondary school.

**Table 8. Method of Checking the Adjustment to School Life of Students with Low-Vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Student interview	206 (27.1)	35 (28.5)	171 (26.9)	84 (23.4)	122 (30.5)
Parent interview	197 (26.0)	26 (21.1)	171 (26.9)	98 (27.3)	99 (24.8)
School life observation	181 (23.8)	32 (26.0)	149 (23.4)	92 (25.6)	89 (22.3)
Checking with other teachers in the school	121 (15.9)	22 (17.9)	99 (15.6)	62 (17.3)	59 (14.8)
Checking through the class head and peer helpers	36 (4.7)	5 (4.1)	31 (4.9)	12 (3.3)	24 (6.0)
Related psychological tests, tool evaluation	10 (1.3)	2 (1.6)	8 (1.3)	7 (1.9)	3 (0.8)
Not particularly sure	8 (1.1)	1 (0.8)	7 (1.1)	4 (1.1)	4 (1.0)
Others	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Total	759 (100.0)	123 (100.0)	636 (100.0)	359 (100.0)	400 (100.0)
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### 3.2.2. The Degree of Adaptation to School Life of Students with Low-Vision

Table 9 shows the results of the degree of adaptation to school life for students with low-vision perceived by teachers. As shown in table 9, 'there is no difficulty in adjusting to school life' was 30.5%, 'there is some difficulty in adjusting to school life' was 52.7%, 'there is considerable difficulty in adjusting to school life' was 9.9%, and 'there are many difficulties in adjusting to school life' was 3.1%. Judging from these results, it was found that the teachers in charge of the education of students with low-vision recognized that students with low-vision had difficulties in adjusting to school life (65.6%).

**Table 9. The Degree of Adaptation to School Life of Students with Low-Vision**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
There is no difficulty in adjusting to school life.	80 (30.5)	18 (42.9)	62 (28.2)	33 (26.2)	47 (34.6)
There are some difficulties in adjusting to school life.	138 (52.7)	19 (45.2)	119 (54.1)	71 (56.3)	67 (49.3)
There are quite difficulties in adjusting to school life.	26 (9.9)	2 (4.8)	24 (10.9)	12 (9.5)	14 (10.3)
There are many difficulties in adjusting to school life.	8 (3.1)	1 (2.4)	7 (3.2)	5 (4)	3 (2.2)
Not sure	7 (2.7)	1 (2.4)	6 (2.7)	4 (3.2)	3 (2.2)
Others	3 (1.1)	1 (2.4)	2 (0.9)	1 (0.8)	2 (1.5)

Total	262 (100.0)	42 (100.0)	220 (100.0)	126 (100.0)	136 (100.0)
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### 3.2.3. Reasons for Difficulties in Building Friendships of Students with Low-Vision

Table 10 shows the results of the difficulties that students with low-vision face in building peer relationships. As shown in table 10, 'lack of confidence in peer relationships due to visual impairment' was the highest at 24.5%, 'lack of opportunity to participate in various peer cultural activities due to visual impairment' was 21.1%, 'compared to peers' 'Lack of social skills' was 20.5%, and 'difficulty in adapting and accepting one's visual impairment' was 14.1%. In view of these results, teachers recognized that students with low-vision had difficulties in building peer relationships. Therefore, it is necessary to prepare a program to support the friendship of students with low-vision. By school level, both special schools (25.0%) and general schools (24.4%) showed the highest level of lack of confidence in peer relationships due to visual impairment. By school curriculum, the lack of confidence in peer relationships due to visual impairment was the highest in both kindergartens and elementary schools (24.8%) and secondary schools (24.2%).

**Table 10. Reasons for Difficulties in Building Friendships of Students with Low-Vision (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Lack of social (interpersonal) skills compared to peers	138 (20.5)	21 (17.5)	117 (21.1)	72 (22.6)	66 (18.6)
Lack of confidence in friendships due to visual impairment	165 (24.5)	30 (25.0)	135 (24.4)	79 (24.8)	86 (24.2)
Difficulty in adapting and accepting one's own visual impairment	95 (14.1)	24 (20.0)	71 (12.8)	42 (13.2)	53 (14.9)
Lack of opportunities to participate in various peer cultural activities due to	142 (21.1)	28 (23.3)	114 (20.6)	67 (21.0)	75 (21.1)

visual impairment					
Lack of understanding or consideration for the students with visual impairment from classmates	81 (12.0)	11 (9.2)	70 (12.6)	32 (10.0)	49 (13.8)
School teachers' lack of interest and intervention in peer relationships	35 (5.2)	6 (5.0)	29 (5.2)	16 (5.0)	19 (5.4)
Others	18 (2.7)	0 (0.0)	18 (3.2)	11 (3.4)	7 (2.0)
Total	674 (100.0)	120 (100.0)	554 (100.0)	319 (100.0)	355 (100.0)

### 3.2.4. How to Support Students with Low-Vision to Adapt to School Life

The results of how teachers help students with low-vision adjust to school life are as follows table 11. As shown in table 11, 'regular student and parent counseling' was the highest at 40.9%, 'training to understand the visual impairment in class' was 22.7%, and 'supporting peer relationships through peer helpers in the class' was 20.2%. By school level, regular student and parent counseling was the highest in both special schools (41.0%) and general schools (40.9%). By school curriculum, student and parent counseling was the highest in both kindergartens and elementary schools (41.8%) and secondary schools (40.2%).

**Table 11. How to Support Students with Low-Vision to Adapt to School Life (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Regular student and parent counseling	200 (40.9)	32 (41.0)	168 (40.9)	94 (41.8)	106 (40.2)
Implementation of	111	18	93	57	54

education on understanding the visual impairment in the classroom	(22.7)	(23.1)	(22.6)	(25.3)	(20.5)
Professional counseling using external psychologists	20 (4.1)	4 (5.1)	16 (3.9)	9 (4.0)	11 (4.2)
Supporting peer relationships through peer helpers in the class	99 (20.2)	16 (20.5)	83 (20.2)	39 (17.3)	60 (22.7)
Operation of educational programs (interpersonal skills, etc.) using external experts	15 (3.1)	4 (5.1)	11 (2.7)	6 (2.7)	9 (3.4)
There is no special support	35 (7.2)	2 (2.6)	33 (8.0)	15 (6.7)	20 (7.6)
Others	9 (1.8)	2 (2.6)	7 (1.7)	5 (2.2)	4 (1.5)
Total	489 (100.0)	78 (100.0)	411 (100.0)	225 (100.0)	264 (100.0)

### 3.2.5. Support needs of Students with Low-Vision to Adapt to School Life

Table 12 shows the results of finding out the support needs for students with low-vision to adapt to school life. As shown in table 12, 'regular student and parent counseling' was the highest at 22.7%, 'instruction to understand the visual impairment in class' was 19.9%, and 'supporting peer relationships through peer helpers in the class' was 15.8% and 'development and dissemination of school life adaptation support program' was 15.5%. By school level, teachers in special schools (22.9%) and general schools (22.6%) had the highest demands for regular student and parent counseling. By school curriculum, teachers in kindergartens and elementary schools (20.7%) and secondary schools (24.5%) all answered that they needed support for regular student and parent counseling the most.

**Table 12. Support Needs of Students with Low-Vision to Adapt to School Life (duplicate response)**

	Total	School Type		School course	
		Special School	General School	Preschool to Elementary level	Secondary level
Regular student and parent counseling	165 (22.7)	27 (22.9)	138 (22.6)	73 (20.7)	92 (24.5)
Implementation of education on understanding the visual impairment in the classroom	145 (19.9)	23 (19.5)	122 (20.0)	70 (19.9)	75 (19.9)
Professional counseling using external psychologists	94 (12.9)	7 (5.9)	87 (14.3)	49 (13.9)	45 (12.0)
Supporting peer relationships through peer helpers in the class	115 (15.8)	25 (21.2)	90 (14.8)	50 (14.2)	65 (17.3)
Operation of educational programs (interpersonal skills, etc.) using external education experts	88 (12.1)	11 (9.3)	77 (12.6)	50 (14.2)	38 (10.1)
Development and dissemination of school life adaptation support programs	113 (15.5)	25 (21.2)	88 (14.4)	55 (15.6)	58 (15.4)
Others	8 (1.1)	0 (0.0)	8 (1.3)	5 (1.4)	3 (0.8)
Total	728 (100.0)	118 (100.0)	610 (100.0)	352 (100.0)	376 (100.0)

#### **4. Discussion and Conclusion**

First of all, the physical environment to increase the independence and safety of students with low-vision in school life includes lighting brightness, contrast enhancement, anti-glare, height-adjustable desk, reading desk support, seating arrangement in consideration of visual characteristics, and support for expanding posts and signs in school [6]. In order for students with low-vision to use their sight comfortably in school life, it is necessary to create a physical environment suitable for the student's residual vision and visual function characteristics. According to previous domestic studies [3], it was perceived that the creation of a physical environment and support were generally insufficient. Because of the lack of physical environment support for students with low-vision, they have difficulties in comfortably accessing the school environment and actively participating in learning activities [7]. In foreign countries, guidelines for creating a physical environment have been developed and applied in detail so that students with low-vision can comfortably utilize their residual vision in their learning activities[8]. In accordance with these guidelines, educational institutions for students with visual impairment can maintain adequate lighting and reduce glare so that students with low-vision can use their remaining vision efficiently and comfortably, in a high-contrast environment, use large-character signs, height-adjustable desks and reading tables, use of matte blackboards [9]. Due to this, students with low-vision can participate meaningfully in learning activities in an optimal educational environment and can more efficiently orient themselves for walking. Therefore, in Korea, it is necessary to improve the physical environment for students with low-vision and support them so that they can maximize their residual vision according to the visual characteristics of the students. In this regard, suggestions for improvement of education for students with low-vision on the 'creating physical environment' are as follows. It is necessary to develop and disseminate guidelines for creating an optimal educational environment for students with low-vision. Then, a physical environment suitable for individual visual characteristics should be supported so that students with low-vision can use their residual vision efficiently in their learning activities. In addition, administrative and financial support is needed to create a school environment so that students with low-vision can participate in their school life and perform learning activities more efficiently.

Second, the results of the status of support for students with low-vision to adapt to school life are as follows; 1) teachers recognized that most students with low-vision had difficulties adjusting to school life. The reasons for having difficulties in peer relationships were various, such as lack of confidence due to disability, lack of social skills, and lack of opportunities to participate in peer activities. 2) the needs of students with low-vision for support for adaptation to school life were found as counseling with students and parents, education on understanding the visually impaired in the classroom, and support for peer relationships through peer helpers. 3) depending on the school level, students with low-vision in general schools showed relatively difficulty in adjusting to school life, but the needs of supporting for school life adjustment was similar between special schools and general schools. 4) according to the school curriculum, it was found that students with low-vision in secondary school had relatively difficulty in adjusting to school life, and the demand of supporting for school life adjustment showed a similar pattern between kindergartens, elementary schools and secondary schools.

Improvement strategies based on the results of adaptation to school life are as follows; 1) it is necessary to develop and disseminate an evaluation tool that can more objectively evaluate the degree of adaptation to school life of students with low-vision in general schools. 2) it is necessary to develop and support educational programs such as interpersonal skills and self-confidence necessary for students with low-vision in general schools to form friendships with other students. 3) teacher training should be conducted to systematically intervene and support students with low-vision who have difficulty adjusting to school life. 4) students who have difficulty in adjusting to school life due to visual impairment should receive counseling and intervention by a professional psychological counselor.

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