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Improving visual efficiency in primary school children with low vision: A Quasi-experimental study of Assistive Learning Approaches

Reena Singh [1] * , Dr. Ashwati Verma [2]

1. PhD Scholar, Capital University, Koderma, Jharkhand, India
srisaiparamedicalcollege2021@gmail.com ,
2. Associate Professor, Capital University, Koderma, Jharkhand, India

Abstract: In our modern world, people from all walks of life and all demographics agree that education is crucial. In today's knowledge-driven society, everyone needs access to high-quality education if they want to thrive. The special educators benefitted from the training they received, which allowed them to provide their low vision children with appropriate functional vision instruction. Utilizing Low Vision Devices for Scanning - Teachers have difficulties while trying to scan with poor vision equipment. Students' expectations are low since low vision. Understanding the kind and degree of the student's visual impairment will allow you, as a teacher, to provide the most appropriate help.

Keywords: Students, Low Vision, School, Learning , education

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INTRODUCTION

A more welcoming attitude developed as the nation advanced (Ryles, 2000). The "National Institute for the Visually Handicapped" (NIVH) in Dehradun was one of many special schools that opened in 1967 to provide specialist education, Braille materials, and careers for the visually impaired. Since then, inclusive education has been more widely implemented in regular schools as well as efforts by the government and other nonprofits to expand learning opportunities for kids who are visually impaired. This set the stage for the present initiatives in India to assist kids with vision impairments.

Even if they can see a little, children with poor vision often struggle with tasks such as visual acuity, accommodation, field of vision, colour vision, and adjusting to varied lighting conditions. Understanding the kind and degree of the student's visual impairment will allow you, as a teacher, to provide the most appropriate help. Braille readers, electronic magnifiers, closed-circuit video, and iPadsTM are among the low vision aids that certain students may be learning to utilize. They may need materials with larger font sizes. By getting to know each student's unique set of skills and interests, you may brainstorm methods to make learning enjoyable, accessible, and secure for everyone.

Utilizing Low Vision Devices for Scanning - Teachers have difficulties while trying to scan with poor vision equipment. Students' expectations are low since low vision gadgets are not available. Students who are visually challenged may benefit from the low vision gadgets. These pupils may use them to enhance their learning and fulfil the requirements set by their instructors. Educators tasked with helping students who are visually impaired must devise plans for the secure storage of low vision aids in the event that such devices become scarce.

Classrooms Lack Controlled Lighting - Students who are visually impaired must have access to appropriate learning technologies in the classrooms. It is considered crucial to have the right infrastructure, weather-appropriate heating and cooling, facilities for students to use, potable water, modern technology, and other resources needed to help kids study. Classrooms should have access to regulated lighting, which is the most crucial component. Students might find this helpful in their learning process. A lack of regulated lighting makes it impossible to focus on schoolwork.

LITERATURE REVIEW

Balal Ahmet and Girli Alev (2017) This research aims to assess the efficacy of a reading fluency intervention programme that use tablet computers. Utilizing previously studied skill- and performance-based methodologies, it delves into the perspectives of parents and students on this intervention. The research included three third- or fourth-graders who were diagnosed with a learning handicap. One of the single-subject experimental models employed in this study was the multiple baselines among participants design, and the findings are displayed visually. The results demonstrate that the reading fluency of the children with learning disabilities was enhanced by the tablet computer-aided intervention programme. The qualitative data shows that the students had a generally favorable impression of the tablet computer-aided reading fluency intervention, suggesting that they enjoyed themselves and were motivated to study because of this research.

Gunarhadi, et al., (2017) This research proved that a global, multi-center RCT of electronic assistive technology can enroll visually impaired children and adolescents. Kids and teens who have trouble seeing reported utilizing and readily accessing tablet computers at school at least once a day, regardless of where they lived. The purpose of this research is to find out how third graders at SLB A YKAB Surakarta who are visually impaired fare when exposed to the instructional strategy known as Cooperative Integrated Reading and Composition (CIRC). A one-group posttest-pretest design was used in this study's experimental methodology. For four sessions, each lasting sixty minutes, reading comprehension learning using the CIRC approach is the means of treatment for the topic.

Veselinka Milović et al. (2017) the aim was to determine the factors contributing to poor vision in children in Montenegro, and to find out how poor vision aids affect reading skills, particularly swiftness and understanding. Forty LV children, all of whom were considered "treatable," were the subjects of a prospective research that mirrored the demographics of Every single one of Montenegro's LV kids. Before and after using LVA, every participant reads the same content. To calculate the reading rate, we looked at the amount of words read per minute. The functional reading speed was determined by multiplying the rate of speeding with the comprehension of reading the text, and then multiplied by 100. Forty LV children, average age 12.60±4.06 years (20 males and 20 girls), were analysed.

Thomas et al., (2018) Tablet computers and other mobile devices have entered the mainstream and are even used in some schools. However, there is a lack of solid evidence about how well these devices, whether they are optical or electronic, help the visually impaired youth in their educational pursuits. The goal for the purpose of determining whether or not tablet computers improve education, and more especially whether or not they allow students with limited vision to access instructional materials independently, a randomized controlled trial (RCT) is required. In order to ascertain if a full-scale trial

could be executed, we performed a pilot RCT. One location in India and two in the UK made up this randomized multicenter pilot study.

Lorenzini et al., (2018) The fast advancement of technology in recent years has brought about a surge in interest in head-mounted low vision devices, making them more user-friendly and practical. Although they are necessary to guide device development in the future, systematic clinical assessments of such devices are still uncommon. This multicenter prospective experiment set out to examine the immediate and intermediate benefits of eSight Eyewear, a head-worn visual improvement technology. From thirteen to seventy-five years old, with stable eyesight, participants were scouted at six different locations. We took measurements before (without device), throughout (with device), and after three months of continuous usage to get our data. Results were evaluated using the following instruments.

RESEARCH METHODOLOGY

An essential component of high-quality research is the selection of appropriate variables. The efficacy of the variable selection is crucial. To determine how a training package affected the visual skill development of children with low vision, the researcher used a quasi-experimental method. The samples were selected using a purposeful sampling strategy. Younger children with visual impairments were intended to participate in this visual efficiency training, we made sure to choose objects that were inexpensive, non-hazardous, visually appealing, and easy to manipulate with little help from adults Children with visual impairments attending elementary schools in 22 Blocks of the Jharkhand Educational District were the focus of the study. The purposive sample method was used to pick 9 schools. Using the World Health Organization's working criteria, we chose children with a corrected visual acuity of 6/18 or below. It took three months to complete the process, and in the end, sixty youngsters with limited eyesight (34 boys and 26 girls) made up the study's sample.

DATA ANALYSIS

Children with impaired eyesight had their pre- and post-test visual efficiency mean scores compared using the "t" test. The outcomes may be seen in table 1.

Table 1: Evaluation of children's visual abilities before and after corrective lenses

S. No	Visual Skill	Test	Mean	N	SD	df	„t'-Value
1.	Visual awareness	pretest	5.18	45	1.86	44	14.23**
		posttest	11.51	45	2.61		
2.	Visual attention	pretest	2.62	45	0.96	44	12.59**
		posttest	4.62	45	0.61		
3.	Visual fixation	pretest	2.31	45	0.85	44	13.31**
		posttest	4.56	45	0.94		
4.	Visual focusing	pretest	1.04	45	1.19	44	5.54**
		posttest	1.96	45	1.04		
5.	Visual tracking	pretest	0.62	45	0.91	44	13.33**
		posttest	4.16	45	1.73		
6.	Visual scanning	pretest	1.91	45	0.60		

7.	Visual discrimination	pretest	3.20	45	0.55	44	13.74**
		posttest	4.69	45	0.63		
8.	Visual figure ground	pretest	0.31	45	0.47	44	14.20**
		posttest	2.49	45	0.99		
9.	Visual memory	pretest	0.89	45	1.85	44	10.56**
		posttest	3.82	45	0.49		
10.	Visual closure	pretest	0.29	45	0.55	44	13.55**
		posttest	2.53	45	1.10		
11.	Spatial relation and form constancy	pretest	0.00	45	0.00	44	14.04**
		posttest	2.31	45	1.10		
12.	Visual motor coordination	pretest	1.89	45	0.78	44	09.13**
		posttest	2.93	45	0.25		

**Significant at 1% level

Using the data in the table above, to check for a statistically significant difference in the average scores, we conducted a paired sample t-test of children with impaired vision on the visual skills test before and after the intervention. At the 1% level of significance, the computed t-value is higher than the 2.69 value in the table. The findings indicate that there has been a notable shift in the average ratings of visual ability between the two tests.

Children with central vision loss had their pre- and post-test visual efficiency scores compared using the "t" test to see if there was a statistically significant change.

Table 2: Comparison of the average visual ability scores of children with central visual loss before and after treatment

S. No	Visual Skill	Test	Mean	N	SD	df	„t'-Value
1.	Visual awareness	Pretest	2.43	7	0.79	6	4.73**
		Posttest	9.43	7	3.41		
2.	Visual attention	Pretest	1.14	7	1.07	6	3.04**
		Posttest	3.86	7	1.68		
3.	Visual fixation	Pretest	0.58	7	0.53	6	5.00**
		Posttest	4.00	7	1.53		
4.	Visual focusing	Pretest	0.00	7	0.00	6	4.58**
		Posttest	2.00	7	1.15		
5.	Visual tracking	Pretest	1.29	7	0.95	6	4.80**
		Posttest	4.14	7	1.07		
6.	Visual scanning	Pretest	0.57	7	0.53	6	5.76**
		Posttest	4.43	7	1.51		
7.	Visual discrimination	Pretest	1.14	7	1.07	6	4.69**
		Posttest	4.29	7	1.11		
8.	Visual figureground	Pretest	0.00	7	0.00	6	5.44**
		Posttest	2.29	7	1.11		
9.	visual memory	Pretest	0.57	7	0.53	6	11.50**
		Posttest	3.86	7	0.38		
10.	Visual closure	Pretest	0.57	7	0.53	6	5.30**
		Posttest	2.71	7	0.76		
11.	Spatial relation and form constancy	Pretest	0.00	7	0.00	6	5.30**
		Posttest	2.14	7	1.07		
12.	Visual Motor coordination	Pretest	0.57	7	0.53	6	4.58**
		Posttest	1.57	7	0.53		

** Significant at 1% level

With the information in the table above, we ran a paired sample t-test to see whether the children with central vision loss had significantly different visual ability mean scores before and after the intervention. The calculated t-value of 3.71 exceeds the table value at the 1% significance level. So, it can be concluded that the results on the visual skills test before and after the intervention are significantly different. It may be deduced by comparing the mean values of the posttest and pretest that the posttest mean scores are higher.

Children with peripheral vision loss had their pre- and post-test mean scores on visual efficiency measured using the "t" test to see if there was a statistically significant change. Table 3

Table 3: Analysis of the average visual skill scores of children with peripheral visual loss before and after the intervention

S. No	Visual Skill	Test	Mean	N	SD	Df	„t'- Value
1.	Visual awareness	Pretest	3.25	8	1.39		
		Posttest	6.75	8	3.49	7	3.38**
2.	Visual attention	Pretest	0.75	8	0.46		
		Posttest	3.50	8	1.31	7	5.60**
3.	Visual fixation	Pretest	2.00	8	1.31		
		Posttest	2.88	8	1.36	7	2.20**
4.	Visual focusing	Pretest	1.50	8	0.93		*
		Posttest	1.50	8	0.93	7	
5.	Visual tracking	Pretest	0.00	8	0.00		
		Posttest	1.63	8	0.74	7	6.18**
6.	Visual scanning	Pretest	0.75	8	0.46		
		Posttest	2.63	8	1.06	7	6.36**
7.	Visual discrimination	Pretest	2.25	8	1.39	7	
		Posttest	3.63	8	1.69		2.76**
8.	Visual figureground	Pretest	0.75	8	0.46	7	
		Posttest	1.38	8	0.74		2.38**
9.	Visual memory	Pretest	0.75	8	0.46	7	
		Posttest	4.13	8	3.36		2.98**
10.	Visual closure	Pretest	1.50	8	0.93	7	
		Posttest	2.00	8	0.93		1.32**
11.	Spatial relationand form constancy	Pretest	0.00	8	0.00	7	
		Posttest	0.88	8	0.35		7.00**
12.	Visual motor coordination	Pretest	0.00	8	0.00	7	
		Posttest	2.25	8	0.71		9.00**

** Significant at 1% level

Using the data in the table as a guide, Before and after the intervention, we compared the average scores of children with peripheral vision loss using a paired sample t-test to see whether there was a significant change. An alpha level of 3.50 was computed, which is higher than the table value at the 1% significance level. It seems that the average scores on the two assessments of visual ability changed significantly. The results of the post-test may be higher than the pre-test when comparing the average values of the two tests. Therefore, the alternative theory "there is no significant difference between the pretest and posttest mean scores of visual skills of children with peripheral vision loss" is not accepted.

The findings demonstrate that there is no change in the mean scores of visual focusing ability between seen in the table above, both before and after the exam. As a result, the t-test is considered valid since the standard error of the difference is 0 cannot be generated.

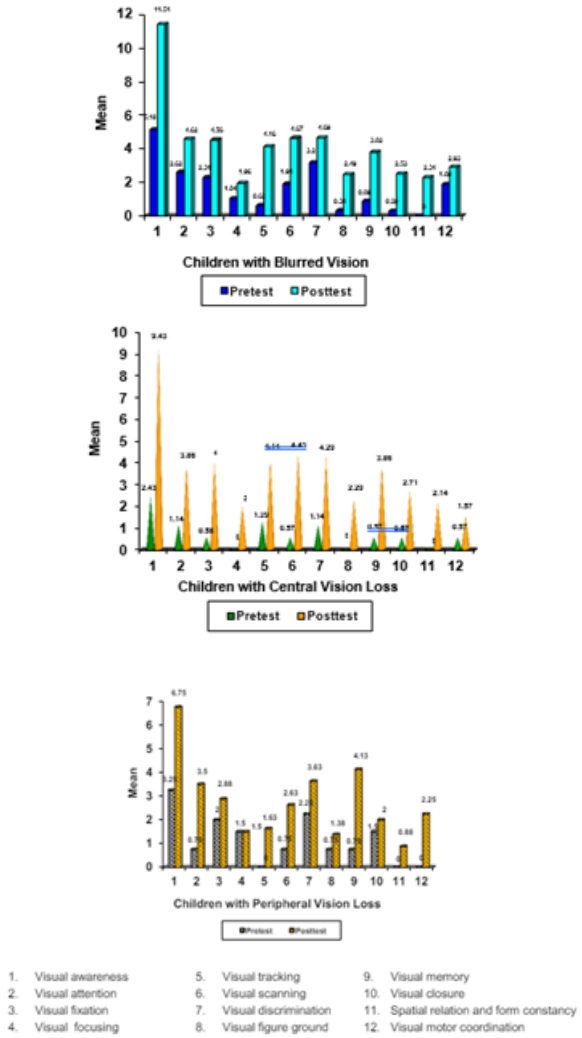


Figure 1: Analysis of pre and posttest mean scores of visual skills of children with blurred vision, central vision loss & peripheral vision loss

The statistical significance of the change in the visual efficiency test scores of boys with poor vision between the pre- and post-test was determined using the t-test. Table 4

Table 4: Analysis of pretest and posttest mean scores of visual efficiency of low vision boys

S. No	Visual Skill	Test	Mean	N	SD	df	„t'- Value
1.	Visual awareness	Pretest	4.65	34	1.97	33	10.96**
		Posttest	10.97	34	3.07		
2.	Visual attention	Pretest	2.21	34	1.20	33	11.71**
		Posttest	4.50	34	0.90		
3.	Visual fixation	Pretest	2.12	34	1.07	33	9.35**
		Posttest	4.35	34	1.01		
4.	Visual focusing	Pretest	0.88	34	1.12	33	4.13**
		Posttest	1.68	34	0.94		
5.	Visual tracking	Pretest	0.47	34	0.83	33	12.02**
		Posttest	4.03	34	1.64		
6.	Visual scanning	Pretest	1.62	34	0.85	33	15.87**
		Posttest	4.47	34	0.86		
7.	Visual discrimination	Pretest	2.76	34	1.02	33	8.73**
		Posttest	4.59	34	0.70		
8.	Visual figure ground	Pretest	0.29	34	0.46	33	10.23**
		Posttest	2.38	34	1.02		
9.	Visual memory	Pretest	0.65	34	0.69	33	12.45**
		Posttest	4.06	34	1.50		
10.	Visual closure	Pretest	0.47	34	0.75	33	9.57**
		Posttest	2.53	34	0.99		
11.	Spatial relation and form constancy	Pretest	0.00	34	0.00	33	11.75**
		Posttest	2.21	34	1.09		
12.	Visual motor coordination	Pretest	1.68	34	1.09	33	7.14**
		Posttest	2.68	34	0.59		

** Significant at 1% level

In order to find out whether the average results on the visual skills test before and after the intervention were significantly different for boys with poor vision, a paired sample t-test was used, taking into consideration the data from the table above. At a significance level of 1%, the computed t-value of 2.73 exceeds the table value. It seems that the average scores on the two assessments of visual ability changed significantly. The results of the post-test may be higher than the pre-test when comparing the average values of the two tests. So, we may say that "there is no significant difference between the pretest and posttest mean scores of visual skills of low vision boys" is not true.

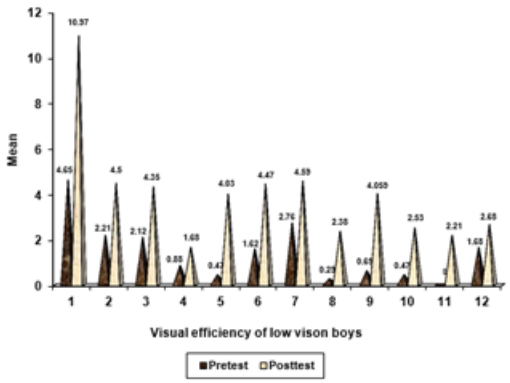
The statistical significance of the change in the visual efficiency of females with poor vision between to find the pre- and post-test, the "t" test was used. Table 5

Table 5: Statistical comparison of low-vision girls' visual efficiency test results before and after treatment

S. No	Visual Skill	Test	Mean	N	SD	df	„t'- Value
1.	Visual awareness	Pretest	04.54	26	2.04	25	9.59**
		Posttest	10.19	26	3.46		
2.	Visual attention	Pretest	02.20	26	1.17	25	6.77**
		Posttest	04.23	26	1.07		
3.	Visual fixation	Pretest	02.00	26	1.02	25	8.15**
		Posttest	04.15	26	1.43		
4.	Visual focusing	Pretest	01.12	26	1.18	25	4.72**
		Posttest	02.19	26	1.10		
5.	Visual tracking	Pretest	00.81	26	0.98	25	8.03**
		Posttest	03.54	26	1.94		
6.	Visual scanning	Pretest	01.58	26	0.70	25	11.62**
		Posttest	04.23	26	1.31		
7.	Visual discrimination	Pretest	02.92	26	1.06	25	7.86**
		Posttest	04.38	26	1.20		
8.	Visual figure ground	Pretest	00.39	26	0.50	25	8.99**
		Posttest	02.23	26	1.07		
9.	Visual memory	Pretest	01.08	26	2.33	25	5.58**
		Posttest	03.62	26	0.75		
10.	Visual closure	Pretest	00.50	26	0.71	25	7.97**
		Posttest	02.42	26	1.15		
11.	Spatial relationand form constancy	Pretest	00.00	26	0.00	25	8.46**
		Posttest	01.96	26	1.18		
12.	Visual motor coordination	Pretest	01.23	26	0.82	25	9.19**
		Post test	02.69	26	0.62		

** Significant at 1% level

In order to find out whether the average results on the visual ability tests before and after the intervention were significantly different for females with poor vision, a paired sample t-test was used, taking into consideration the data from the table above. With a significance level of 2.79 percent, the computed t-value exceeds the table value. It seems that the average scores on the two assessments of visual ability changed significantly. It is reasonable to assume that the post-test scores are higher when comparing the average values of the pre- and post-tests. "There is no significant difference between the pretest and posttest mean scores of visual skills of low vision girls" cannot be accepted as a valid hypothesis.



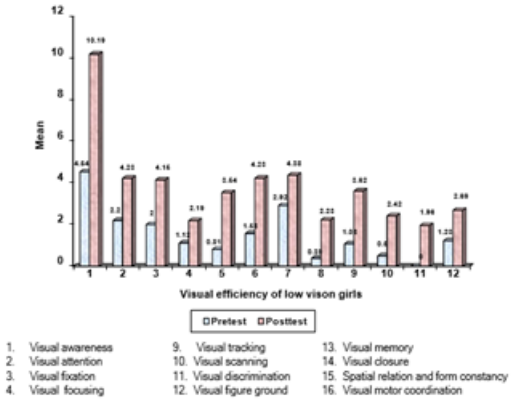


Figure 2: Analysis of pretest and posttest mean scores of visual efficiency of low vision boys & girls

CONCLUSION

Those who work with students who have unique needs benefitted from the training they received, which allowed them to provide their low vision children with appropriate functional vision instruction. low vision was enrolled in mainstream schools. The most common issues that these kids reported had to do with their study habits, such as taking notes on the board, reading their textbooks at arm's length, writing straight lines, distinguishing between pictures Utilizing Low Vision Devices for Scanning - Teachers have difficulties while trying to scan with poor vision equipment. An essential component of high-quality research is the selection of appropriate variables.

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