Cognitive Abilities of Visually Impaired Students in Relation to their Certain Demographic Variables

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Abstract

The primary objective of this paper is to assess and compare the cognitive abilities of visually impaired students studying in Class VIII with regard to certain demographic variables. This study has covered three demographic variables namely gender, age of onset of visual impairment and students categorised on the basis of visual impairment. Data of the study were collected from ninety-one visually impaired students of Class VIII studying in special schools of Kolkata using two stage random sampling design. Indian adapted version of WISC-R (Verbal) for the visually impaired children developed and standardised by National Institute for Empowerment of Persons with Visual Disabilities (NIEPVD), Dehradun was used as a tool for data collection. The collected data was analysed with the help of statistical techniques like mean, SD and t value. The results of the statistical analysis revealed that there is a significant difference in the cognitive abilities between visually impaired boys and girls. It indicates that visually impaired boys are having relatively higher cognitive abilities than visually impaired girls. Furthermore, it was found that visually impaired student's cognitive abilities did not differ significantly with respect to age of onset of blindness as well as to students categorised on the basis of visual impairment.

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Introduction

Vision is one of the most important medium for acquiring knowledge. An individual's perceptual senses are directly or indirectly linked through vision and it is through visual perception that we can best understand his cognitive development (Cohen, 1969). The role of vision in the intellectual development process is clearly evident in the theory of Piaget. Since visually impaired persons lack vision, the effects of blindness are basically cognitive in nature. It implies that vision plays an important role in cognition. So, for children with visual impairment, their needs in this area will show specific differences as compared with other sighted children. Numerous speculations have been offered with respect to possible effect of visual impairmenton cognitive functioning and also to assess whether or not, conceptual development varies in cases of visual impairment.

Lowenfeld (1948) had identified and pointed out clearly that blindness imposes three general restrictions, all of which may have influence on cognitive development: (i) in the range and variety of experiences (ii) ability to get about (iii) control of environment and self in relation to environment. This is also in consonance with the work of Elonen and Zwarensteyn (1964) who had found in their study that ability to conceptualise depends on two things simultaneously, i.e., on all of the concomitantly developing skills and experiences of each child through all his senses. On the other hand, Corso (1967) found that sensory deprivation did not, in general, affect cognitive functioning. Similarly, Bateman (1967) and Jurma (1967) postulated that blindness itself is not seen to be a "factor hindering differentiation" of mental ability, and if the brain (information processor) and expressive abilities (output systems) are functioning properly, cognitive abilities would not be affected. Pathak (1992) reported that cognitive abilities develop more slowly in visually impaired children than in sighted children. However, Rathore (1990) reported that there is no significant difference in cognitive abilities between blind and sighted children. It means that a visually impaired child needs for cognitive development is a systematic and appropriate instruction to overcome the deprivations resulting from loss of vision. Hallahan et. al. (2009) conducted a comparative study on cognitive abilities of adolescents with visual impairments with their sighted peers that found cognitive abilities is similar in most cases and finally concluded that vision loss does not result in lower cognitive abilities. One reason for this finding might be explained by them that, blindness does not necessarily involve the brain. So, no cognitive deficit is expected to occur due to lack of sight. Various studies suggest that by promoting effective usage of all other sense organs amongst children would facilitate systematic development of

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cognitive functions. The educational program must include opportunities for utilisation of residual vision and other sources of sensory input to maximise sensory stimulation.

Need of the Study

There are many explicit and ample number of studies available, which have explored the cognitive abilities of sighted students and its relationship with various psychological as well as demographical variables. However, there are very few studies that have been conducted to find out relationships between cognitive abilities of visually impaired students and certain demographic variables, i.e., gender, age of onset of visual impairment and students categorised on the basis of visual impairment. Hence, it was considered worthwhile to study and find out the probable association between these variables. To bridge this lack of information, the present study has tried to explore associations between these variables with reference to visually impaired students.

Motivation

Gottfredson (1997) and Trippe (2005) stated that cognitive abilities are collection of abilities which enables an individual to reason, think abstractly, plan, solve problems, comprehend complex ideas, learn quickly and learn from experience. It was further reported by Cronbach (1984) and Dicken (2008) that cognitive ability refers to overall mental ability of an individual and can be used synonymously with intelligence and can be assessed with the help of intelligence tests.

Vision plays a pivotal role in cognition, and children having impaired vision would have difficulty in experiencing things through other senses. The need for holistic understanding of cognitive abilities of visually impaired children is of great importance and demands more attention at present time. Against this backdrop, researcher has tried to assess cognitive abilities of visually impaired children with reference to certain demographic variables.

Objectives

The study purports to compare—

1. the cognitive abilities of visually impaired students studying in Class VIII with respect to gender,
2. the cognitive abilities of visually impaired students studying in Class VIII with respect to category of visual impairment,
3. the cognitive abilities of visually impaired students studying in Class VIII with regard to age of onset of visual impairment.

Hypotheses

As per the objectives of the study, following null hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference in cognitive abilities of visually impaired students with respect to gender.

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2. There is no significant difference in cognitive abilities of visually impaired students classified on the basis of category of visual impairment.
3. There is no significant difference in cognitive abilities of visually impaired students with respect to age of onset of visual impairment.

Keywords

In this section, the major keywords used in the present study are given.

1. Age of onset of visual impairment – It refers to age at which sight is lost or child becomes blind. It is divided into two age groups:
   A. Congenital Visual Impairment: A child who is born blind or lost his sight before he was 5–7 years of age refer to congenital blind. They do not retain a useful visual imagery nor most likely any color ideas. They rely completely upon their nonvisual senses and must be educated by methods adapted accordingly (Lowenfeld, 1973).
   B. Adventitious Visual Impairment: An adventitious visually impaired child is one who lost his sight (may be gradual or abrupt) later in life and may retain visual imaginary and color ideas of which they make use in their learning process. However, they are not able to make any current visual observation (Lowenfeld, 1973).
2. Students categorised on the basis of Visual Impairment— Students with Visual Impairment (VI) display a wide range of visual disabilities, ranging from total blindness to relatively good residual vision. The Persons with Disability Act (1995) defines visual impairment in terms of blindness and low vision.
   A. Blindness refers to a condition where a person suffers from total absence of sight or visual acuity not exceeding 6/60 in the better eye with corrective lenses or limitation of the field of vision subtending an angle of 20 degree or worse.
   B. Low vision refers to a condition where a person with impairment of visual functioning even after treatment or standard refractive correction, but who uses or is potentially capable of using vision for the planning or execution of a task with appropriate assistive device.
3. Cognitive abilities in the present study refers to scores obtained by visually impaired students on six sub-tests such as information, similarity, arithmetic, vocabulary, digit span and comprehension which are the parts of Indian adapted version of WISC–R (Verbal) developed and standardised by NIVH for visually impaired children.

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Methodology

Keeping the objectives of the study in mind, descriptive survey method was used to collect the data.

Tools used

In order to assess the cognitive abilities of visually impaired students, an Indian adapted version of WISC-R (Verbal) for the visually impaired children developed and standardised by National Institute for Empowerment of Persons with Visual Disabilities (NIEPVD), Dehradun was used in the present study. This test consists of six subtests, i.e., Information, Digit Span, Similarity, Arithmetic, Vocabulary and Comprehension. Wechsler considered these subtests as the most important cognitive abilities and classified them as being primarily verbal test (Wechsler, 1974). During the adaptation process reliability was established by test–retest technique by NIEPVD and was found to be ranged from 0.89 – 0.98 for six subtests. During the adaptation process, validity was determined by Concurrent Validity and found to be 0.94.

Sample and Sampling Design

A two-stage random sampling design was followed in the present study. Four blind schools from eight blind schools functioning in Kolkata namely Ram Krishna Mission Blind Boys academy (located in Narendrapur), Light House for the Blind (located in Kalighat), Kolkata Blind School (located in Behala) and Voice of World (located in Behala) were selected randomly in the first stage of sampling.

After that, for the second stage of sampling, from each of the sampled blind schools selected in the first stage, all the visually impaired students studying in Class VIII, i.e., whole class was selected in order to get a suitable number of samples for the study. Visually impaired students of Class VIII were particularly chosen. This was done as students of this class comes under adolescent stage. This stage is referred as Formal Operational stage in Piaget theory of cognitive development. Piaget asserted in his theory that most of the cognitive abilities are likely to develop in a child at this particular stage. This is also invariably observed among visually impaired students studying in this class (Advani, 1992). However, in case of visually impaired children, this stage of cognitive development like other stages of cognitive development proposed by Piaget may be delayed by some time depending upon their early identification and intervention but couldn't be skipped altogether (Advani, 1992). Thus, the sample consisted of a total of 91 visually impaired students (66 visually impaired boys and 25 visually impaired girls, 31 students having low vision, 60 students were blind, 61 students having congenital visual impairment, 30 students having adventitious visual impairment.

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Data Analysis

The mean, SD and t-test were used for data analysis.

Results

The results are presented in the following tables—

It is found from Table 1 and Figure 1 that computed value of t exceeds the critical value of t with 89 degree of freedom at 0.05 level of significance. This indicates that differences are significant and consequently null hypothesis is rejected. It can be concluded from the obtained results that the cognitive abilities of visually impaired boys and girls differ significantly, and this difference should not be attributed merely due to a chance factor. The mean scores of visually impaired boys (103.14) on WISC-R (Verbal) are higher than the mean scores of visually impaired girls (94.93). Hence, it could be inferred that visually impaired boys have relatively higher cognitive abilities than their counterparts and cognitive ability gets affected by gender.

Table 1
The t-test of the Mean Score of Visually Impaired Boys and Girls on WISC-R Verbal

Variable	Gender	N	Mean	Mean Difference	Standard Error Difference	t-value	Level of Significance
Gender	Boys	66	103.19	8.25	2.58	3.215 (significant)	0.05
	Girls	25	94.93				
df=89, Table value of t=1.99							

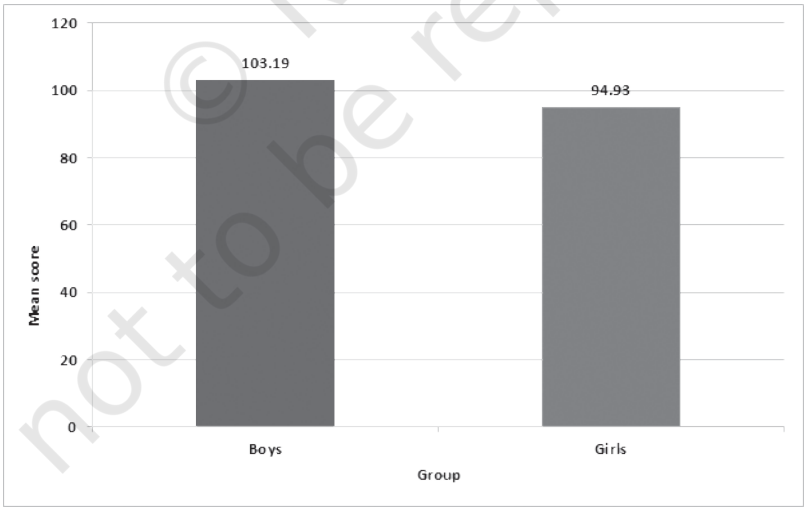

Figure1: Mean sores of visually impaired boys and girls on WISC-R (Verbal)

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It is found from Table 2 and Figure 2 that computed value of t is less than the critical value of t value with 89 degree of freedom at 0.05 level of significance. This indicates that result is statistically not significant and consequently null hypothesis is accepted. It can be concluded from the obtained result that both groups, i.e., students having low vision and those students who are blind do not differ significantly on WISC-R (Verbal), and the difference is likely due to chance factor. The mean scores of these two groups are 101.3 and 100.6 respectively. This difference is not significant and it can be inferred that students with low vision and blind students performed in a similar way on WISC-R (Verbal) and cognitive abilities do not get influenced by low vision or blindness.

Table 2
The t-test of Mean Score of Low Vision and Blind students on WISC–R Verbal

Variable	Group	N	Mean	Mean Difference	Standard Error Difference	t-value	Level of Significance
Gender	Low Vision	31	101.3	0.660	2.55	0.25 (significant)	0.05
	Blind	60	100.6				
df = 89, Table value of t = 1.99							

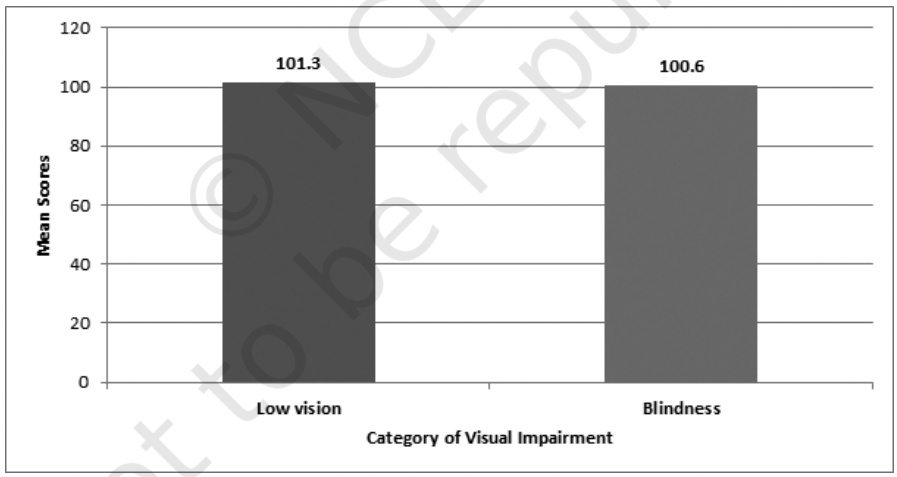

Figure 2: Mean scores of low vision and blind students of on WISC-R (Verbal)

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It is found from Table 3 and Figure 3 that computed value of t is less than the critical value of t value with 89 degree of freedom at 0.05 level of significance. The result is statistically not significant and consequently null hypothesis got accepted. It can be inferred from obtained result that both groups, i.e., congenitally and adventitiously visually impaired children do not differ significantly on WISC-R (Verbal) and the difference is likely due to chance. The mean scores of these two groups are 101.3 and 100.6 respectively. Although the difference is not significant but it indicates that Congenitally blind students performed slightly better than Adventitiously blind students in WISC-R(Verbal).

Table 3
The t-test of Mean Score of Congenital and Adventitious Visually Impaired Students on WISC-R Verbal

Variable	Group	N	Mean	Mean Difference	Standard Error Difference	t-value	Level of Significance
Age of onset of Visual Impairment	Congenital	61	101.7	2.431	2.43	0.994 (significant)	0.05
	Adventitious	30	99.2				
df= 89, Table value of t = 1.99							

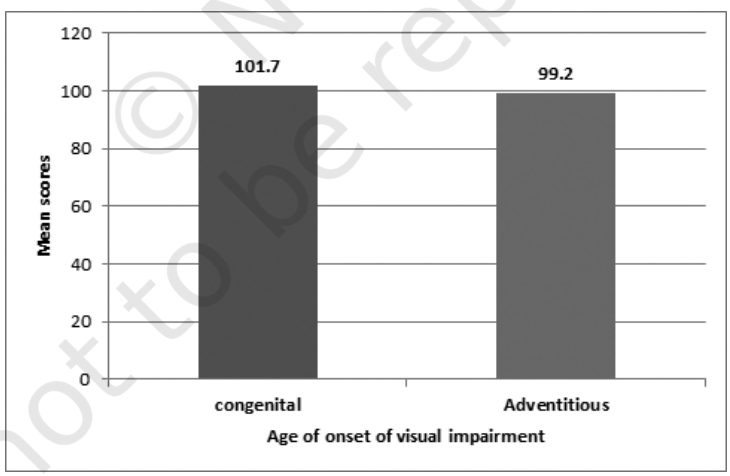

Fig.3: Mean scores of congenital and adventitious visually impaired students on WISC-R (Verbal)

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Findings

The findings of the study are presented in this section.

- Visually impaired boys and girls children differ significantly in their cognitive abilities. It implies that visually impaired boys students have relatively higher cognitive abilities than visually impaired girls.
- Low vision and blind students do not differ significantly in their cognitive abilities. It implies that students having low vision and those who are blind are almost at par in their cognitive abilities.
- Congenitally and adventitiously blind students do not differ significantly in their cognitive abilities. It implies that performance of congenitally blind students seems to be relatively better than their counter parts.

Discussion

From the analysis of data, it was observed that there is a significant difference in cognitive abilities between visually impaired boys and girls. This indicates that visually impaired boys performed comparatively better than their counterparts on WISC (verbal). The discrepancy perceived in the cognitive abilities with reference to gender may be attributed to the effect of sociocultural factors. Anjalmose and Arumungam (2018) and Ranganathan and Wadawa (2017) reported in their studies that sociocultural factors are large scale forces like family patterns, family's financial status, parenting styles, interpersonal relationship, cultural deprivation and attitude that are present within culture and society that affect thought, feelings and behaviours of the gender. This in turn influences their cognitive abilities. This finding also corresponds with the findings of some previous studies conducted by Shah and Godiyal (2008) who found that boys reported higher cognitive abilities than girls and also claimed that cognitive performance of students depends on sociocultural factors. Begum (1993) and Singh et. al., (2010) reported in their studies that parents have a tendency to exhibit more favorable attitude towards their differently abled son than towards their differently abled daughter. Further, sometimes due to early intervention and early entry in the school, visually impaired boys receive sufficient training in their plus-curricular skills as compared to their counterparts (Singh et. al, 2010). In order to perform well in curricular aspects, a visually impaired child needs a compensatory curriculum referred as plus-curricular activities which includes braille reading and writing, daily living skills, orientation and mobility, multi-sensory training, using assistive devices (Mani, 1992). In due course of time, they tend to discover different study procedures and study habits in comparison to their counterparts that may lead to their better performance in testing conditions.

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Further, it was found that performance of students with low vision is somewhat similar to blind students of class in WISC-R (Verbal). It is obvious that a child who was born totally blind experiences the world around him in a different way than the child who is having low vision. The former must make use of his non-visual senses, while the latter can gain knowledge of the world by use of his vision as well as of his other senses. Individualised educational plan (IEP) based on students' current level of functioning in the following area (academic skills, communication skills, sensory motor skills, daily living skills) developed by the school for both groups might be probable reason which enable them to perform in a similar manner in the test. Along with this, resource room was equipped with embossed 3D models, books in braille and print, magnifier and other optical and non-optical aids. Availability of various useful software (for enlarging prints and to convert print to audio) in the school is another probable reason that facilitates and fosters their learning which in turn help them to perform well in academics.

Another finding of the study indicates that congenitally blind students reported slightly better than adventitiously blind students on WISC-R (verbal). The results of this study get sustenance from an exploratory study that was carried out by Kapoor and Sen (1984), who had compared the congenitally and adventitiously blind with their sighted peers with respect to some cognitive and psychological variables. They claimed that performance of congenitally blind students is better than adventitiously blind students on cognitive variable. In Congenital blindness the external world is specified right from the beginning in terms of information contents of non-visual stimulation and central nervous system is programmed accordingly, whereas when blindness sets in at a later stage, nervous system reprogrammed and behavioural sequences depending upon visual feedback discontinued and new behavioural sequences are to be assembled and maintained. Consequently, the child faces lots of problem in adjusting to the new media of reading and writing, i.e., braille that in turn lowers their self-confidence. These may be the probable reasons of the above findings.

Conclusion

To sum up, we can infer that visually impaired children need systematic instruction to overcome the deprivation resulting from loss of vision. Assessment of their cognitive abilities with respect to gender, age of onset of visual impairment and categorisation on the basis of visual impairment will render a great help to teachers, special educators, parents and curriculum designer in structuring and improving total teaching-learning process. And through some pedagogic innovations, teachers can incorporate various activities in the classroom that will help to strengthen cognitive abilities in visually impaired children.

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