

Comparative Study of Curiosity among Sighted and Visually Impaired Students

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ABSTRACT

Purpose: *Curiosity is the basis of learning anything new. Children possess heightened curiosity than adults. Several studies have explored the relationship between curiosity and motivation. This trait is also found to enhance learning in children. Does this trait have similar significance in visually impaired children as sighted children? This study aims to understand the difference between the two groups with the standardized Curiosity and Explorative Inventory (CEI-II.). Most of the learning is by observing and seeing. In the absence of this in visual impairment, the ability to become curious becomes limited. Embracing new ideas and learning them can provide insight to their open-mindedness. The explorative nature of curiosity renders in personal growth and personality development. This study opens up areas like motivation, personal growth, and approach to learning new things to be explored as potential areas for future researchers.*

Design/Methodology/Approach: *This comparative study would be based on an equal number of participants of 9th, 10th, 11th and 12th standard groups of children who are sighted and visually impaired.*

Findings/Result: *This study aims to determine the difference and relationship between curiosity levels of sighted and visually impaired school students.*

Originality/Value: *Curiosity trait among visually impaired children compared to those of sighted children in an Indian context is being explored in this study.*

Paper Type: *Comparative analysis based paper.*

Keywords: Curiosity, CEI, VI, Visual Impairment, Blind, Adolescents

1. INTRODUCTION :

Globally there are about 2.2 billion who have near or distant visual impairment. The prevalence of the impairment in India is about less than 2% of the population of India. The classification of visual impairment may be moderate, severe, profound or legally blind based on the vision loss. Curiosity in Wikipedia states that Curiosity is a strong desire to know or learn about something. Curiosity is the inquisitive thinking that can explore, learn and investigate more about something. Some observers feel that curiosity is more of information seeking in a broader sense. Curiosity has been a fascinating subject for many in the research field. Curiosity is a fundamental component of human intellect, yet its biological role, methods, and brain underpinnings are still unknown. It is, nevertheless, a learning motivator and influencer. Children are inquisitive beings. They investigate, question, and wonder, learning about the moment of birth, and maybe even before. Humans are naturally drawn to new experiences. When we are intrigued by something new, we want to learn more about it. And it is during exploring that we make discoveries. Our life would be boring if we did not have creativity. It is via imagination, and imagination plays a huge part. Any accomplishment owes a great deal to the ability to imagine [1]. Curiosity has been extensively researched in the context of accomplishing tasks with limited rewards. In the authors' opinion, it serves two important purposes. Curiosity assists an agent in exploring its environment in search of new knowledge-a desired quality of exploratory behavior is that it will improve as the agent learns more. Furthermore, curiosity is a means for an agent to gain new abilities. That might come in handy in the future. Curiosity is regarded as a powerful driver of learning. Learning may appear to be increased since we are most interested in the knowledge that we are going to learn. Thus, rather than curiosity naturally promoting learning, the apparent increase to learning may be driven by one's past knowledge, or there may be a feedback loop between the two aspects [2]. Being

curious and being creative go hand in hand. Children are highly curious when most learning happens. Some children have an eye for potentially important things by being curious. Many remarkable observations or inventions are created benefiting humanity. Teachers facilitate and encourage curiosity from an early age. If properly nourished, new initiatives, skilled approaches, lateral and critical thinking can be well developed by the teachers. Hands on, practical knowledge with an inquisitive thinking sparks new ideas building an ability to supplement in the problem solving, decision making processes.

2. OBJECTIVES :

- (1) To determine the curiosity levels of sighted adolescents.
- (2) To determine the curiosity levels of adolescents with visual impairment
- (3) To compare the curiosity level of both groups of children.

3. REVIEW OF LITERATURE :

In the past, being curious was considered inquisitive along the lines of vice. The need for curiosity in acquiring new knowledge and other aspects, the role has changed from vice to virtue. Research finds that curiosity has significant effects on memory among 7 and 8 year olds [3]. A study which is based on prior knowledge theory as a contributing factor to curiosity has in fact revealed results showing that there is a significant relationship between curiosity and memory regions in our brain. Their research shows heightened curiosity levels enhance learning [4]. Hope being a psychological asset was studied with curiosity as a predictor with few other predictors like self-efficacy, self-construal and decisiveness. For this study however, the relevance of curiosity is to be understood. The above study found that curiosity had no role to play as a predictor [5]. It makes one wonder at the thought of could being curious make oneself happy? Many studies are available to see the relevance between curiosity and academic achievement. This particular study was based in India among high school children and there seems to be a positive relationship between curiosity and happiness [6]. People's curiosity towards scientific solutions might be influenced by their social context. Participants were provided daily scientific questions from a prominent online forum, and they were offered the choice to divulge a selection of them. Participants were more interested in the answers to questions with a high (vs. low) number of up-votes. These effects were somewhat mediated by surprise and the assumed utility of information, with a stronger influence from surprise. These social constructs based studies result in triggering curiosity among us. The interesting findings indicate that popularity's principal impact was to lower interest about less popular issues rather than to boost curiosity about more popular ones. Perhaps popularity acts as a clue for determining what not to learn more about rather than a cue for determining what to pursue [7]. Exciting new advances have occurred in the investigation of curiosity and how it affects memory recently. This study suggested PACE (Prediction, Appraisal, Curiosity and Exploration) framework, which combined beliefs about curiosity with current models on prediction errors, appraisal, exploration, and the neuro modulation of hippocampus-dependent memory, based on convergent evidence from psychology and neuroscience [8]. This fuels the curiosity to determine the memory of sighted vs visual impaired children.

The Indian government recently released National Education Policy (NEP) 2019, a critical policy framework for structuring education, Curiosity is expressly mentioned as an important attribute for children to acquire in the country's education system (MHRD, 2018). The NEP requests that "puzzles" be included into the curriculum in the context of teaching mathematics, language, logic, and creativity. It encourages better play and for pupils under the age of eight, discovery-based learning is used. In Karnataka this is the nali kali method for preschoolers. The National Education Policy additionally implies that science in vernacular compared to the English language is today of worse quality, and the majority of pupils do not gain adequate competency [9]. Undergraduate college students were studied to understand the relationship between life satisfaction, gratitude and curiosity. Gratitude was positively significant with curiosity. Girls scored more than the boys showing satisfaction scales tipping to their side [10]. An intervention based - a fresh method of stimulating interest - changing the perceived worth of a topic. It was explicitly investigated whether altering the perceived worth of a topic could elicit curiosity. The popularity of a scientific issue might also influence people's interest in that subject. If such a value modification influences curiosity, then interventions on value may have significant consequences not only for curiosity researchers, but also for science. The project resulted in a more successful technique. To pique people's interest is to provide information in a way that allows them to

immediately understand its worth and importance rather than presenting interesting information [11]. A person is considered legally blind in India when the field of vision is less than 20 degrees or the eyesight is lesser than or equal to 20/200 based on the Snellan chart. This study aims to study the curiosity level of the visually impaired high school children. A total of 4,029 pupils from nine schools were tested in Hyderabad. The average age of the children was 9.33.4 years, ranging from 3 to 18 years. There were 2,348 male children (58.3 percent) and 1,681 girls (41.7 percent). Hyperopia was prevalent at 22.6 percent, myopia at 8.6 percent, and astigmatism at 10.3 percent. Myopia was substantially more prevalent in children aged 10 years [12]. Another study examined the teaching of life sciences (biology) to blind and visually impaired students in 11 special schools in South Africa, with a focus on the development of science process skills in outcomes-based classrooms. Individual structured interviews were done with nine scientific educators from the various special schools, as well as focus group interviews with 10 Grade 12 students from each of the schools. The study indicated that learners struggled to apply science process skills due to a lack of vision, confidence, motivation, and so on [13]. In a polish blind school, a total of about 11500 students learnt a foreign language. It was identified that they had the necessary skills and they were in no way lesser than sighted students in their interest and motivation to learn something new. This shows that VI students have greater potential and motivation to learn [14]. Curiosity can be elicited based on five main principles namely novelty, partial exposure, complexity, uncertainty and conflict. They were analyzed with fourteen different behavioral indicators and multi modalities. A couple of educational areas seem to be significant with trait curiosity enhancing learning [15].

Similar eliciting of information as stated above is being studied as first person cues, third person cues and future oriented cues. Children in general want to find out reasons, causes for a multitude of things and their question is always 'why'. This explanation seeking behavior and motivational drive of curiosity contributes majorly towards children's learning [16]. Eight different behaviors were discovered through classroom observations as approaches for instructors to foster a curious classroom atmosphere. For example, when students are more at ease with uncertainty, they are more likely to strive to figure out what they don't know rather than being afraid of being wrong. Students must have the chance to think, question, and engage in order to perceive ambiguity, and they must believe that they are expected to do so. Children teamed up for different activities in order to experience the above [17]. Not long ago research was majorly carried out by going to the libraries. The myriad of knowledge and materials that could be found in actual articles, journals, books and previous research papers etc., was extraordinary. The advancement of technology has bestowed upon us an ocean of reference materials available at our fingertips. The role of libraries and librarians, undeniably played a major role in cultivating the element of curiosity among children. Engagement with learning and disengagement from learning based on the teaching method, style and depth of learning makes one curious resulting in different kinds of research papers [18].

Curiosity based learning (CBL) method is the latest method that the student teachers are trained with for the bachelors program. This method is where the teacher is the center for all learning, facilitating the teaching learning process. This CBL as opposed to the Inquiry based model is what the Indian education system used to be. Students learning is greater involving a sharing of curiosity and increase in curiosity. The benefits seem to be more which keeps the students engaged and involved in class [19]. Creative self- efficacy (CSE) and Creative Personal Identity (CPI) were analyzed against the curiosity inventory and there was a strong correlation between them. It showed that CSE has more significance against curiosity showing a dominant creative nature in both [20].

Based on the above reviews and data from previous research, it is found that curiosity helps in academic achievement, personal growth, motivation, self-confidence etc. Since there is no sufficient evidence in the curiosity levels of visually impaired children, this study aims to bridge the gap by determining the difference in the curiosity levels of both sighted and non-sighted adolescent children.

In a unique study of visual impaired children learning through art, formulation strategies based on investigation via the original question of artistic creation was required for the process of transferring knowledge and skills from the production of art experiments. People with low eyesight do research by fumbling and peering closely, whereas people with near-blindness and absolute blindness processed information through touch and hearing. Near-blind persons made an effort to perceive differently to aim the light source as directly as possible onto the item, but persons who are completely blind utilize constantly sniff items to comprehend them specifically [21]. In workshops conducted on body

awareness among blind people, men showed more curiosity and touched female models whereas women were less curious and were apprehensive to even explore and touch the models. They were curious to know more about their gender, menstruation, pregnancy but not on sexuality or pleasures [22]. The level of curiosity among visually impaired children in the field of science is more, but less accessible because of the many abstract concepts. They need to explore by touching and feeling in a tactile method to examine models to help them in understanding the concepts [23].

Table 1: Keywords used: Visual impairment, Curiosity, Sighted, Bind students.

S N	Author with Date	Topic	Methodology	Research Design	Findings
1	India, G., Jain, et al. (2021)	An audio-based virtual exploration to encourage walking among people with vision impairments. [24]	Special app followed by interviews	Quasi-Experimental with semi structured interview	Spatial audio was an immersive experience
2.	Ryakhovskaya, Y, et al.(2022)	Curiosity as feelings of interest versus deprivation. [25]	Convergent and Divergent Validity	Exploratory and Confirmatory	curiosity-as-interest was the more robust trait predictor
3	Koutstaal, W., Kedrick, K., & Gonzalez-Brito, J. (2022)	Capturing, clarifying, and consolidating the curiosity-creativity connection. [26]	Correlational Study-Association finding	Experimental Design	behavioral curiosity measure of gap-provoked information foraging was linked to performance
4	Wiggin, K. L., Reimann, M., & Jain, S. P. (2019)	Curiosity Tempts Indulgence. [27]	Multimethod Approach	Conceptual and Experimental	curiosity produces a desire for rewards, which in turn tempts indulgence
5	Fandakova, Y., & Gruber, M. J. (2021)	States of curiosity and interest enhance memory differently in adolescents and in children. [28]	Behavioural Analysis using mixed level models	Experimental	Post-answer interest effects on memory for trivia answers were more pronounced in adolescents than in children
6	Kahan, D. et al. (2017)	Science Curiosity and Political Information Processing. [29]	Empirical with Bayseaian Convergence Conjecture	Observational and experimental	subjects high in science curiosity display a marked preference for surprising information
7	Halpin, G., & Tillman, M. H. (1973)	Relationships between creative thinking, intelligence, and teacher-rated characteristics of	Torrance tests and Pearson's Correlational was used	Correlational Study	Curiosity was related to creativity and IQ.

		blind children. [30]			
8	Jirout, J. J. (2020).	Supporting early scientific thinking through curiosity. [31]	Discussion and potential direction	Explanatory Research	Potential directions for research on the development of curiosity and curiosity-driven inquiry in young children are discussed
9	Lydon-Staley, D. M., Zurn, P., & Bassett, D. S. (2020)	Within-person variability in curiosity during daily life and associations with well-being. [32]	Statndard Deviation and Avg for 167 partiipators	Experimental	Positive associations among curiosity lability and depression was found
10	Van Schijndel, Tessa & Jansen, Brenda & Raijmakers, Maartje. (2018).	Do individual differences in children’s curiosity relate to their inquiry-based learning? [33]	139 children (77 girls and 62 boys):	Exploratory and Intervention based	For low intelligent children, environment structure positively affected their quality of exploration.

4. METHODOLOGY :

4.1 Hypothesis:

H₀: There is no significant difference between curiosity levels among adolescent children of sighted and visually impaired school students.

4.2 Tool

CEI-II Inventory (Kashdan, T. B., 2009) [34], IBM SPSS, MS Office

4.3 Sample Size:

The total number of adolescent children were 100. A total of 50 sighted and 50 visually impaired students participated in the study. All of them belonged to the same demographic background and same ethnicity.

5. RESULTS AND DISCUSSION :

An Independent Sample ‘t’ Test was processed and analyzed with the data collected and the following two tables are displayed as outcomes.

	Eyesight	N	Mean	Std. Deviation	Std. Error Mean
Stretching	V	50	21.2000	2.31234	.32701
	S	50	15.4000	3.30121	.46686
Embracing	V	50	19.7000	1.74087	.24620
	S	50	15.5800	2.73369	.38660
Total	V	50	40.9000	3.77018	.53318
	S	50	30.9800	4.09823	.57958

Table 3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
Stretching	Equal variances assumed	7.082	.009	10.175	98	<.001	<.001	5.80000	.57000	4.66886	6.93114
Embracing	Equal variances assumed	9.845	.002	8.989	98	<.001	<.001	4.12000	.45834	3.21044	5.02956
Total	Equal variances assumed	.003	.959	12.596	98	<.001	<.001	9.92000	.78753	8.35718	11.48282

The 50 children from each group, a total of 100 children, as mentioned by the author of the tool, were divided as a two factor model, one for the motivation to seek out knowledge and new experiences which is termed as “Stretching” and a willingness to embrace the novel, uncertain, and unpredictable nature of everyday life is termed as “Embracing”. Seeking information in new situations, performing best in challenging situations, finding opportunities to learn and grow in such circumstances and self-reflections during and after, are the highlights of this inventory. Visually impaired students (V) have a higher mean of 21.2 than the sighted students (S) in such scenarios. After interacting with the bunch of them, it is a privilege to state that they carry themselves with high self-esteem. Many of them consider and use opportunities as something new and challenging. They like to approach situations with a brave stride without much fear. On the other hand, the 50 children who are sighted have a far lesser mean of 15.4. Their approach is more on a cautious scale. It makes one wonder and also opens up possibilities for future research to find out why such a difference exists. Could it be that they are intimidated at trying out newer things? Are they less confident because they have eyesight? That they can literally see around and become demotivated, scared and skeptical?

Embracing new ideas, events, unfamiliar people, etc is the very backbone of the students for the second factor in this two factor model of the inventory. Being adventurous and daring, doing exciting, frightening things, things that are uncertain and unpredictable can be easy to handle for some students. With the visually impaired, this factor again seems to be on a higher scale than the sighted children. The mean is 19.700 although making it lesser than their stretching score. Could it be that they are self-

aware of their limitations and hence affected the score to some extent? This means however is definitely higher than the sighted students' score which means that the curious nature of the adventurous spirit is more in the VI students. Again, it is curious to know the reason behind this difference. In Table 3, the mean of each question is displayed. It is found that there is not much variance for situations that are unpredictable, frightening and challenging between the two groups. Table 4 gives item-wise t-test significance data.

Table 4: Group Statistics

	Eyesight	N	Mean	Std. Deviation	Std. Error Mean
I actively seek as much information as I can in new situation	V	50	4.54	.734	.104
	S	50	3.04	1.245	.176
I am the type of person who really enjoys the uncertainty of everyday life	V	50	4.44	.787	.111
	S	50	3.22	1.314	.186
I am at my best when doing something that is complex or challenging	V	50	4.48	.789	.112
	S	50	3.36	1.481	.209
Everywhere I go, I am out looking for new things or experiences	V	50	4.02	.685	.097
	S	50	3.02	1.478	.209
I view challenging situations as an opportunity to grow and learn	V	50	3.36	.898	.127
	S	50	2.74	1.468	.208
I like to do things that are a little frightening	V	50	3.68	.741	.105
	S	50	3.06	1.300	.184
I am always looking for experiences that challenge how I think about myself and the world	V	50	4.12	1.043	.147
	S	50	3.12	1.534	.217
I prefer jobs that are excitingly unpredictable	V	50	2.72	.730	.103
	S	50	2.90	1.418	.201
I frequently seek out opportunities to challenge myself and grow as a person	V	50	4.70	.763	.108
	S	50	3.14	1.355	.192
I am the kind of person who embraces unfamiliar people, events and places	V	50	4.84	.370	.052
	S	50	3.38	1.550	.219

Table 5: Independent Samples Test

Levene's Test for Equality of Variances		t-test for Equality of Means								
	F	Sig.	t	df	One-Sided Sig.	Two-Sided Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper

						ed p	Side d p				
I actively seek as much information as I can in new situation	Equal variances assumed	8.835	.004	7.339	98	<.001	<.001	1.500	.204	1.094	1.906
I am the type of person who really enjoys the uncertainty of everyday life	Equal variances assumed	16.287	<.001	5.634	98	<.001	<.001	1.220	.217	.790	1.650
I am at my best when doing something that is complex or challenging	Equal variances assumed	37.118	<.001	4.719	98	<.001	<.001	1.120	.237	.649	1.591
Everywhere I go, I am out looking for new things or experiences	Equal variances assumed	51.623	<.001	4.342	98	<.001	<.001	1.000	.230	.543	1.457
I view challenging situations as an opportunity to grow and learn	Equal variances assumed	18.204	<.001	2.547	98	.006	.012	.620	.243	.137	1.103
I like to do things that are a little frightening	Equal variances assumed	11.544	<.001	2.930	98	.002	.004	.620	.212	.200	1.040
I am always looking for experiences that challenge how I think about myself and the world	Equal variances assumed	15.381	<.001	3.812	98	<.001	<.001	1.000	.262	.479	1.521

I prefer jobs that are excitingly unpredictable	Equal variances assumed	26.506	<.001	-.798	98	.213	.427	-.180	.225	-.627	.267
I frequently seek out opportunities to challenge myself and grow as a person	Equal variances assumed	17.919	<.001	7.093	98	<.001	<.001	1.560	.220	1.124	1.996
I am the kind of person who embraces unfamiliar people, events and places	Equal variances assumed	126.456	<.001	6.477	98	<.001	<.001	1.460	.225	1.013	1.907

Table 3 summarizes the t test run on independent samples which gives the following result.

Total Mean of Sighted Children: 30.98
 Total Mean of Visually Impaired children: 40.90
 (1) The critical value for df (98) = 1.984
 T value = 12.596 > 1.984

(2) P value < 0.001
 (3) Confidence Interval is between .787 and 8.357 and does not cross zero.

Hence based on the above criteria, the null hypothesis is thus rejected. This results in the visually impaired children’s curiosity levels as not being equal to the curiosity levels of those of sighted children. There is a significant difference between their curiosity levels.

VI students, with higher level of curiosity, and from the above reviews of literature, is it safe to assume that this may have direct correlation to their academic performance, well-being, happiness, positive outlook, etc. When this is applied with collaborated facilitation by the special education teachers, it may be highly beneficial for the children. Increased motivation, experiential learning can be experienced by children with proper guidance and facilitation.

6. CONCLUSION :

Visually challenged students have exclusive online library for them that could answer many of their curiosity related questions. This initiative was started by the Government of India with having a strong understanding about the needs and perception of people with VI. “Sugamya Pustakalaya” has a vision and good scope that needs to spread throughout the nation [35]. Lack of intrinsic motivation and discouragement from family members act as barriers for VI people to have regular exercise and walking. Previous literature reviews indicate that the dedicated phone apps for different purposes aiding their daily living are available for free downloads. Percentage of curiosity at different levels could also be satiated through these apps. Online books and phone apps through smartphones are a boon to people with visual impairments. We discover that explanation-seeking interest is sparked in a predictable and systematic manner. People are attentive to how a given stimulus matches or disagrees with their current or previous views, as well as to how they anticipate an explanation to alter their potential selves. This future-focused approach not only aids in our understanding of human curiosity but also generates fresh inquiries that may help guide future scientific investigation [36]. The aim of this study was to understand and compare the curiosity level of visually impaired adolescent students with sighted students. Data was collated and compared with curiosity levels of sighted school students and it resulted in rejection of the null hypothesis proving that there does exist a significant difference in the curiosity levels

between the groups. Curiosity could be a factor to motivate the kids to learn, assimilate and remember. There is room for an increase in attention and cognition. Furthermore, it could help them shape up their personality and increase their confidence. This study has scope for more research on visually impaired students.

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