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A Comparative Study of Spatial Ability of Science and Humanities Students of Higher Secondary Schools in Kozhikode District

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Abstract: *Spatial Ability presents an important component of human intelligence. A child should possess good Spatial Ability so that he can correlate things with his present situation. Spatial Ability appears to be central to many scientific domains. The present study was undertaken with a view to find the level of Spatial Ability between Science students and Humanities Students of Kozhikode district. Mathew's Test of Mental Abilities was used to collect the data. Results showed that Spatial Ability of both Science students and Humanities students is only at an average level. It was also found that there is no significant difference in Spatial Ability between Science and Humanities students based on Gender.*
Keywords: *Spatial Ability, Science Students, Humanities students.*

I. Introduction

In this present scenario, we cannot constrain learning inside the four walls of a classroom. Digitalization has a great influence over this younger generation. They get a wide range of knowledge from different sources .There are many factors influence learning such as teachers, parents, family, environment, classrooms and many more. Individual Difference also influences learning.

A devoted teacher should always identify the capabilities of his students. A teacher must understand that a student's mind is not an empty pot. A child possesses a variety of abilities. Gardner (1999), proposes eight different intelligences to account for a broader range of human potential in children and adults. These intelligences are Linguistic Intelligence, Logical-Mathematical Intelligence, **Spatial Intelligence**, Bodily-Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence and Naturalist Intelligence.

Our schools and culture focus most of their attention on linguistic and logical-mathematical intelligences. We should also place equal attention on individuals who show gifts in the other abilities: artists, architects, musicians, naturalists, designers, dancers, therapists and others who also enrich the world in which we live. Unfortunately, many children who have these gifts don't receive much reinforcement for them in school.

Spatial Ability can be said as the capacity to perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions, and to be able to re-create aspects of one's visual experience, even in the absence of relevant physical stimuli. A spatial learner is a student who learns holistically rather than in a step-by-step fashion. Visual imagery plays an important role in the student's learning process, because the individual is processing primarily in pictures rather than words. Such students are usually gifted with well integrated abilities.

II. Need And Significance Of The Study

Traditional education was imparted on the assumption that the time consuming steps of learning could be bypassed and the final knowledge could be transmitted to the learners by a sort of intravenous behaviour feeling process. Schools were considered as knowledge shops and teachers as information managers. Subjects were taught according to logical method of presentation and little attention was paid to the eagerness, curiosity and capacity of the pupil.

In most of the cases of traditional education, spatial learning style is not addressed in school, and there students' self-esteem suffers accordingly. Traditional teaching techniques are designed for the learning style of sequential learners. Concepts are introduced in a step-by-step fashion, practiced with drill and repetition, assessed under timed conditions, and then reviewed. By way of contrast, spatial learners are systems thinkers-they need to see the whole picture they can understand the parts. They are likely to see the forest and miss the trees.

Spatial Ability presents an important component of human intelligence. A child should possess good Spatial Ability so that he can correlate things with his present situation. Spatial Ability appears to be central to

many scientific domains. In this present world, 'Spatial Ability' has got that much importance. It is even relevant in each and every simple aspect of our everyday activities of life like driving, household work, cleaning, reading, orienting oneself, in a strange environment, rearranging furniture, fitting a lot of things into the apt place. It also helps to understand three dimensions formations without physically examining them.

So it is very necessary to think that whether we are occupied with necessary level of Spatial Ability or not. National Curriculum Framework (2005) has mentioned about Spatial Ability; 'areas of Mathematics is such as Spatial Thinking are not developed enough in the curriculum'.

It has been revealed from the review of related studies that Spatial Ability has influence in learning subjects like Mathematics, Geography, Science, History, Engineering, Mechanical, Technical and Design field. Although there are many studies related to 'Spatial Ability', only very few studies are conducted in our country. To improve the level of Spatial Ability, studies and researches has to be done in this field.

Statement of the Problem

A Comparative Study of Spatial Ability of Science and Humanities Students of Higher Secondary Schools in Kozhikode District"

Definition of Key Terms

The key terms of the title of the study are defined as follows:

Spatial Ability:

Despite the prominent role of the Spatial Ability, review of literature in this field indicates that there is no precise definition of the concept.

The first identifiable study to examine and define Spatial Ability appeared when Thurstone (1938), who was studying primary mental abilities, defines as "space" factor. Thurstone classified spatial-visual aptitude as one of the primary mental abilities, generally defined as the ability to mentally manipulate shapes, sizes and distances in the absence of verbal or numerical symbols.

Science and Humanities Students of Higher Secondary Schools:

It denotes those schools which are imparting instruction for XI to XII standard for science subject and Humanities subject in Kerala syllabus.

Variables of the Study

Criterion Variable

'Spatial Ability'

Classificatory Variables

1. Gender
2. Locale
3. Type of Management

Objectives of the Study

1. To find out the level of Spatial Ability of Science and Humanities students of Higher Secondary Schools for the total sample and the subsamples based on Gender of students.
2. To find out whether there is any significant difference between the percentage of science and humanities students of Higher Secondary Schools for the total sample and the subsamples.

Hypotheses of the Study

1. The Spatial Ability of Science and Humanities students will be 80 percentage and above.
2. There exists a significant difference in the Spatial Ability between the Science and Humanities students of Higher Secondary Schools for the total sample and all the subsamples selected for the study.

III. Methodology

The methodology used for the present study is given briefly under the following headings.

Sample

The sample selected for the study was the students of Science and Humanities subjects of Higher Secondary Schools of Kozhikode district. Representative sample included 600 students, i.e., 300 science students and 300 Humanities students taken from among 13 schools of Kozhikode district of Kerala State

Tool Used for the Study

The tool used for the study is Spatial Ability Test of "**Mathew's Test of Mental Abilities**" (V.George Mathew, 1973).

Statistical Techniques Adopted for the Study

In order to find out the level of Spatial Ability between Science and Humanities students, the following statistical techniques were used.

1. Estimation of Percentage
2. Test of Significance of Difference in Percentage between the Comparable Subsamples.

IV. Results And Discussion

The statistical analysis was conducted in two sections. At first, the percentage of Spatial Ability of total sample and that of subsamples were estimated separately. Secondly, each of the percentage thus obtained was compared between equivalent subsamples, by testing the significance of difference in percentages.

TABLE 1: Percentage of Spatial Ability of Science and Humanities Students for the Total sample And Subsamples based on Gender, Locale and Type of Management

Sample		Science Students			Humanities Students		
		N	% of Spatial Ability	Percentage in Population	N	% of Spatial Ability	Percentage in Population
Total Sample		300	67.91	62.62-73.19	300	60.13	54.59-65.67
Gender	Boys	135	68.74	60.92-76.55	162	60.78	53.26-68.29
	Girls	165	67.23	60.06-74.39	138	58.19	49.66-66.42
Locale	Urban	147	68.94	61.46-76.42	157	59.93	52.26-67.59
	Rural	153	67.06	59.61-74.50	143	60.34	52.32-68.35
Type of Management of Schools	Govt.	165	68.95	61.89-76.01	181	59.28	52.12-66.44
	Aided	94	65.46	55.84-75.07	72	59.04	47.68-70.39
	Unaided	41	69.34	55.23-83.45	47	65.05	51.42-78.68

From the Table 1, it is clear that the percentage of Spatial Ability for Science students is 67.91 and Humanities students is 60.13. Based on this, the investigator inferred the percentage for the population. It was found to be 62.62 – 73.19 for Science students and 54.59 –65.67 for Humanities students.

To study whether significant difference exists in Spatial Ability between two categories, the data was analyzed by test of significance of difference between percentages. Difference in Spatial Ability between Science and Humanities students in each category was compared

TABLE 2: Comparison of Spatial Ability between Science and Humanities Students

Variable	Sample				Critical Ratio	Level of Significance
	Science Students		Humanities Students			
	P_1	N_1	P_2	N_2		
Spatial Ability	67.91	300	60.13	300	1.986	0.05

Note: S = significant

From Table2, it is clear that the critical ratio of Spatial Ability between the total sample of Science and Humanities students is 1.986. It indicates that there is significant difference in the Spatial Ability between the Science and Humanities students because, the difference is 1.986 which is considered to be significant at 0.05 level.

TABLE 3: Comparison of Spatial Ability between Science Boys and Humanities Boys

Variable	Sample				Critical Ratio	Level of Significance
	Science Boys		Humanities Boys			
	P_1	N_1	P_2	N_2		
Spatial Ability	68.74	135	61.78	162	1.252	NS

Note: NS = Not significant

From Table 3, it indicates that there is no significant difference in Spatial Ability between Science Boys and Humanities Boys because, the critical ratio is 1.252 which less than the table value for significance even at 0.05 level.

TABLE 4: Comparison of Spatial Ability between Science Girls and Humanities Girls

Variable	Sample				Critical Ratio	Level of Significance
	Science Girls		Humanities Girls			
	P_1	N_1	P_2	N_2		
Spatial Ability	67.23	165	58.19	138	1.625	NS

Note: NS= Not significant

From the table it indicates that there is no significant difference in Spatial Ability between Science Girls and Humanities Girls because, the critical ratio is 1.625 which is less than the table value for significance even at 0.05 level.

Major Findings

Major findings of the study are:

1. The level of Spatial Ability for Science students is only at an average level. The level of Spatial Ability for Humanities Students is also at an average level.
2. There exists no significant difference in the level of Spatial Ability between Science Students and Humanities students based on Gender.

V. Conclusions

From the study it was concluded that there is no much difference between the level of Spatial Ability between Science and Humanities .The level of Spatial Ability of Science students and Humanities students is only at an average level. The teachers should be enough capable to improve the Spatial Ability of Students. The curriculum designers should have a thorough understanding about the research outcomes and should make the timely changes in the curriculum. Spatial Ability can be improved through visual media. Visual programmes should be developed by expert team and should make available for topics like geometry, geography and science subjects.

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