

AN INQUIRY INTO REASONING ABILITY OF HIGH SCHOOL STUDENTS IN SCIENCE

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ABSTRACT

The purpose of the study is to identify the levels of scientific reasoning skills attained by high school students and examine the impact of reasoning ability in science. The sample consists of 300 high school students from different schools. The Investigators have used the Reasoning Ability in Science Scale constructed and standardized by Anuradha Joshi & Bhuban Chandra Mahapatra. The results revealed that there is no variation in terms of gender and medium of instruction in ability to reason scientifically, that is the scientific reasoning ability effect does not depend on gender and medium of instruction. This finding highlights the importance of the need for instructional design that is focused on supporting scientific reasoning ability among students. Therefore, there is a need for designing curricula that focus on to promote students' scientific reasoning.

Keywords: Inquiry, Reasoning Ability, Science, High School Students

INTRODUCTION

Scientific reasoning encompasses the reasoning and problem-solving skills involved in generating, testing and revising hypotheses or theories, and in the case of fully developed skills, reflecting on the process of knowledge acquisition and knowledge change that result from such inquiry activities. Science, as a cultural institution, represents a "hallmark intellectual achievement of the human species" and these achievements are driven by both individual reasoning and collaborative cognition (Feist, 2006). Our goal in this article is to describe how young children build from their natural curiosity about their world to having the skills for systematically observing, predicting, and understanding the world. We suggest that scientific reasoning is a specific type of intentional information seeking, one that shares basic reasoning mechanisms and motivation with other types of information seeking (Kuhn, 2011). For example, curiosity is a critical motivational component that underlies information seeking (Jirout & Klahr, 2012), yet only in scientific reasoning is curiosity stated by deliberate data collection and formal analysis of evidence. In this way, scientific reasoning differs from other types of information seeking that it requires additional cognitive resources as well as an

integration of cultural tools. To that end, we provide an overview of how scientific reasoning emerges from the interaction between internal factors (e.g., cognitive and metacognitive development) and cultural and contextual factors.

PURPOSE OF THE STUDY

The study pertaining to high school students which indicate that high schools are transferable across science and mathematics, and that we could learn a great deal about the role of reasoning in science problem solving by examining potential links between the two. The purpose of the study was to identify the levels of scientific reasoning skills attained by high school students and examine the impact of reasoning ability in science. The problem taken up by the investigators is stated as “An Inquiry into Reasoning Ability in Science of High School Students in Sankarapuram Taluk”.

METHOD OF THE STUDY

Here the investigators attempt to study Reasoning Ability in Science of High School Students in Sankarapuram Taluk by using normative survey method. It involves describing, recording, analysis and interpreting the data which are all directed towards a better understanding of the present. Therefore simple random sampling technique was found to be suitable for the collection of data.

SAMPLE OF THE STUDY

The sample consists of 300 high school students from different schools. The samples were selected by using simple random sampling technique. In the present study, high school students will be used to mean all those students studying in high schools within Sankarapuram Taluk since the target population sample were from Classes IX (who will be followed up till Class X). Sankarapuram is called a Panchayat Town in Viluppuram District in the Indian State of Tamil Nadu. It is a subdivision of a district; a group of several villages organized for revenue purposes.

TOOL USED IN THE PRESENT STUDY

The Investigators used the Reasoning Ability in Science Scale constructed and standardized by Anuradha Joshi (1994) & Bhuban Chandra Mahapatra (1994).

OBJECTIVES OF THE STUDY

The investigators formed the following objectives.

1. To find out the significant difference in the Reasoning Ability in science between Male and Female high school students.
2. To find out the significant difference in the Reasoning Ability in science between English and Tamil Medium high school students.

HYPOTHESES OF THE STUDY

Keeping the objectives in mind, the investigators formulated the following hypotheses.

1. There is no significant difference in the Reasoning Ability in science between Male and Female high school students.
2. There is no significant difference in the Reasoning Ability in science between English and Tamil Medium high school students.

STATISTICAL TECHNIQUES USED IN THE STUDY

In the present study following statistical techniques were used: Descriptive Analysis (Mean, Standard Deviation), Differential Analysis (t-value).

STATISTICAL ANALYSIS

Table1

MEAN, SD AND 't' TEST FOR MALE AND FEMALE HIGH SCHOOL STUDENTS' REASONING ABILITY

Gender	N	Mean	SD	Calculated 't' Value	Remark at 5 % Level of Significance
Male	120	15.97	2.25	0.54	NS
Female	180	16.15	3.05		

It is evident from the Table1 that the calculated 't' value is 0.54 which is not significant at 0.05 level. Hence, the framed null hypothesis is accepted. It is inferred that there is no significant difference found between male and female high school students with regard to their reasoning ability.

Table 2

MEAN, SD AND 't' TEST FOR TAMIL AND ENGLISH MEDIUM HIGH SCHOOL STUDENTS' REASONING ABILITY

Medium of Instruction	N	Mean	SD	Calculated 't' Value	Remark at 5% Level of Significance
English	207	16.18	2.58	1.02	NS
Tamil	93	15.83	3.11		

It is evident from Table 2 that the calculated 't' value is 1.02 which is not significant at 0.05 level. Hence, the framed null hypothesis is accepted. It is inferred that there is no

significant difference found between English and Tamil high school students with respect to their reasoning ability.

FINDINGS OF THE STUDY

The findings emerged out of the present study are presented below

1. Male and Female high school students have similar level of reasoning ability. Hence the null hypothesis that “there is no significant difference in the reasoning ability between male and female high school students” is accepted.
2. Tamil and English Medium high school students have similar level of reasoning ability. Hence the null hypothesis that “there is no significant difference in the Reasoning ability between Tamil and English medium high school students” is accepted.

EDUCATIONAL IMPLICATIONS OF THE STUDY

A Scientific reasoning has significant educational implications for enhancing students’ academic performance. The results also reveals that there is no variation in terms of gender and medium of instruction in ability to reason scientifically, that is the scientific reasoning ability effect does not depend on gender. This finding highlights the importance of the need for instructional design that is focused on supporting content knowledge may not sufficient to promote scientific reasoning ability among students. Therefore, there is a need for devising curricula that focus on promoting students’ scientific reasoning. Moreover, it is suggested that science education should be taught by inquiry-based methods computer-based laboratories which foster students’ scientific reasoning ability as the core of scientific literacy.

CONCLUSION

The present study reveals that the high school students have similar level of reasoning ability in terms of gender and medium of instruction. Secondary education plays a very decisive role in every individual’s life since after secondary education all decisions are made for the future. Students need proper guidance for the management of their skills and efforts for better learning.

REFERENCE

1. Feist, G. J. (2006). *The psychology of science and the origins of the scientific mind*. New Haven, CT: Yale University Press.
2. Jirout, J., & Klahr, D. (2012). Children’s scientific curiosity: In search of an operational definition of an elusive concept. *Developmental Review*, 32, 125-160.

3. Joshi, A. & Mahapatra, B.C. (1994). Manual for Reasoning Ability in Science (RAIS). Agra: National Psychology Corporation,.
4. Kuhn (2011). "Problem-Based Learning in K-12 Education: Is it Effective and How does it achieve its effects?" American Educational Research Journal, October 2011, Vol. 48, No. 5, pp. 1157-1186.