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'Image Of A Scientist' Among The Secondary School Students

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ABSTRACT

Inflow of young learned community into the field of pure scientific research has been declined throughout the world including India. The initial attitude and the understanding of the nature of scientific endeavours and the people associated with them have a great role in determining the choice of science as career. How children perceive the scientists can indicate how they perceive the nature of science. The present study finds the images of Scientists among the secondary level students through a projective technique to identify any the stereotypical perceptions. The study also indicates their understanding of the nature of science and suggests modifications in the science curriculum.

In the 21st century 'knowledge' is considered as the biggest resource of development. We should have a strong knowledge base in our country, particularly in science. Science is a popular subject among the secondary grade students to opt in higher studies, possibly due to a greater possibility of getting an honorable job by moving into technology-oriented course of study. Despite a vast infrastructure for science education created in the country, the field of scientific researches and higher studies is experiencing a constant decline of enrolment. It is therefore a subject of interest to see the perception of the school students at the secondary level of study about scientists. It will reveal some aspects of their attitude towards science and their idea regarding the nature of scientific activities.

Efforts in this direction were taken through a variety of projective and non-projective techniques. One significant way was to use The Draw A Scientist Test (DAST). It was originally developed by Chambers (1983) as an open-ended projective test with seven standard image indicators to detect children's perceptions of scientists. The test was expanded and revised by others (Mason, Kahle and Gardner, 1991; Symington and Spurling, 1990; Finsen, Beaver & Cramond, 1994). Several studies indicated the emergence of a stereotypical image of scientists (Chambers, 1983; Schibeci and Sorensen, 1983). It was used by classroom teachers to assess children's images of scientists (Barman, 1996; Huber & Burton, 1995) and to evaluate the effectiveness of instructional programs in changing students' attitudes toward science (Flick, 1990; Mason et al, 1991). They were less stereotypical including fewer images of scientists with facial hair, glasses and lab coats, and more images of female scientists (Nuno, 1998) as in the cases of 1960–70. Matthews (1996) found from a study of 132 secondary school students less gender bias in the standard image of the scientist. It was useful in analyzing attitudes towards science (Matkins, 1996) and is easily administered using a checklist method (Finsen et al, 1995) as opposed to survey methods (Stephen and Riesz, 1995; Holler, 1995). Nuno (1998) found a number of studies using a combination of DAST and other methods for increasing reliability or have modified the instructions (Matkins, 1996).

Objectives:

This study is based on the following objectives:

To identify the stereographic images of the students of class Xth about-

1. the physical appearances of the scientists,
2. the symbols of research associated with the scientists,
3. the symbols of knowledge associated with the scientists,
4. the products of science,
5. the discipline of study associated with the scientists.

Methodology:

The study is qualitative in nature. This is based on the projective technique to reveal the mental images of the secondary class students about the scientists.

Population and Sample: The population for the study is the total collection of secondary level students. However, a sample of only 240 students of class Xth of schools under Uttar Pradesh Board of Secondary Education was selected by incidental purposive sampling technique.

Tool Used: A check list was used to quantify the information as projected by the learners in their responses to the Draw a Scientist Test. The check list has 26 items grouped under 5 dimensions. Most of the items were taken from Draw-a-Scientist Test (DAST) by Nuno (1998).

PROCEDURE: Students were asked to draw two pictures on the given two sheets of white papers, of what they think a scientist may look like. They were told that (1) the drawings were for a research study and were not going to be evaluated, (2) the pictures may not necessarily be very artistic but should reflect the pupils' idea about the physical appearance of a scientist and also the objects, environment and activities associated with him with maximum possible details. Approximately 15 minutes were given to draw each image. Drawing two sets of images are expected to provide them the freedom to depict cases like gender, discipline etc. with wider choices.

Analysis:

The researcher first identified the broad characteristics under the six dimensions of stereotypical perception by studying a group of 24 (5% of the total sample) randomly selected images. Percentage analysis was used for the analysis purpose.

TABLE 01: SHOWING %RESPONSES FOR DIMENSION 01 – PHYSICAL APPEARANCE

Categories		Picture I	Picture II
1. Gender	Male	95%	97.5
2.	Female	5%	2.5
3. Lab coat	P	92.5	85.0
4.	A	7.5	15.0
5. Eye glass	P	47.5	45.0
6.	A	52.5	55.0
7. Pen/pencil	P	5	0.0
8.	A	95	0.0
9. Appearance	Untidy	67.5	57.5
10.	Tidy	32.5	42.5
11. Hair	Bald	12.5	25.0
12.	Long	30	27.5
13.	Curley	10	5.0
14.	Normal	47.5	42.5
15. Facial hair	P	22.5	35.0
16.	A	77.5	65.0
17. Overall Expression	Smiling	9.58	18.33
18.	Cynical	67.92	53.75
19.	Neutral	22.5	27.92

* P– Present, A–Absent

Clear stereotyping of the scientists with male domination (around

95% of the students) can be seen in the Table 01, in both the cases. The initial standard image of the scientists included lab coat and untidy appearance in most of the cases. A little less than half of the responses were given for the eye glasses. About 50% of the total responses showed scientists with normal hair and 30% of it indicated long hair. A small proportion responded for bald and curly hair (~10% each). Facial hair was also a chief feature in 22.5% of the responses. More than 50% for both the images, the scientists were shown with cynical expression. The smiling expression came more (in double proportion) in the second images as compared to the first one.

TABLE 02: SHOWING %RESPONSES FOR DIMENSION 02 – SYMBOLS OF RESEARCH

Categories		Picture I	Picture II
20. Test tubes 21.	P	55.00	57.90
	A	45.00	42.10
22. Flasks 23.	P	57.50	52.08
	A	42.50	47.92
24. Microscope 25.	P	7.50	4.16
	A	92.50	95.84
26. Burner 27.	P	20.00	45.83
	A	80.00	54.17
28. Spacecraft 29.	P	5.00	8.75
	A	95.00	91.25
30. Computer 31.	P	5.00	7.92
	A	95.00	92.08
32. Animals/plants 33.	P	22.50	19.16
	A	77.50	80.84

* P– Present, A–Absent

The Table 02 shows that among the symbols of researches, test tubes were indicated by exactly half of the responses while flasks and burners got 57.5% and 20% respectively. A few responses showed microscope (7.5%). 5% of the responses thought each of spacecrafts and computers as a symbol of research. Only in 22.5% cases animals and plants were considered in this group.

From the Table 03 it is clear that the symbols of knowledge category like books, files etc. got relatively lesser percentage (around 15% & around 6–8% respectively) of responses. Some other indicators include tables and shelves etc.

TABLE 03: SHOWING %RESPONSES FOR DIMENSION 03– SYMBOLS OF KNOWLEDGE

Categories		Picture I	Picture II
34. Books 35.	P	15.0	13.33
	A	85.0	86.67
36. Files 37.	P	5.83	7.92
	A	94.17	92.08
38. Tables etc. 39.	P	27.5	38.33
	A	72.5	61.67
40. Shelf with test tubes, flasks etc. 41.	P	15.0	21.25
	A	85.0	78.75

* P– Present, A–Absent

The Table 04 shows that solutions in the test tubes or bottles as a product of science got 45% responses. Interestingly, for the first picture, 22.5% of the responses included rockets and missiles in this category and 2.5% of them went to the bombs. In the second picture, these proportions went higher with nearly 41% and 17.5% responses in each.

TABLE 04: SHOWING %RESPONSES FOR DIMENSION 04: PRODUCTS OF SCIENCE

Categories		Picture I	Picture II
42. Soln. in test tube 43.	P	45.0	37.50
	A	55.0	62.50
44. Machines 45.	P	2.5	00.00
	A	97.5	100.00
46. Bombs 47.	P	2.5	17.50
	A	97.5	82.50
48. Missile/rockets 49.	P	22.5	41.25
	A	77.5	58.75

* P– Present, A–Absent

From the responses shown in the Table 05 the following conclusions may be done. For the first picture, about 42.5% of the responses considered the scientists 'inside the lab' while half of these went to the 'outside the lab' category. A large part remained undecided in this issue. However, for the second representation, 67.5% of the pictures showed the Scientists working inside the lab. Therefore the selected sample of children had a general idea that scientist work mostly inside the lab. They seem not to be aware that scientific activities may also be carried on in the open environment.

TABLE 05: SHOWING %RESPONSES FOR DIMENSION 05 – WORKING ENVIRONMENT AND SCIENTIFIC ACTIVITIES

Categories		Picture I	Picture II
50. Environment 51. 52.	Inside	42.5	67.5
	Outside	22.5	27.5
	?	35.0	5.0
53. Activity 54. 55. 56. 57.	Expt. with plants/ animals	6.0	7.92
	Expt. with chemicals	42.5	39.17
	Observing and thinking	16.5	22.0
	Production of rockets/missiles etc.	20.5	25.5
	Others	14.5	5.41

* P– Present, A–Absent

A half of the pictures (both the first and second cases) depicted scientists experimenting with chemicals shown by the indicators like solutions, test tubes, burners etc. The next major proportion of children (~25%) described scientists engaged in the production of rockets, missiles etc. indicated either by symbols or by words. Pictures representing the scientists engaged in observing and thinking were 16–22% of the total response in this category.

Very few (~6–8%) pictures included plants and animal as a subject of research. The activities of the scientists in the pictures were related more to physical sciences than life sciences.

It shows that the selected children find the scientific activities related to physical science to be more 'science like' than those belonging to life science. This general idea of the secondary school learners regarding the subjects of science is alarming.

The perceptions of scientists among the students reflect that the secondary students need a proper understanding of the nature of science and the scientific endeavours requiring suitable modification in the planning and implementation of school science curriculum.

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