

**Executive Summary of the findings
of
UGC funded Minor Research Project**

**An Exploratory Study of the Phenomenological Primitives
and Misconceptions of Students of Age Group 11-13 years**

by

Dr. K. M. Rajan

Principal, St. Joseph's Training College
Mannanam, Kottayam

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A fundamental principle of learning in constructivism is that learners construct knowledge for themselves. Each learner individually constructs meaning as s/he learns. The process of construction of knowledge is influenced by phenomenological primitives and misconceptions that learners possess. It is therefore important to explore the phenomenological primitives and misconceptions.

Students' response and no response to questions put by teachers are also important in the context of learning. Students' response and no response to questions stem from different contexts. These are - (1) No Response, (2) Wrong Response, (3) Partially Correct Response, (4) Incomplete Response and (5) Correct Response situation. No Response on the part of pupil may be due to his or her inability to understand the questions, to structure the response, or due to lack of requisite facts, concepts and generalization needed for the purpose of responding or the failure to recall the related facts. Wrong Response on the part of pupil may be due to phenomenological primitives and misconceptions, lack of knowledge, incorrect knowledge and lack of understating of the ways and means to structure the correct response. Partially Correct Response may be due to a partial knowledge, inattention and guessing of response. Incomplete Response may be due to lack of proper understanding of questions, inability to structure response and other pupils' interference. Correct Response situation satisfies the criterion response expected by the teacher. Therefore, the nature of unacceptable response is pedagogically important.

Sample

The study explored the Phenomenological Primitives and Misconceptions of students of age group 11-13 years. Sample for the study was selected taking into consideration the total number of different types of schools (Government, Aided & Unaided) in the Kottayam Revenue District. Students of Grades VI, VII and VIII were included in the study to capture students of age group 11 to 13. Table 1 shows the total number of schools in the Kottayam Revenue District under the Palai, Kaduthuruthy, Kanjhirappally and Kottayam Educational Districts.

Table 1

Number of Different Types of High Schools in Kottayam Revenue District

Sl. No.	Educational Districts	Govt.	Aided	Unaided	Total
1	Kottayam	23	58	9	90
2	Pala	6	37	5	48
3	Kaduthuruthy	16	24	3	43
4	Kanjhirappally	15	47	5	67
	Total	60	166	22	248

A total of 1219 students included in the study were - - 414 sixth graders, 404 seventh graders and 401 eighth graders. The students selected were from Kottayam, Pala and Kaduthuruthy Educational Districts. The sample selected reflects the proportion of Government, Aided and Unaided school students of the Kottayam Revenue District. The main goal of study was to bring out the Phenomenological Primitives (p-prims) and Misconceptions related to concepts such as solution, electricity, light, mass, energy, force & motion, gravity, heat & temperature and properties of gas.

Table 2

Grade-wise Sample Selected for the Study

Grade	School			Total
	Government	Aided	Un-aided	
VI	73	277	64	414
VII	89	284	31	404
VIII	104	273	24	401
Grand Total				1219

Tools

The tools used for the study were a paper-pencil test and an unstructured interview. The paper-pencil test consisted of a total of ten two-tier multiple choice item with open-ended questions to explore students' phenomenological primitives (p-prims) and misconceptions. Of the 10-items, five questions were 'yes or no' type and five questions were two-tier multiple choice questions with diagrams. The items in two-tier multiple choice diagnostic tests were specifically designed to identify students' p-prims. The first part of each item consisted of a multiple choice content question having four choices. The second part of each item consists of a set of possible reasons for the answer to the first part. Incorrect reasons are derived from student's p-prims gathered from research, interviews, and free response tests. Unstructured interviews were conducted with a small sample which was exploratory in nature.

Results

The analysis of data revealed very robust phenomenological primitives and misconceptions of students of standard VI, VII and VIII. The response of students that only moving objects possess energy is a p-prim as well as a naïve conception. 12 of the 414 students (2.90%) hold the view that still and moving objects possess energy. 333 of the 414 students (80.43%) have the notion that only a moving vehicle and a rolling ball have energy. The major misconception of seventh grade students is that

when a book is kept on a table, 166 (41%) seventh grade students (out of the 404) asserted that the table does not exert a force on the book. Only 103 (25.5%) out of 404 students agree that a book kept on a table exerts a force on the table and the table exerts a force on the book. The major misconceptions of eighth grade students are - -
(1) Gravitational force will vary even with increase in the height to a few meters and
(2) fish in water breathes oxygen of the water molecule.

Teachers must explore the reasoning of wrong responses rather than searching for correct responses of students. It may not be feasible to explore any one pupil's ideas in depth, however, where students' ideas are valued and listened to, that in itself will equip teachers with a better approach to classroom transaction. It will be desirable to examine the sources of the phenomenological primitives and misconceptions of students and to develop suitable strategies to help students to realize the mismatch between their conceptions and the scientific concepts.