An Analytical Study of Teaching and Learning of Physics Curriculum At +2 Level

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Abstract

The National Curriculum Framework for School Education brought out by the NCERT in 1975, 1988 and 2000 (NCFSE 1975, 1988 and 2000) envisaged science education as one of the most effective and comprehensive instrument of quality improvement of school education. The teaching and learning of Science in the school was required to lay emphasis on its application in daily life. The studies on the process of teaching physics are lacking. Therefore, the present study was planned and executed. The present research was conducted on the problem **"An Analytical Study of Teaching and Learning of Physics Curriculum at+2 Level".** The major objectives of the analytically studies were to the methods of classroom teaching of physical science curriculum; the teaching-learning materials and other related problems of physics subject at +2 level. The study was conducted on randomly selected schools in rural areas 14 and urban areas 47 of Bhopal Division only. The population comprised of class XI and XII for stakeholders. On the basis of the analytical research study, statistical analysis of data and interactions with the Principals, Physics Teachers, and Students of classes XI&XII of Physics group. **The conclusions were are:** All these findings urge us and the government to make efforts to provide the necessary infrastructure in the form of educational technology facilities, proper classrooms, laboratory and library facilities, physics related books in Hindi and English medium for the students studying at +2 level in class XI & XII physics groups in different schools run by the different types of managements and specially in the government managed schools. The concluded that the Physics teachers use mostly a question answer method 100% and lecture methods 78.57% in rural areas and but question answer method 91.49% and lecture method 80.85% in urban areas. The have used TLM in 55% urban school and 7.14% rural school.

Keyword: Analytical Study, Teaching and Learning, +2 Level Secondary Education, Physics curriculum.

Introduction: The National Policy on Education (NPE, 1986) and Programme of Action (POA, 1992) have stressed the need for a complete revamping of "10+2+3" curriculum including science education. The National Curriculum Framework for School Education (NCFSE) envisaged science education as one of the most effective and comprehensive instrument of quality improvement of school education. Teaching of science and technology is now important instead of only science which is being taught up to higher secondary stage at +2 levels. Scientific temper may be inculcated for promoting and strengthening the process of objective verification, experimentation and generalization. This broad objective of education applies to Science Education in general and Physics curriculum in particular at +2 level.

Research Review: The International and National level selected studies reviewed on science, physics curriculum, teaching components and teaching-learning processes were as follows:

Wahyudi (2002) conducted a study on the teaching and learning of science into two rural secondary schools in Indonesia from cooperative learning perspective.

Stavrou (2010) conducted a study on "Teaching and Learning Deterministic Chaos: An Empirical Study on Pre-Service Teachers". Vaiteka, and Fernandez (2010) conducted a study on "Curriculum and Teaching Ideas of Pre-Service Chemistry Teachers In A Context of Educational Reform In Brazil". Welzel-Breuer (2010) conducted a study on "CAT: The Effective Use of Computer Aided Teaching and Learning Materials in Science Teaching – A Teacher Training Course With A European Perspective" and Yakar and Cekmecelioglu (2010) presented a paper on "Childhood Science Experiences Related to Science Educators' Epistemological Beliefs: Examples from Different Countries"

Ansari (1984) conducted a study on "Construction and Standardizatic of Achievement Tests in General Science for standards V, VI and VII for Children Studying through Hindi as the Medium of Instruction in Great Bombay". Pande (1984) conducted a research on "An Analytical Study and Development of Secondary School Curriculum in Maharashtra". Dange and Praveen (2007) conducted a study on "Library Facilities and the Academic Achievement of Secondary Students".

Operational Definitions of the Terms

Analytical Study: The analytical study includes the conceptual and the true realistic study of a scheme in Madhya Pradesh. In this study the analysis is of teaching and learning science at +2 levels as is being done by covering all the aspects of Physics curriculum of Madhya Pradesh Board of Secondary Education (MPBSE).

Teaching and Learning : Teaching is a complex process and the teacher has to play multiple roles while trying to increase students' learning. Learning is relatively a permanent change though teaching-learning process takes place informally from birth to maturity. Formal teaching and learning is a process which goes on during teaching and learning among the students and the teachers.

+2 Level Secondary Education: The National Policy on Education (NPE), 1986 recommended a common system of education throughout country. Ten years of general education is followed by two years of senior secondary education which is followed by three years of college education for the first degree which can be termed as "10+2+3" curriculum. Each stage of education has its own characteristics, depending upon the development levels of the learners and their individual preferences, needs and aptitudes. The senior secondary stage of school education in the country refers to the stage comprising classes XI and XII. It is treated as diversified education with provision of a diversified curriculum for all students as per their need. Diversified curriculum consists of academic and vocational streams.

Physics: Physics is one of the important branch of science. Therefore, Physics is defined as follows:

"Physics is a branch of Science dealing with the matter and energy which is or was a part of living system"

Curriculum: Traditionally, the term curriculum has been defined as "an organized set of formal educational intentions". A broader and educationally meaningful definition that curriculum stands for organised learning experiences provided by an educational system or its instrumentalities. There are, however, equivalent terms like 'course of study' or 'syllabus' which is in use in educational literature. Specific meaning of 'curriculum study' means a study of the 'prescribed syllabus' by an examining body.

Objectives of Present Study: The main objectives of the present research was to study the teaching and learning of **Physics** subject at +2 level of senior secondary stage. The following objectives were as:

- To analytically study the teaching-learning materials of physics curriculum.
- To analytically study the methods of classroom teaching of physics curriculum.

Delimitation of the Study: The delimitation of the study were:

- The study was conducted on schools of Bhopal Division only
- The population comprised of class XI and XII for stakeholders

The detail of sample for the study was delimited as follows:

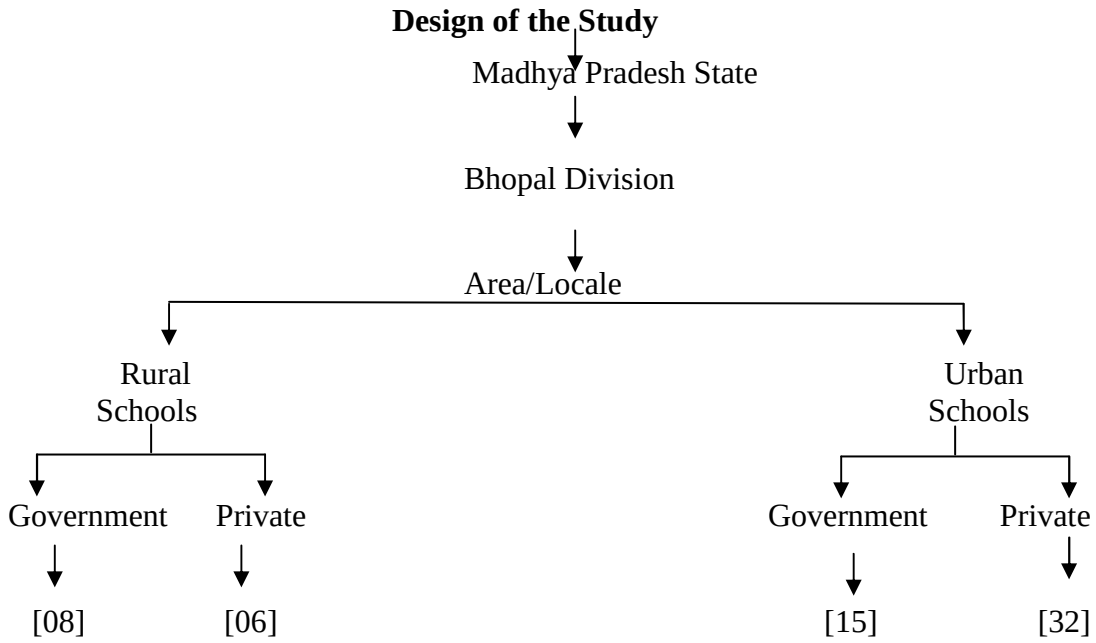
Division = Bhopal
Area = Rural and Urban.
Schools = +2 level Govt. and Private Schools
Classes = 11^{th} and 12^{th}
Subject = Only Physics curriculum consisting of theory and practical units.

Sample: The government and private schools was obtained from the Madhya Pradesh Board of secondary Education (MPBSE) Bhopal. The higher secondary schools have been selected randomly in the ratio of 25% for the present study. Distribution of sampled schools has been presented below in Table 1.

Table -1: Distribution of Sampled Schools

Areas	**Rural**		**Urban**	
Types of School	Govt.	Private	Govt.	Private
No. of Randomly Schools Selected	8	6	15	32

Design of the study: Research design means the plan, structure and strategy for investigation. According to Kerlinger (1974), a research design is used to provide answer to research questions. In this study, government and private higher secondary schools were selected from rural and urban areas of Bhopal Division. The design of the study is given below:



Variables of the Study: The following variables were of the study:

1 Independent Variables

- System of Higher Secondary Schools (2)
  - Government Senior Secondary Schools
  - Private Senior Secondary Schools
- Gender (2): Boys and Girls of Senior Secondary Schools
- Area/Locale : Rural and Urban

2. Dependent Variables

- Responses on Questionnaire
- Responses on Observation Schedule
- Outcomes of Group Discussions

Tools Used in the Study: The tools used in present study were related to the teaching and learning process in physics subject. The following tools were used in conducting the study-

1. Questionnaires for Principals
2. Questionnaire for Physics Teachers
3. Questionnaire for Students

Table-2: Description of Tools/Test

S. No.	Name of The Tool/Test	Purpose of Tools/Test
1	Questionnaire for Principals of Higher Secondary Schools.	To study the Physical science facilities and teaching-learning processes.
2	Questionnaire for Physics Teachers of Higher Secondary Schools.	To study the Physical Science facilities and teaching-learning processes.
3	Questionnaire for Students studying physics in class XI and XII.	To study the facilities available for teaching-learning physics in the school.

Data Collection: Data was collected with the help of various research tools/tests as described. These tools were administered personally by the investigator. The data was collected by administering the tools on Principals, Physics Teachers and physics students in class XI and XII.

Analysis of the Data: In the present study, survey and analytical method has been mainly focussed on namely:

Analysis of Responses of Principals': In this study, objective based questionnaires were developed for Principal. This questionnaire contained twelve questions. The reactions of Principals were collected from rural and urban areas both of government and private schools. From **rural areas**, reactions of 14 Principals were taken, out of these 8 were government and 6 were private school Principals. from **urban areas,** reactions and responses of 40 Principals were taken, out of these 15 were government school principals and 25 were Principals of private schools.

Table 3 : Area–wise use of Teaching Learning Material

Area/ Locale	Teaching Learning Material				
	N	Yes	%	No	%
Rural	14	1	7.14	13	92.86
Urban	40	22	55.00	18	45.00
Total	54	23	42.59	31	57.40

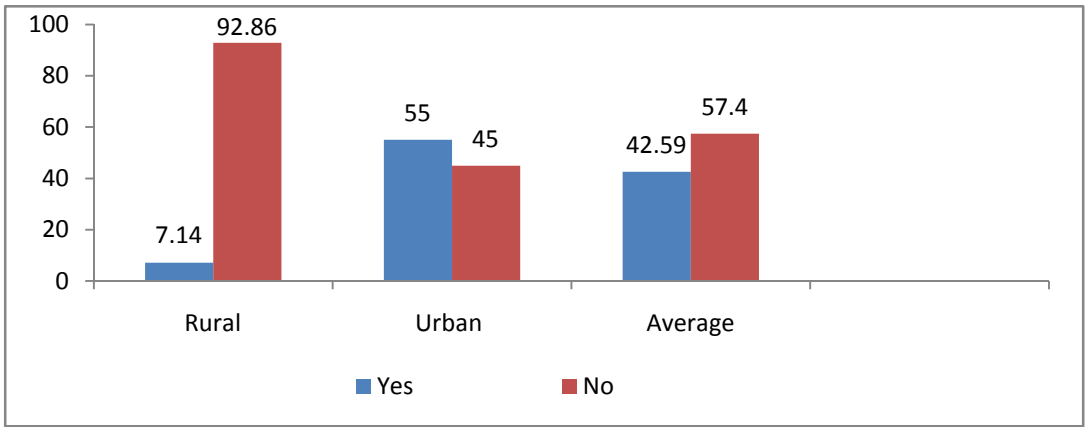


Figure 1 : Area–wise use of Teaching Learning Material

- It is found that in **urban area** schools, 55% schools have used teaching learning material but in **rural areas** only 7.14% schools have used teaching learning material. During **observation** and conversation with staff the investigator found that in most of the schools science faculty have prepared and used teaching learning material.
- On the **average** 42.59% schools of all categories have used teaching learning material. Thus it is **concluded** that most of the schools have not used any teaching learning material.

Analysis of Responses of Physics Teachers: In this study, objective based questionnaire was developed for Physics teachers. This questionnaire contained twenty five questions. The responses of teachers were collected from **rural** and **urban areas** both of government and private schools. From **rural areas**, responses of 14 teachers were taken, out of these 8 were government and 6 were private school teachers. From **urban areas,** responses of 47 teachers were taken, out of these 15 were government school teachers and 32 were teachers of private schools.

Table 4: Area–wise used of Teaching Methods

Area	Rural						Urban					
Teaching Methods	Govt.(8)		Private (6)		Total no. of schools (14)		Govt. (15)		Private (32)		Total no. of schools (47)	
	f	%	f	%	f	%	f	%	f	%	f	%
Lecture Method	6	75	5	83.33	11	78.57	13	86.67	25	78.13	38	80.85
Lecture - cum - Demonstration Method	7	87.5	3	50.00	10	71.43	10	66.67	18	56.25	28	59.57
Demonstration Method	5	62.5	2	33.33	7	50.00	6	40.00	10	31.25	16	34.04
Experimental Method	4	50	0	0.00	4	28.57	8	53.33	15	46.88	23	48.94

Project Method	5	62.5	1	16.67	6	42.86	5	33.33	10	31.25	15	31.91
Question–Answer Method	8	100	6	100.00	14	100.00	13	86.67	30	93.75	43	91.49
Other Methods Problem, Discussion and Observation Method	1	12.5	1	16.67	2	14.29	2	13.33	6	18.75	8	17.02

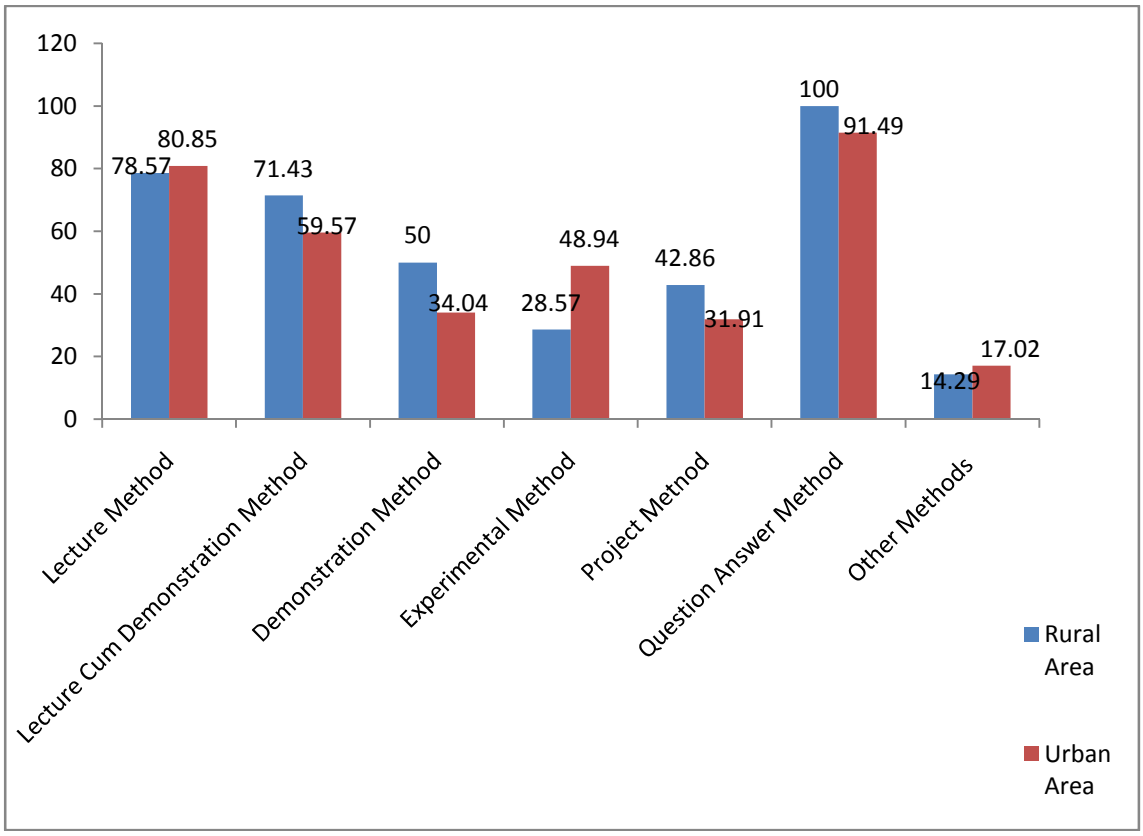


Figure -2 Area–wise used of Teaching Methods

- It is concluded that the Physics teachers use mostly a question answer method 100% and lecture methods 78.57% in rural areas and but question answer method 91.49% and lecture method 80.85% in urban areas..

Findings: The major findings related to Principal and Physics Teachers on physics teaching–learning components and curriculum at +2 levels are given below:

Principals: In general, responses of the Principals indicated that-

- Majority of the Principals are not taking classes regularly. They remain occupied in administrative work.
- Majority of the Principals do both teaching and administrative work during their stay in schools.
- Some of the Principals, who had taught Physics subject as teachers, took classes of Physics subjects and students were found to be satisfied with the quality of their teaching.

- The Principals pointed out that the schools do not have all the required physical facilities for the smooth functioning of a school, including laboratories.
- Majority of the schools had no laboratory assistant thus the Physics teachers do teaching as well as the laboratory work, hence teachers are not able to guide to the students as required.
- It is also found that there are no specified funds for Teaching- Learning Materials (TLM) and practical work for Physics and other science subjects.
- Physics teachers do not prepare teaching-learning material due to lack of funds.

Physics Teachers: On the basis of the responses analysed of the Physics teachers it is found that-

- Majority of the Physics teachers used lecture method and that too with the help of text-books for teaching the students.
- Most of the Physics teachers were using question answer method and at times lecture-cum- demonstration methods. Some of them also use demonstration methods.
- Most of the schools do not have the required facilities for practical work.
- The practical classes are held with the for purpose of preparing the students for annual examinations organized by the MPBSE.
- Majority of the schools had no laboratory assistant.
- Physics practical's are done only on 2 or 3 days in a week.
- Physics teachers have found the text books in Physics subject to be of good standard and do not follow rigidly the prescribed syllabus.

Conclusions: On the basis of the analytical research study, statistical analysis of data and interactions with the Principals, Physics Teachers of classes –XI &XII students of Physics group. The following conclusions were as:

- All these findings urge us and the government to make efforts to provide the necessary infrastructure in the form of educational technology facilities, proper classrooms, laboratory and library facilities, physics related books in Hindi and English medium for the students studying at +2 level in class XI & XII physics groups in different schools run by the different types of managements and specially in the government managed schools.
- The physics teachers under study showed quite a positive attitude towards the utilisation of active teaching-learning method. They were of the opinion that utilising active teaching methods is crucial as it makes students' participation in discussion, integrating their learning experiences and raising their interest in learning physics. Besides, teachers underlined the paramount significance of active teaching-learning as it helps them to improve their physics teaching methods. Though teachers showed positive attitude towards the utilisation of active teaching-learning methods, there were a number of factors hindering them from utilising this approach properly. These included lack of enough teaching experience, inadequate funds meant for the purchase of instructional materials and the shortage of enough seats in the classrooms for all the students. Since quality of education is a product of stable and solid leadership, effective polices, concern for teaching and sustained commitments are quite important. The reform of teaching practice in teacher education programme must begin with faculty members' efforts. An important first step is to select strategies promoting active teaching-learning that one can feel

comfortable with. Faculty developers can help, stimulate, and support teachers effort to change by highlighting the instructional importance of active teaching-learning given in the newsletters and publications they distribute. Academic administrators can help these initiatives by recognising and rewarding excellent teaching in general and adoption of instructional innovations in particular. Comprehensive programmes to demonstrate this type of administrative commitment should solve institutional policies and practices, the allocation of adequate resources for instructional development and the development of strategic administrative active teaching-learning plans.

Suggestions: The **s**ome of the suggestions worth mentioning for better outcomes of the physics teaching-learning process and curriculum at +2 levels are given below:

- Physics teaching related teaching learning materials (TLM) of good quality should be supplied in time and in sufficient numbers by the government and also release sufficient funds for TLM to the schools.
- The physics Laboratory Manuals be made available in school library for use by the students and teachers.
- physics teachers and laboratory assistant may be given in service training preferably during summer vacation.
- Sufficient infrastructural and instructional facilities may be provided to the higher secondary schools for smooth conduct of science theory and practical classes.
- The science library may be developed in each higher secondary school.

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