EduInspire: An International E-Journal ISSN- 2349-7076

# A STUDY ABOUT THE STATUS OF SCIENCE EDUCATION WITH PRACTICAL WORK AT UPPER PRIMARY LEVEL IN VALSAD CITY

Bhadreshkumar R. Sudani,
Government Engineering College,
Tithal Road,Valsad-396001.
Email:brsudani@gmail.com

Navrang K. Dobariya & Kapildev Vasani
District Institute of Education and Training, Parnera Pardi, Valsad-396001.

A STUDY ABOUT THE STATUS OF SCIENCE EDUCATION WITH PRACTICAL WORK AT UPPER PRIMARY LEVEL IN VALSAD CITY

## Introduction

The purpose of this paper is to explore and discuss the role of practical work in the teaching and learning of science at upper primary school level. It may be useful, however, to begin with some general remarks about science and science education with practical approaches, to lay out a framework for the discussion later in the paper.

The aims of science education might then be summarized as:

- to help students to gain an understanding of as much of the established body of scientific knowledge as is appropriate to their needs, interests and capacities;
- to develop students' understanding of the methods by which this knowledge has been gained, and our grounds for confidence in it (knowledge about science).(Millar, 2004)

From the education system to the modern educational curriculum system, practical work is seen as an essential part of teaching and learning science. [(Abrahams & Millar, 2008)(Hodson, 2005)(Jenkins, 1999)]

## Definition of practical work:

Research has shown the importance of including practical activity in the curriculum, and it is recognized to be a potent learning medium. Children's understanding and recall of what they have learnt is increased if they have done a related practical activity.

A big number of terms exist to describe practical work, many of which are frequently used with little clarification. As an example, according to SCORE report, some countries' national education frame work refers as 'Practical and enquiry skills', 'practical and investigative activities', 'independent enquiry' and 'experimental work'. The published

review of the literature (Lunetta, Hofstein, & Clough, 2007)on learning and teaching in the school science laboratory gives what it calls a classical definition as:

> *…learning experiences in which students interact with materials or with secondary sources of data to observe and understand the natural world (for example: aerial photographs to examine lunar and earth geographic features; spectra to examine the nature of stars and atmospheres; sonar images to examine living systems)*(Lunetta, Hofstein, & Clough, 2007).

There is evidence that practical work can increase students' sense of ownership of their learning and can increase their motivation. There is evidence that the teacher's role in helping students to compare their findings with those of their peers and with the wider science community is critical. Students (and their teachers) need to understand something about the nature of science if they are to appreciate the limits and value of practical activities. The evidence suggests that teachers appear to adapt their practices slowly when faced with new curricula such as Twenty First Century Science. These findings also have implications for pre-service and in-service teacher training(Dillon, 2008).

**Sampling Area and Tool:**

With reference to the economical growth of the state Gujarat in India, and skill development mission of government of India, development of students' creativity at primary education level must be definite. Scientific skill development is more useful for the 'Make in India' initiatives. In order to study the status of skill based practical work in upper primary schools in valsad city were selected. Science teachers of these schools were sent a questionnaire in digital form as *Google form*.

A questionnaire in two parts was used to elicit responses from individual teachers. It was widely available blogs and social media like *WhatsApp*, *Facebook* and email. This is in line with the overall focus of the initial concerns surrounding practical work in science education. Some Sample questions are given in the following Table-1.

***Table-1:*** *Sample question*

| Sr. No. | Question |
|---|---|
| 1 | Medium of instruction in your school? /આપનાશાળામાશિક્ષણનુમાધ્યમકયુછ? |
| 2 | Is there separate laboratory for upper primary division at your school? / શુઆપનાશાળામાઉચ્ચતરપ્રાથમિકવિભાગમાટઅલાયદીપ્રયોગશાળાછે? |
| 3 | How many teacher in your school are having masters or higher degree in science? / આપનાશાળાનાકેટલાશિક્ષકોપાસેવિજ્ઞાનમાંઅનુસ્નાતકકેપીએચ.ડી.છે? |
| 4 | How would you like to encourage students to develop understanding of science principles and facts? /આપવિજ્ઞાનપ્રત્યેવિદ્યાર્થીઓનેકેવારીતેપ્રોત્સાહિતકરશો? |
| 5 | How many experiments do you teach in 6th std. / ધો. 6 માકેટલાપ્રયોગોકરાવોછો? |

| | |
|---|---|
| | How many experiments do you teach in 7th std. / ધો. 7 માકટલા પ્રયોગો કરાવો છો? |
| | How many experiments do you teach in 8th std. / ધો. 8 માકટલા પ્રયોગો કરાવો છો? |
| 6 | How frequently your students visit laboratory / વિદ્યાર્થીઓ પ્રયોગ શાળાના મુલાકાત કેટલા વખત લે છે? |
| 7 | According to you why practical should be there in the curriculum? / આપ ના મત અભ્યાસક્રમમા પ્રયોગો શામાટે હોય છે? |
| 8 | How many practicals are performed according to curriculum? અભ્યાસક્રમ પ્રમાણે કેટલા પ્રયોગો કરાવી શકાય છે? |
| 9 | Average percentage weight-age for various assessment strategies. / મૂલ્યાંકન માટે ઉપયોગ મા લેવાતી યુક્તીઓ ના સરરાશ ટકાવારી (આશર ) |
| 10 | What resources are available for teaching science practicals in your school? પ્રાયોગિક શિક્ષણ માટે કયા કયા રાસાયણ આપના શાળામા ઉપલબ્ધ છે? |
| 11 | What are the barriers for teaching practicals in upper primary division? ઉચ્ચતર પ્રાથમિક વિભાગ મા પ્રયોગ શીખવવા માટે શુ અવરોધ રૂપ બાબતો છે? |

The questionnaires endeavored to identify what teachers considered to do practical work in terms of specific activities rather than overarching statements.

**Results and discussions:**

From total 21 schools we received 48 responses. The data analysis is as following.

1. ***Medium of instruction in the school:***Out of total 21 schools 5 are of only English medium, 9 schools are of only Gujarati medium and 7 schools are dual medium.
2. ***Separate science lab for upper primary:*** Out 21 schools almost 18 schools are having separate science laboratory for upper primary division which indicates that possibilities of practical based science education may be higher.
3. ***Teacher with Higher qualifications in Science:*** The data indicates that out of 21 schools only three schools having non higher qualified teacher in science.
   (See the graph-1)

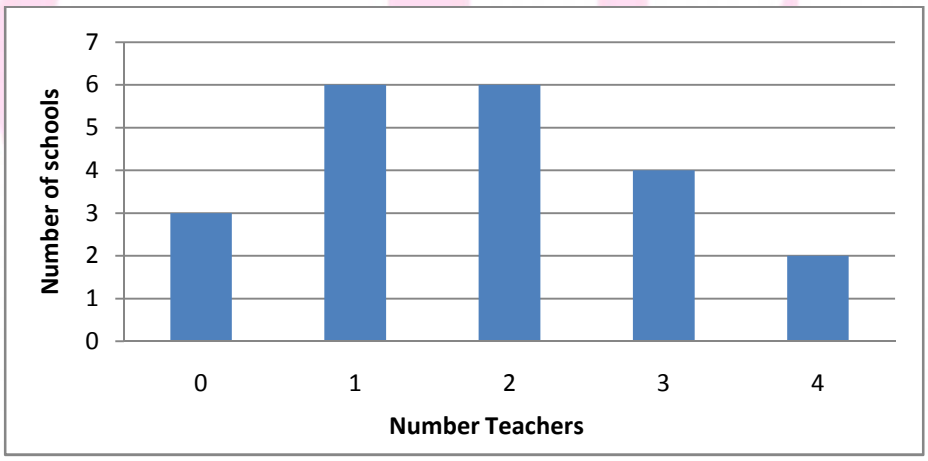



Fig-1: Teacher with higher qualifications

4. ***Encouragement of students to develop understanding about science:*** It is very clear that practical work in itself does not automatically improve learning in science rather it must be fully integrated as a major element of effective pedagogy in science. In this study some effective learning motives were given to choose in order to know the importance pedagogical development in science education. The percentages of responses according to their frequent responses in rank order are given on the Table-2.

***Table-2:*** *Pedagogical importance of practical*

| Sr. No. | Purpose | % of respondents |
|---|---|---|
| 1 | Both equally (theory + practical) | 85 |
| 2 | Field work | 79 |
| 3 | TLM models | 75 |
| 3 | More practical experiments | 71 |
| 4 | Group projects | 52 |
| 5 | More theory classes | 48 |
| 6 | Visits | 46 |
| 7 | ICT simulations | 42 |
| 8 | Presentations | 25 |

5. ***Experiments performed in Std. 6th, 7th and 8th.*** : In order to know the number of laboratory session taken in the specific class viz. 6th, 7th and 8th the related question was asked and the responses are as following Figure-2.

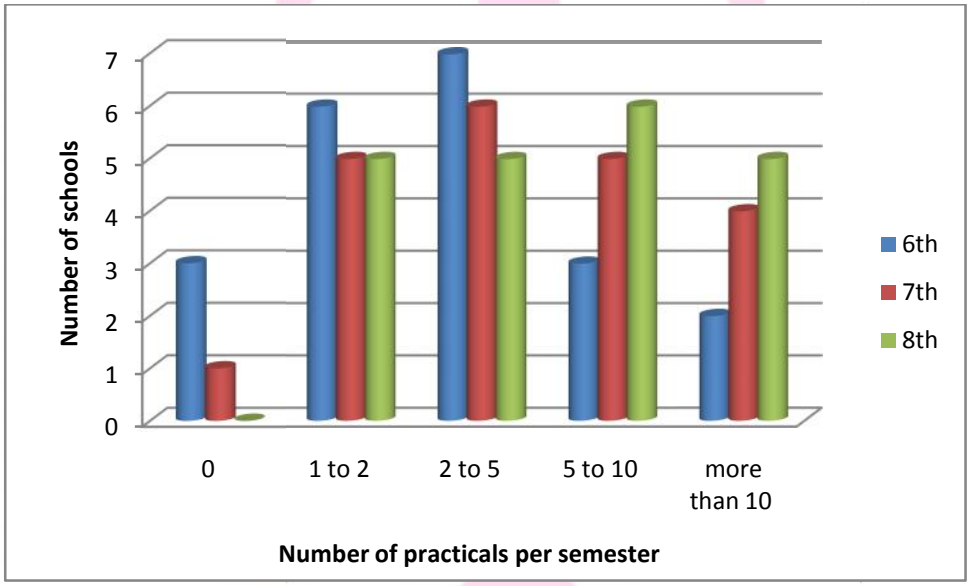



Fig-2: Number of experiments thought in the semester

6. ***Frequency of students' laboratory visits:*** in order to know the continuous laboratory visit is done or not in the schools among the study area related question was asked and the findings are as per the graph shown in the fig-3. This indicates that most of

schools allow students for laboratory visit either, ones in a week or ones in the fortnight.

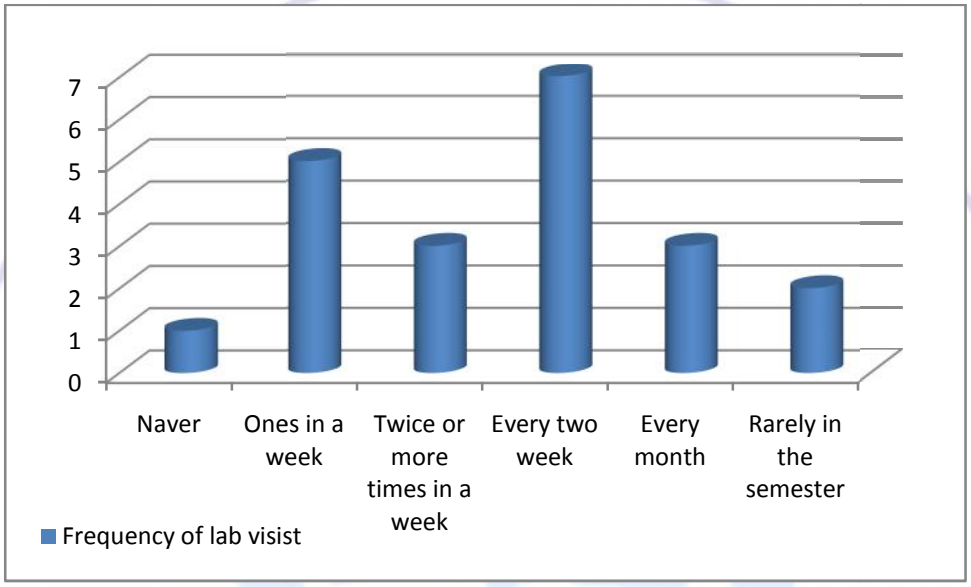



Fig-3: Frequency of lab visits

7. ***Why practical should be there in the curriculum?*** In order to know about the teacher's scientific teaching learning attitude and understanding of methodological aspects related question was asked. From the findings of the individual responses to this item, it is clear that practical work in science is well-embedded in the professional life of teachers of science and that there is an almost universal expectation that a teacher will develop expertise in this, in time. See the Table-3 for the percentages of responses according to their frequent responses in rank order.

***Table-3***: *Objectives of practical work in science*

| Sr No. | Objective of practical work | % of respondents n=48 |
|---|---|---|
| 1 | Teach Skills | 90 |
| 2 | Show how science works | 85 |
| 3 | Linking theory to practical | 81 |
| 4 | Motivate the students | 79 |
| 5 | Teach concepts | 73 |
| 6 | Develop creativity | 73 |
| 7 | Encourage team work | 63 |
| 8 | Cultivate curiosity | 54 |
| 9 | Understanding investigation process | 48 |
| 10 | Make learning a fun | 35 |

8. ***% of practical performed according to curriculum.*** According to the data identified in this item the pie chart (figure-4) indicates that very less number of schools perform

100 % practical according to the decided curriculum. Most of schools perform 50% or more than 50% practical according to defined curriculum.

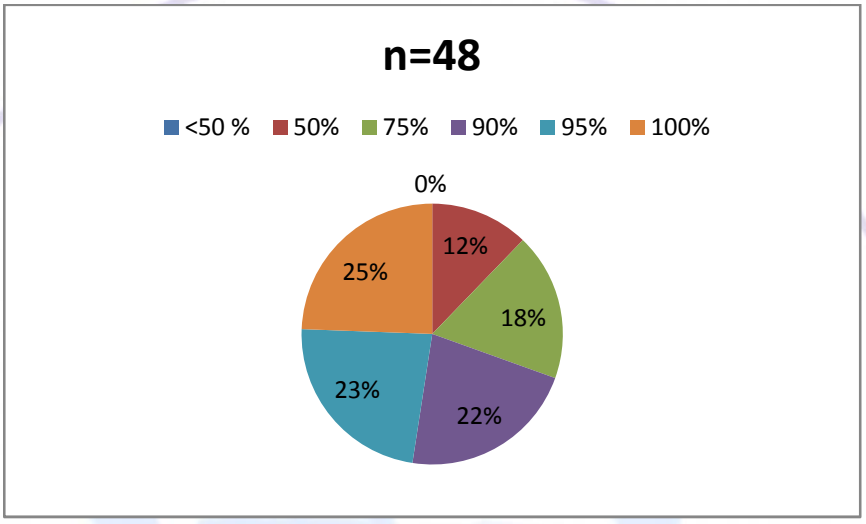


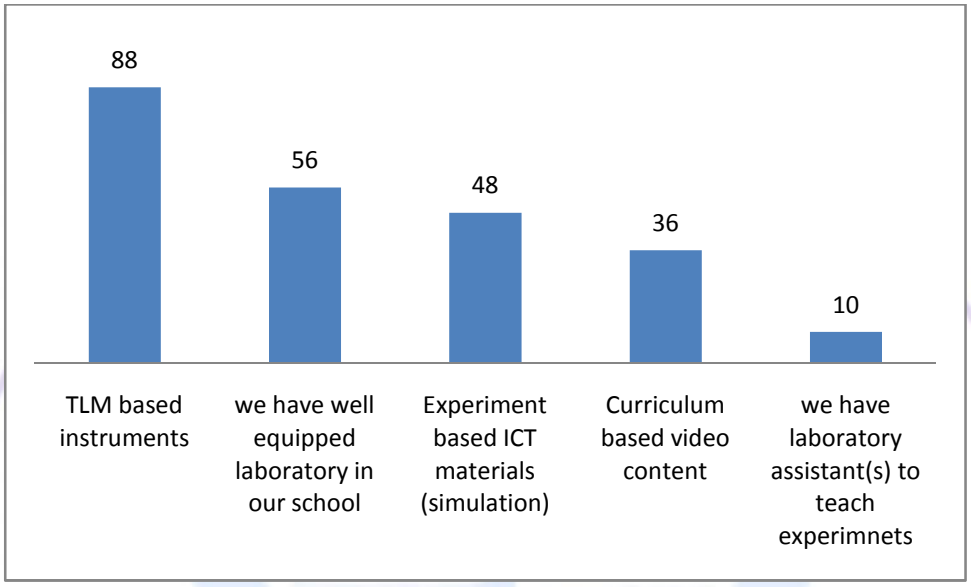

Fig-4:% of practical performed according to curriculum

9. ***Various assessment strategies:*** Assessment of students' progress is also most important for over all development. For this matter we have incorporated related question in the study tool. The results indicate various tools for student's assessment given in the Table-4. Most of schools evaluate the students equally focused on theory, assignments, practical and project based methods. Surprising results obtained in this item was that none of the school uses more focused on practical based evaluation or only project or practical based evaluations.

***Table-4***: Assessment tools used by teachers

| Sr No. | Tool | % of respondents n=48 |
|---|---|---|
| 1 | equally focused on theory, assignments, practical and project based | 95 |
| 2 | equally focused on practical and theory based evaluations | 80 |
| 3 | more focused on writing exam | 75 |
| 4 | more focused on writing Assignments | 24 |
| 5 | more focused on practical based evaluation | 0 |
| 6 | only project or practical based evaluations | 0 |

10. ***Resources are available for teaching science practical:*** in this item we found that most of schools are having sufficient scientific tools or equipments to do practical work in the upper primary level. Figure-5 indicates the % of different types of practical material available with schools in the study area. As most of the schools are old and working in since long, they have enough amount of teaching learning modules useful for practical based education.




11. ***Barriers for teaching practical in upper primary:*** As it was expected that in spite of sufficient equipment some school can't give practical oriented learning experiences to the students. For this we had incorporated a typical question in our tool that why does their current practice (of teaching practical science) vary from their ideal. If any barrier is there in their teaching activity of science with practical approach in upper primary. The results indicated some typical barriers shown in the table

***Table-5***: *Barriers in practical based approach of teaching*

| Sr No. | Barrier | % of respondents n=48 |
|---|---|---|
| 1 | Non teaching work load | 78 |
| 2 | Technical support from management | 67 |
| 3 | Time (for preparation) | 65 |
| 4 | students' behavior | 53 |
| 5 | Lake of specific training about practical teaching | 46 |
| 6 | Exams and assessment | 29 |
| 7 | Resources and facilities | 20 |
| 8 | Teachers' own experience | 16 |
| 9 | Support from colleagues | 16 |
| 10 | Class size (number of students is high) | 16 |
| 11 | None of the above (no Barriers) | 7 |

**Conclusions:**

Based on the evidence obtained during this study there is an overall positive attitude towards practical work in the upper primary level education in the study area. More over there are some good examples but there are also several messages that need to be addressed:

- The current assessment methods are damaging practical science.

- Although many teachers are dissatisfied with the amount of time and resources for practical work and some have experienced falls in facilities, the time devoted to it is still considerable importance.
- Guidance and proper trainings to inexperienced teachers can build confidence in practical science.

**References:**

Abrahams, & Millar, R. (2008). Does practical work really work? a study of the effectiveness of practical work as a teaching and learning method in school science. *Journal of Science Education, 30* (14), 1945–1969.

Bell, D. e. (2008). *Practical work in science: a report and proposal for a strategic framework.* 6-9 Carlton House Terrace,, Department for Children, Schools and Families and the Gatsby Charitable Foundation. London SW1Y 5AG: SCORE - Science Community Representing Education.

Dillon, J. (2008). *A Review of the Research on Practical Work in School Science.* London: King's College.

Hodson, D. (2005). Towards research-based practice in the teaching laboratory. *dies in Science Education, 41* (1/2), 167–177.

Jenkins, E. W. (1999). Practical work in school science - some questions to be answered. In A. C. Paulsen (Ed.), *Practical Work in Science Research Recent Research Studies* (pp. 19-32). Frederiksberg: Roskilde University Press.

Lunetta, V. N., Hofstein, A., & Clough, M. P. (2007). Teaching and learning in the school science laboratory. An analysis of research, theory, and practice. In S. K. Abell, & N. G. Lederman, *Handbook of research on science education* (pp. 393-431). Mahwah, NJ: Lawrence Erlbaum Associates.

Millar, R. (2004). *The role of practical work in the teaching and learning of science.* University of York, Department of Educational Studies,. Washington, DC: National Academy of Sciences.

Paper Received : 8th November, 2016

Paper Reviewed : 24th December, 2016

Paper Published : 1st January, 2017