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# PREPAREDNESS OF PHYSICAL SCIENCE TEACHERS FOR CURRICULUM CHANGES AND EVALUATION PROCEDURES AT SECONDARY LEVEL - A STUDY

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## ABSTRACT

*This paper discusses the physical science teacher's preparedness, curriculum changes and evaluation procedures at secondary school level. The government observes that the exercise revising school curriculum, with the aim to revitalize school education can't be achieved without addressing the need for creating reflective teaching practitioners. It envisions that the learning inputs in new teacher education programmes will be predominantly learner oriented as it would provide for variety in learning exposures, accommodate differential learning and encourages divergence, reflection and insightful treatment of a learning situation. The exercise of revising a curriculum also provides for critical examination of diverse social conditions of learners, larger issues of social disparity, inequity, gender divide and field specific administration and organisational anomalies. All these contribute to each teacher evolving one's own conviction about teaching as a profession and a professional commitment. There is an urgent need to model effective and practical teacher professional development strategies that put the physical science teachers' real context at the centre, and employ it to engage them in modes that will mobilize them for change and professional growth.*

**KEYWORDS:** *Preparedness, Curriculum Changes, Evaluation Procedures.*

## INTRODUCTION

Education is an activity which is undertaken to fulfil the needs of both the individuals and the society at the same time. School in general and classrooms specifically are places where many processes take place such as teaching, learning and evaluation. Teaching, learning and evaluation are interdependent and a science teacher should take these aspects together to make teaching learning process effective.

A Learning Outcome is a statement of an intended result of learning and teaching. It describes knowledge, skills and values that learners should acquire by the end of the Further Education and Training band (Grades 10 to 12). Assessment Standards are criteria that collectively describe what a learner should know and be able to demonstrate at the end of a specific grade. Such standards embody the knowledge, skills and values required to achieve the Learning Outcomes. Assessment Standards within each Learning Outcome collectively show how conceptual progression occurs from grade to grade (DoE, 2003:7).

## RATIONALE FOR USING THE REVISED BLOOM'S TAXONOMY (RBT)

The use of the RBT, which is a two-dimensional table, was a move away from the restrictive hierarchical original taxonomy. The notion of a cumulative hierarchy has been removed so that a student may use a higher-order cognitive skill without a lower-order one (Anderson, 2005:106). For example, a student may be applying a law (say Newton's first law) without necessarily understanding the law. The cognitive complexity at a lower level may be greater than at a higher level. These points are emphasised by Krathwohl (2002:215) when he states: However, because the revision gives much greater weight to teacher usage, the requirement of a strict hierarchy has been relaxed to allow the categories to overlap one another. This is most clearly illustrated in the case of the category Understand. Because its scope has been considerably broadened over Comprehend in the original framework, some cognitive processes associated

with Understand (e.g. Explaining) are more cognitively complex than at least one of the cognitive processes associated with Apply (e.g. Executing).

Mayer (2002:226) posited the idea that the revised taxonomy is aimed at broadening the range of cognitive processes so that meaningful learning can occur. This can be achieved by not only promoting retention of material but transfer as well which entails the ability to use what was learned to solve new problems. This is particularly relevant in Physical science where the learner must solve problems that they have not encountered before by applying their prior knowledge. Nasstrom (2009:40) has also shown that the revised taxonomy is useful as a categorisation tool of the standards for the following reasons:

1. It is designed for analysing and developing standards, teaching and assessment as well as of emphasising alignment among these main components of an educational system.
2. It has general stated content categories which allow comparisons of standards from different subjects.
3. In a study where standards in chemistry were categorised with two different types of models, Bloom's revised taxonomy was found to interpret the standards more unambiguously than a model with topics-based categories.

This particular alignment study focuses on the range of competences per content area within Physical Sciences using the RBT. The two-dimensional structure of the RBT allows for teachers to increase the cognitive complexity of their teaching which may lead to meaningful learning (Amer, 2006:224- 225).

Given this background, one can argue that research on teacher development needs to grapple with and be embedded in teachers' real contexts, in ways that are supportive and empowering to the teacher's role in the classroom. There is an urgent need to model effective and practical teacher professional development strategies that put the science teachers' real context at the centre, and employ it to engage them in modes that will mobilize them for change and professional growth.

## NEED OF THE STUDY

Science curriculum has changed over time and the job of science teacher has become more challenging now; Teacher is no more only a provider of information. Students come to class with their own experiences and lots of information and questions as they have access to information from other sources such as internet, media, variety of books, science magazines and supplementary reading materials. Sometimes a student challenges teacher's knowledge. Teachers are required to have updated knowledge and should be ready to verify and validate their own knowledge. In this aspect we need do research in particular issues like

1. Preparedness of Physical Science Teachers
2. Curriculum changes in Physical Sciences.
3. Evaluation procedures in Physical Sciences.

## OBJECTIVES OF THE STUDY

- To create awareness about preparedness of physical science teachers towards physical science curriculum.
- To identify the curriculum changes in physical sciences.
- To analyse the evaluation procedures in physical sciences.
- To know about the physical science teachers attitudes towards physical science curriculum.

## HYPOTHESES

1. There is no significant difference between male and female physical science teachers towards preparedness for curriculum.
2. There is no significant difference between male and female physical science teachers towards curriculum changes in physical science.
3. There is no significant difference between male and female physical science teachers towards evaluation procedures in physical sciences.

4. There is no significant difference between government and private physical science teachers towards preparedness for curriculum.
5. There is no significant difference between government and private physical science teachers towards curriculum changes in physical science.
6. There is no significant difference between government and private physical science teachers towards evaluation procedures in physical sciences.
7. There is no significant difference between rural and urban physical science teachers towards preparedness for curriculum.
8. There is no significant difference between rural and urban physical science teachers towards curriculum changes in physical science.
9. There is no significant difference between rural and urban physical science teachers towards evaluation procedures in physical sciences.

## METHODOLOGY

The investigator selected survey method for this research. For this, a questionnaire prepared and information collected from teachers working in secondary schools regarding Preparedness of Physical Science Teachers, Curriculum changes in Physical Science, Evaluation procedures in Physical Science.

## TOOL

The tool consisted of 3 Areas related to the secondary schools regarding Preparedness of Physical Science Teachers, Curriculum Changes in Physical Science, and Evaluation Procedures in Physical Science.

**Table 1: Area Wise Items**

| S.No. | Area | No. of Items |
|---|---|---|
| I | Preparedness of Physical Science Teachers | 10 |
| II | Curriculum changes in Physical Science | 16 |
| III | Evaluation procedures in Physical Science | 10 |
| | Total | 36 |

## CONSTRUCTION OF THE TOOL

The present investigation is intended to study the perceptions of teachers on secondary schools regarding Preparedness of Physical Science Teachers, Curriculum changes in Physical Science, Evaluation procedures in Physical Science. After going through various previous investigations and research articles in journals and periodicals and some of the research papers published on the subject matter, the investigator has taken the present research problem, 'Preparedness of Physical Science teachers for Curriculum changes and Evaluation procedures at Secondary Level - A study.

## POPULATION AND SAMPLE OF THE STUDY

From the Population the researcher selected 100 Secondary School Physical Science teachers as sample working in secondary schools in Visakhapatnam District were randomly chosen for this study from various schools.

## DATA ANALYSIS

**Table 2: Significant difference between Male and Female Physical Science Teachers towards Preparedness, Curriculum Changes and Evaluation Procedures in Secondary Schools**

| Area | Gender | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|---|
| Awareness on Preparedness of Physical Science Teachers | Male | 80 | 40.96 | 2.73 | 0.74 NS | 0.46 |
| | Female | 20 | 41.69 | 4.90 | | |
| Curriculum changes in Physical Science | Male | 80 | 40.96 | 4.33 | 0.92 NS | 0.36 |
| | Female | 20 | 39.92 | 5.35 | | |
| Evaluation procedures in Physical Science | Male | 80 | 39.82 | 5.34 | 0.35 NS | 0.73 |
| | Female | 20 | 39.36 | 6.09 | | |

*NS-Not Significant.*

Table-2 depicts that the mean scores of female physical science teachers with respect to preparedness (41.69) is faintly higher than the mean score of Male physical science teachers (40.96). The t-value is found to be 0.74 and the p-value is 0.46 which is not significant. This shows that there is no significant difference between female and male physical science teachers with respect to preparedness. Hence, the hypothesis-1 is accepted.

With regard to curriculum changes in Physical Science, the mean scores of male physical science teachers (40.96) are faintly higher than the mean score of female physical science teachers (39.92). The t-value is found to be 0.92 and the p-value is 0.36 which is not significant. This shows that there is no significant difference between male and female physical science teachers with respect to curriculum changes in physical science. Hence, the hypothesis-2 is accepted.

With regard to resources available in the schools for Evaluation procedures in Physical Science, the mean scores of male physical science teachers (39.82) is faintly higher than the mean score of female physical science teachers (39.36). The t-value is found to be 0.35 and the p-value is 0.73 which is not significant. This shows that there is no significant difference between male and female physical science teachers with respect to resources available in the schools for evaluation procedures in physical science. Hence, the hypothesis-3 is accepted.

**Table 3: Significant difference between Rural and Urban area Physical Science Teachers towards Preparedness, Curriculum Changes and Evaluation Procedures in Secondary Schools**

| Area | Locality | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|---|
| Awareness on Preparedness of Physical Science Teachers | Rural | 20 | 42.33 | 2.74 | 0.71 NS | 0.48 |
| | Urban | 80 | 41.38 | 4.58 | | |
| Curriculum changes in Physical Science | Rural | 20 | 40.83 | 3.64 | 0.45 NS | 0.65 |
| | Urban | 80 | 40.13 | 5.26 | | |
| Evaluation procedures in Physical Science | Rural | 20 | 39.17 | 6.04 | 0.20 NS | 0.84 |
| | Urban | 80 | 39.53 | 5.88 | | |

*NS-Not Significant.*

Table-3 showing the mean scores of rural area Physical Science teachers with respect to Awareness on Preparedness of Physical Science Teachers (42.33) is faintly higher than the mean score of urban area Physical Science teachers (41.38). The t-value is found to be 0.71 and the p-value is 0.48 which is not significant. This shows that there is no significant difference between rural and urban area physical science teachers with respect to awareness on preparedness of physical science teachers. Hence, the hypothesis-4 is accepted.

With regard to curriculum changes in Physical Science, the mean scores of rural area Physical Science teachers (40.83) is faintly higher than the mean score of urban area Physical Science teachers (40.13). The t-value is found to be 0.45 and the p-value is 0.65 which is not significant. This shows that there is no significant difference between rural and urban area physical science teachers with respect to curriculum changes in physical science. Hence, the ypothesis-5 is accepted.

With regard to resources available in the schools for evaluation procedures in Physical Science, the mean scores of urban area Physical Science teachers (39.53) is faintly higher than the mean score of rural area Physical Science teachers (39.17). The t-value is found to be 0.20 and the p-value is 0.84 which is not significant. This shows that there is no significant difference between urban and rural area physical science teachers with respect to resources available in the schools for evaluation procedures in physical science. Hence, the hypothesis-6 is accepted.

**Table 4: Significant difference between Government, Private Unaided and Aided School Physical Science Teachers Attitudes towards Preparedness, Curriculum Changes and Evaluation Procedures in Secondary Schools**

| Area | Management | N | Mean | SD | F | p-value |
|---|---|---|---|---|---|---|
| Awareness on Preparedness of Physical Science Teachers | Govt. | 24 | 39.82 | 4.60 | 12.98** | 0.00 |
| | Private Unaided | 43 | 45.10 | 3.42 | | |
| | Private Aided | 33 | 41.87 | 2.94 | | |
| Curriculum changes in Physical Science | Govt. | 24 | 38.90 | 5.85 | 5.36* | 0.01 |
| | Private Unaided | 43 | 43.10 | 3.13 | | |
| | Private Aided | 33 | 40.47 | 3.93 | | |
| Evaluation procedures in Physical Science | Govt. | 24 | 37.90 | 5.87 | 7.97** | 0.00 |
| | Private Unaided | 43 | 43.70 | 4.96 | | |
| | Private Aided | 33 | 39.33 | 5.16 | | |

***Significant at 0.01, *Significant at 0.05 level & NS-Not Significant.*

Table-4 shows that the mean opinion scores of teachers based on their school management with respect to Awareness on Preparedness of Physical Science Teachers, for government school Physical Science teachers is 39.82, for private unaided school Physical Science teachers is 45.10 and for private aided school Physical Science teachers is 41.87. The Std. Dev. Values are 4.16, 3.42 and 2.94 respectively. The F- value is found to be 12.98 and the p-value is 0.00 which is significant at 0.01 level. This shows that there is significant difference among teachers opinion based on their school management with respect to awareness on preparedness of physical science teachers. Hence, the hypothesis-7 is rejected.

With regard to curriculum changes in Physical Science that, the mean opinion scores of teachers based on their school management with respect to curriculum changes in Physical Science for government school Physical Science teachers is 38.90, for private unaided school Physical Science teachers is 43.10 and for private aided school Physical Science teachers is 40.47. The Std. Dev. Values are 5.85, 3.13 and 3.93 respectively. The F- value is found to be 5.36 and the p-value is 0.01 which is significant at 0.05 level. This shows that there is significant difference among physical science teachers opinion based on their school management with respect to curriculum changes in physical science. Hence, the hypothesis-8 is rejected.

With regard to resources available in the schools for evaluation procedures in Physical Science, the mean opinion scores of Physical Science teachers based on their school management with respect to evaluation procedures in Physical Science, for government school teachers is 37.90, for private unaided school Physical Science teachers is 43.70 and for private aided school Physical Science teachers is 39.33. The Std. Dev. Values are 5.87, 4.96 and 5.16 respectively. The F-value is found to be 7.97 and the p-value is 0.00 which is significant at 0.01 level. This shows that there is significant difference among physical science teachers opinion based on their school management with respect to resources available in the schools for evaluation procedures in physical science. Hence, the hypothesis-9 is rejected.

## FINDINGS OF THE STUDY

1. There is no significant difference between male and female teacher's perceptions with respect to preparedness of physical science teachers, curriculum changes in physical science, and evaluation procedures in physical science in secondary schools.
2. There is no significant difference between rural and urban area teacher's perceptions with respect to preparedness of physical science teachers, curriculum changes in physical science, and evaluation procedures in physical science in secondary schools.
3. There is a significant difference among teachers perceptions based on their school management with respect to preparedness of physical science teachers, curriculum changes in physical science, evaluation procedures in physical science in secondary schools.

## EDUCATIONAL IMPLICATIONS

- Government need to provide facilities to all schools for meeting the challenges in a global scenario.
- New curriculum plans should be prepared for strengthening the secondary education.
- Supervision is needed for monitoring the teachers to motivate regularly and indentifies the gaps in the teaching learning process.
- Evaluation techniques should be upgrade for better results in secondary education.
- Innovative motivational techniques needs for the readiness of the job and its implications.
- More research is needed for the better planning to implementation of secondary education.
- Allocate funds to construct physical science laboratories in the school and also recruit lab assistants for useful to the students and also teachers.
- Conduct Science Exhibitions actively for updating the knowledge and thinking innovatively.
- Seminars, Workshops are needed for the better understanding of the different aspects of physical science.

## CONCLUSION:

Several recommendations emerged because of the findings of this study. The increased emphasis on preparedness of physical science teachers, curriculum changes in physical science, evaluation procedures in physical science. Some recommendations may require some form of curriculum change. The employment of laboratory assistants could be a positive step in enhancing and fulfilling the present emphasis on hands on experiments for the science learners. When this is achieved, future reforms in science education may require that learners carry out experiments as part of their examinations.

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