International Journal of Social Policy and Education
Vol. 1, No. 2; December, 2019. pp 114-126
ISSN 2689-4998 (print), 2689-5013 (online)

Published by International Center for Promoting Knowledge
DOI: 10.61494/ijspe.v1n2a11
URL: https://doi.org/10.61494/ijspe.v1n2a11

Necessary Pedagogical Skills for Teaching General Science to Elementary Classes in an Evolving Educational Context

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Abstract

Generally, in Pakistan, teacher's performance is measured in terms of students' achievements in internal and external examinations. Maximum marks is the centre of attention for teachers while around the world, the actual classroom situation has been changed due to different push and pull factors in teaching learning process and these factors are also affecting the Pakistani classrooms. Curriculum of teacher training programs is considered a vibrant force that train the teachers to decorate new generation with skills necessary for survival in the changing context of 21st century. There is a perception that a mismatch exists between the curriculum of teacher training programs and the actual classroom situations. To meet the needs of evolving context, teacher training programs are needed such a curriculum that fabricate reflective practioners. The objective of the study was to find the opinion of in service teachers about the curriculum of general science in teacher training program B. Ed with focus on pedagogical skills. The sample for the study was 45 in-service teachers teaching general science to elementary classes. A questionnaire was developed to explore the opinion of the teachers of general science about the potential of curriculum of teaching of general science in B. Ed with focus on pedagogical skills. Statistical test ANOVA was used to calculate the difference among the teachers of class VI, VII and VIII about learning of pedagogical skills for teaching of science in teacher training program (B. Ed) for teaching science to the elementary classes. It is found that student-teachers are trained to apply different pedagogical skills for teaching science to produce students who have conceptual understanding in the evolving context.

Introduction

Teacher is considered the core element in the whole teaching learning process. Teacher's subject knowledge, pedagogical and communication skills, blending of new concepts in the field and its proper usage propose an effective teacher. Innovative technologies make teaching learning process more smart and at the same time it has its own demands. New technologies shift the knowledge, generated in any corner of the world to other corner within seconds that helps the teachers in any part of the world to absorb it and make their teaching more cool and attractive. Parallel to this, the birth of this new knowledge forces the learning organizations to decorate their curriculum with the current ongoing practices to meet the challenges of the world.

It is teacher training curriculum that is responsible to equip the teachers with latest subject knowledge and its pedagogical skills to use in the classroom effectively. It is necessary that teacher training curriculum must be aligning with the school curriculum so that teachers match the learning in teacher training program with the teaching in the classroom to maximize the efficiency.

In Pakistan, the field of science education is facing different problems. The ratio of science graduates to arts graduate is not balanced. National Education Policy (1998-2010, p.84) envisage that the ratio of Arts and Science subjects is 71:29 [at higher education] and claims that it shall be progressively brought to 50:50. This figure shows that majority of the students say goodbye to science subjects after matriculation. It is also an observation that students want to join science stream at secondary or higher secondary level but non-availability of science teachers especially in remote areas force them to move to arts subjects.

National Education Policy (1998-2010, p.38) predict that science graduates tend to seek employment in other technical areas, if possible and join teaching as their last resort. The main objectives of teaching science in teacher training program (B. Ed) are to prepare the student-teachers to teach the science at school level and generate understanding of phenomenon all around and find hidden facts for the benefit of humanity. It is said that curriculum of science in teacher training B. Ed does not prepare the teachers properly, especially in pedagogical skills; student-teachers get through the examination on the base of their academic learning and the aspects of pedagogical skills are not addressed properly in the teacher training programs.

Literature

Currently, we can see science in action everywhere. It is science that has done so many things possible which were unbelievable in the past. Learning of General science at school level provides a base for higher level learning. Spencer and Walker (n.d) are of the view that the love and/or interest in science education begin in elementary schools. Younger children tend to be more curious and motivated to learn. The pipeline for increasing the number of people interested in science fields begins in these formative years. Effective science teaching helps students develop conceptual understandings and inquiry abilities necessary to be productive citizens and science learners (Davis and Arbor, 2008).

In Pakistan, curriculum of teacher training program (B. Ed) is blamed that it has less potential to prepare the student-teachers for working in an evolving context where content knowledge, pedagogical skills and integration of new knowledge in the existing curriculum is necessary. National Education Policy (1998-2010) envisages that quality teaching depends on quality teachers and show dissatisfaction over the teachers. In the current scenario, emphasized is given to prepare the science teachers decorated with content knowledge and pedagogical skills as well. Pardhan (2005) states that in Pakistan, studies paint a grim picture of teacher knowledge base and classroom practice in general, and science education in particular. National Education Policy (2009, p.44) make a promise that in-service teacher training in science shall be based on real life situations, use of science kits and provision of science kits to all primary and middle schools.

It is a fact that principles, laws and theories in science cannot be understand by reading them, practical work can add much more in the theoretical knowledge to understand the concepts and ideas which are working behind the scene. It is also a common perception that teacher training programs do not offer opportunities to do practical work for more clarification and justification.

Akbar (n.d) conducted a study entitled “Mind the Fact: Teaching Science without Practical as Body without Soul” and recommended that refresher courses for science teachers may be organized to nurture them in holding laboratory work activities and content of theory may be taught in alignment with its practical activities.

Objective of the Study

The objective of the study was to find the opinion of in-service teachers about pedagogical skills for teaching general science taught in teacher training program B. Ed.

Delimitation of the Study

The study was delimited to the

1. Pedagogical skills for teaching of General science in teacher training program (B. Ed).
2. Teachers of Boys schools of Federal Directorate of Education (FDE) situated in urban areas of Islamabad.

Method and Material

Sample

The sample of the study was the teachers who were engaged in teaching science to elementary classes (VI-VIII) in Model schools of Islamabad who belonged to all four provinces of Pakistan. The sample teachers have completed their teacher training program B. Ed from teacher training institutes of their areas.

For the current research, multi stage sampling technique was used, at first stage; 15 Islamabad Model Schools (I-X) of Federal Directorate of Education (FDE) located in urban areas were selected (available at www.fde.edu.pk).

At the second stage, from each sample school, 3 teachers (one from each class i.e VI-VIII) engaged in teaching General science to elementary classes were randomly selected. The teachers were divided into three groups on the basis on class. The final sample for the current study is as under:

Final Sample

Table No. 1
Total Number of Schools

Islamabad Model Schools (I-X) in Urban Area	Class			Total Number of Teachers
	VI	VII	VIII	
15	15	15	15	45

Instrument

A questionnaire on five-point Likert scale (Strongly Agree=SA, Agree=A, Uncertain=UNC, Disagree=DA, Strongly Disagree=SDA) was developed. There were 10 statements in the questionnaire regarding pedagogical skills for teaching science. The major focus was on the pedagogical skills learnt in teacher training program (B. Ed) and their practical applications for teaching science in the classrooms.

Validity and Reliability

For validation, the questionnaire was presented to 5 teacher trainers who were teaching science to student-teachers and were requested to validate it keeping in view the objective of the study. They were also invited to suggest the steps for the improvement of the statements. They pointed out some gaps which were addressed in the light of their suggestions.

To measure the reliability of the questionnaire, a pilot study was done on 10 teachers of FDE schools who were teaching science to elementary classes. The reliability of the questionnaire was measured through Cronbach's Alpha which was 0.62. The teachers who participated in pilot study were not included in the final sample.

Administration of the Instrument

The final version of the questionnaire was administered to the sample teachers by the researcher; some help was also taken by the teachers of sample schools to approach the sample teachers. There was attached a cover letter with each questionnaire to describe the objective of the study. The sample teachers were also contacted through mobile to request them to return the filled questionnaire.

Data Analysis

Statistical tests one-way between-groups analysis (ANOVA) of variance was used. It tells whether there are significant differences in the total scores of the three groups of teachers on the dependent variable (pedagogical skills).

Table No.2

Class Wise Number of Teachers

Class	N	Mean	Std. Deviation
VI	15	38.0667	3.99046
VII	15	39.4000	1.99284
VIII	15	39.5333	2.87518
Total	45	39.0000	3.06742

Table No. 2 gives information about number of teachers from each class, their mean scores, and standard deviation.

Table No. 3

Homogeneity of Variance

Levene Statistics	Df1	Df2	Sig
1.615	2	42	.211

Table No. 3 provides sig value that is 0.211 which is greater than 0.05, it means that the assumption of homogeneity of variance has not been violated.

Table No. 4

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.733	2	9.867	1.051	.359
Within Groups	394.267	42	9.387		
Total	414.000	44			

Table No. 4 tells the sig value 0 .359 that is greater than 0.05, it means there is no significant difference among the total scores of teachers about learning pedagogical skills for teaching science to elementary classes.

Results

Teachers were divided into three groups according to the class to whom they were teaching General science. A one-way between-groups analysis of variance (ANOVA) was run and no statistically significant difference at 0.05 level was found. All the teachers agreed that during teacher training program (B. Ed), pedagogical skills of particular subjects are discussed and an environment is provided to the student-teachers to practice these pedagogical skills, in addition, during practicum, student-teachers are observed by the experts. Moreover, student-teachers are trained to develop conceptual understanding and inquiry abilities among the students and make teaching science a fun through real world applications.

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Questionnaire

Sr. No	**Statement**	**SA**	**A**	**UNC**	**DA**	**SDA**
1	During teacher training program, particular subject wise pedagogical skills are discussed.					
2	In teacher training program, student-teachers are provided an environment to practice pedagogical skills.					
3	Student- teachers are trained to develop conceptual understanding and inquiry abilities.					
4	In teacher training program, student-teachers are guided to elaborate the scientific concepts through experiments.					
5	During teacher training program, student- teachers are involved in practicum to apply the pedagogical skills.					
6	During practicum, student- teachers are observed by the experts.					
7	Student- teachers' problems are discussed in the class and solutions are suggested by the teachers.					
8	During training, evolving concepts relevant to pedagogical skills of science are highlighted to integrate in the existing curriculum.					
9	Student-teachers are trained to teach General science through inquiry method.					
10	Student- teachers are trained to make teaching science a fun through real world applications by experiments.					