

Effect of Teachers' Professional Education on Students' Achievement in Mathematics

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Abstract

The purpose of the study was to compare the effectiveness of teaching of professionally trained and untrained teachers and the effect of students' gender on secondary school students' achievement in Mathematics. Data were collected from four public and private boys and girls high schools' record. Four hundred secondary school graduates (Two hundred boys and two hundred girls) taught by trained and untrained teachers of mathematics were selected conveniently. The results of the study supported the fact that the students taught by trained teachers showed better results in Mathematics and gender has no significant effect on achievement in mathematics.

Key words: Trained/ untrained teachers, Gender difference, Mathematics achievement

Introduction

Education is systematic instruction for the development of character or mental power. Rao (2001) quoted that in an education conference, father of the nation Quaid-e-Azam Muhammad Ali Jinnah addressed that education does not merely mean academic education. There is immediate and urgent need for giving scientific and technical education to our people in order to build up our future. Education is synonymous to learning, instruction, teaching, acquiring knowledge and guidance. The success of our educational system depends on good teachers. We cannot replace the teacher with any other type of instructional material (Hanif & Saba, 2002). Teacher is a role model for students. He/She is that person who transfers his knowledge in students' mind in a systematic way. The importance of the role of the teacher as an agent of change, promoting understanding and tolerance, has never been more obvious than today (Delors, Mufti, Amagi, Carneiro, Chung, Geremek, Gorham, Kornhauser, Manley, Quero, Savane, Singh, Stavenhagen, Suhr, Won, & Nanzhao, 1996). According to Charis (1989), effective teaching is essentially connected with how best to bring about the desired pupil learning by some educational activity. It requires a lesson

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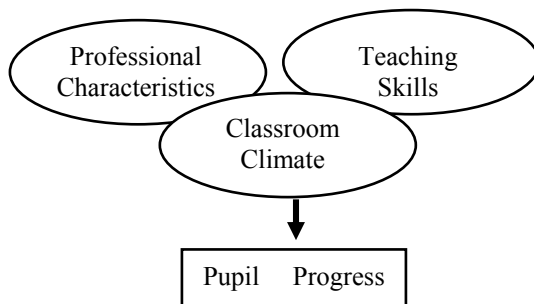
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organization which can be adequately monitored. The teacher might have to be not only a clarifier of ideas and presenter of information, but also an advisor and model of scientific thought.

Many people teach, some are effective, they maintain student interest in subject matter and then a few are truly great they have spent much time in learning to be effectively. Effective teaching is bail of bright future whereas ineffective depress the environment (Hanif & Saba, 2002). Some evidence suggested that factors like class size, teacher qualification, school size and other school variables may play an environmental role in student's achievement (Linad, 1999). Mathematics teaching is a field in which knowledge of the subject matter is the first necessity. Teaching mathematics, however, involves more than knowing and enjoying the subject. The mathematics teacher must be able to motivate his students, he must be able to guide them to discover ideas and he must be able to evaluate the achievement of his students.(Mayor, 2005).Mathematical abilities are not innate, but are properties acquired in life that are formed on the basis of certain inclinations.

Some persons have inborn characteristics in the structure and functional features of their brains which are extremely favorable to the development of mathematical abilities. Anyone can become an ordinary *mathematician* and one must be born an outstandingly talented one (Orton, 2001). Teachers take help of different methods for their proper working. These methods are pattern of teacher behaviour that recurrent, applicable to various subject matter, characteristics of more than one teacher and relevant to learning (Farooq, Hussain & Mahmood, 2005). Successful teaching experience prior to professional training is also a valuable asset. Every teacher of mathematics should prepare himself professionally (Sidhu, 1992). Professional training is to educate a person so as to be fitted, qualified and proficient in doing some job (Dahama, 1997). Skills of teaching and good qualities can not be developed in teacher within a short span of training. Training say reorientation of higher education and teacher will help the prospective teachers to understand the environment of the learner and how to modify it (Panda, 1997). According to Moore (2004), teachers are trained in the acquisition of certain competencies related to aspects of classroom management, long-term medium-term and short-term planning, recording and reporting students' work leading to the achievement of prescribed, assessable and (presumably) acquired-for-life 'standards'. A good teacher is kind, is generous, listens to students, encourages them, has faith in them, keeps confidences, likes teaching children, likes teaching their subjects, takes time to explain things, helps them when they are stuck, tells them how they are doing, allow them to have their say, doesn't give up on them, cares for their opinion, makes them feel clever, treats people equally, stands up for them, makes allowances, tells the truth and is forgiving (MacBer, 2000). All these qualities are in trained teachers and untrained teachers lack of these

qualities. According to Andrew (2002), effective teacher much internalize knowledge and skills so that they can deploy them quickly and flexibly. Moon, Mayes & Hutchinson (2004) indicated that there are three main factors within teacher's control that significantly influence pupil achievement are professional characteristics, teaching skills and classroom climate.



*Figure 1: The measure of teacher effectiveness
(Source: Teaching Learning and Curriculum in Secondary School, 2004)*

Each provides distinctive and complementary ways that teachers can understand the contribution they make. None can be relied on alone to deliver value added teaching. A trained teacher may exhibit micro behaviour like professional characteristics and teaching skills while untrained teacher lack these micro behaviour.

Research on school effectiveness suggests that variations in children's literacy performance may be related to three types of effect: whole school, teacher and methods/materials. Of these, the consensus is that the effect of the teacher is most significant (Wray, Medwell, Poulson & Richard, 2002). Alexander (1992) said that effective teaching depends on the successful application of teachers' 'curricular expertise' by which they mean 'the subject knowledge, the understanding of how children learn and the skills needed to teach subjects successfully'. According to McBer (2000), teacher is not only carer and nurturer but he should also exhibit nine discrete 'teaching skills' for effective teaching like high expectations planning, methods and strategies, pupil management, time and resources management, time on task, lesson flow, assessment, setting appropriate and challenging homework. The good teacher here, that is to say, is precisely the teacher who does not 'take over', dictate, instruct but who supports, responds, advises, assesses needs and assists development (Moore, 2004). According to Professor David Reynolds and other colleagues as quoted by MacBer (2000) there are seven inspection headings of teaching skills:

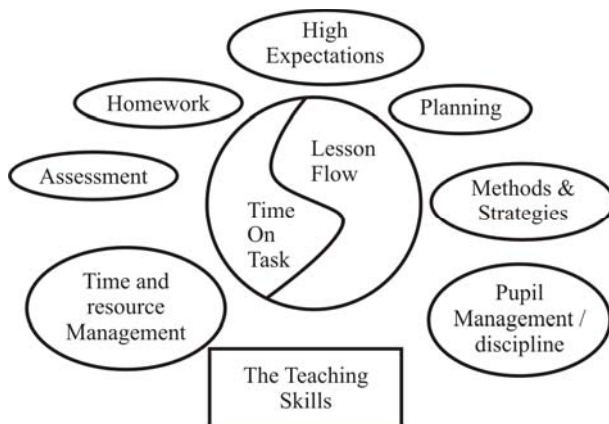
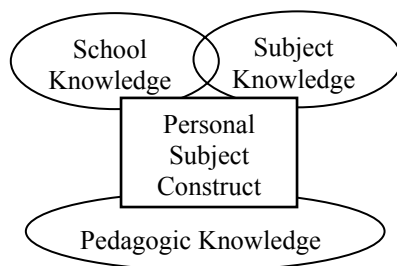


Figure 2: The Teaching Skills

(Source: *Teaching Learning and Curriculum in Secondary School*, 2004)

In addition to the micro-behaviours under the seven inspection headings, teaching skills can be observed in terms of the way the lesson is structured and flows, and the number of pupils who are on task through the course of the lesson. Smith (2002) argues that a class taught by an effective teacher would be full of lively, interested and positive children who achieve high standards. There will be low stress and little tension. There will be a lot of group cooperation and tolerance. The children should leave up to teacher's high expectations and behave accordingly.

In contrast there are several criteria for bad teacher. Bad teacher creates a tension based on pressure of unrealistic goals and deadlines and has a similar level of punishment for all incidents big and small. A bad teacher frowns on a wide curriculum and sees education in terms of a narrow range of basic skills and sees outcomes as standard and stereotyped and develops a restrictive timetable that dominates every routine. He demands passive learning and has a single dominating teaching style. He goes on to suggest that if most of these attributes are present, children will often produce less and of a lower standard because they are working at the pace of the slowest and what they do is teacher controlled (Smith, 2002). Teachers with more recent educational training or with more year of teaching experience have students with higher achievement test scores (Stockard & Mayberry, 1992). In the education field if the teacher is untrained then whole of education system will be disturbed, because he is not familiar with modern educational methods. (Jafri & Shahzadi, 2002). The five key points for approaching any key concept; narrational, logical or quantitative, foundational, experiential and aesthetic- do not simply represent a rich and varied way of mediating a subject. Rather they emphasize the process of pedagogy and a practice which seeks to promote the highest level of understanding possible.



*Figure 3: Teacher's professional knowledge
(Source: Teaching Learning and Curriculum in Secondary School, 2004)*

Above figure represents in diagrammatic form of our synthesis of the interrelation of subject knowledge, school knowledge and pedagogic knowledge and our starting point for conceptualizing teacher-professional knowledge (Gardner & Boix-Mansilla, 1994). The source of gender differences has long been a topic of heated debate. Though tests of general intelligence suggest no overall differences between male and female, there are large gender differences in scores on specific cognitive tasks. Male performs better at certain spatial visual tasks; women excel verbally. While these differences may someday be traced back to known differences in hormonal exposure and male and female brain structures, it is also possible those differences in academic development arise from the fact that male and female teachers have a tendency to treat boys and girls differently in the classroom (Dee, 2006). The evidence is clear that there are differences in achievement in mathematics between girls and boys. These differences begin in primary school. It is sometimes claimed that at that stage the differences are minimal and that the manifestly greater success which boys enjoy, develops during adolescence (John, 1991). Different studies on mathematical abilities of boys and girls revealed that there was no clear evidence of any difference. Sex differences did not appear to exist in the ability to solve arithmetic word problems (Orton, 2001).

Method and Procedure

Sample

Sample of the study was drawn through convenient sampling technique. Firstly teachers of mathematics having professional education and those without professional education were identified from two public and two private sector high schools of Muzaffar Garh city. Mathematics' teachers of public sector boys and girls high schools were found having professional education but teachers of both the boys and girls high schools of private sector were found lacking professional education. Secondly, four hundred high school graduates who passed their secondary school certificate

examination were selected conveniently. The selected graduates were taught by professionally trained and untrained teachers. Among these four hundred students, two hundred were boys and two hundred were girls. These two gender based groups were further divided into four equal sub groups based on the professional education of their mathematics' teacher.

Research Design

To evaluate the effectiveness of teaching of trained and untrained teachers, on achievement of mathematics, descriptive survey type research design was used.

Data Collection

Data were the mathematics scores of the selected secondary school students appearing in the final examination and were collected from respective schools.

Results

Paired sample t-test was implied to test the significant difference between 'trained and untrained teaching' and 'gender difference' on the achievement of Mathematics score.

Table 1

Comparison of achievement scores of students' taught by trained and untrained teachers

Variable	N	Mean	df	t-value	Sig.
Trained Teachers	200	92.59	368	2.489	0.03*
Untrained Teachers	200	86.62			

*Significant at $p \leq 0.05$ level of significance

Table 1 indicates that t-value (2.489) is significant at $p \leq 0.05$ level of significance. Further it is obvious that mean value for trained teachers (92.59) is greater than mean value for untrained teachers (86.62). It shows that there is a significant difference in the teaching of trained and untrained teachers of mathematics. It is therefore concluded that the teaching of trained teachers has significant impact on the mathematics achievement of the students. Students of trained teachers are better performer than the untrained teachers.

Table 2
Comparison of scores of male and female students

Variable	N	Mean	df	t-value	Sig.
Female	200	90.12			
Male	200	89.09	398	0.428	0.669*

*Not significant at $p \leq 0.05$ level of significance

t-value (0.428) shows that there is no significant difference between the achievement score of male and female students in the subject of mathematics (Table 2). Mean values for female (90.12) and male (89.09) students have also very minute difference. It is concluded that students of mathematics have no difference in achievement on the basis of their gender.

Discussion

The purpose of the study was to know about the impact of teaching of trained and untrained teachers of mathematics on the achievement score of their respective students. Also the effect of gender on the achievement of student at secondary level was the focus of the study. The data analysis favored the purpose of study that trained teachers' of mathematics have positive effect on students' achievement. The study has conclusive results as others. Moon, Mayes & Hutchinson (2004) found that trained teachers have strength in understanding others, working out the significance of behaviour of pupil and others even when this is not overtly expressed. The trained teachers can use their ability to impact and influence pupils to perform. Moreover trained teachers know different teaching styles. Students studying under the guidance of untrained teachers remained deprived from the latest pedagogical supports due to unawareness of their teachers in pedagogical skill areas. Some research studies showed that boys are better achiever than girls in subject of mathematics; some other researches stated that there is no significant difference in the achievement of mathematics on the basis of their gender. This research also showed that girls and boys have no significant difference in achievement of mathematics on the basis of their gender. Teacher training courses for teachers of mathematics at secondary level are needed. Government should restrict the management of private schools for appointing such teachers who have professional degrees.

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