Exploratory Assessment of the Factors of Personality Trait of Mathematics Teacher's that Effects on the Academic Achievements: A Statistical Surveyed Approach

Shila Devi[1,*], Zaira Wahab[1] and Afaq Ahmed Siddiqui[2]

[1]*Iqra University Karachi, Pakistan*

[2]*University of Karachi, Karachi, Pakistan*

Abstract: The interaction between teachers and students is one of the aspect that helps the students in their career grooming because teacher's personality and their behavior is responsible for his/her effectiveness in the teaching and plays an important role in learning process in terms of achievement and success in the classroom as well as in their entire life. It has been proved that the personality factors such as extraversion, conscientiousness, openness to experience, neuroticism and agreeableness are the key characteristics of teachers' personality and behavior. The aim of this study is to investigate the effect of teachers' personality on students' academic achievement particularly in mathematics subject. In order to pursue the objectives of the study, researcher used quantitative paradigm. Researcher adopted the survey research design for collection of quantitative data. In this way, Big Five Inventory (BFI) is used to identify the teacher's personality type. This inventory comprised of forty statements about big five personality traits (eight statements about each personality trait). Moreover, the quantitative data is also collected from students' midterm examination results from the chosen schools. A total of fifty seven public schools and forty five private schools were selected through stratified random sampling technique. The participants of the study comprised of public and private sector elementary 6^{th} -8^{th}grade school teachers of Karachi, Pakistan. The reliability of the data is found to be around 0.7 of each construct in both sets of data. An independent t test was used to analyze the difference in responses of public and private school teachers. The significance value (P-value) of this indicates that there is statistically significant difference among responses of public and private school teacher's responses regarding their personality styles that affect the academic achievement of the students. Furthermore, for an inside study a multivariate statistical tool "Exploratory Factor Analysis (EFA)" was used to explore and identify the most important factor in the data. Finally, four factors emerged in the data. The factors emerged in both of sets of data indicates that combination of Agreeable and Conscientious are the most important personality style of teachers that may affect the academic achievement of students.

Keywords: Extraversion, Agreeable Conscientious, Factor analysis, Independent t-test.

1. INTRODUCTION

Creating an effective educational atmosphere encouraging optimum student learning is a challenging task in the field of education. The role and responsibilities of teacher is considered as the indispensable element of this challenge. Teacher plays vital role in the classroom, this notion communicates the idea of teacher expectations with their students. Teacher has the key role in a classroom. His/ her personality and behavior have a direct effect on the student. Teachers have been generally acknowledged as a standout amongst the most vital part of training [1]. According to Sadeghi & Nikou (2012) [2], teachers have a significant impact on students' learning and achievement. Ikpi, Enya, & Johney (2014) [3], supported that academic achievement is a main issue among students, teachers, parents, school administrators, and the community at large. Personality can be accessed through the interview, behavior reports, trait rating and attitude to which the respondents have to answer by agreeing or disagreeing in various situations. Personality is the prediction of us to others. It helps teachers to end up delicate to students' needs and give them the information and abilities required to make minding and wholesome learning environment. According to Khan, Shah, & Khan (2012) [4], teachers are the most appreciated and valued assets of a country. Through instruction they impart knowledge and develop various skills among the students which bring positive change in their behavior. The way teachers behave as well as while facing the teaching and learning process their personality is likely to influence their teaching. In this direction, when we study the role of teacher's personality in education, we need to look at individual attributes and instruments which are used to measure personality styles of individuals.

The examination of selected studies on teacher effectiveness and personality traits by (Costa & McCrae, 1990) [5] shows that there are seven potential teacher personality traits which play a big role in making the teacher's personality effective. These seven personality traits; extraversion, congeniality,

*Address correspondence to this author at the Iqra University Karachi, Pakistan; Tel: 0300-3315957; E-mail: shilalakhani@yahoo.com

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cordiality, setting up the appropriate environment, holding cherishing and warm environment with students, have a sound knowledge of topic, taking an individual enthusiasm towards every student, and enthusiastic personality with a comical inclination reflects teaching effectiveness.

No doubt exists regarding the positive potential of teacher's role in the classroom. A student imitate his/her teacher therefore, teacher's role as a guide and leader of the classroom is highly influential on the students. In addition to it, a teacher is solely responsible for what goes on in the classroom, this phenomenon is ascertained with teacher due to the responsibilities a teacher has as an elder and a guide in the classroom. Teachers determine the set of rules, standard and mannerisms in a classroom, they are also responsible for how these objectives should be achieved [6].

A mathematics teacher falls in the same lieu and there exists much expectancies are associated with a Mathematics teacher. The first and foremost of these expectancies is that the Mathematics teacher must teach the subject with effectiveness. Teaching a subject as Mathematics requires a teacher to understand the subject crucially and pay attention to the subject demands, it requires the teacher to analyze it closely and design the lesson accordingly. In order to fully inculcate the knowledge of mathematics in a student's mind it is necessary that the teacher teach the subject effectively [7].

1.2. Relevance of the Study

Teachers are intended to motivate, stimulate, empower, rouse trust, and guzzle guidelines to the learners alongside their educating. This study would promote evaluation of the relationship between the personality and teacher's viability particularly related with the quality of big five personality factors. Impressively, identity is a vital element for teacher viability which supports the development of teacher him/her-self, students and the educational institutions they work in. In this manner, the comprehension of the exploration issue was thought to be fundamental to lead a study on the "effect of personality styles of teachers on the academic achievement of students in elementary schools of Karachi''.

The study is significant because education is the promoter of personality development of students like physical, mental, social and emotional, there the prescribed curricula must include elements that are conducive to creating and cultivating such types of characteristics in children that subscribe to the total development of personality of children, issues of paradigm and personality development was addressed in a number of research documents. Through their style, teachers coordinate the speculations or teaching method in which they accept and the practices they embrace in the classroom. Subsequently, the suitability between showing styles and identity will prompt the adequacy of instructing.

1.3. Objective of the Study

The present research is designed to study the relationship of academic achievement under the influence of teacher's personality and styles. The interaction between teachers and students is considerable because teacher's personality factors are equally responsible for his/her effectiveness in the teaching and plays an important role on learning process in terms of achievement and success in the classroom.

This study explores the personality of elementary school teachers as they are known as front- line workers in the delivery of good quality education. The study investigates the achievement of elementary school students in mathematics, and how their learning influenced by the personality of their teachers.

The main objectives of the study were as follows;

i. To identify the most important factors that explains the personality of teachers

ii. To investigate the personality style of teachers at elementary level in the schools located in Karachi

iii. To measure the level to which personality factors has influenced on students' academic achievement particularly in Mathematics subject.

1.4. Research Questions

To achieve the objective of the study following research questions were developed.

- What are main personality factors of the teachers?
- What is the effect of teachers' personality style on students' achievement?

- What is the difference between personality style of teachers of mathematics in public and private school?

1.5. Research Hypotheses

We expressed our research hypotheses on the areas to our primary examinations based on the research objective.

Hypothesis 1: Personality styles of teachers have significant effect on the academic achievement of students in Mathematics.

Hypothesis 2: Male mathematics teacher has significantly different personality styles compare to female mathematics teacher.

Hypothesis 3: Private mathematics school teacher has significantly difference personality style compare to public school teacher.

2. DATA AND METHODOLOGY

2.1. Research Strategies

A quantitative strategy has been adopted for this study with special emphasis on interpretation of quantitative output. The data were recorded using Microsoft Excel 2010 and processed (statistical analysis) through PASW 22 (Predictive Analytics Software) and advanced version of SPSS.

2.2. Population and Sample

The population of the study is comprised of teachers and students of all elementary schools of both public and private sectors of Pakistan. To encompass the objective of the study the following criteria is adopted to get the sample from the large population:

i. Participants should be the teacher of Mathematics either in public or private school of Karachi

ii. All participants should be responsible or directly or indirectly involve in teaching of mathematics to elementary level students either in public or private school of Karachi

iii. All participants should be currently teaching mathematics

iv. All participants must be registered by the schools listed in Sindh Education Management Information System (SEMIS)

A probability sampling technique, stratified random sampling was used for the data collection. To get the sample, a list of all government elementary schools in these towns was accessed from Sindh Education Management Information System (SEMIS), Government of Sindh. According to the information provided by the data management officers, the total number of public and private elementary schools listed was 171 in these towns. Each school was assigned a number and through the stratified random sampling procedure schools were identified for the study. Finally, 57 schools showed their willingness to take part in the study. Almost all of the teachers teaching mathematics in these schools were included in the study that was around 300. The final sample consists of 300 teachers from 60 schools. The sample at this stage is 5% of these 300 teachers the researcher could access 278 teachers from 57 schools. Data was collected during January 2013 to March 2013. From the 278 accessed teachers 112 were males, while the remaining 166 were females. 79 teachers were Bachelors in Arts (B. A), 129 teachers were Bachelors in Science (B. Sc.), 61 teachers have done their masters in humanities group (M.A), and remaining 9 teachers were selected as sampled have done the Masters in Science (M.Sc.). Out of 278 teachers 102 teachers have a Bachelors in Education (B.Ed.) and remaining 176 teachers were Masters in Education (M.Ed.).

2.3. Research Instrument: Big Five Personality Test Inventory

In order to determine the personality of teachers Oliver John's Big Five Personality Inventory (2007) (with 44 things) was chosen with answer key to get data about the teachers' identity. This stock was initially created by (John & Srivastava, 1999)

The BFI has been utilized much in studies as a part of exploration settings. These Big five identity qualities are Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness. These five elements give a rich calculated system to incorporating all the exploration discoveries and hypothesis in identity brain research. On the basis of pilot testing of questionnaires, 40 items were finalized. These questionnaires were used for data collection from the respondents. All questions were constructed on a 5-point Likert scale (strongly agree to strongly disagree) and these were coded from 5 to 1. To measure the effect of personality of mathematics teacher on the academic performance of students the items of questionnaires has been divided into five constructs

Table 1: Reliability Statistics: Cronbach Alpha for all Constructs

Constructs	No. of items	Cronbach's Alpha
Extraversion	8	0.702
Agreeableness	8	0.694
Conscientiousness	8	0.700
Neuroticism	8	0.703
Openness	8	0.643

that are Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness.

3. DATA ANALYSIS AND RESULTS

3.1. The Reliability of the Instrument

The reliability of the instrument was tested prior to the conducting the main analysis.

Croncbach alpha was used to calculate the reliability of each construct. Table **1** shows the reliability value of each construct along with total number of items in each construct. The reliability value of each construct was found to be fairly good and indicates that the responses of responses are consistent within each construct. These high reliability values of each construct show the higher internal consistency of the responses within each construct.

3.2. Independent t-Test

This section deals with the statistical analysis of the data to test the hypotheses regarding the objective of the study. The main objective of the study is to analyze the difference in personality effects of mathematics teachers among private and public schools as well as differences in responses of male and female teachers. In this regard an independent t-test was run to test the differences. In order to conduct an independent t-test the data must be continuous as well as must follows normality assumption. The data of each set of construct are composed on Likert Scale ranging from strongly agree to strongly disagree.

Hence the data are in ordinal in nature this may lead to violate the normality assumption. In order to overcome this pitfall and meet the consequences of the violation of assumption. The data of each construct was made continuous by summing all the scores (responses) of the individual respondent for each construct. To test the normality assumption a test of normality was carried out to meet the basic assumption of independent t-test. Kolmogrove –Smirnove test was used to test the normality of the data. The test statistics and their corresponding significance value of each construct are given in Table **2**.

The significance value of each construct is found to be less than 0.05. This indicates that the score (responses) are found to be significant. This can be taken to mean that responses/scores of each construct follows normal distribution.

As the data follows normal distribution and the respondents are different in public and private as well as male respondents are entirely different from female respondents i.e the group are independent to each other. The data fulfilled the fundamental assumption of independent t-test, therefore an independent t-test was conducted to compare the difference in responses of

Table 2: Test of Normality: Test Statistic and Significance Value of each Construct

Constructs	Statistic	Degree of Freedom	Sig. Value
Extraversion	0.759	300	0.015
Agreeableness	0.364	300	0.000
Conscientiousness	0.125	300	0.000
Neuroticism	0.865	300	0.024
Openness	0.321	300	0.000

Table 3: Test Statistics and Significance Value of Independent t – Test of each Construct among Responses of Public and Private School Teachers

Construct	Levene's Test for equality of variance		t-test for equality of means	
	F-Statistics	Sig.value	t-test statistics	Sig. value
Extraversion	56.12	0.000	2.387	0.017
Agreeableness	67.35	0.000	2.557	0.011
Conscientiousness	84.28	0.000	5.948	0.000
Neuroticism	36.81	0.000	2.370	0.018
Openness	74.25	0.000	5.165	0.000

effect of personality style of teachers of each construct among public and private school. The test compares the mean scores or responses of two independent groups and shows whether significant differences exist or not among two groups.

Column 1 of Table **3** represents construct of the questionnaire, column 2 and column 3 shows the test statistics and significance value of Levene's test for equality of variances. This test measures that whether the variances of both groups are assumed to equal or not. In our data set the test statistic and significance value of Levene's test indicates that variances are assumed to be equal for both public and private school teacher responses in each construct. The next columns titled t-test for equality of means are the test statistics and significance value of independent t-test that compare the responses of private and public school teacher's responses within each construct. The significance value of each construct shows that there is statistically significant difference exists among responses of teachers in each construct. From the table it is clear that significance value of all big five identity qualities i.e Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness are significant. This can be taken to mean that personality style of mathematic teacher's effect differently on the academic performance of public and private school students.

3.3. Factor Analysis

In the previous section Independent t-test was used to analyze any significance difference exist among personality style of private and public school teacher's that effect the academic performance of students and class room environment.

However, for an in depth study of this research we are also interested to reveal or explore the underlying structure or hidden pattern of data. We are interested to identify the most important factors of personality style of teachers individually on public and private schools that have some adverse or favorable effect on the academic performance of students. For this purpose we have applied an Exploratory Factor Analysis (EFA) separately on the Public School and Private School data to identify the hidden factors in the data.

The instrument used in this study has been composed of 5 constructs i.e Extravers, Agreeable, Conscientious, Neuroticism and Opennes. Items E1 to E8 represents the Extravers, items A1 to A8 are the items of Agreeable, C1 to C8 are the items of construct Conscientious while N1 to N8 represents Neuroticism and O1 to O8 are the construct of last construct i.e Opennes.

The adequacy of the data was checked by Kaiser Meyer Olkin (KMO) test. The KMO test value in private school data is found to be 0.721 and in public school data the KMO value is 0.815. This value indicates that the values of both private and public schools data are as accordance to the requirement of the EFA. Therefore, both set of data are considered to be adequate for the EFA.

Table 4: Factors of Questionnaires of Public School Mathematics Teacher

Factors	Linear Combination	Cut off value	% of Variation	Reliability
Factor1	0.9(C6+O6)+ 0.6(E2+E8)+0.5(E3+E4+A3+C7+O2+O5+O7)	0.5	15.733	0.754
Factor2	0.7(E2+A5+A8)+0.6(E2+E3+E4+A6)	0.40	9.199	0.691
Factor3	0.8(N2+N3)+0.5(N4+N8)	0.45	8.632	0.712
Factor4	0.6O1+0.5(C6+C8)	0.40	7.321	0.652

Table 5: Factors of Questionnaires of Private School Mathematics Teacher

Factors	Linear Combination	Cut off value	% of Variation	Reliability
Factor1	0.9C6+0.8(E1+E3+E4+O6)+0.6(E6-C1)+0.5(C2-E7)	0.4	17.476	0.781
Factor2	0.8(A4+A5)+0.5(A7+A8)	0.4	7.061	0.521
Factor3	0.7(N5+N7)+0.5(N2+N3+N8)	0.4	6.151	0.621
Factor4	0.7(C5+C8)+0.6E6	0.5	5.464	0.501
Factor 5	0.6(A6+O3)+0.4(A8-C8)	0.3	5.268	0.648

In Public School Mathematics Teachers data, we consider the first four factors as an important factor based on eigen value criteria. Therefore, for the interpretation and explanation of the data we consider these first four components as important factors as they explain more variation in all sets of data. For the naming and interpretation of data we have calculated a threshold or cut off value of each factor. We consider only those items their factors loading are greater than their cut off value and ignore all the items their factor loadings are less than their cut off value. Table **4** represents the results of Factor Analysis of Public school data with their corresponding cut off values. Last column of Table **4** represents the reliability of each factor. The reliability values of all the factor are found to be fairly good and hence indicates that the factors emerged from the data are highly reliable and valid to draw a conclusion based on these results. Factor 1 of Public school data represents the combination of items of Agreeable and Conscientious. This shows that public school teachers tend to show more agreement towards these two personality traits. Factors emerged from the private school data also depict the same picture. Factor 1 of private school data also contains the items of Agreeable and Conscientious. This can be taken to mean that the most important personality traits of the mathematics teachers that can affect the student's academic performances are the Agreeable and Conscientious in both sets of data. Factor 2 in both set of data also contains the items of construct Agreeable and Conscientious. The results of Factor analysis in both sets of data indicates that the most important factors that represent the overall data are Agreeable and Conscientious.

CONCLUSION

The test statistics value of Independent test of each construct indicates that there is a statistically significant difference among responses of Public and Private School Mathematics teacher responses. This statistically significant value reveal the fact that personality style of public school teachers affect differently on the academic performance of students as compare to public school teacher. However, the results of Factor Analysis show the clear and define able pattern of the data. The results indicate that factors with high loading of items that represent Agreeable and Conscientious are appeared more consistently in Public School data. On the other hand Private school data almost portray the same picture. This can be taken to mean that although there is a difference regarding the personality trait of Public and Private School teacher responses but the Agreeable and Conscientious are the personality styles that are common in both Public and Private School teachers.

Overall this study is significant in terms of technique and subject-matter. Study investigates the most neglected cause of failure in academics therefore, takes in to consideration an issue of immense importance that of teachers personality style and student's academic achievement. In the context of Pakistan where the teachers mostly are unaware of the certain influence they are capable of having on their students the study will prove to be a breakthrough. It was concluded from the findings that there is significant relationship between agreeableness, and conscientiousness personality style of teacher with students' achievement in midterm mathematics score. Although the results of the study concluded that albeit personality being an important factor in students' academic excellence it does not impact the results at a large scale rather it's the curriculum, teaching style and other classroom environment proved them to be among the biggest factors influencing the students' academic achievement.

RECOMMENDATION

The study provides an overview of personality style of teachers with student's achievement in their mathematics examination. It is suggested that but for mathematics teaching, teacher should be flexible and use variety of teaching method to create variety,

reduce dullness, boring environment and enhance interest for learner. This procedure makes sure and enhances discipline and atmosphere in the classroom before and after each lesson. In order to facilitate effective teaching and learning process on the part of the students should be considered in the recruitment of teachers. Teachers should adopt good communication techniques through verbal and nonverbal means that would attract students' attention and enhance effective communication during lesson. The researchers further suggests that Educational executives, Policy developers should frequently design and improve such programs to encourage teacher personality and also include those programs that develop teachers emotional intelligence to manage neuroticism dimension of personality.

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