

Development and Validation of School Teacher Effectiveness Questionnaire

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This study focused on developing and validating the School Teacher Effectiveness Questionnaire (STEQ) based on students' perceptions employing the National Professional Standards for Teachers in Pakistan. Using the stratified sampling technique, the data were collected from 2009 students of grade 9 in District Khanewal. The overall reliability of the STEQ was found to be high ($\alpha=.88$), while the scale-wise reliabilities ranged from .70 to .76. Exploratory factor analysis revealed that STEQ was a valid measure with five factors: Subject matter knowledge, Instructional Planning and Strategies, Assessment, Classroom Environment, and Effective Communication. Confirmatory factor analysis revealed that STEQ presented a good fit model with a significant value of χ^2 , and values of RMSEA, GFI, and CFI presented a good fit model as well. The findings of the model provided initial evidence of a valid and reliable instrument to measure teacher effectiveness at school levels. The recommendations have also been discussed in the study.

Key Terms: *Instructional planning and strategies; Subject matter knowledge; Teacher effectiveness; National Professional Standards; Communication; Classroom environment.*

Introduction

The teacher is considered accountable for interpreting the educational guidelines into action through effective teaching to the students. Effective teachers constantly focus on improving student learning (Stronge, 2006; Suleman, Aslam, Habib, Javed, & Umbrin, 2011), exhibiting subject matter knowledge, showing commitment to maximize students' learning, taking responsibility for supervision of the students, and thinking analytically about their individual practices (Ellett & Teddlie, 2003; Markley, 2004; Peterson, 2000; Stronge, 2013). An effective teacher

identifies the individual needs of the students and chooses the best teaching methods, practices, or activities suitable for the students' learning (McBer, 2000). Effective teachers model continuous improvement principles, bring those principles to the classroom, plan for improvement, and take control of their own learning (Kyriacou & Kunc, 2007). An effective teacher not only makes students feel good but also helps them increase their achievement (Stronge & Tucker, 2017, 2000; Wright, Horn, & Sanders, 1997).

Due to the increased accountability of teacher performance, identification of effective teachers is required. Teacher

evaluation is a tool used for the identification of effective teachers as this tool provides feedback to teachers on their teaching and offers improvement in student achievement (Tucker & Stronge, 2005). Teachers have been evaluated through different methods and tools throughout the world. In Pakistani public high schools, Performance Evaluation Report (PER) is used to evaluate teacher effectiveness. A teacher cannot be considered for promotion due to incomplete or poor comments given by the head teacher on this evaluation report. This report is perceived a purposeless function and considered a formality to filling the evaluation form only (UNESCO, 2006). The characteristics which are evaluated in the Performance Evaluation Report (PER) do not focus on the particular tasks that relate to teaching and learning (Akram & Zepeda, 2013, 2015). In such a situation, it is important that we use other data sources, side by side head teachers' ratings, to evaluate teachers (Stronge, 2006).

Historically, Teachers have been evaluated through various methods including students' perceptions since decades (Follman, 1995, Harris, 1996; Sutcliff, 2011). Though the majority of the investigations of teacher effectiveness have been conducted at the college level

(Follman, 1995), the literature reviewed during the last 70 years strengthened the argument that secondary school students have rated and can rate teachers reliably (Follman, 1992). The research tells that engaging students in measuring teacher performance is the best activity as the students are the direct client of the teaching-learning process (Stronge, 2006; Sutcliff, 2011).

Students' ratings are believed to constitute better feedback as they are the major client of teachers and their perceptions of teacher quality and effectiveness may be more meaningful to that teacher than judgments by any other client group (Peterson, 2000). Students are an integral part of the whole education system and the schools achieve their objectives through students. The students are in a position that they can give highly effective feedback on teachers' knowledge of the subject matter, their skills and ways of communications, the teaching strategies they use in the classroom, their attitudes and behaviours with the students, and the level of their response to the students queries (Keane & Labhrainn, 2005).

Wilkerson, Manatt, Rogers, and Maughan (2000) studied the validity of students' ratings and found the best

predictors of student success. Aleamoni (1987) argued that practice of involving students' ratings should be restricted to formative assessment; Peterson and Stevens (1988), however, suggested that student ratings for several years are needed to establish patterns of teacher performance. Various other studies established evidence in favour of using students' ratings for measuring teacher effectiveness (Ackerman, Gross, & Vigneron, 2009; Arbuckle & Williams, 2003; Belanger & Longden; 2009; Beran & Violato, 2009; Chen & Hoshower, 2003, Scriven, 1994).

Based on the literature reviewed, the researcher came to the conclusion that students' perceptions provide useful information for measuring teacher quality. Since the PER is used only for promotional purposes and it does not include teacher quality indicators given in the national professional standards designed by the Ministry of Education (MOE) Pakistan and which are research-based indicators and provide evidence of teacher quality (Akram & Zepeda, 2015), it was imperative to use students ratings of teacher quality in school setting. There are limited studies that examined the secondary school students' perceptions of teaching effectiveness

(Ferguson, 2012; Follman, 1995; Worrell & Kuterbach, 2001), the researcher could not find any study that used school students' rating for measuring teacher effectiveness in Pakistan. This study was conducted to fill this gap. The researcher focused on developing a School Teacher Effectiveness Questionnaire (STEQ) employing teacher performance standards developed by the Ministry of Education (2009). The researcher hopes this preliminary study will contribute knowledge to teacher evaluation through students' perceptions.

Theoretical Framework

Follman (1992, 1995) reviewed dozens of studies on measuring teacher effectiveness through students' perceptions and concluded that secondary school teachers could rate their teachers reliably on performance standards as their ratings were consistent over the years (Aleamoni, 1999; Ferguson, 2012). The reasons behind this finding might be students' extensive daily contact with their teachers (Worrell & Kuterbach, 2001), and their position as being the recipient of instruction (Follman, 1995, Peterson, Wahlquist, & Bone, 2000). Based on such previous findings, the researcher framed this study employing national professional standards that have

previously been used for measuring teacher effectiveness through self-assessment (Akram & Zepeda, 2015). The researcher assumed that the students might evaluate their teachers' performance effectively on these professional standards.

National Professional Standards for Teachers in Pakistan

The professional standards for teaching clarify the characteristics of teaching and help teachers in identifying their professional needs. The MOE (2009) developed 10 teacher quality standards for measuring teacher performance. These standards are highly compatible with international teaching standards, especially used in the United States (Akram & Zepeda, 2015). The researcher employed five of ten standards for measuring teacher effectiveness. *Subject matter knowledge* includes the way that the teacher gives the students a better understanding of concepts. A teacher is assumed to be effective if he has command over the subject content (Liakopoulou, 2011), and has the skill mastery to convey the knowledge according to the objectives of national curriculum and usability of the subject in practical life (McBer, 2000). *Subject matter knowledge* describes that teachers demonstrate accurate

knowledge of content; they link previous knowledge with the current knowledge and understand students' developmental needs (Darling-Hammond, 2000; Stronge, 2010).

While using *Instructional planning and strategies*, an effective teacher cultivates individual learning methodologies and uses multiple teaching strategies to engage students in effective learning (Stronge & Tucker, 2000). Effective teachers use various teaching strategies to make classroom discussion interesting and meaningful (Stronge, 2013). Through *assessment*, an influential educator utilizes a variety of appraisal techniques and methods to display students' comprehension of the lesson and the work (Hadley, 2011). *Assessment* focuses on providing formative and diagnostic information for effective feedback to monitor student progress (Sanders & Sullins, 2005). Further, an effective teacher establishes a *learning environment* in the class in which students collaborate naturally, get progress, and create supportive, safe, and respectful environment for effective learning (Good & Brophy, 1994). Oliver, Wehby, and Reschly (2011) stated that *learning environment* supports and facilitates both academic and social-emotional learning. *The learning environment* is a climate based on teacher

and student interaction which motivates the student to learn and develop his or her skills and grow effectively (Danielson, 1996; Frey & Schmitt, 2007; Marzano, 2011). *Effective communication* is another factor which includes positive interaction between stakeholders such as a teacher, student, and the parents where open dialogue and proper use of language plays a key role in increasing student learning (Fullan, 1993; Akram & Zepeda, 2015).

The previous research informs that measuring teacher effectiveness through students' perceptions is valid and reliable. Therefore, there was a dire need of using the instrument for measuring teacher effectiveness through students' perceptions. The researcher, however, could not find a valid and reliable instrument for school teacher evaluation in the Pakistani context. To fill this gap, the researcher developed a *School Teacher Effectiveness Questionnaire (STEQ)* based on the National Professional standards and used accordingly.

Population and Sample

Division of Multan in Punjab province was the population over which the results of the study could be generalized. Division Multan includes four districts: Lodhran, Vehari, Khanewal, and Multan. Initially, through simple random sampling, one district (Khanewal) was selected as sample of the study. Using the stratified sampling technique, the researcher selected 20% (40 public secondary / higher secondary (boys and girls) schools across four Tehsils (Khanewal, Kabirwala, Jahanian, and Mian Channu) of district Khanewal and 10% students (boys and girls each) from each tehsil. In overall, 1196 (60%) students were male and 813 (40%) were female. Among the sampled students, 1013 students belonged to rural schools while 996 students were selected from urban schools. Table 1 presents the summary information regarding the sample.

Table 1: *Population and Sample of the Study*

No	Tehsil	Gender	Total Schools	Sampled Schools	Population	Sample (10%)
1	Khanewal	Male	32	5	3493	346
		Female	26	5	2510	290
2	Mian Channu	Male	33	5	3436	348
		Female	23	5	1985	213
3	Kabirwala	Male	44	5	3543	347
		Female	23	5	1943	195
4	Jahanian	Male	14	5	1512	155
		Female	10	5	892	115
Total			205	40	13,314	2,009

Instrument Development

The purpose of this study was to develop a valid measure of the underlying construct (Clark & Watson, 1995)—teacher effectiveness. Daigneault and Jacob (2014), Sousa and Rojjanasrirat (2011), and Viberg and Sundstrom (2009) suggested that there were three steps of the scale development process: *operationalization of the construct, item generation, and checking construct validity*. Following these criteria, the researcher, initially, operationally defined the teacher evaluation construct with five factors.

Secondly, through a rigorous process required for a valid and reliable instrument development, items were developed for *School Teacher Effectiveness Questionnaire* (STEQ). The STEQ, a five-point Likert scale, includes 29 items with five factors. The scales of the STEQ were considered Never (1), Rarely (2), Sometimes (3), Often

(4), and Always (5). It was assumed that students would rate their teachers highly effective by stating that their teachers performed *often* or *always* a certain role, and the students would rate their teacher at lower scale by stating that their teachers *never* or *rarely* assumed the required roles given against each statement. The overall reliability of the STEQ was quite high ($\alpha=.84$). The STEQ was translated into the Urdu language to help students understand the items easily.

Thirdly, content validity of the STEQ was secured through experts' and practitioners' panels. The first panel of experts included 10 university teachers who had vast experience of teaching and test development validated the content of the instrument. This panel focused on item redundancy, relevancy of the items in the domain, and grammar mistakes. The second panel comprised 50 students of mathematics

in two public high schools in district Khanewal. These students were asked to identify those items which were not clear to them due to the language of meaning problems. Both panels provided important information regarding the content validity of the STEQ. After careful consideration of the critique of these two panels, the STEQ was

reduced to 26 items (see Table 2). The data collected from 50 participants showed that the STEQ was highly reliable with alpha as .84. The results of pilot testing provided evidence that the questionnaire was a valid measure of measuring teacher effectiveness through students' perceptions.

Table 2: *School Teacher Effectiveness Questionnaire (STEQ)*

I: Subject Matter Knowledge	
	My teacher:
1	demonstrates accurate knowledge according to subject matter while teaching.
2	links present content with past and future learning experiences.
3	teaches content through a variety of teaching skills.
4	makes the subject matter accessible to me.
5	links the content with practical life.
6	explains the content according to my intellectual, physical and emotional needs.
II: Instructional Planning and Strategies	
7	uses different teaching strategies to enhance students' understanding.
8	changes his/her teaching methodology to make topics relevant to students' lives.
9	teaches the students according to their individual differences.
10	uses the appropriate material, technology and resources while teaching.
11	engages, motivates, and maintains students' attention to their lesson.
12	uses available resources for students' learning needs.
III: Assessment	
13	conducts class tests to monitor students' performance regularly.
14	evaluates students' performance and provides timely feedback on their errors.
15	maintains a record of students' results.
16	uses multiple assessment strategies.
17	encourages the students to do better next time.
IV: Learning Environment	
18	creates a climate of mutual trust and respect in the classroom.
19	emphasizes continuous improvement towards students' achievement.
20	maintains a classroom setting that minimizes disruption.
21	creates an attractive and friendly classroom environment.
22	ensures students' participation in the learning process.
23	ensures that lower-achievement students have opportunities to be successful.
V: Effective Communication	
24	uses correct vocabulary and grammar in teaching
25	explains lessons according to the age and ability of the students.
26	responds to students' questions in appropriate language.

Data Collection

The data collection started in 2015 and completed in 2016. The researcher visited

40 boys and girls high schools in district Khanewal and distributed questionnaire to 2009 students of grade 10. Before that,

proper permission to collect data from teachers was sought from each of the 40 head teachers. Students were asked to complete questionnaire keeping in mind the relevant teacher who taught Mathematics when they were in grade 9. The researcher was able to collect 2009 questionnaires across forty Schools. The response rate was 92%. All ethical concerns regarding data confidentiality and security were followed accordingly.

Data Analysis

Data analysis started with calculating reliabilities of the factors. According to Table 3: *Reliability Analysis of the Factors*

Scales	No of items	M	S.D. Means	Mean Item Alpha	Cronbach
Subject Matter Knowledge	6	21.77	4.06	3.63	.76
Instructional Planning and Strategies	6	21.45	3.97	3.57	.72
Assessment	5	17.76	3.45	3.55	.70
Learning Environment	6	20.88	3.96	3.48	.71
Effective Communication	3	9.68	2.39	3.22	.70
Overall	26	15.26	3.56	3.49	.88

The Scree plot is an analysis that shows how many factors or components the researcher has to retain in the factor or principal components analysis. The graphical representation of a scree plot is

Table 3, the highest alpha reality was found in *subject matter knowledge* (.76) with M=21.77, and SD=.4.06, followed by *instructional planning and strategies* (.72) with M=21.45 and SD=3.97 and *learning environment* (.71) with M=20.88, and SD=3.96. The lowest Cronbach alpha level was found for *effective communication* (.70) with M=9.68, and SD=2.39. In overall, Table 3 showed that reliabilities of all factors were equal to or higher than .70, indicating that the factors were reliable enough to run further analyses.

given in Figure 1. According to this figure, only 5 factors with an eigenvalue of 1 accounted for as much variance, and the logic is that only those factors are selected which demonstrate eigenvalue either equal

to 1 or more. Figure 1 presents the scree plot below.

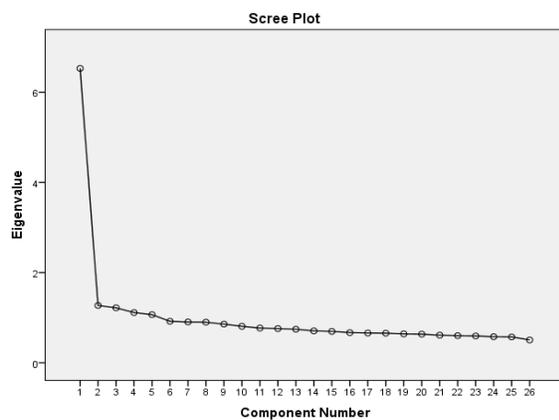


Figure 1: *Scree Plot*

Exploratory Factor Analysis (EFA)

Further data analysis started with exploratory factor analysis. Exploratory factor analysis is an adequate approach to measure the loadings of different factors of the construct. At first stage, all pairwise combinations of 26 items were computed to determine the goodness of fit as Bartlett's test of sphericity, $\chi^2 = 10264.53$, $df = 325$, $p = .000$, and a Kaiser–Meyer–Olkin measure of sampling adequacy, $KMO = 0.94$. According

to Hutcheson and Sofroniou (1999), the value of KMO between 0.8 and 0.9 are superb, while Bartlett's test showed that correlations between the items were adequate to run factor analysis (Field, 2009; Hutcheson & Sofroniou, 1999).

In addition, a varimax rotation method for factor extraction on the items was used to run the principal component analysis. A principal component analysis which uses eigenvalues represents the proportion of variance accounted for by the factors of the construct. Only those factors were calculated which demonstrated eigenvalue higher than 1. The analysis showed that 5 factors explained for 43.07 % variance in teacher effectiveness. Factor-wise variance explained by each factor was as: subject matter knowledge (25.11%), Instructional planning and strategies (4.89%), Assessment (4.69%), environment (4.29%), and effective communication (4.11%).

Table 4: Factor Loadings of Five Factors of the School Teacher Effectiveness Questionnaire

	1	2	3	4	5
Item 3	.686	.066	.085	.244	.131
Item 1	.675	.159	.086	.153	.124
Item 6	.643	.134	.121	.154	.062
Item 5	.520	.113	.139	.201	.112
Item 2	.505	.250	.288	.050	.069
Item 4	.423	.352	.352	-.078	.050
Item 7	.100	.630	.169	.102	.043
Item 9	.182	.626	.036	.067	.160
Item 8	.118	.586	.163	.142	.004
Item 12	.072	.546	.235	.146	.067
Item 10	.191	.489	.064	.277	.203
Item 11	.186	.393	-.003	.242	.358
Item 16	.202	.099	.608	.090	.141
Item 14	.159	.228	.600	.131	-.014
Item 13	.123	.070	.573	.161	.231
Item 15	.279	.274	.539	.065	-.013
Item 17	.069	.016	.510	.230	.360
Item 18	.227	-.005	.084	.603	.046
Item 23	.154	.202	.113	.571	.048
Item 22	.230	.085	.255	.511	-.005
Item 19	.177	.250	.136	.500	.155
Item 21	.078	.326	.031	.486	.238
Item 20	-.141	.175	.330	.333	-.013
Item 25	.155	.128	-.045	-.085	.690
Item 26	.072	.128	.264	.169	.588
Item 24	.105	.075	.329	.181	.565

According to Table 4, STEQ comprises 5 factors. *Subject matter knowledge* includes 6 statements, describing 25.11% of the variance in teacher effectiveness with an eigenvalue of 6.52 and factor loading range between .69 and .42. *Instructional planning and strategies* (6 items), described 4.89 of the variance in

teacher effectiveness with an eigenvalue of 1.27 and factor loading range between .63 and .39. *Assessment* (5 items) described 4.69% of the variance in teacher effectiveness with an eigenvalue of 1.21 and factor loading range .61 to .51. *The learning environment*, (6 items) demonstrated 4.29% of the variance with

eigenvalue 1.11 and factor loading range between .60 and .33 respectively. Lastly, *effective communication*, which includes 3 items, demonstrated 4.11% of the variance in teacher effectiveness with factor loading range between .69 and .57. According to a rule of thumb, a rotated factor loading for a sample size of at least 300 using an alpha level of .01 (two-tailed), .32 would be considered statistically meaningful (Tabachnick & Fidell, 2007). In Our study, we chose only those items which demonstrated at least .33 loading on any factor. The results, therefore, were reliable for further analyses.

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis was conducted using Lisrel program. The best model fit was demonstrated on 24 items. Chi-square index reported good fit with $\chi^2=899.64$, $p=0.0$. Further, other fit indexes comprising Root Mean Square Residual (SRMR) =.02, Goodness of Fit Index (GFI) =.98, Comparative Fit Index (CFI) =.99, and Root-Mean-Square Error of Approximation (RMSEA) =.026, indicated that the measurement model fitted the data well (Marsh Hau, & Wen, 2004), and the model provided valid evidence of the construct. Path Diagram can be seen in Figure 2.

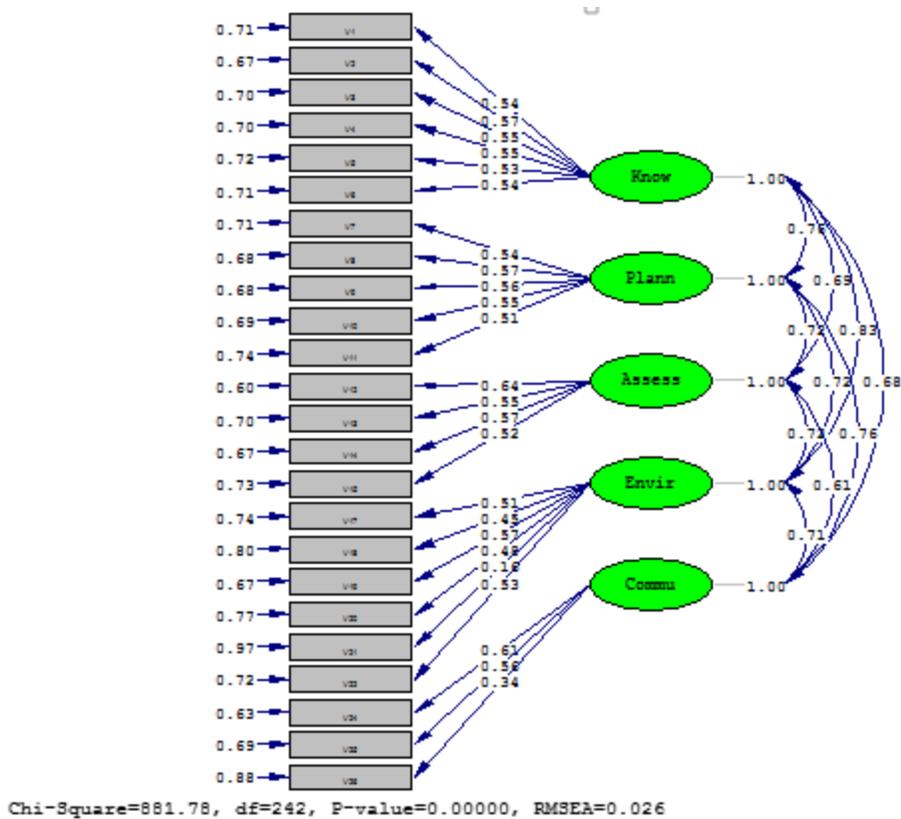


Figure 2: Path Diagram

Table 5: Relationship between the Factors of Teacher Effectiveness

Factors	1	2	3	4	5
Subject Matter Knowledge					
Instructional Planning and Strategies	.64*				
Assessment	.56*	.64*			
Learning Environment	.54*	.61*	.63*		
Effective Communication	.39*	.44*	.45*	.53*	

*Correlation is significant at the 0.01 level (2 tailed).

Correlation Matrix

Correlation coefficients between the five factors were calculated. According to Table 5, Subject matter knowledge demonstrated the highest correlation with instructional planning and strategies (r=.64), followed by assessment (r=.56) and learning

environment (r=.54). Instructional planning and strategies showed the highest correlation with assessment (r=.64), followed by learning environment (r=.61). The assessment showed the highest correlation with learning environment (r=.63), while Learning environment showed the highest

positive correlation with effective communication ($r=.53$). Tabachnick and Fidell (2007) were of the view that the correlations between the factors must be .30 or greater to avoid weak relationship between the variables. In this study, all the relationships were higher than .39, indicating moderate relationships between the factors.

Results and Discussion

This study focused on developing a valid and reliable questionnaire of teacher effectiveness based on students' perceptions. Initially, the instrument was based on the literature review. Exploratory factor analysis was run to get an initial reliable model of the questionnaire. The questionnaire included 29 items of which 3 items showed a lower level of factor loading (less than .30). Based on *exploratory factor analysis*, three items were dropped from the analysis and further analyses were run with 5 factors and 26 items in them. Confirmatory factor analyses revealed that the 24 items of the instrument demonstrated a good fit with five dimensions which explained 42.07% of the variance in teacher effectiveness with their factor loadings ranging from .69 to .33. It is adequate, therefore, to assume that the

variance percentage is reasonable and at acceptance level in social sciences.

The initial model of the scale-shaped with *exploratory factor analysis* was further confirmed with *confirmatory factor analysis*. The Chi-square value demonstrated that the overall model fit was quite reasonable; the root means square residual, the goodness of fit index, comparative fit index, and the root-mean-square error of approximation showed acceptable values. The factor loading of the items ranged between .33 and .69.

Lastly, the correlation coefficients between the five factors were calculated. Pearson r values demonstrated that teacher effectiveness factors significantly moderately correlated with each other. The relationships between the factors ranged from highest (.64) to lowest (.39), demonstrating moderate relationships among them.

The findings of this study are aligned with various previous researches that employed students' perceptions of teacher effectiveness as a valid measure of teacher quality. This study provides evidence that students can provide valid and reliable information regarding teacher effectiveness as they are the first stakeholders of teaching

and learning process. The Bill and Melinda Gates (2012) found that students provide valuable and actionable feedback to teachers that will help to improve their students' experiences and achievement in the classroom. Chen and Hoshower (2003) found that students' evaluations of teacher effectiveness were the most attractive outcome of a teaching evaluation system as they provide valuable information regarding teaching quality. Various other studies found students perceptions as an important and valuable source of measuring teacher quality (Hejase, Al Kaakour, Halawi, & Hejase, 2013; Jackson, Teal, Raines, Mansel, Force, & Burdsal, 1999; Korur & Eryilmaz, 2012; Peart & Campbell, 1999; Sutcliff, 2011).

Based on the results of Cronbach alpha, scree plot, exploratory and confirmatory factor analyses, relationships between the factors, and the findings of various researchers discussed above, the researcher proposes that the *School Teacher Effectiveness Questionnaire (STEQ)* is a valid and reliable instrument that might be used for measuring teacher effectiveness based on students' perceptions. The STEQ has provided useful and valuable feedback of teacher quality and might be used for measuring teacher quality for teaching improvement purposes i.e. formative

assessment. The policymakers may recommend the district authorities to use this questionnaire for improving teaching quality at the secondary level. The head teachers in public, as well as private schools who want to get students' feedback about their teachers' performance for decision-making purposes, may use STEQ accordingly. The teachers, by themselves, can use STEQ for getting quick feedback about their teaching and improve their teaching.

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