

Development of Teaching Effectiveness Scale for University Teachers

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Abstract

Effectiveness can be assessed in terms of achievability of objectives. Teaching process at higher education level aims at students' cognitive, psychomotor and effective development so that university graduates could become effective members of society after completion of their studies. Purpose of education can never be achieved without teachers. It can safely be said that effectiveness of education system largely depends on effectiveness of its teachers. Accountability or teacher evaluation helps ensure teaching effectiveness. Therefore, this study aimed at construction of such a scale which could be used to assess university teachers' teaching effectiveness. For preparing Teaching Effectiveness Scale (TES), primarily, 65 statements were prepared as an item pool after literature review related to capabilities of efficient and effective teacher. Items were extracted from literature review (i.e., contemporary scales for teacher evaluation), informal interviews with ten university teachers and focus group discussions with three intact groups of graduates were held. Later on, 16 Subject Matter Experts (SMEs) judged the content validity. Content Validity Index (CVI) and Content Validity Ratio (CVR) were calculated to retain 43 content valid items. Finally, these 43 items were administered to 698 university students. Confirmatory Factor Analysis (CFA) was performed on LISREL 8.8. to ensure construct validity. Finally, there remained 32 items whose factor loadings were more than 0.40. Reliability Coefficient Value (RCV) was high ($r= 0.87$). In this way, TES comprised four sub scales i.e. (a) Classroom Management (CM), (b) content and pedagogical skills, (c) Facilitative Classroom Environment (FCE) and (d) Student Teacher Relationship (STR). The scale possesses high psychometric properties and is available for use.

Keywords: Teaching Effectiveness, Content Validity Index, Content Validity Ratio, Confirmatory Factor Analysis.

Introduction

Significance of education in societal development is undeniable. Purpose of education can never be achieved without teachers, who hold central position in education process (Rao & Kumar, 2004). As they are known to be backbone of the education process,

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therefore, effectiveness of education system largely depends on effectiveness of its teachers (Barman, Bhattacharyya, & Barman, 2015). Effectiveness can be assessed in terms of achievability of objectives. Teaching process at higher education level aims at students' cognitive, psychomotor and affective development so that university graduates could become effective members of society after completion of their studies. According to Doyle (2008), effective teaching can be assessed in terms of student learning. Importance of teachers' role ultimately calls for their accountability (David & Macayanan, 2010).

In Pakistan, Quality Enhancement Cells (QECs), established in universities under the Higher Education Quality Assurance Agency (QAA), are responsible for teachers' evaluation. Variety of sources are used to evaluate teacher effectiveness. Among them, student ratings are considered to be the most imperative teacher evaluation tool. Results of these evaluative measures are useful for decision making regarding teachers' induction, promotion and increments (Higher Education Commission, 2017). These decisions are valuable in teachers' career. Therefore, the tools used to evaluate teaching effectiveness should be developed keeping high standards in mind. Simpson and Siguaw (2000) exhibited their reservations about psychometric properties of Student Evaluation of Teaching Scales (SETs). They showed their concerns about problematic or unknown psychometric properties of SETS. They claimed that many of the scales available to assess the construct were not serving their purpose well. Some other researchers also argue that the scales should be both valid and reliable and should possess higher technical standards than those many of today's evaluation tools own (Penny, 2003; Shaw, 2010). Therefore, the present study aims at development and validation of a teaching effectiveness scale with high technical standards which may be used in higher education institutes.

Literature Review

Teaching is the process of helping learners gain knowledge, develop attitude and learn skills necessary to bring desired changes in them (Kiadese, 2011). Effective teaching involves preparation and boosting efficiency of not only the cognition but also of the emotions (Day & Qing, 2009). According to Doyle (2008), effective teaching is mirrored in the extent of student learning. Characteristics of an effective teacher can be enlisted as pedagogical skills, content clarity (Bosshardt & Watts, 2001; Day & Leitch, 2007; Powell & Kusuma-Powell, 2010), good communication skills (Leaman, 2008) and healthy student teacher relationship (Thomas, 2008). Effective teacher is supportive, empathic, aware of students' emotions, respectful (Erguer, 2009) caring (Kremenitzer & Miller, 2008), firm, flexible, ready for experiment, warm, dynamic, attentive, and reliable (Mortiboys, 2005). S/he generates a learning place which is pleasing, creative, joyous, challenging as well as interesting (Powell & Kusuma-Powell, 2010) where students participate enthusiastically (Bosshardt & Watts, 2001). S/he actively participates in students' life events and their work (Nelson, Low, & Nelson, 2005), manages his/her classroom behavior expertly, appreciates

and acknowledges students' innovative ideas, (Powell & Kusuma-Powell, 2010), practices humor in class (Coetzee & Jansen, 2007), has realistic expectations from learners (Kremenitzer et al., 2008), and helps students gain good grades (Powell & Kusuma-Powell, 2010) by explaining the task till every student comprehends it well as well as helps them utilize their maximum potential (Wilson & Corbett, 2007). Furthermore, his/her assertiveness, motivating personality, self-esteem, self-confidence, and relationship with students and other stakeholders (colleagues, parents) make him effective and inspiring teacher (Leaman, 2008).

Laursen (2005), in an empirical study, discovered characteristics of the teachers who are authentic. He interviewed 30 Danish school teachers and revealed that authentic teachers have realistic "personal intentions" and make efforts for their fulfillment (p. 206). In addition, they give students due respect, have professional relations with colleagues, and are energetic for their own professional and personal improvement.

In order to find whether teacher possesses the above mentioned characteristics, it is necessary to properly evaluate him/her. A variety of sources is available to evaluate teachers' effectiveness. The most eminent work related to strategies of teacher evaluation is that of Berk (2005) who reviewed 12 strategies named as self-evaluation, alumni ratings, student ratings, student interviews, peer ratings, videos, employer ratings, teaching awards, teaching scholarship, administrator ratings, learning outcome procedures and teaching portfolios. He declared that students and alumni ratings can best be used for formative, program and summative decisions. Still their triangulation is endorsed to get authentic evaluation. Bollington, Hopkins and West (1993) preferred classroom observation as assessment of teaching effectiveness. Besides, they affirmed student ratings to be equally valuable as they depict students' viewpoint. In educational setting, learners are pertinent source of teacher's evaluation because if teachers are there to transmit knowledge then students are to receive the same (Leaman, 2008). Students distinguish and appreciate enthusiastic teachers who help them shine (Bollington et al., 1993, p. 2). Students are a paramount source of evidence for the reason that they spend a lot of time in their teachers' company (Sutton & Wheatley, 2003). Above all, student rating is an extremely consistent (0.8 to 0.9), valid and economical manner of judging effective teaching (Doyle, 2008).

Many researchers have developed and validated the scales to assess teaching effectiveness all around the world. They used variety of sources, especially, student ratings. There is no census on factor structure of this construct. Some of them proved teaching effectiveness to be uni-dimensional (Altaf, Kamal, & Hassan, 2013; Batoool et al., 2015; Silva et al., 2017) whereas others believe it to be multi-dimensional such as 10 dimensions (Barman et al., 2015), 9 (Catano & Harvey, 2011; Marsh & Dunkin, 1992), 7 (Awofala, 2012; Ramsden, 1991), 5 (Akram & Zepeda, 2015; Darling-Hammond et al., 2013; Faley & Awopeju, 2012), 4 (Calaguas, 2012), 3 (Brown & Atkins, 1993; Moreno-Murcia,

Torregrosa, & Pedreño, 2015; Patrick & Smart, 1998), and 2 (Lowman & Mathie, 1993; Mittal & Gera, 2013; Shevlin, Banyard, Davies, & Griffiths, 2000).

In Pakistan, an ample research has been conducted on tool development and validation to assess variety of psychological constructs such as depression among amputees (Iqbal, Ayaz, & Khalid, 2017), access to higher education (Bakari, Hunjra, & Attiq, 2017), criminal thinking (Sana & Batool, 2017), parenting style (Batool & Mumtaz, 2015), and Alexithymia (Fatima & Ghayas, 2016) but there is scarcity of research on assessment tools of teaching effectiveness. Akram and Zepeda (2015) collected data from 279 English and Mathematics teachers of grade 10 to prepare and validate teacher self-assessment instrument. They performed CFA and confirmed five sub factors named as instructional planning and strategies, subject matter knowledge, assessment, effective communication, and learning environment. Altaf, Kamal, and Hassan (2013) used the data collected from 300 university students to develop and validate a university teacher's evaluation scale. They performed factor analysis through principal component factor analysis and explored an internally consistent single factor scale. Batool et al. (2015) developed an effective teaching evaluation scale on the basis of students' perceptions of an effective teacher. They explored factor structure of the scale to ensure its construct validity using exploratory factor analysis and ended up with a uni-factor solution. The above mentioned work is no doubt a great effort to develop a standardized tools to assess teaching effectiveness but such tool are mostly self-rating in nature and meant for school teachers (Akram & Zepeda, 2015) or they have explored the factor structure using exploratory factor analysis (Altaf, Kamal, & Hassan, 2013; Batool et al., 2015). Therefore, the present study aims at development and validation of a Teaching Effectiveness Scale (TES) with higher technical standards which could be used in higher education institutes.

Development of TES. Marsh and Dunkin (1997) pointed out that most of teaching effectiveness scales are developed on the basis of content analysis of effective teaching, objectives of ratings and review of related literature. They complemented their view in a supplementary study (e.g., Marsh, 2007).

Item pool development. Following the similar path, primarily, 65 statements were prepared as an item pool by means of literature review related to capabilities of efficient and effective teacher, contemporary scales for teacher evaluation, informal interviews with ten university teachers, and focus group discussions with three intact groups of graduates about their perceptions of effective teaching.

Content validity of TES. Assessment of content validity followed the preparation of content domain. It helped in initial selection of test items. Relevance of the items with general principles of teaching in higher education settings was ensured. A group of 16 subject matter experts (SMEs) judged the content validity of initial draft of TES which comprised 65 items. Quality and relevance of the items were major areas of concern. Very

first thing to examine was relevance of scope with the sub themes. They were, then, to check relevance of the statements with sub themes. They were to rate the statements whether to be 'essential', 'useful,' or 'necessary' according to sub themes. Later on, CVR and CVI were calculated with the help of SMEs' judgment to retain 43 content valid items. The remaining 22 items, having CVR below the acceptable size, i.e., 0.51(Shultz & Whitney, 2005), were deleted. Item wise CVR and cumulative CVI are mentioned in table 1.

Table 1 *CVR and CVI of TES*

Sr. #	CVR	Sr. #	CVR
1	0.86	23	0.75
2	0.62	24	0.75
3	0.75	25	0.75
4	1.00	26	0.62
5	0.86	27	0.75
6	1.00	28	0.86
7	0.62	29	0.62
8	0.86	30	0.75
9	0.86	31	0.86
10	0.75	32	1.00
11	0.62	33	0.75
12	1.00	34	0.62
13	0.86	35	1.00
14	0.62	36	0.86
15	0.75	37	0.62
16	0.75	38	0.62
17	0.62	39	0.86
18	0.62	40	0.75
19	1.00	41	0.62
20	0.86	42	0.86
21	0.86	43	0.86
22	0.86	CVI	0.78

Construct validity of TES. The retained 43 items were administered for pilot testing on 698 students. Sample included 502 (72%) female and 196 (28%) male students whose age ranged from 19 years to 24 years ($M = 22.69$, $SD = 2.05$). They were students of either Masters (35%) or BS program (65%). Confirmatory factor analysis is executed on LISREL 8.8. to endorse construct validity. Figure 1 presents the model of TES.

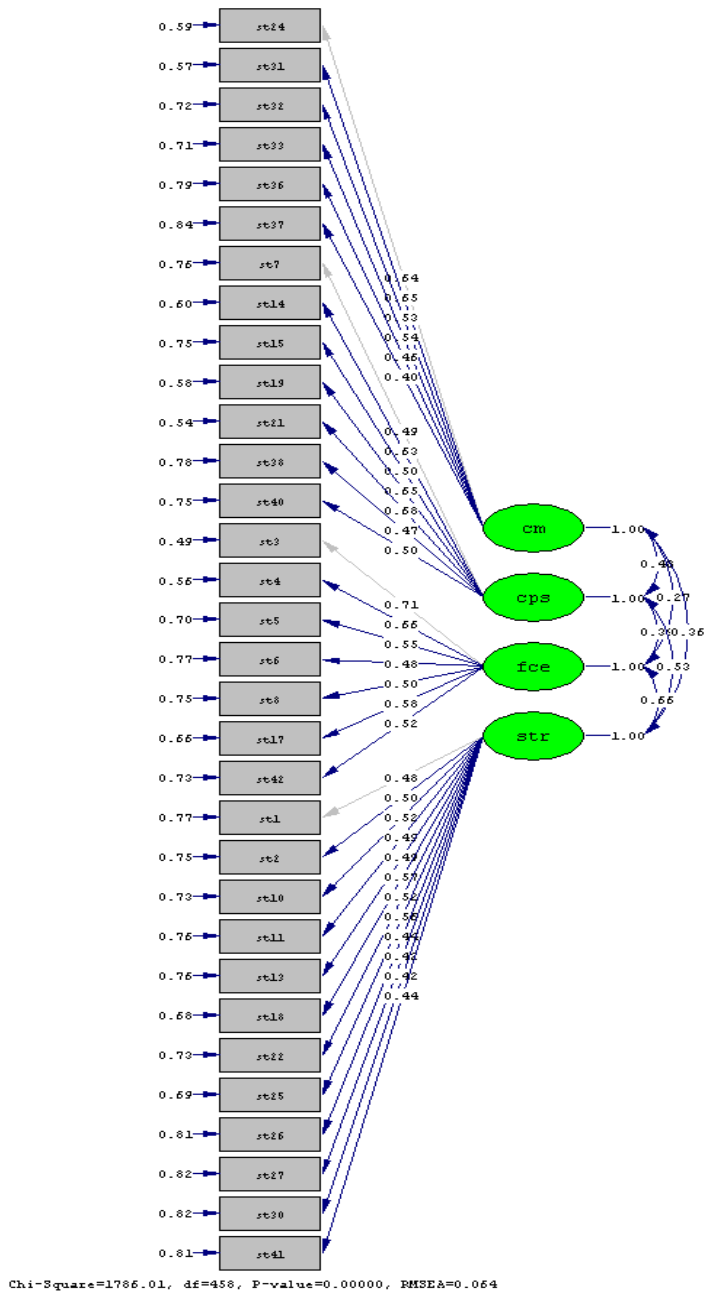


Figure 1. Confirmatory factor analysis of Teaching Effectiveness Scale

Factor loading values of TES. After execution of CFA on 43 items, factor loading values were observed. The items with double loadings and with out of standard range were

discarded from the test before finalizing it. Lastly, 32 items were carefully chosen whose factor loading value was more than 0.40 as per recommendation of Hair, Anderson, Tatham and Black (1998). In this way, Final draft of TES comprised four sub scales i.e. (a) classroom management (CM), (b) content and pedagogical skills, (c) facilitative classroom environment (FCE), and (d) student teacher relationship (STR). Factor loadings of finally selected items related to four sub themes are given in table 2.

Table 2 *Factor loading values of TES*

Sr. # in final TES	statement #	STR	FCE	CPS	CM
1	1	0.48	----	----	----
2	2	0.50	----	----	----
3	3	----	0.71	----	----
4	4	----	0.66	----	----
5	5	----	0.55	----	----
6	6	----	0.48	----	----
7	7	----	----	0.49	----
8	8	----	0.50	----	----
9	10	0.52	----	----	----
10	11	0.49	----	----	----
11	13	0.49	----	----	----
12	14	----	----	0.63	----
13	15	----	----	0.50	----
14	17	----	0.58	----	----
15	18	0.57	----	----	----
16	19	----	----	0.65	----
17	21	----	----	0.68	----
18	22	0.52	----	----	----
19	24	----	----	----	0.64
20	25	0.56	----	----	----
21	26	0.44	----	----	----
22	27	0.42	----	----	----
23	30	0.42	----	----	----
24	31	----	----	----	0.65
25	32	----	----	----	0.53
26	33	----	----	----	0.54
27	36	----	----	----	0.46
28	37	----	----	----	0.40
29	38	----	----	0.47	----
30	40	----	----	0.50	----
31	41	0.44	----	----	----
32	42	----	0.52	----	----

Correlation among TES sub scales. Correlation among all four latent variables is shown in table 3. Moderate or weak correlation among them is evident of their independence of one another.

Table 3 *Correlation among TES sub scales*

	1	2	3	4
1 (STR)	1.00			
2 (FCE)	0.66	1.00		
3 (CPS)	0.53	0.39	1.00	
4 (CM)	0.36	0.27	0.48	1.00

Fit indices for TES. Model fit plays highly significant role in CFA models. Abundant of fit indices are there in out-put data but some of them are more important and relevant and are more highly recommended in literature. McDonald and Hu (2002) consider CFI, GFI, NNFI and NFI important to report whereas Klin (2005) recommends reporting SRMR, RMSEA and CFI. Hooper, Coughlan and Mullen (2008) pointed out the cut off values which are in table 4. They are not the hard and fast cut values as Hu and Bentler (1999) warn users that these values are not rigid standards.

Table 4 *Fit indices for TES*

Fit Index	Value	Cut off value
GFI	0.86	0.9
CFI	0.9	0.9
NNFI	0.9	>0.85
NFI	0.87	0.9
SRMR	0.06	>0.05 & <0.08
RMSEA	0.064	<0.07

Reliability. As the items, whose reliability was low, were deleted to achieve good psychometric properties, therefore, the final test yielded reliability coefficient value of 0.87. Details of sub-factors are given in table 5.

Table 5 *Details of sub-factors in TES*

Sub Factors	Scope	No. of items	Sr. # in final scale	α	Sample items
CM	Effective and efficient use of class time to manage the class activities	6	19,24,25,26,27,28	.71	knows which student is attentive and who is not during class.
CPS	Grip on content area and teaching methods	7	7,12,13,16,17,29,30	.76	changes his/her teaching strategies according to students' needs.
FCE	motivation and encouragement for supporting students' learning	7	3,4,5,6,8,14,32	.77	involves students in classroom activities.
STR	association between student and teacher characterized with help, care and fairness on behalf of teacher	12	1,2,9,10,11,15,18,20,21,22,23,31	.79	is fair in his/her dealing with me.
TE	Teaching effectiveness involves perfect blend of four above mentioned sub-factors	32	1-32	.87	

Scoring and interpretation of TES. TES comprises 32 items on four subscales given in table 5. Six point Likert-Type Scale is used to assess teaching effectiveness from students' perspective. Possible range of raw score for each item can possibly be from one to six. Table 6 describes the used scale.

Table 6 *Description of Likert-Type Scale for TES*

Range of score	Description
6	Strongly agree
5	Agree
4	Agree slightly more than disagree
3	Disagree slightly more than agree
2	Disagree
1	Strongly disagree

Sum of the raw score on certain items of a particular subscale presented in table 5 gives an individuals' total score on that subscale. Likewise, Summation of 32 statements gives total TES score. Like this, possible range of total TES score can range from 32 to 192. Teaching effectiveness increases with an increase in total score. Interpretative guidelines for TES are given in table 7. As all the sub-scales have different number of items, consequently, their interpretation guideline and potential range also differ.

Table 7 *Interpretive guidelines for TES scores*

Scales	No. of items	Potential range	Interpretation guideline		
			Need improvement	Satisfactory	Effective
CM	6	6-36	6-17	18-29	30-36
CPS	7	7-42	7-20	21-34	35-42
FCE	7	7-42	7-20	21-34	35-42
STR	12	12-72	12-35	36-59	60-72
TES	32	32-192	32-95	96-159	160-192

Discussion

The present study aims at development and validation of a teaching effectiveness scale with higher technical standards which could be used in higher education institutes. The very first step was item pool generation. The items were rooted in the literature and were selected very carefully and systematically as proposed by number of researchers (e.g. Creswell, 2012; Fraenkel & Wallen, 2009; Howitt & Cramer, 2011; Marsh & Dunkin, 1992; Shaughnessy, Zechmeister & Zechmeister, 2012). Later on, content validity index was prepared following the standard procedure recommended by Shultz and Whitney in 2005.

Findings of the study further revealed that teaching effectiveness is a multi-dimensional construct. Final draft of TES comprised four sub scales i.e. (a) classroom management (CM), (b) content and pedagogical skills, (c) facilitative classroom environment (FCE) and (d) student teacher relationship (STR). These findings are consistent with those of previous studies (Akram & Zepeda, 2015; Awofala, 2012; Barman

et al., 2015; Calaguas, 2012; Catano & Harvey, 2011; Darling-Hammond et al., 2013; Faleye & Awopeju, 2012; Lowman & Mathie, 1993; Marsh & Dunkin, 1992; Mittal & Gera, 2013; Moreno-Murcia, Torregrosa, & Pedreño, 2015; Patrick & Smart, 1998; Ramsden, 1991; Shevlin et al., 2000). Finally selected 32 items were proved to be reliable source of teacher evaluation. TES is now ready to be used as a valid and reliable tool to assess teaching effectiveness. Teachers may benefit from it in terms of realization of their strengths and weaknesses as perceived by their students. The information may further be used by students in the selection of courses and instructors. It can be used in further studies to find correlates of teaching effectiveness. Concerned authorities may also use it for making decisions about teachers. Although TES has got sound psychometric properties yet it needs further reconsiderations as commended by Altaf, Kamal, and Hassan (2013) who endorsed that such scales should be reviewed and renewed after certain period of time so as to cater the rapidly changing demands of students and teachers. The convergent validity needs to be determined by using other scales which serve the same purpose or by using the scales of constructs which theoretically correlate with effective teaching.

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