PSYCHOMETRICS AND STANDARDIZATION OF TEACHER'S SELF EFFICACY SCALE

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Abstract: *This study was carried out on 600 School/college Teachers to determine the psychometric characteristics i.e. objectivity, reliability, validity, norms and practicability of a bilingual (English and Hindi) Teacher's Self Efficacy scale. Cronbach's Alpha of the scale was found 0.85, which is quite high. Content validity of the scale was verified by a number of subject matter experts, academicians and professionals. Using a more structured method, Exploratory Factor Analysis (EFA) with varimax rotation was carried out and six factors emerged in the analysis. In summing up all six factors explained 51.91% of the total variance which confirms the high factorial/construct validity of scale. Further, inter-factorial correlations among sub-dimensions of Teacher's Self Efficacy scale found highly significant (p<0.001). It can be concluded that the present research work confirms high psychometric characteristics of Teacher's Self Efficacy scale. Conclusion drawn uses, implications and suggestions for future research proposed.*

Keywords: *Teacher's Self Efficacy, Reliability, Validity, Effect size.*

INTRODUCTION

According to Bandura's (1977a, 1986) social cognitive theory, individual possess a self-system which enables them to exercise a measure of control over their thoughts, feelings, motivation and actions. The self-system encompasses one's cognitive and affective structure that provides a reference mechanism of perceiving, regulating and evaluating behavior that results from the system and the environmental sources of influence. Every individual estimates his ability to get things done, it may be an important element of a person's self-concept, which is a constellation of beliefs and experiences about his/her ability to deal effectively with the tasks and accomplish what needs to be done. Bandura (1977b)

suggested that self-efficacy is an important component of self-concept. He further suggested that low self-efficacy lead to negative mood, pessimism, stress, tension and psychological distress.

Self-efficacy is self-perception of an individual's capability which becomes instrumental when he pursue to the goals and the control which he can exercise over his environments. Albert Bandura (1977) focused on human behavior and motivation in which he described that self-efficacy as individual's belief about their capabilities which guides the person that what actually they are capable of accomplishing. It is the belief which they hold about their capabilities which help in determining what a person can do with knowledge and skills which he possesses.

Self-efficacy affects every area of human endeavor. By determining the beliefs a person holds regarding his or her power to affect situations, it strongly influences both the power a person actually has to face challenges competently and the choices a person is most likely to make. These effects are particularly apparent, and compelling, with regard to behaviors affecting health (Luszczynska & Schwarzer, 2005).

Similarly, Sherer et al. (1982) defined general self-efficacy a global construct is the composite of all life success and failure that are attributed to the self-efficacy.

According to Medenick (1982) personal efficacy refers to a belief or expectation that one can successfully bring about change, people with expectation are more likely to take risks, set more difficult goals, persist longer at chosen activities and be more involved in what they are doing. Deaux (1976) stated that the subjects having high efficacy attribute success to ability or high effort and failure to lack of effort in some instances to external factors such individuals expect to be successful in what they do and other expect them to be successful.

Muller and Major (1989) emphasized that the beliefs which are considered to be important component of self-efficacy is mainly concerned with the persons which they create, develop and hold to be true about themselves from the exact foundation of human agency and this act is a vital force for their success or failure in all endeavors.

Self-efficacy originated as a situation-specific construct, but researchers have begun to investigate and refine the concept of general self-efficacy in recent years (Scherbaum, Cohen-Charash, & Kern, 2006). Luszczynska, Scholz, & Schwarzer, (2005) stated that self-efficacy is an individual's belief in his/her own competence, while general self-efficacy can

be described as a global sense of confidence in one's ability to cope with a wide range of challenging and stressful situations. It also refers to a broad and stable sense of personal competence (Luszczynska, Scholz et al., 2005). Schwarzer, (1993) defined generalized self-efficacy, refers to a broad and stable sense of personal competence to deal effectively with a variety of stressful situations. Research indicates that general self-efficacy is a universal and cross-cultural construct (Luszczynska, Gutierrez-Dona, & Schwarzer, 2005; Scholz, Gutierrez-Dona, Sud, & Schwarzer, 2002). Self-efficacy is an extent or strength of one's belief in one's own ability to complete tasks and reach goals (Ormrod, 2006).

Tipton and Worthington (1984) observed that the performance of an individual is affected by both specific self-efficacy and general self-efficacy, they pointed out that in a clearly defined and familiar situation, the specific self-efficacy accounts for more of the variance whereas in ambiguous and less familiar situation general self-efficacy accounts for more of the variance. Kumari and Singh (1989) stated that personal efficacy can affect the individuals behavior in a number of ways, it can affect at the initiation and the persistence of coping or problem solving behavior. People may not initiate any action if they believe that they have low competency or efficacy in the tasks. The low efficacy people if they try to perform a task, their belief of low personal efficacy would determine how much effort and time they would expand on the task, if they have stronger perceived personal efficacy it might be expected that they would expand greater effort and persist greater on the tasks assigned.

The objective of this research was to develop and standardized measure of teacher's Self Efficacy. This measure is designed to help researchers and practitioners to assess the current state of various dimensions of teacher's Self Efficacy at different levels of teaching (e.g. Schools, Colleges as well as Universities level).

DEVELOPMENT OF THE SCALE

In the initial stage experts in the field of Psychology, Education and Sociology were contacted and the objective of developing the scale explained to them. Including their inputs, six dimensions of Teacher's Self Efficacy Scale were finalized and were:

1. Restraint
2. Outgoing/Participating
3. Evolving
4. Versatile

5. High Expectations

6. Constructive

OPERATIONAL DEFINITION

Self Efficacy

It is an individual's belief about his/her ability to accomplish a task or to deal with the challenges of life.

Restraint: It is a measure or condition (unemotional, dispassionate, or moderate behaviour) that keeps someone or something under control. It is an individual's control over the expression of one's emotions or thoughts.

Outgoing/Participating: It is friendly and socially confident, they also found responsive and open-mindedness.

Evolving: It is a gradual developing nature to produce natural evolution processes and brings evolutionary change.

Versatile: Ability to adapt or be adapted to many different functions or activities and capable of turning forward or backward.

High Expectations: Very positive expectations or hopes; good feelings about any work that proceeds towards high level of achievements.

Constructive: Having or intended to have beneficial purposes, relating to construction or creation as well as promoting improvement or development.

FIRST DRAFT OF THE SCALE & ITEM ANALYSIS

In the first phase, a pool of 30 items keeping in consideration the construct was prepared with Likert type, 6-point responses, viz., Strongly Disagree=1, Disagree=2, Somewhat Disagree=3, Somewhat Agree=4, Agree=5 and Strongly Agree=6. This scale was administered on a representative sample of 400 school/college Teachers, in age they were varieng from 24 to 62 years and were from different districts of Uttar Pradesh, India. After scoring the scale, the data was arranged in the order of highest scoring to lowest scoring. From this order, two groups, one of 27% from highest scoring and other of 27% from the lowest scoring were selected. In these two groups inter-correlation matrix was examined in order to overcome existence of multicollinearity and singularity in the scale. In addition to inter-correlation matrix, 'Determinant' of the R-matrix was estimated and it was greater than 0.00001 (i.e. 0.006), which is pre-requisite. Sampling adequacy through Kaiser-Meyer-Olkin

(KMO) test was also carried out and found to be greater than 0.50 (i.e. 0.868). On this basis 7 items having multicollinearity and singularity were rejected and the final manuscript of the scale had 23 items distributed across six dimensions emerged through Exploratory Factor analysis with PCM extraction and Varimax rotation methods. The distribution of items and dimensions is given in **Table 1**.

Table 1. Teacher's Self Efficacy dimensions and No. of items

Dimensions		Items	Total No. of items
X1	Restraint	19, 20, 21, 22, 23	5
X2	Outgoing/Participating	1, 3, 4, 8, 9, 10, 14	7
X3	Evolving	16, 17	2
X4	Versatile	7, 11, 12, 13	4
X5	High Expectations	2, 15, 18	3
X6	Constructive	5, 6	2
Total Items			23

Scoring criterion is shown is table – 2.

Table 2 Scoring System

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6

Standardization of the Scale

The **Teacher's Self efficacy** has been standardized on 600 participants selected from 70 School/colleges situated in different districts of Uttar Pradesh of India. Their age varied from 24 to 62 with mean age 32.42 years. Working experience varied from 1 to 38 years with mean 9.52 years. In qualification they were TGT (Trained Graduate Teacher), PGT (Post Graduate Teacher) and others (BTC, NT, AST) of government and private school/colleges.

Targeted population of this study was government and private school/college teachers. In which 300 school/college teachers were included from each from government and private school/colleges. However, in gender wise they comprises 53.33% male and 46.66% Female teachers from government school/colleges and 47.33% Male and 52.66% Female teachers from Private school/colleges.

Administration of Scale

The scale can be administered individually or in a group (not more than 30 subjects) at a time. The subjects were assured that their responses will not be disclosed and will be used

for the research purpose only. Read each and every item carefully and give your responses candidly.

Reliability

The considerations of reliability and validity typically are viewed as essential elements for determining the quality of any standardized test. However, professional and practitioner associations frequently have placed these concerns within broader contexts when developing standards and making overall judgments about the quality of any standardized test as a whole within a given context. For establishing the internal consistency reliability: Cronbach's alpha is estimated and is shown in Table 3A & 3B.

Table 3A- Descriptive Statistics of items, scale and Alpha

| Item No. | Descriptive Statistics for Items | | | | Descriptive Statistics for Scale | | | |
	Range	Mean	SD	Var	Scale Mean if item deleted	Scale Variance if Item Deleted	*Item total correlation	Alpha if item deleted
SE1	5	5.37	.771	.595	106.51	127.086	.440	.842
SE2	5	5.18	.750	.563	106.71	128.696	.356	.845
SE3	5	5.15	.854	.730	106.73	127.105	.389	.844
SE4	6	5.08	.951	.905	106.80	123.519	.515	.839
SE5	5	4.72	1.329	1.767	107.17	121.300	.419	.843
SE6	5	2.41	1.266	1.604	106.90	124.248	.398	.843
SE7	5	3.62	1.634	2.671	107.31	126.578	.270	.849
SE8	5	4.98	1.108	1.228	106.66	124.899	.460	.841
SE9	5	2.94	1.108	1.227	106.81	126.096	.361	.844
SE10	5	4.57	1.202	1.444	106.73	126.560	.346	.845
SE11	5	5.22	.929	.863	107.19	124.492	.384	.844
SE12	5	5.07	1.012	1.024	107.07	126.083	.368	.844
SE13	6	5.15	.997	.993	107.03	123.852	.475	.840
SE14	5	4.69	1.117	1.248	106.80	124.607	.485	.840
SE15	5	4.82	.997	.995	107.21	128.384	.215	.850
SE16	5	4.86	.992	.983	107.17	124.303	.387	.844
SE17	5	5.09	.913	.834	107.26	123.426	.429	.842
SE18	5	4.67	1.153	1.329	107.07	126.042	.375	.844
SE19	5	3.23	1.479	2.188	107.11	123.040	.452	.841
SE20	5	2.27	1.221	1.492	107.22	121.852	.535	.838
SE21	5	4.71	1.130	1.277	106.99	123.580	.541	.839
SE22	5	4.63	1.118	1.249	107.58	120.128	.460	.841
SE23	5	4.06	1.531	2.343	107.41	121.385	.448	.841

r=.07 (p<.05); .10 (p<.01); .13 (p<.001)- two tailed

Table 3B- Descriptive statistics of scale and Reliability (Cronbach's Alpha)

Statistics for Scale	Mean	Variance	Std. Deviation	Alpha Coefficient	No. of Items
Scale	111.88	135.322	11.633	0.849	23

One of the most commonly used reliability coefficient i.e. Cronbach's Alpha was found 0.849, **significant at 0.001 levels**. The internal consistency of the scale is quite high and this gives a defense that the scale is highly reliable.

Validity

Content (Face and logical) validity of the scale was verified by number of experts, academicians and professionals. Good correspondence was found to exist between the scale results and the considered judgments of experienced observers.

There are various methods to establish construct validity of the tool. Hence, quite a few of them are having limitations as role of time and existence of subjectivity in subject's ratings. To overcome these limitations, Exploratory Factor analysis with Varimax rotation was used to establish the construct validity of the tool. Data screening was carried out in order to overcome existence of multicollinearity (i.e. item that is highly correlated with many) and singularity (i.e. item that is not correlated with any) in the scale and fulfills other requisite requirements. Table 4 shows factors, range of loadings, percent of variance and cumulative percent of variance.

Table 4: Factorial Structure of Teacher's Self efficacy (TSES)

Factors	Item Numbers	Factor Loadings	Variance	
			PCT of Variance	Cum. Variance
I	19, 20, 21, 22, 23	.764-.524	12.017	12.017
II	1, 3, 4, 8, 9, 10, 14	.526-.426	11.295	23.312
III	16, 17	.662-.626	8.475	31.787
IV	7, 11, 12, 13	.639-.485	7.552	39.339
V	2, 15, 18	.503-.487	6.790	46.129
VI	5, 6	.638-.695	5.783	51.911

I- Restraint, II- Outgoing/Participating, III- Evolving, IV- Versatile, V- High Expectations, VI-Constructive

Using a more structured method, Confirmatory Factor Analyses (CFA) presents evidence of the measures' convergent and discriminant validity. Six factors emerged and confirmed in the Confirmatory Factor Analysis. The percent of variance accounted by

factors varies from 5.783 to 12.017%. In summing up all six factors explained 51.911% of the total variance. The factorial validity of the scale is highly satisfactory. Table 5 shows inter-factorial validity, Cronbach's alpha and effect size.

TABLE 5: Inter-factorial validity, Cronbach's Alpha and Effect-Size Dimension Wise

Dimensions	Factors						Reliability (α)	Effect-size
	I	II	III	IV	V	VI		
I	1						0.76	0.58
II	.434**	1					0.73	0.53
III	.441**	.362**	1				0.57	0.32
IV	.347**	.456**	.303**	1			0.56	0.31
V	.381**	.338**	.246**	.263**	1		0.41	0.17
VI	.318**	.398**	.254**	.391**	.197**	1	0.56	0.31

I- Restraint, II- Outgoing/Participating, III- Evolving, IV- Versatile, V- High Expectations, VI- Constructive

Inter-factorial correlations indicate that all the factors are highly and significantly correlated with each other and measuring the same construct. The Cronbach's Alpha for factors varied from 0.56 to 0.76. The effect size have been drawn on the line chart and shown as figure 1.
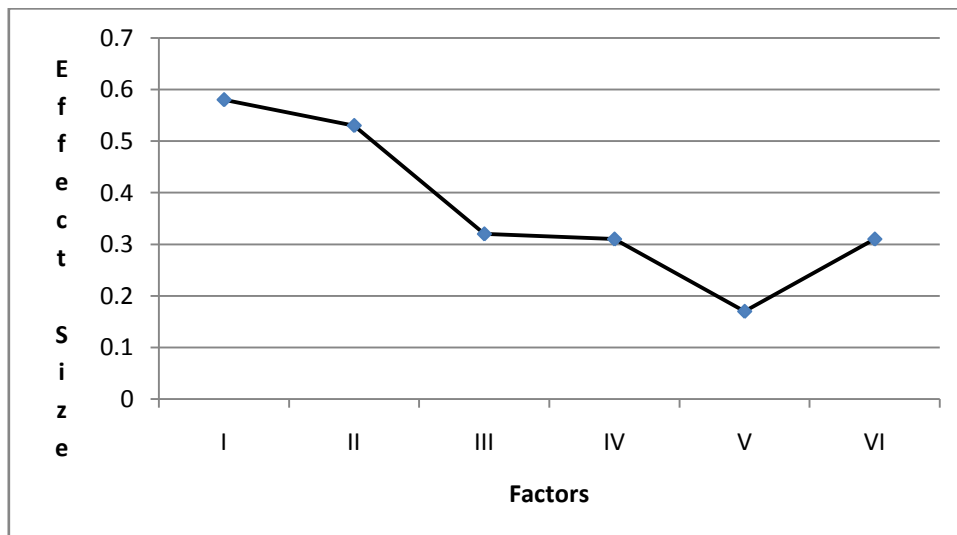

Figure 1: Effect Size

The effect-size for Teachers' Self Efficacy dimensions varies from 0.17 to 0.58 and shows medium to high strength of relationship among items for the respective dimensions.

CONCLUSION

1. Objectivity, Reliability, Validity, Norms and Practicability characteristics based on 600 school/college teachers showed high psychometric values and it can be concluded

that the Teacher's Self Efficacy scale is standardized measure of Teacher's Self Efficacy scale. The more structured, exploratory factor analysis provided evidence of the construct /factorial validity which was found to be highly satisfactory.

2. Inter-factorial correlations indicate that all the factors are significantly correlated with each other and measuring the same construct which confirms inter-factorial validity of the scale.

3. The effect size shows high strength of relationship among items for the respective sub dimensions of teachers self-efficacy scale.

4. The results of the present investigation exhibited that the bilingual version of Teacher's Self Efficacy scale can be used for assessment, intervention and research purposes.

IMPLICATIONS

1. In this study we have sought to standardize the Teacher's Self Efficacy scale on the basis of the representative sample. It has been established that psychometric properties (reliability and validity) of the scale are highly satisfying. Accordingly, the first major practical contribution of present research is that it provides sufficient background to measure Teacher's Self Efficacy of the same population.

2. After reviewing a number of research studies it can be opined that six proposed facets are sufficient to explain the Teacher's Self Efficacy. Our study, being of an exploratory and interpreting in nature, raises a number of opportunities for future research. More research will in fact be necessary to refine and further elaborate our novel findings.

SUGGESTIONS FOR FUTURE RESEARCH

Teacher's Self Efficacy plays very important role in teaching. In the present investigation psychometric and standardization of Teacher's Self Efficacy scale was established. Therefore, a further research investigation is required to address the different facets of Teacher's Self Efficacy in different countries, states, settings as well as different culture, climate and structure.

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